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CITY OF LIVERPOOL.

HANDBOOK

COMPILED FOR

THE CONGRESS

OF THE

ROYAL INSTITUTE OF PUBLIC HEALTH.

1903.

ISSUED BY THE LOCAL EXECUTIVE COMMITTEE.

EDITED BY E. W. HOPE, M.D., D.Sc.,

Hon. Gen. Secretary of the Liverpool Congress.

LIVERPOOL:
Lee & Nightingale, Printers, North John Street.

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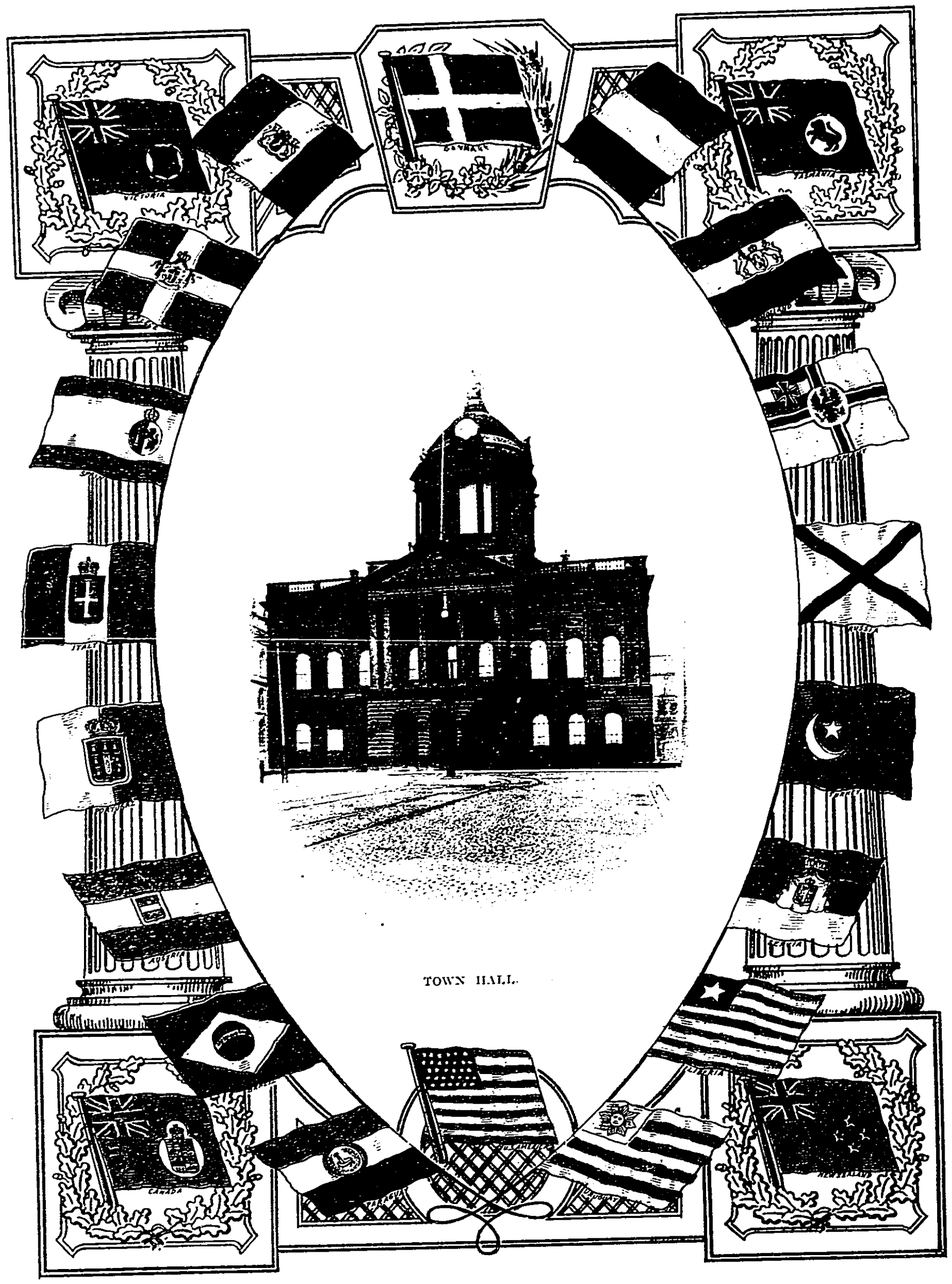
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Colonial Flags and Flags of the different Governments having Consular Representatives in the City.

EDITOR'S NOTE.

THE Local Executive Committee, to which was entrusted the arrangements for the meeting of the Royal Institute of Public Health, desired that the Hand-book, which it has been customary to issue upon the occasions of the visit of the Institute, should be so amplified as to give a reasonably full account of the establishments and undertakings of the various Committees of the Corporation, more especially those dealing directly or indirectly with matters affecting the public health. It was also felt that some account of the Institutions of the City, as well as the special features of the City and Port, would add to the interest of the volume. By the kind co-operation of a number of writers, those requirements have been fulfilled as far as exigencies of space admitted. No reference to even the principal buildings associated with the business of the City has been possible, and it will be understood that the necessary limitations excluded specific references to the trades and enterprises carried on.

An introductory chapter has been furnished by Mr. E. W. Pierce, the Deputy Town Clerk, and a descriptive account of the Town Hall, St. George's Hall, Municipal Offices, and other public buildings, is contributed by Mr. T. Shelmerdine, the City Surveyor, who with Mr. Herbert deals also with the Parks and Gardens, Open Spaces, and Recreation Grounds, &c.

The condition of Liverpool, in regard to educational matters, has been dealt with, so far as the University is concerned, by Principal Dale, Professors Sherrington, Boyce, Paterson, and Herdman. The latter also contributes an account

of the Lancashire Sea Fisheries Board and its work. The subject of Technical and Elementary Education is fully treated by Mr. Hewitt, the Director of Technical Instruction. The articles relating to the Art Galleries, the Public Libraries, and the various Museums, have been written by Mr. C. Dyall, Mr. P. Cowell, and Dr. H. O. Forbes, respectively.

Very complete details of some of the works having for their object the promotion of the public health are given, notably with regard to the Water Supply, by Mr. Joseph Parry, the Water Engineer; Municipal Engineering, by Mr. J. A. Brodie, the City Engineer; and associated with these is the work of the Electric Supply Department, dealt with by Mr. A. Bromley Holmes; the articles on Lighting and Locomotion are furnished by Mr. Bellamy. A descriptive account of the Baths and Wash-houses has been contributed by Mr. W. R. Court, the Engineer and Chief Superintendent; while the Markets have been described by Mr. Hatch, the Superintendent. The Building Regulations, which are in force in Liverpool, are described in the articles by Mr. Goldstraw, the City Building Surveyor, under the title of the Building Surveyor's Department, and Mr. F. T. Turton, the Deputy City Surveyor, deals very fully with the measures taken for the Demolition of Insanitary Areas, and Re-housing the Dispossessed. The duties carried out by the Police Force are described by the Head Constable, Mr. Leonard Dunning.

The Corporation are the owners of a large number of draught horses, and an article on this subject has been written by Mr. T. Eaton Jones, M.R.C.V.S., the Veterinary Superintendent.

A work of the desired character would be very incomplete without some reference, however brief, to the number of Medical and other Charities of the City. Mr. F. H. Moore, of the Royal Infirmary, has kindly written a short description of that Institution, and Mr. Wm. Adamson has given an

account of the Royal Southern Hospital; the Local Executive Committee are indebted to various gentlemen for short accounts of other Medical and kindred Institutions.

The Seamen's Orphanage, the Homes for Aged Mariners, and the Sailors' Home, are described by Captain Stubbs, Mr. Grylls and Mr. Hanmer, respectively.

The account of the training ship "Indefatigable" is given by Captain Bremner.

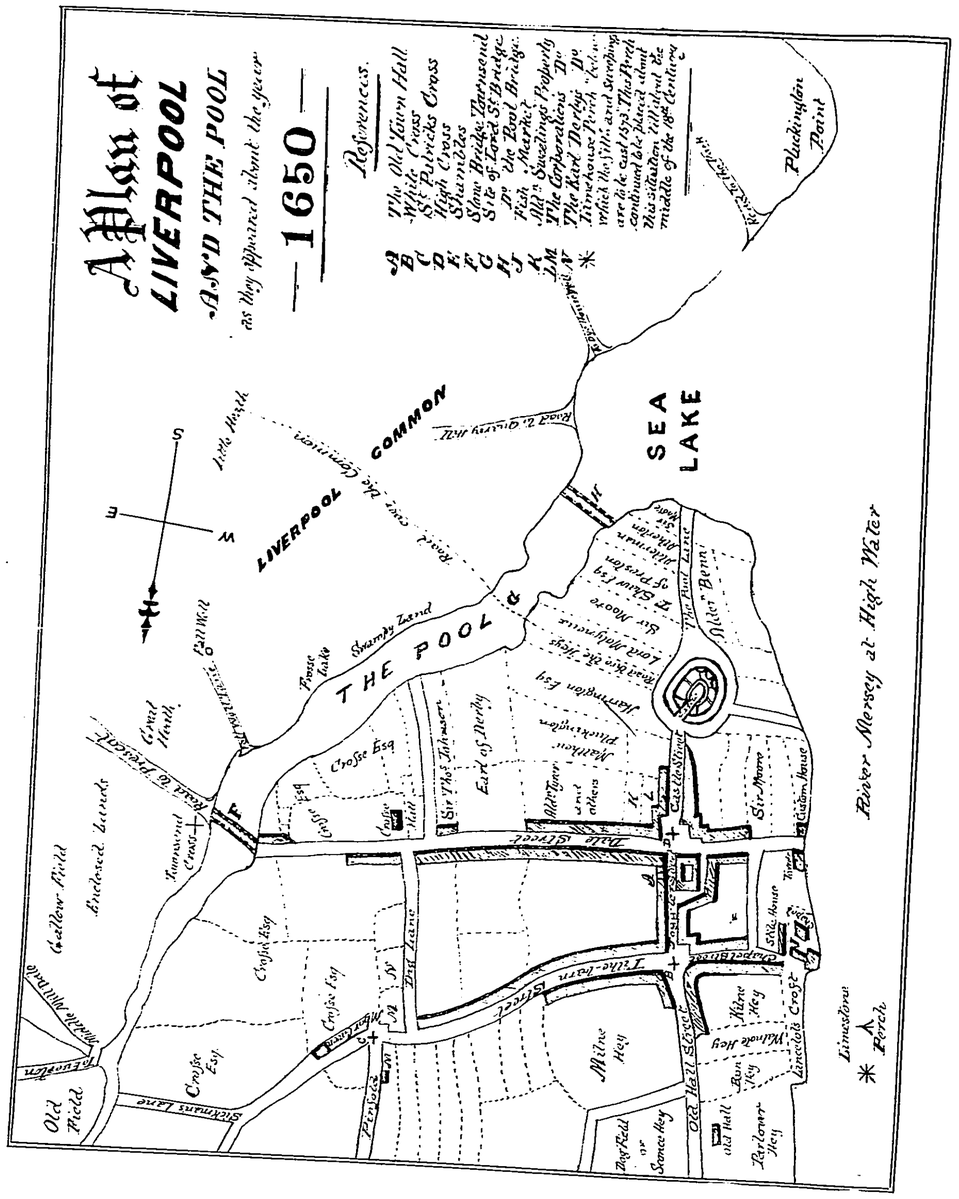
A short description of the General Post Office has been added by Mr. Salisbury.

An important article by Mr. Miles Kirk Burton, the General Manager and Secretary of the Mersey Docks and Harbour Board, describes the functions of the Board, and the work carried on in connection with the immense shipping trade of the Port. The limitation of space prevents more than a brief notice of the principal shipping firms, and the accompanying map is illustrative of the lines of commercial intercourse between Liverpool and various ports of the world.

Thanks are due to Messrs. J. and C. F. Clay, Cambridge, for the use of an Illustration showing the General Arrangements for Large Board Schools, and to the Proprietor of the *Architectural Review* for the two Photographs of the Interior of St. George's Hall.

E. W. H.

July, 1903.



INTRODUCTION.

IT may not be considered inappropriate to furnish those attending the present Congress with some brief particulars of the City in which it is held.

Liverpool is a town of considerable antiquity. It has been identified by antiquarian writers as the British Port called Portus Segantiorum referred to in the writings of Ptolemy, the Geographer of Alexandria, and its history, therefore, dates from the time of the Roman dominion in Britain.

During the period of the Danish rule over the Kingdom of Northumbria, the Town appears to have been in existence, and it is probable that it acquired its present name during that period, and that the name is derived from two Danish words, "Lide" or "Lithe," signifying the sea, and "pool," signifying a creek or inlet from the sea.

In those days the Town was situated on a neck of land lying between a creek or pool (which at that time ran along what is now the site of two streets, named Paradise Street and Whitechapel) and the river front, and the name "Lider" or "Lither" was an appropriate appellation, signifying the creek or inlet by the sea.

The River Mersey, on which the Town is situated, derives its name from the circumstance that it formed the boundary between the Kingdom of Mercia and the Kingdom of Northumbria.

Liverpool's chief importance in early times appears to have been as a point of embarkation for Ireland.

Liverpool received its first Charter in the year 1173 from King Henry II.

In the year 1207 the Town of Liverpool received a Charter from King John, and its history as a Borough may be said to date from that event.

Twenty years later the Town was constituted a full Borough by King Henry III. Several Charters were subsequently granted by different Sovereigns, the last Charter prior to the Municipal Act being granted by George IV. in the year 1828.

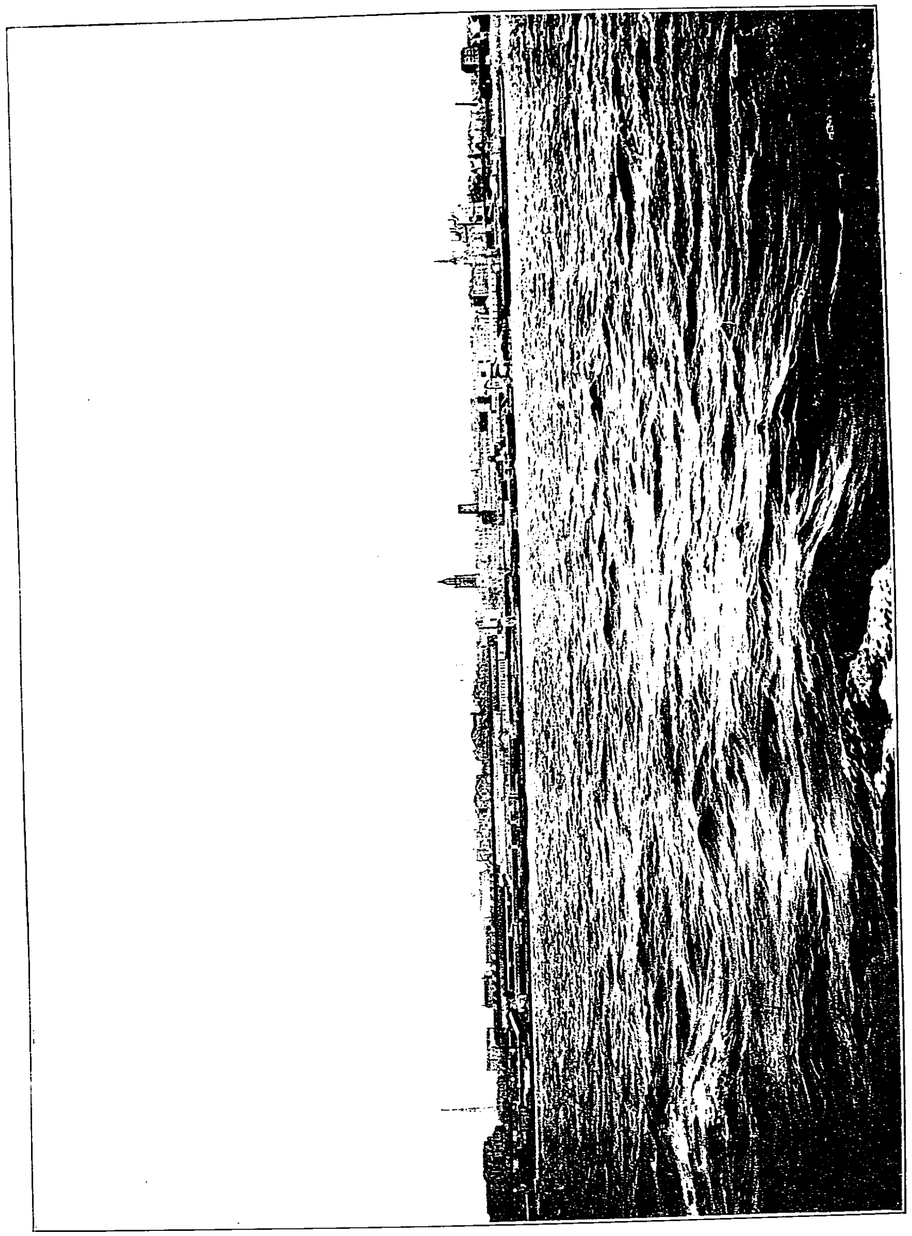
Up to the year 1835 both the Municipal and the Parliamentary Boroughs of Liverpool consisted only of the old Parish of Liverpool which fronted the River Mersey and formed the centre part of the Town. From that nucleus has sprung up the present City of Liverpool and its environs with a population of about a million persons.

For a long period the Town of Liverpool made little progress, the population in 1700 being only 5,700 persons. During the eighteenth century, however, the maritime and commercial business of the Port began to assume important dimensions; in the year 1801 the Town contained a population of 77,000 persons.

The following figures indicate the growth of the Town during the early portion of the nineteenth century :—

In	1801	the	population	was 77,000
„	1811	„	„	„ 94,000
„	1821	„	„	„ 118,000
„	1831	„	„	„ 165,000

In the year 1835 the Municipal Boundary of the Borough was extended by making the same co-terminus with the Parliamentary Boundary, which had been enlarged by the Boundary Act of 1832 so as to include not only the Parish of Liverpool but the Townships of Everton and Kirkdale and the populous parts of the Townships of West Derby and Toxteth Park.



VIEW OF LIVERPOOL FROM THE MERSEY.

By that extension, the population of the Borough increased to 205,000 persons, and the area from 1,860 acres to 5,210 acres.

From the year 1835 to the year 1857 the trade and prosperity of the Town increased by rapid strides, and the demand for increased facilities for the shipping using the Port ultimately became so urgent that it was found necessary to make special arrangements for dealing with the matter.

Under an Act of Parliament, passed in the year 1857, the business of the Corporation as a Dock Authority (including the right immemorably held by them to levy Dock dues) was vested in a newly-constituted body, called the Mersey Docks and Harbour Board, elected by the commercial community, to be held and managed by such body as a public trust, upon the conditions and subject to the rights, privileges, and duties defined by the said Act.

Since its constitution the Mersey Docks and Harbour Board has greatly extended the docks, and has expended large sums in providing improved facilities for the shipping using the Port.

Since 1857 the trade and prosperity of the Town has continued to increase, and during the last fifty years the great increase in the population made it necessary for the Corporation to expend large sums of money in improved sanitary administration, street improvements, the provision of public parks, markets, baths, libraries, and other public institutions.

Up to the year 1864, Wavertree Park and the Botanic Gardens adjoining, comprising together an area of about 40 acres, were the only public recreation grounds belonging to the Corporation, and they were situate on the confines of the Town, adjoining Wavertree.

Owing to the increased requirements of the population, the provision of additional public parks became a pressing

necessity, and as the unbuilt on land in the Borough was very limited, the Corporation were compelled to go outside their Boundary to obtain lands for the purpose.

Between the years 1864 and 1872 four parks were laid out by the Corporation—namely, Stanley Park, which is situated in the Township of Walton-on-the-Hill, containing an area of 100 acres, of which 7 acres are used as building land; Newsham Park, situated in the Township of West Derby, containing an area of 160 acres, of which 46 acres are used as building land; Shiel Park in the same Township, containing an area of 15 acres, all of which is park land; and Sefton Park, which is in the Township of Toxteth Park, containing an area of 382 acres, of which 113 acres are used as building land.

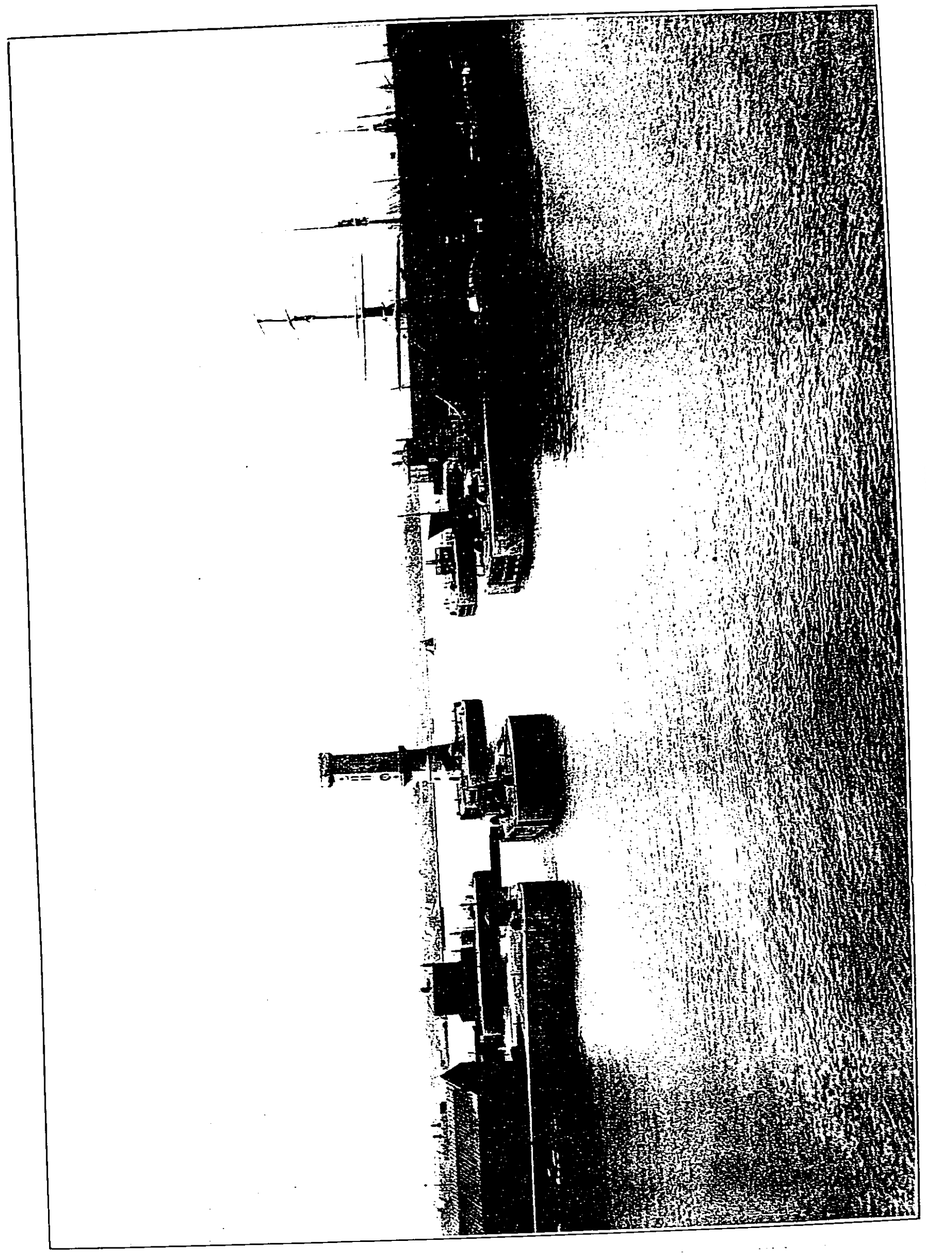
The laying out of these Parks naturally attracted residents to their neighbourhood, and increased the value of the property in the districts in which they were situated.

In the year 1880 a Charter constituting Liverpool a City was granted by her late Majesty Queen Victoria.

In the year 1895, when the population of the City had increased to 503,967, the Corporation again sought to extend their Boundary by means of a Provisional Order so as to include the whole of the Urban Districts of Walton, Wavertree and Toxteth Park, and part of the Urban District of West Derby.

The application was successful, the Local Government Board issuing an Order, which was confirmed by the "Local Government Board's Provisional Order Confirmation (No. 10) Act, 1895 (59 Vic., Cap. VII.)," extending the Boundary of the City so as to include the districts of Walton, West Derby, Wavertree and Toxteth Park.

In the year 1897 the Corporation obtained statutory powers to acquire the local tramways and to adapt them for electric traction.



ENTRANCE TO THE SALISBURY DOCK.

Shortly after the powers were obtained, the Corporation proceeded to carry them into effect, and during the years 1898, 1899, and 1900 the tramways were gradually converted into the present electric system.

The effect of the establishment of the present electric tramway system, with its cheap and quick service, has been to greatly increase the exodus of the population of the City to the suburbs and outlying districts, and this circumstance, in combination with the increase of the trade and prosperity of the Port, has led to a remarkable increase in the population of such outlying districts.

In the year 1900 a further extension of the City boundaries was granted by the Local Government Board, by the inclusion in the City of the Urban District of Garston, a district lying to the southward of the City, containing a population of 17,289 persons, and an area of 1,673 acres.

A further extension is at the present time under the consideration of Parliament in a northerly direction, the Local Government Board having, after Inquiry, directed that a Provisional Order should be issued for the inclusion within the City of the Borough of Bootle, a district containing an area of about 1,576 acres, and a population of about 58,556 persons.

The present population of the City is 716,810, and contains an area of 14,909 acres.

The debt of the Corporation for all purposes amounted on the 31st December, 1902, to the sum of £12,751,277 4s. 10d. The sinking fund accumulated in respect of such debt amounted on the 31st December, 1902, to the sum of £1,171,366 11s. 2d.

The estimated capital value of property of the Corporation, excluding water works, tramways, and electric supply works amounts to the sum of £7,816,510.

The estimated capital value of the Corporation Waterworks on the 31st December, 1902, was £5,337,007, Tramway Works £1,832,977, and Electric Supply Works £1,336,709 representing the capital expended thereon, amounting to £8,506,693, excluding Garston.

Under the old Charters the inhabitants of Liverpool appear to have owned the whole of the Town with the waste land adjoining, subject to the ground rents payable to the Crown or its assignees, and also subject to the feudal rights originally vested in the ground, but which subsequently became vested in Sir William Molyneux.

In the middle of the seventeenth century the Corporation purchased all the feudal rights from Sir William Molyneux, and subsequently purchased the whole of the ground rents from the Duchy of Lancaster. By these means the great Corporate Estate of Liverpool was formed.

From time to time portions of the Estate have been sold and other properties purchased and exchanged. At the present time the Estate of the Corporation is for the most part leased for terms of 75 years, which Leases are ordinarily renewed by the Corporation on payment of fines.

The revenue of the Corporation from their real and personal estate, as averaged for 10 years ending December, 1901, amounted to £110,000.

The revenue of the Corporation derived from rates for the year 1901, was £716,658.

A rate of one penny in the £ produces for the whole City about £15,000.

It is estimated that the tonnage of the ships of the world is about 29,000,000 tons. Of this total some 14,000,000 tons are British, and of that, 4,000,000 tons belong to the Port of Liverpool.

In order to meet the requirements of the enormous trade represented by the above figures, and to maintain the position of the Port amongst the Ports of the world, great efforts have from time to time been put forth by the authorities and citizens of Liverpool. Spacious dock accommodation has been provided, extensive warehouses have been erected, appliances for the rapid unloading of vessels and for the efficient handling of goods on the wharves have been provided, special facilities and concessions have been granted to Railway Companies to enable them to more conveniently deal with the passenger and goods traffic of the Port; Exchanges and Markets have been provided for conducting business; electric tramways have been laid throughout the City, enabling those employed at the Docks and in the business portion of the City to travel rapidly and cheaply to and from their places of employment; a vigilant system of sanitary supervision has been established and in every manner possible it has been the aim and object of the Municipality, acting in co-operation with the Dock and Commercial authorities and associations and private citizens, to maintain the arrangements of the Port at a high standard of efficiency.

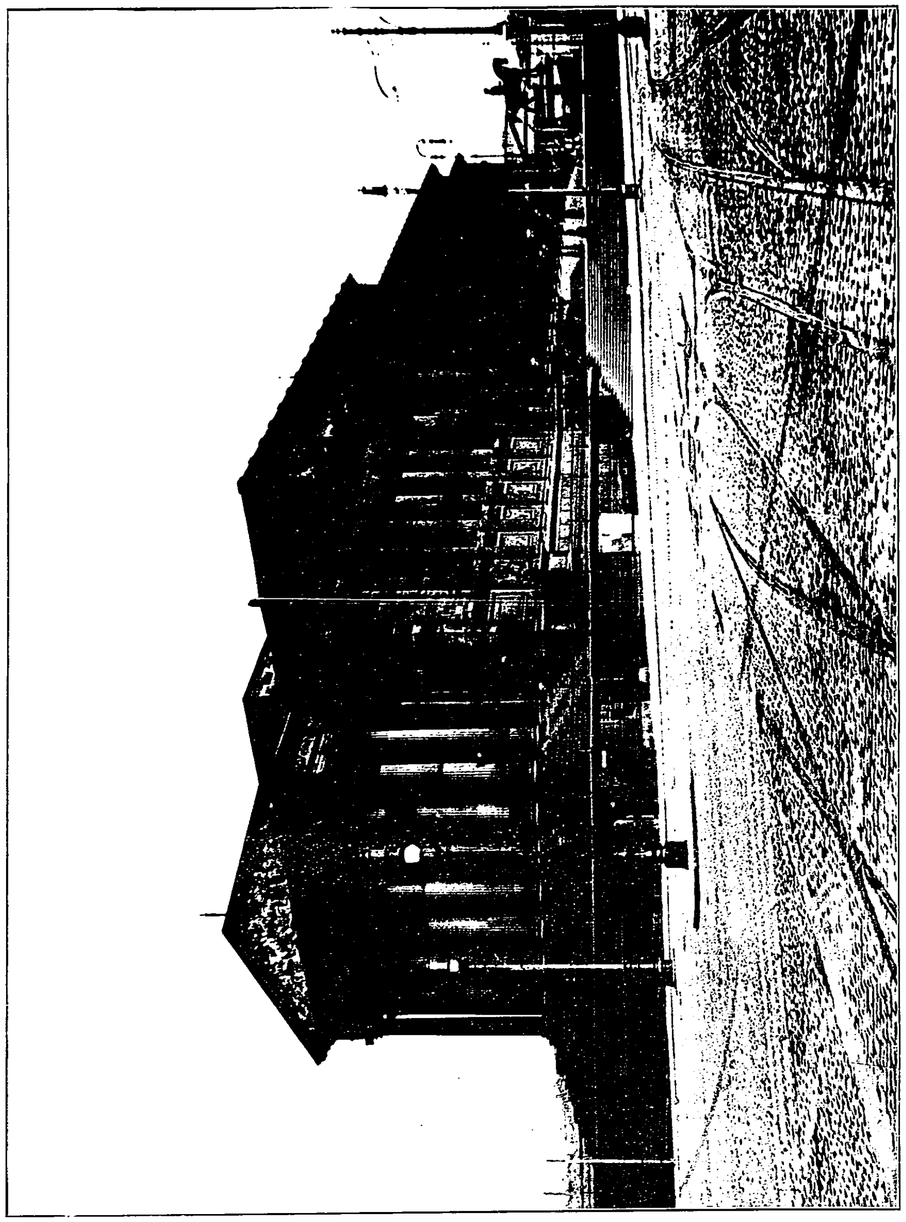
THE CONSULAR BODY in Liverpool is a large and important one. There are Consular representatives of a larger number of Foreign Governments in the City of Liverpool than in any other city in the world. The frontispiece of this volume gives the flags of the different nationalities having Consular representatives in the City.

TOWN HALL.

The first Town Hall which Liverpool possessed appears to have stood on the land in Dale Street now occupied by the Liverpool and London Insurance Chambers, between Exchange Street East and High Street, and up to the year 1567 it seems to have been a thatched building. It was used, not only as the Town Hall, but also as the Custom House and a lock-up. This building served until about the year 1671, when a second building was commenced on the open space at the north end of Castle Street, in front of the site of the present Town Hall. In 75 years this building showing signs of decay, the Corporation, in 1749, entered into an agreement with Mr. John Wood, of Bath, to erect a new "Exchange," on the model of the Royal Exchange of London, and in 1754 the building was opened amid great rejoicings. Up to this period the Town Hall was designated "The Exchange," being intended quite as much for commercial as for municipal purposes. On the 24th July, 1795, the whole interior was destroyed by fire, and in the work of restoration the interior was arranged practically as it now exists. The dome and cupola were added about the year 1802, and the projecting portico and arcade on the south front about nine years later, completing the edifice externally as at present.

At the entrance to the Town Hall from Castle Street, there is a spacious vestibule, beyond which is the grand staircase, situate directly under the dome, and leading to the reception rooms, ball rooms, and banqueting hall. An excellent view is obtained from the principal ball-room of the "Exchange Flags" and the fine bronze monument to "Nelson," in the centre.

The Town Hall contains many objects of considerable historic interest as well as of intrinsic value. There is a unique collection of antique silver, some of which is of a very beautiful



ST GEORGE'S HALL.

design. This collection includes tankards, epergnes, bowls, knives and forks, and other articles, dating from the 16th and 17th centuries. There is also a valuable collection of old china, which is of even earlier date.

There are some fine pictures in the Lord Mayor's Parlour, and in other places are hung a number of portraits, including that of George III., George IV., William IV., his brother the Duke of York, the Sixteenth Earl of Derby, who was the first Lord Mayor of Greater Liverpool, and a number of former Mayors and distinguished citizens of Liverpool.

At the head of the grand staircase is a statue by Chantry of the Right Hon. George Canning, M.P., who died in 1827. There are also busts of Queen Victoria, and Princess Christian, and other persons who have been connected with the City.

The dome surmounting the staircase is decorated with allegorical pictures representing the Commerce of Liverpool.

The Ball-room opens from the staircase, and is a large lofty apartment, measuring 88-ft. 6-ins. by 42-ft. by 42-ft., and containing some fine inlaid furniture and massive cut-glass chandeliers.

The Regalia of the Lord Mayor dates back to the time of the Sixth Earl of Derby, and includes a ceremonial sword which was carried before His Excellency Sir William Norris, of Speke, on his Embassy to the Great Mogul about 1702.

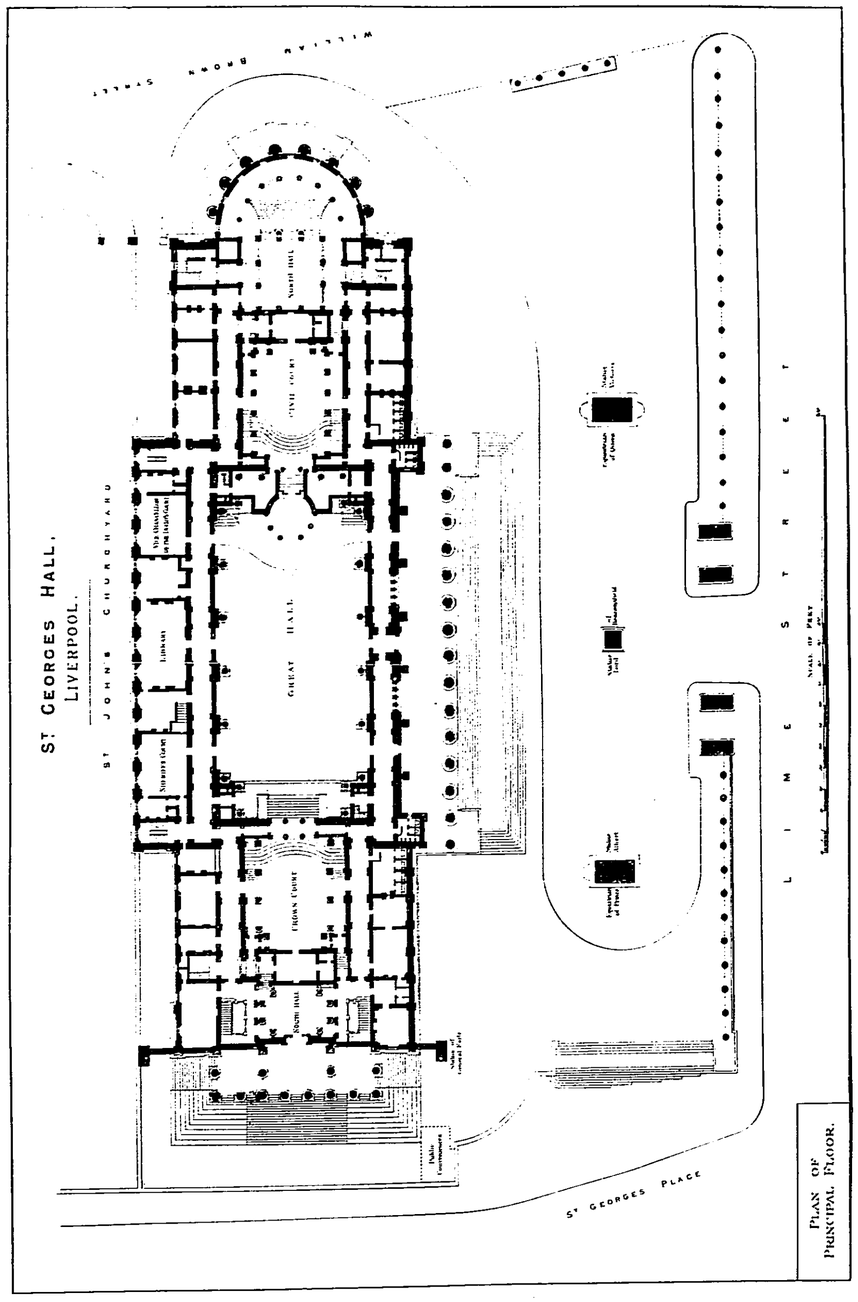
The suite of rooms used by the Lord Mayor and Lady Mayoress are situate on the ground floor on either side of the building. On this floor, in the rear of the hall, is the Council Chamber. This room has recently been enlarged and re-decorated, and provides seating accommodation for 128 Aldermen and City Councillors. It is reckoned to be one of the finest rooms of its kind in the country. In the basement, cloak rooms, smoke room and lavatories have been provided.

THE MUNICIPAL OFFICES.

This is a bold and imposing building, situate in Dale Street, with a tower and square pyramidal spire, over 200 feet high. The former contains a four dialled clock, which rings the Canterbury chimes every quarter of an hour. The eastern and western sides of the building are ornamented by four circular three-quarter columns and six square pilasters, and the Dale Street front, which is 226 feet long, has ten three-quarter circular columns, eight square pilasters, and six circular columns. These latter project and produce an elegant porch for the principal entrance, which is reached by an easy flight of steps.

It is unfortunate that the building approaches so near the line of Dale Street, inasmuch as if it had been recessed, power would have been added to the design and contributed materially to the general effect.

When the building was opened in 1867, it was thought that the accommodation had been too liberally provided, but with the rapid growth of the City, it is now found impossible to accommodate all the branches of the Service, and additional Offices have had to be erected in the city to meet the present requirements.



ST. GEORGE'S HALL.

Mr. Norman Shaw says—"I have been all over the continent and I have certainly seen nothing finer in its way than St. George's Hall, if as fine. Its simplicity makes it all the more impressive, and whilst striking to the eye, the design is full of refinement, and in it we have a building for all time, one of the great edifices of the world. I look upon it as our finest example of Greek style."

The foundation stone of this noble building was laid on the Coronation Day of Her late Majesty, Queen Victoria, June 28th, 1838, the building being completed and opened on the 18th September, 1854. The design of the edifice was supplied by Mr. Harvey Lonsdale Elmes, a brilliant architect, who died at the early age of 33, before the completion of the work, and it was left to Professor C. R. Cockerell to continue and carry it out.

In regard to its situation the building is most fortunate, occupying as it does the most central and commanding position in the city, with a sufficiently extensive area on every side to exhibit its proportions to the best advantage. The plan is simple in arrangement and is soon described.

In the centre is the great hall, 170 feet long, and 75 feet wide, capable of seating 2,200 persons. At each end and opening therefrom are the Assize Courts. A corridor runs round the hall and the courts, communicating on the east side with the external portico, and on the west side with the Library, Robing Rooms, Sheriffs' Court, and other subordinate apartments. The south end is terminated by a vestibule opening to the

south portico. The north end terminates in a semi-circle, within which is a spacious entrance, and above, on the upper floor, is placed the Concert Hall. The corridors are repeated on the upper floor, and from these access is gained to the galleries of the great hall. The Grand Jury Room is situated over the southern vestibule.

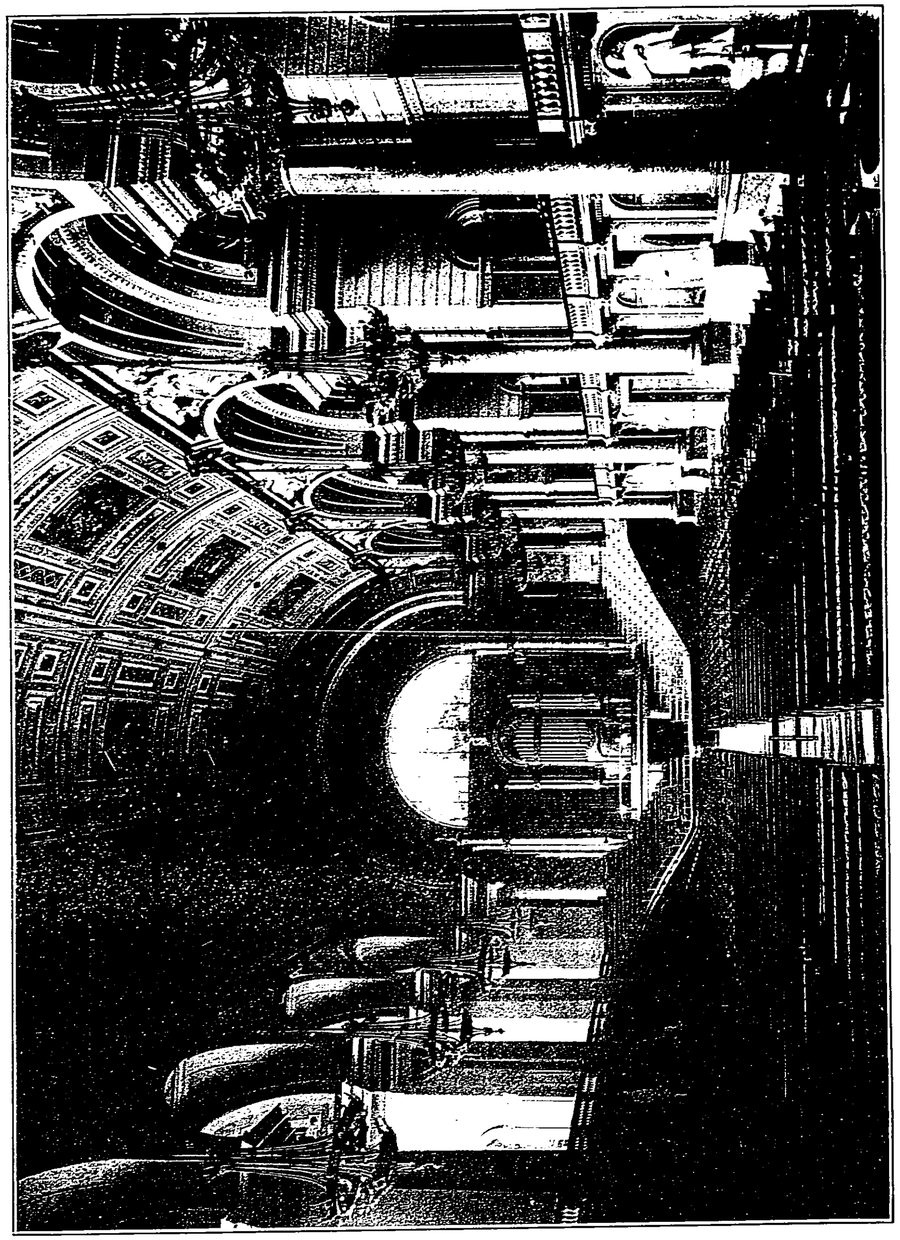
In the great hall there is a magnificent organ, built 50 years ago, by Mr. Willis, of London, under the superintendence of Dr. Wesley. This instrument has 108 stops and 8,000 pipes, and cost £10,000. When the Assize Courts are not sitting, organ recitals are given by Dr. A. L. Peace, organist to the Corporation, on Saturdays, at 3 p.m. and 8 p.m.

The Concert Hall on the upper floor at the north end of the building, will accommodate about 1,200 persons, and in its arrangement and decoration reflects the highest credit on Professor Cockerell, from whose designs it was completed. The plan is semi-circular with a light gallery around, and in the centre, suspended from the ceiling, is an immense crystal lustre, which is particularly striking. The acoustic properties of this Hall are excellent.

Returning to the exterior, the most favourable point of view is from the south-east, but from wherever seen, the combination of boldness and dignity, with great breadth and repose is admirable, and concentrates the attention of the spectator.

The east portico, with its sixteen fluted Corinthian columns, and lofty flight of steps, gives great majesty and richness to this side of the building.

On this front, in Lime Street, are four colossal lions, each 13 feet long, and 6 feet high, and between these and the building, on the intervening plateau or esplanade, are equestrian statues of Prince Consort and Queen Victoria, and statues of the Earl of Beaconsfield and Major General Earle.



INTERIOR OF GREAT HALL.

ST. GEORGE'S HALL.



INTERIOR OF ST. GEORGE'S HALL, SHOWING BRASS DOOR AND STATUARY.

The distinguishing feature of the southern portico is the fine group of statuary which embellishes the pediment, and represents commerce and the arts bearing tribute to Britannia.

The design, which is very effective in its general features, is by the late Professor Cockerell, whose description, written on his original drawing in the possession of the Corporation, is as follows:—

> "Composed upon the Greek system of the Parthenon, and other examples, in entire statues, with symmetry of parts, and everything of lines and quantities.
>
> "The subject represents Britannia in the centre, and Neptune at her feet; in her left she holds out the olive branch to Mercury, and the four quarters of the globe; of whom the last, Africa, does homage for the liberty she and her children owe to her protection; beyond are figures representing the vine and other foreign commercial productions. In her right she extends her protecting spear over her own productions, agriculture, sciences, domestic happiness, the plough, the loom, and the anvil."

The building is constructed of a durable sandstone from the Stancliffe Quarries, Darleydale, and the cost of erection and furniture has been about £328,500.

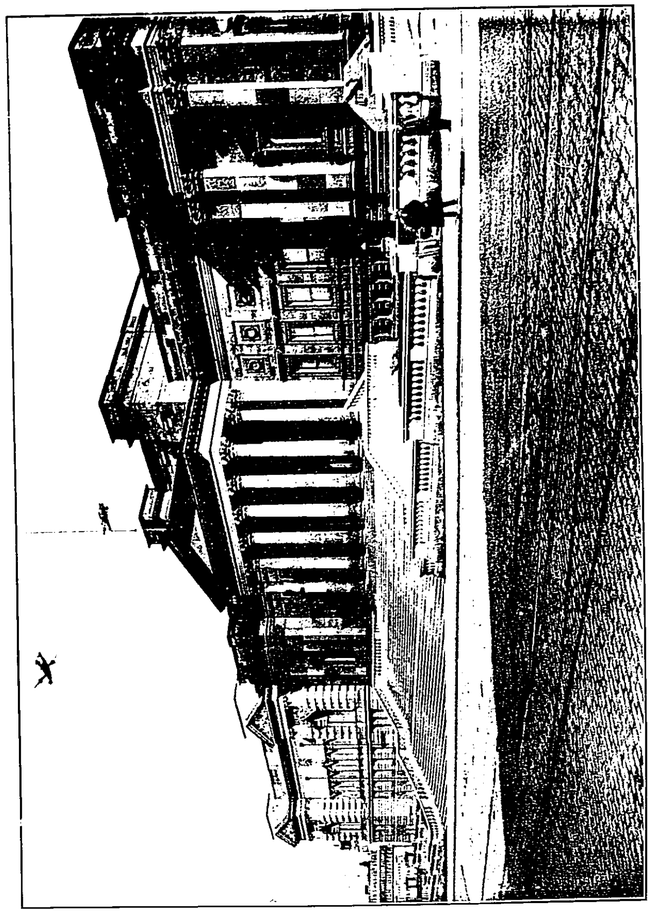
PUBLIC MUSEUMS.

The Free Public Museums in William Brown Street include the Lord Derby Museum and the Mayer Museum. The former contains the zoological, botanical, geological and mineralogical collections, and has attached to it an aquarium, containing both marine and fresh water animals, from temperate and tropical latitudes. The Mayer Museum contains the archæological, ethnographical and ceramic collections.

The Lord Derby Museum commemorates, in its designation, the munificence of the Thirteenth Earl of Derby, who bequeathed to the City (in 1851), in addition to other natural history specimens, his celebrated collection, partly mounted and partly in skins, of mammals and birds.

The Mayer Museum in like manner, commemorates, in its name, the liberality and public spirit of Joseph Mayer, F.S.A., a goldsmith of Liverpool, who presented to the City, during his lifetime in 1867, a collection but little less valuable and extensive than Lord Derby's. Mr. Mayer devoted a large fortune to the acquisition, whenever he had the opportunity, of objects valuable to history, archæology, and art. His museum was specially rich in pottery and in Assyrian, Egyptian, Greek, and Mediæval antiquities. His gift is remarkable, not only as being the collection of one individual, but, owing to Mr. Mayer's wonderful discrimination and judgment, in containing, notwithstanding its great diversity, so little that is not of very high value.

The Derby bequest, opened to the public in March 1853, was at first exhibited in rooms in a comparatively small house in Duke Street, along with the nucleus of the Public Library,



THE MUSEUM AND LIBRARY BUILDINGS, WILLIAM BROWN STREET

until the liberality of Sir William Brown provided for it a fitting home in 1860, by erecting and presenting to the City the stately edifice which now shelters it and part of the Library. On the arrival of Mr. Mayer's collection in 1867, a large square central court in the western wing, with three tiers of galleries surrounding it, was entirely set apart for the Mayer Museum.

The acquisitions to both Museums had by 1894 become so numerous that it was found imperative to provide additional space for their reception and exhibition by the erection of the handsome extension, which, begun in November 1897, was completed in June 1902. These splendid galleries, on two floors each horseshoe in shape, and 420 feet long, which have been assigned to the Lord Derby Museum, are now under process of furnishing and arrangement, and will, when completed, be, it is believed, unsurpassed out of the Metropolis.

On the upper of these floors is now being arranged a series of types of the main groups and sub-divisions of the Animal Kingdom—living and extinct—showing their structure by dissections, casts, or drawings, "so displayed as to give the public an idea of the vast extent and variety of natural objects, to diffuse a general knowledge of the results obtained by science in their investigation and classification, and to serve as a general introduction to the student in Natural Science." The series will commence with the highest animal forms in their culmination in Man, as exemplified in the Caucasian, Mongolian and Melanian races, and descend through all their phyla to the unicellular forms. Thus the Biological series will fall into logical sequence with the Anthropological exhibits in the Mayer Museum, while in an adjacent transept will be exhibited the main facts of the Geographical Distribution of animals and plants, and also illustrations of protective resemblance, variation of species, and other principles of biology. Following on this series are being arranged the Mineralogical and Geological collections so as to illustrate the chemical

constitution of the earth; rock formation; the deposit, superposition and succession of strata and the mode of preservation of fossils, and a stratigraphical series showing typical examples of the forms of life which characterised the different geological ages.

In the galleries of the lower floor are being arranged the Local Collections, as complete a series as possible, *i.e.*, of the Archæology, Biology, Mineralogy, Geology, and Palæontology of the "Local Area," namely, a land and sea area embracing the county of Lancashire and part of Cheshire and of North Wales, and the Irish sea east of the Isle of Man—which includes the area also within which the Liverpool Marine Biological and Lancashire Sea Fisheries Committees operate.

The Lord Derby Museum is specially rich in birds, containing more than 50,000 specimens, a large number of which are types and specimens of historical interest. It contains also a fine series of minerals, the gift of the Fourteenth Lord Derby. Its collection of shells is of especial excellence, being particularly rich in the beautiful genera *Conus* and *Cypræa;* while its collection of *Marginella* and *Oliva* is unexcelled perhaps elsewhere.

The Mayer Museum is now housed in three galleries in a large central court in the west wing of the old buildings, together with the main hall and its surrounding balcony. It contains a very valuable collection of antiquities, ethnography and pottery, besides a large assemblage of objects which may be classed under the heading of art.

The objects in this department are being arranged according to their ethnic origin as belonging to the Caucasian (white), Mongolian (yellow), or the Melanian (black) race.

The objects of Mongolian (the Chinese, Japanese, and Malayan, &c.) handiwork occupy the upper floor. Those of Caucasian origin (practically those of the chief civilised races)



MAMMAL GALLERY, LOOKING TOWARDS INTRODUCTORY ROOM.



ZOOLOGICAL GALLERY (UPPER FLOOR).

are arranged in the main hall and its surrounding balcony, while the anthropology of the Melanian (Negroid, Papuan, Australioid, &c.) peoples is being placed in the basement and the adjoining gallery parallel to it.

The objects most worthy of attention in the Mayer Museum are the Brian-Faussett Anglo-Saxon collection (including the priceless broach from Kingston Down), the Napoleon miniatures, the Fejerváry ivories, the Wedgwood Pottery, the Mexican codex, the collection of African ethnology, and the splendid carved Totem-pole from Queen Charlotte Islands, North America, 39 feet in length.

WALKER - - ART GALLERY.

Prior to the erection of the Walker Art Gallery the Corporation possessed a comparatively small collection of Works of Art, which had been acquired from time to time by presentation and purchase, and which was for the time being deposited in the Library and Museum buildings. In 1871, the Annual Exhibition of Pictures by modern artists was inaugurated, and was largely instrumental in creating and promoting a taste for art in this locality. Artists of the highest eminence, members of the Royal Academy, and others, cordially seconded the Committee's efforts, by contributing some of their finest productions. The Autumn Exhibitions were largely attended by all classes of the community.. High-class works found purchasers, and became permanently located in private collections, where they exercised a potent influence in improving the public taste.

This influence soon became so manifest that the pressing necessity for the erection of a Gallery of Art, which should be worthy of a town so important as Liverpool, presented itself very forcibly to the Committee, and to others interested in the subject, the result being that in 1873 a report was presented to the Town Council recommending the erection of a Gallery of Art as an addition to the educational facilities of the Library, Museum, and Art Department. The proposal was so strongly opposed by a section of the ratepayers that it was not thought desirable to press the matter at that time. Several public-spirited citizens showed their earnestness in the matter by offering liberal donations towards a fund for the erection of the building.

WALKER ART GALLERY.

SCULPTURE GALLERY.

UPPER VESTIBULE.

A public meeting was held at the Town Hall, on Monday, 29th September, 1873 (the Mayor, Edward Samuelson, Esq., presiding), for considering the best means of erecting a Gallery of Art for the town of Liverpool by voluntary subscription. A Committee was formed, and subscriptions announced in the room amounting to nearly £7,000, five contributions promised being of £1,000 each.

In November of the year 1873, however, all doubts and difficulties which might possibly have surrounded the project of raising an adequate amount were happily removed by the munificence of Mr. Alderman A. B. Walker, who, on being elected Mayor, announced his intention of erecting the building at his own cost, and presenting it to the town.

The foundation stone was laid on 28th September, 1874, by H.R.H. the Duke of Edinburgh, the Archbishop of York taking a prominent part in the ceremony. The building was designed by Messrs. Cornelius Sherlock and H. H. Vale. It was completed in 1877, and opened to the public on the 6th September of the same year by the Rt. Hon. the Earl of Derby. The occasion was celebrated by a trades procession, the day being observed as a public holiday; and in the evening a grand banquet was held in St. George's Hall, which was attended by the Mayor and members of the Corporation, with many of the principal inhabitants, and presided over by Lord Derby.

The new Gallery of Art, which gave a great impetus to the Autumn Exhibiton, was named after its munificent donor; and soon after its opening Alderman Walker received from Her Gracious Majesty Queen Victoria the honour of knighthood, in recogniion of his public spirit and generosity, and was created a Baronet in 1886.

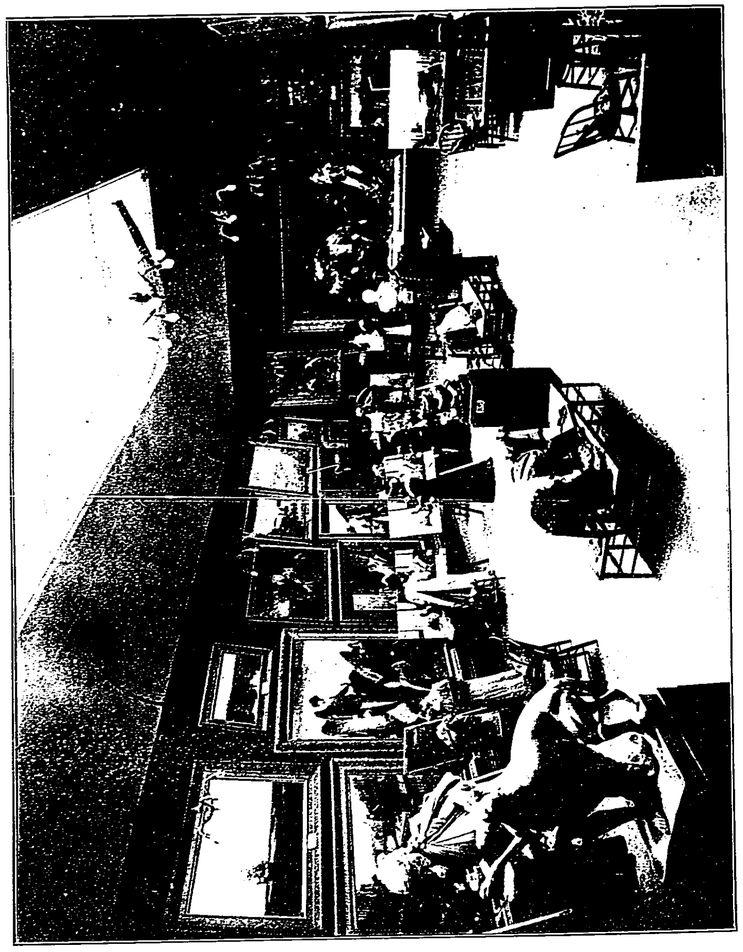
In the year 1882 the Permanent Collection had so increased that additional space became necessary, and an extension of the building, at an estimated cost of £11,500, was sanctioned

by the City Council. On the completion of the new buildings, Sir A. B. Walker gave an additional instance of his generosity and public spirit by defraying the entire cost himself, thus making the town his debtor for perhaps the finest Art Gallery in the Provinces.

The Collection has now attained a national reputation, and is also well-known and held in high esteem in America. The artistic value of the works is highly appreciated by the publishers of Art periodicals and magazines, as is shown by the constant applications received for permission to reproduce them as illustrations or as examples of the Art of the time.

After the lapse of half a century, Liverpool has reason to be proud of her early recognition and support of the little band of young men known as the Pre-Raphaelite Brotherhood, and the City is now fortunate in the possession of some of the works of the daring young painters who have had so great an influence on their contemporaries and successors in Art. Perhaps the most distinctive example of this School is found in the late Sir John Millais' "Lorenzo and Isabella," which graces the Collection. When we remember that this was the work of the student in his twentieth year, when we study its admirable colour and drawing, the wonderful delineation of every minute detail, we must own that it well maintains and justifies its claim to be regarded as one of the pictures of the world.

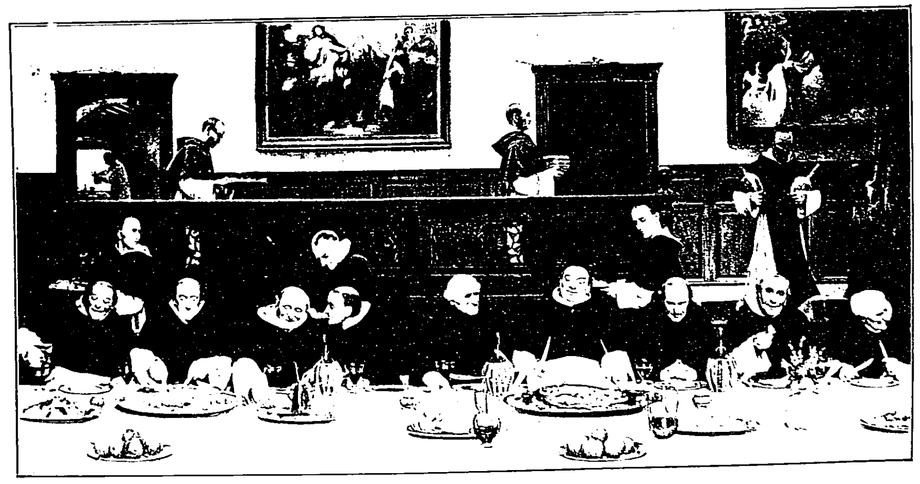
The Permanent Collection is also raised to a position of much distinction by the productions of painters of strong individuality — works standing apart from conventional or academic Art. Amongst these may be named those of Sir Edward Burne-Jones, Bart., Albert Moore, Maurice Greiffenhagen, Segantini, William Stott of Oldham, E. A. Hornel, Byam Shaw, Arthur Melville, and Robert Fowler. The Gallery is rich in splendid examples of the accepted Schools, but the inclusion of uncommon, unique, and individual effort gives



STUDENTS' DAY. WALKER ART GALLERY.



LORENZO AND ISABELLA.
Sir J. E. Millais, Bart., P.R.A.



FRIDAY.
W. Dendy Sadler.

great variety and interest to the Collection, and shows that the aims of artists may be realised by divers methods, and that Art may be true and sincere although it is presented to us in many-sided aspects.

The Collection includes 322 oil paintings, 69 water-colour drawings, 76 engravings, etchings, and mezzotints, the Liber Studiorum of Turner, and the 15 additional plates completed by Mr. Frank Short, besides an almost complete series of the lithographs in colour of the altar pieces, frescoes, and mural decorations of celebrated churches and cathedrals of Italy and Germany, published by the Arundel Society. 1,100 photographs of the public monuments of France, prepared under the direction of the Minister of Public Instruction of Paris, portfolios of reproductions of celebrated pictures and engravings, issued and presented by the British Museum, are also available for the use of Students. Ninety-seven pieces of sculpture, either in marble or plaster casts, have been acquired, including copies of the most celebrated antique statues and groups, while examples in bronze, the work of some notable living sculptors, also adorn the Gallery, together with numerous architectural casts of the French Renaissance and other periods. The interesting series of pictures known as the Roscoe Collection, deposited by the Trustees of the Royal Institution, are also displayed in the Gallery, and excite very considerable interest amongst Students and connoisseurs. An interesting and most valuable educational work, the model of the central portion of Ancient Rome, is placed in the Cast Room. This model is 15 feet square. Some years ago it was repaired and restored by the Curator and his assistants. It has recently been brought up to date as regards historical accuracy by Dr. Caton.

The General Collection includes some valuable works by the older Masters, but its modern contemporary character is shown by the fact that it includes many works by living and

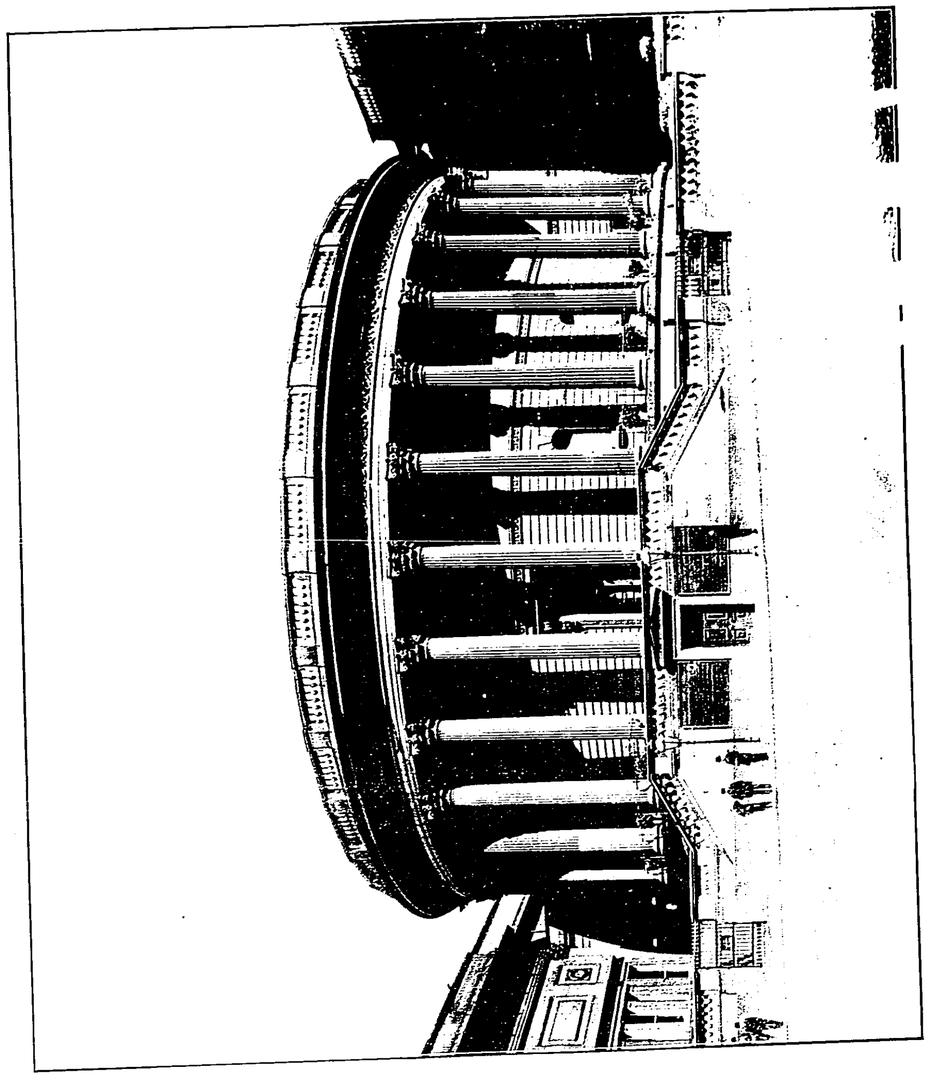
deceased members of the Royal Academy, to the number of 73. In making their selections, the Committee have at times run counter to the popular judgment, and in some cases have made purchases which at the time seemed to some to be unwise, but which the advancement of public taste has since fully justified. Whilst taking a comprehensive view of Art generally, the claims of local artists have not been forgotten; 64 Liverpool painters, including members of the Liverpool Academy, are represented by works of the highest merit. The reputation of the Liverpool Water-Colour School is well maintained, and the Collection is enriched by numerous examples of great artistic skill, which are widely and justly appreciated.

The City is much indebted to a large number of generous donors, who have made valuable gifts to the Gallery of works which are, in many cases, not amongst the least attractive of the Corporation's Art possessions. There is no doubt that if ample and suitable hanging space were provided, the Collection would be further enriched by valuable donations or bequests.

The munificent generosity of the donor of the Gallery, the late Sir A. B. Walker, Bart., has borne fruit far beyond original expectations. By its example it has led the way to the establishment of many similar institutions throughout the Kingdom, and there seems to be but little doubt that future developments will cause it to be regarded as the home of the most important collection of Works of Art in the Provinces.



RUTH AND NAOMI.
Philip H. Calderon, R.A.



PICTON READING ROOM.

LIVERPOOL - - PUBLIC LIBRARY.

The first Public Libraries Act which became law in 1850, and was commonly called Ewart's Act, was largely the outcome of the zeal and activity of William Ewart, a merchant of Liverpool, and for many years her representative in Parliament.

During the half century dating from the 18th October, 1852, the growth and development of the Public Library of Liverpool has been as remarkable as the public appreciation of its usefulness.

During the first year of the Library's existence 111,723 volumes were issued, and during its jubilee year just completed 603,601 volumes. Altogether the life work of the Library is represented by the issue of upwards of 51 million volumes, apart from an enormous issue of magazines and newspapers. The Reference Library possesses 125,206 volumes, and in the six branch libraries there are 93,991 volumes more, making a total of 219,197 volumes available for the citizens of Liverpool and the residents of the surrounding districts.

Again we are tempted to ask what is the measure of the benefit of these more or less read 51 million volumes. This, of course, cannot be answered, but we know a taste and an appetite for reading is being created, and if created by means of books and periodicals of literary merit, and free from pernicious tendencies, the result cannot be other than beneficial.

As the Liverpool Public Library was one of the first in the country to be established and stands in importance in the forefront of such institutions, the following brief account of its history, work, and character may prove of interest.

Towards the end of 1849, attention was first directed to the need of a public institution in Liverpool where documents, &c., could be consulted; and, as a result of this expression of public opinion, Councillor (afterwards Sir) James A. Picton, in April of 1850 (the year in which Mr. Ewart's Public Libraries Act was passed), submitted a motion to the Town Council that "A Commiteee be appointed to inquire and report on the propriety of establishing a Free Public Library in the town of Liverpool." That motion being approved, a committee of inquiry was formed for the purpose named, its deliberations resulting in a favourable recommendation to the Council. The public meeting subsequently called was marked by many manifestations of earnestness on the part of the public for the establishment of a public library, practical support of the movement being shown by the voluntary contribution for library purposes of nearly £1,400 and some 4,000 volumes. The scheme being thus countenanced by both Council and public, these subscriptions were duly transferred to the Corporation by the Preliminary Committee, and measures were forthwith taken to carry the wishes of the inhabitants into effect. In 1851, the thirteenth Earl of Derby died, bequeathing to the town his valuable and extensive collection of natural history objects. To carry out the conditions attached to the gift, the Corporation obtained a Special Act of Parliament, which in its title, "An Act for Establishing a Public Library, Museum, and Art Gallery at Liverpool," laid down the lines upon which the Committee of this Institution has never ceased to work and keep before it. The collection of books then made by the Corporation Committee was housed in a building in Duke Street, and on the 18th October, 1852, the Reference Library was opened to the public, the total number of volumes then being 8,296. Few institutions have been more favoured than this with noble and generous gifts. The first of our benefactors was the late Sir William Brown, Bart., who, by the offer in 1853 of £6,000 (afterwards increased in 1856 to £12,000), endeavoured to spur the Corporation into taking speedy measures for the erection of a free library of such

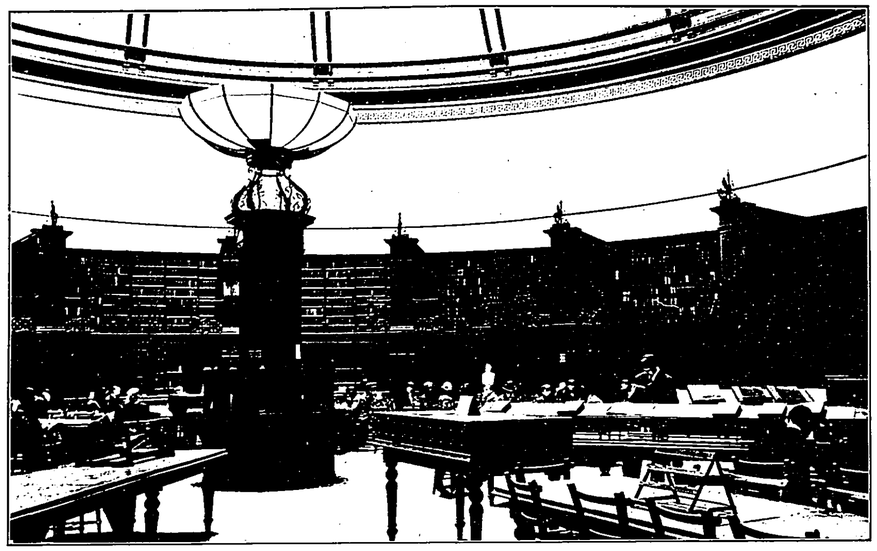
proportions as would be a credit to the town architecturally, and which, internally, would afford that accommodation which had become a pressing necessity. His generosity went even further; and, jealous of delay, and anxious to see erected during his lifetime a free public library worthy of the greatness of Liverpool, he addressed, on the 31st December, 1856, the following letter to the Mayor:—

> "My dear Sir,—I have been long desirous that Liverpool should have a Free Public Library and Museum worthy of the town, where the inhabitants—be their position in life what it may—can resort for intellectual improvement; and, as some of my relatives and friends have expressed a wish that I should build one and present it to my fellow-townsmen, I am prepared to do so on the site provided by the Corporation. I have no wish to interfere with the resolution the Council have already come to—of leaving the plans in the hands of the Corporation Surveyor. Probably it will not be unreasonable for me to hope and expect that, in some way or other, my name will be connected with it, to show that I have endeavoured to be useful in my generation; and possibly it may encourage others who have the means to contribute to useful public works, and that some of my family or executors may be continued on the Managing Committee.
>
> Ever yours respectfully,
>
> WILLIAM BROWN."

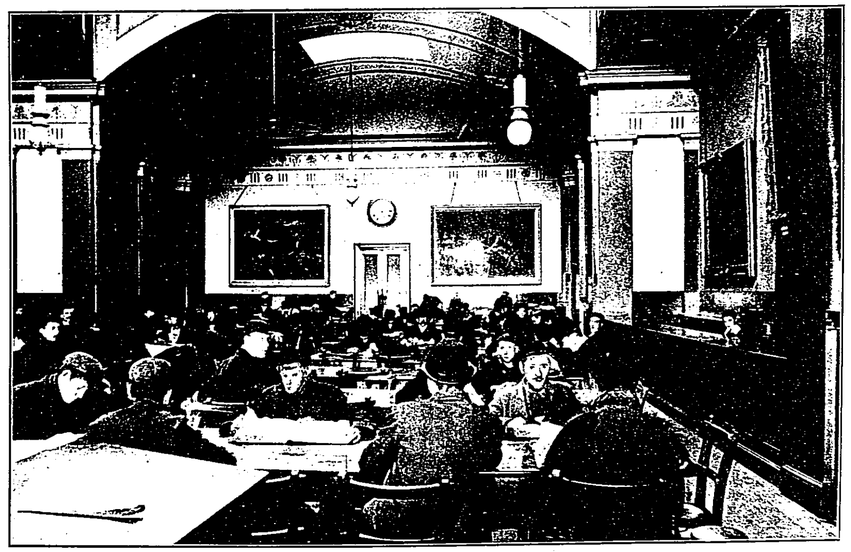
The burden of cost being thus removed from the shoulders of the Council, invitations were issued to architects for plans for a suitable building, and a premium of 200 guineas was offered for the best design submitted. In the competition which followed preference was ultimately given to the designs of Mr. Thomas Allom, an architect of some eminence in the literary as well as

the art world, and whose works are worthily represented on the shelves of our library. This important matter decided, and all preliminaries arranged, the foundation stone of that part of this Institution known as the Brown Library was laid on the 15th April, 1857, by Sir William Brown; and the building, having been completed, it was opened to the public on the 18th October, 1860, the occasion being marked by no little ceremony and many expressions of public satisfaction.

After the passage of some years, during which time the Reference Library had grown, prospered, and increased in usefulness beyond all expectation, the need of an extension to the library forced itself upon the consideration of the Committee. Not only was further space required for the rapidly-increasing stock of books, but increased accommodation was urgently needed for readers, particularly for that class denominated "student readers." For some years one of the smaller book-rooms had been furnished with tables and chairs for the special convenience of those readers who came for study and literary work. The *entrée* of this room was obtained on written application to the Library Committee, who, being satisfied with the object the applicant had in view, issued a ticket entitling him to the use of the room for twelve months. This room became very popular, on account of its seclusion and the privileges allowed in it, which were not permitted to readers in the general reading room. It invited and encouraged at the outset a class of readers which has increased in numbers ever since—readers who came for literary work and investigation or self-education, and not merely for light and recreative reading. To overcome the difficulty thus presented to the Committee, it was determined to erect a new reading-room on the vacant land between the Brown Library and Walker Art Gallery, and the Council having sanctioned the proposal submitted by the Libraries Committee, a circular reading-room was built by the Corporation, and named the Picton Reading-room, in recognition, by the Council and the people of Liverpool generally, of the long and devoted service to this Institution of Sir James A. Picton.



PICTON READING ROOM.



BROWN READING ROOM.

It may be of interest to mention here the lines on which the Reference Library has been built up. Though the Committee has during the long period of the library's history, kept steadily in view the provision of standard works, both British and foreign, in all departments of learning and embracing as far as possible all branches of human inquiry; particular attention has been given to certain subjects, with the result that in the departments of architecture and the fine arts generally, in natural history, in the literature of geographical investigation, and in regard to books bearing upon those commercial and maritime affairs peculiarly valuable to the inhabitants of a great seaport, the Liverpool Public Library may justly claim to possess an unusually rich collection.

The topographical section is also very extensive; while it may be said that, as regards local illustrations and publications, pains have not been spared, even from the foundation of the library, to gather together what is, perhaps, at this moment the finest and most valuable collection of the kind in the country. A decided impulse was given to the collection and preservation of such prints and documents as would serve to illustrate the history of Liverpool and Lancashire, by the purchase, some fifty years ago, of a very large number of maps, original drawings, views, portraits, &c., relating to the County Palatine; and, from that time forward, additions to the collection have been made, not only manuscript and printed matter being gathered, but drawings being expressly made for the Committee of such ancient and notable buildings as were to be demolished for purposes of street improvement.

Among the most recent acquisitions to this local collection may be mentioned numerous autograph letters, deeds, and other documents connected with the Moores of the Old Hall, Oldhall Street, and later of Bankhall. The Moores were the family *par excellence* of Liverpool for nearly 500 years. We find a Sir John de la More living at the Old Hall as early as 1236;

and, in the time of Edward I., Richard de la More and John de la More represented Liverpool in Parliament. Sir Peter de la More was speaker of the House of Commons in 1377; while Colonel John More was Governor of Liverpool Castle, and defended the town when it was besieged by Prince Rupert in 1644, and he was one of the signatories to the death warrant of King Charles I. The office of Mayor of Liverpool was filled by members of this family forty times between the reign of Edward III. and the middle of the 17th Century, Colonel More, the regicide and uncompromising Cromwellian, being the last Mayor of the family. Their estates in and about Liverpool were extensive, and would now have been of immense value. Moor Street and Moorfields perpetuate the family name; and Bank Hall and Oldhall Street their residences. These documents number 1,344 items, and are a valuable contribution to local history.

In accordance with the scope of the work of a public library, sketched out in the original special Act of Parliament, lectures formed a part, and in the building erected by Sir William Brown a lecture hall holding about 400 people was provided. On January 19th, 1866, free lectures were inaugurated, the earliest series being chiefly upon scientific subjects, including natural philosophy, zoology, geology, and mining, the non-metallic elements, chemistry and metallurgy, practical perspective, decorative art, &c. Later on a more popular element was introduced into the lecture series, in order to provide for the lesser studious section of the public. The average attendance at the free lectures to-day is 1,131.

In 1897 the extension of the free lectures to a number of the outer districts of the city was inaugurated. With those given in the Central Lecture Hall, William Brown Street, the total number of lectures delivered last year was 112, and the total attendances 70,353.

In 1853 two Branch Lending Libraries were established in a tentative way for the issue of books for home reading, and some years later five (now reduced to three) Evening Reading Rooms were opened in various school rooms, provided with a liberal supply of magazines and newspapers. It was not, however, until the election of the present Chairman, Sir William B. Forwood, that these auxiliary libraries received due attention. Since then four new Branch Libraries have been opened, and several others projected. Women and boys' rooms have been provided in several of the libraries, and a careful selection of juvenile literature placed on the shelves, calculated to please and instruct the numerous young readers and satisfy the wishes of their parents and guardians.

Some little satisfaction may here be expressed that among free libraries Liverpool first sought to cultivate a taste for music by placing on the shelves of these branch libraries high-class works in this delightful art. Last year 1,509 volumes found their way into the homes of the people. It may also be further mentioned that, in 1859, it was in these libraries that the blind as readers first received recognition, and had their tedious hours lightened by a literature adapted to their needs. These readers have to-day a very generous friend in Miss M. L. Hornby, who has added to the collection of books in the library in Braille type to an extent which calls for the grateful acknowledgment of the city at large. A few years ago the number of books lent to the blind averaged annually about 200 volumes, while last year it had increased to 1,308. Much of this increase is due to the bright, cheerful character of books presented by Miss Hornby, which may be indicated by the titles of some of her more recent gifts, so different from what some years ago was thought only fit reading for the blind, Doyle's "The Great Boer War," Fitchett's "How England Saved Europe," Keane's "The Far North," Stevenson's "St. Ives," Crawford's "Cigarette Maker's Romance," Wallace's "Ben Hur," &c. This special library now numbers 1,079 volumes.

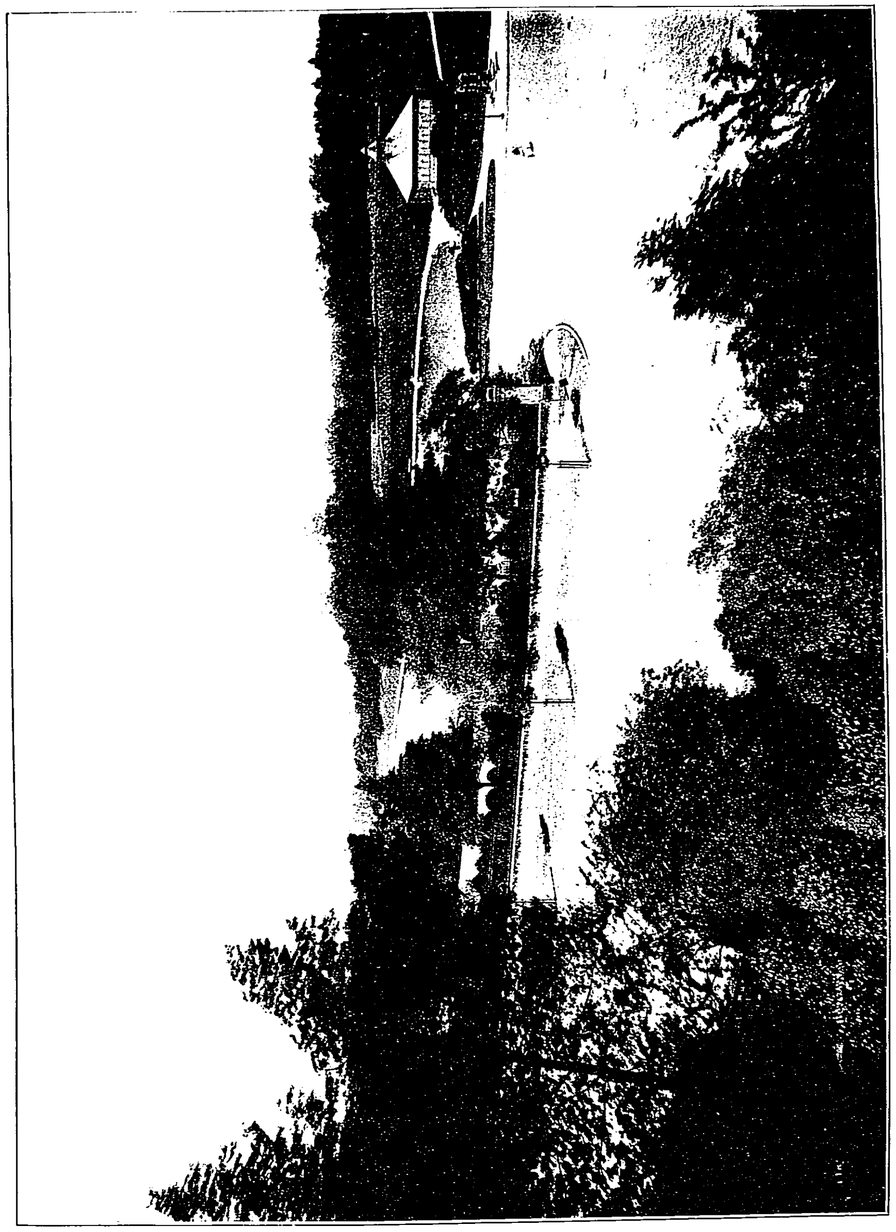
PUBLIC PARKS, GARDENS, AND RECREATION GROUNDS.

The Parks are situate in the residential districts of the City, and embrace a very extensive area, the largest being as under—

Sefton Park	about	270 acres.
Newsham Park and Sheil Park..	„	147 „
Stanley Park.....	„	93 „
Wavertree Park	„	33 „
Botanic Gardens	„	11 „
Kensington Gardens	„	19 „

Sefton Park, besides being the largest, is also the most beautiful. The land alone cost £264,000, and the construction about £147,000. It was designed by M. E. Andre, Director of the Public Parks of Paris, and Mr. Hornblower of this City. The opening ceremony was performed by H.R.H. Prince Arthur, on the 20th May, 1872.

It contains large drill grounds, cricket, football, lawn tennis, and archery grounds, bowling green, &c., and a fine lake, of which every advantage is taken for the sailing of model yachts. The Palm house, presented by Mr. Henry Yates Thompson in 1896, occupies a very commanding position, and is visible from all quarters of the Park. The building is constructed entirely of steel and glass, standing on a base of polished granite and stonework. It is about 100 feet in width and 70 feet from the floor to the top of the lantern, the superficial area being about 8,500 feet. It is entered on four sides through massive wrought iron



SEFTON PARK, LIVERPOOL.

gates. Surrounding the building at each angle are full-sized statuary representing John Parkinson, apothecary to James I.; Andre Le Notre, the great French landscape gardener; Darwin, Linnæus, Prince Henry, Captain Cook, Columbus, and Mercator. Inside the building statuary is grouped with the plants. The system of heating is by hot water conducted through 4,000 feet of 4-inch iron pipes. A very convenient and useful balcony, which is ascended by a spiral staircase, runs around the roof inside. The fine Palm House in Stanley Park is also the gift of Mr. Henry Yates Thompson.

In Sefton, Stanley, and Newsham Parks. Aviaries, containing many varieties of British and foreign birds, have been provided, mainly through the generosity of Councillor J. R. Grant, and these are highly appreciated by the general public, and are great favourites with the children, who are instructively entertained.

Stanley Park, in the North-end of the City, is beautifully laid out in walks, terraces, and flower beds, and possesses a spacious and ornamental artificial lake. It has a fine elevation on the Eastern side, and on clear days excellent views are obtained of parts of Cumberland, Westmoreland, and Yorkshire. This Park was opened on May 4th, 1870.

Wavertree Park, although one of the smallest, is very much frequented, and serves an admirable purpose for the inhabitants of Eastern Liverpool. The Botanic Gardens, which adjoin, are always well worth visiting. They are well kept, splendidly arranged, and the conservatories, which are most extensive, contain many rare specimens of tropical plants. Each plant is distinctly labelled, and to the student affords an excellent opportunity of becoming acquainted with plant life.

In Newsham Park and Sheil Park there has been no very large expenditure in laying out, but a boulevard, pleasant avenues,

and walks have been formed. There is a fine lake and a large round pond in Newsham Park, on which the sailing of model yachts is much indulged in.

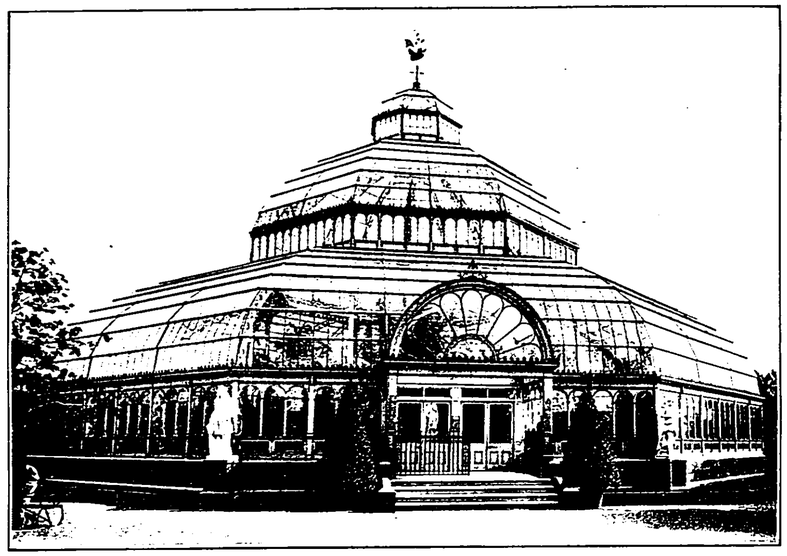
In Newsham Park the Judges' Lodgings are situate. Previously His Majesty's Judges of Assize were provided with a residence in St. Anne Street; but in the year 1867 the Corporation altered, enlarged, and furnished Newsham House at a cost of about £11,500. The house is a commodious, well-built brick mansion, standing in its own grounds in the Park, containing nearly three acres, and undoubtedly affords the best accommodation for His Majesty's Judges to be met with in the country.

Newsham House has also been the temporary residence of Royalty. Her late Majesty Queen Victoria resided there in 1886 when she visited the city to open the International Exhibition of Navigation, Commerce, and Manufactures.

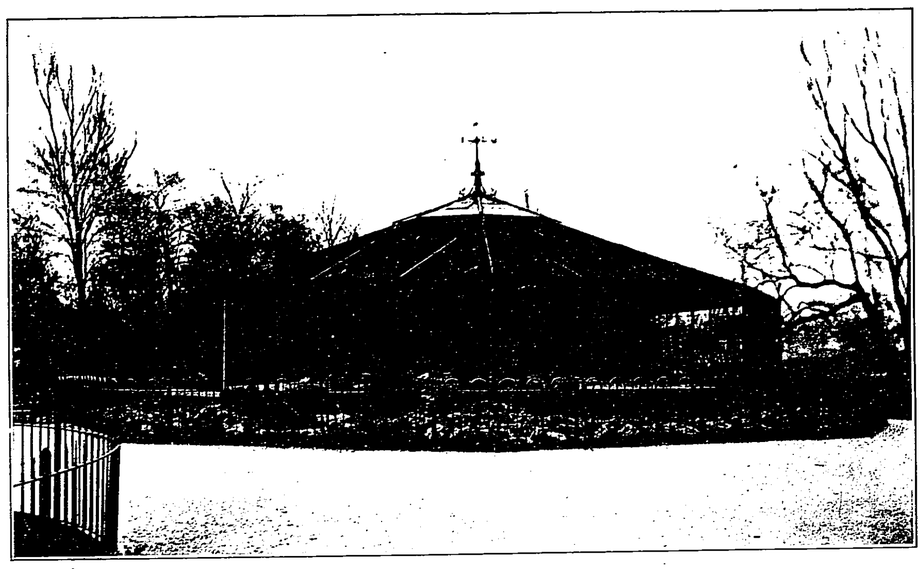
Wavertree Playground was presented to the Corporation in 1895, and cost about £100,000. It is probably the largest "playground" in the world, and it was the wish of the donor that it should be used as a playground for children educated in the public schools in the city. With the gift several residences and other properties were included, the rents from which are applied towards the maintenance of the playground. It was opened in September, 1895, when thousands of school children were *fêted*.

In addition to the Parks referred to, the Corporation have under their control some forty Recreation Grounds and enclosures, dotted about in various parts of the city, all of which are well patronised by the inhabitants in the surrounding districts.

An especial feature which the Corporation have borne in mind has been the acquisition of large open spaces upon which cricket, football, tennis, and other out-door games could be played, and the popularity of these Recreation Grounds is very great.



PALM HOUSE, SEFTON PARK.



AVIARY, NEWSHAM PARK.

The Corporation have taken over a number of old and disused churchyards—which in many instances bore a neglected appearance—and transformed them into gardens. The remains in the graves were not disturbed to effect this change, the gravestones being simply levelled with the surface of the ground and a covering of soil of sufficient depth to preserve and fructify plant life placed thereon. The result has been that spaces, which were previously eyesores, have been formed into pleasant and healthful public walks and gardens. A striking example of this in the centre of the city is St. Peter's Gardens, Church Street, and when completed, St. John's Gardens, the laying out of which is being proceeded with. The cost of this work, including new boundary walls, will be about £22,000.

Two disused burial grounds have also been acquired, viz., the Necropolis in West Derby Road, and St. Mary's Cemetery, Kirkdale; and it is the intention, at no very distant date, to convert these disused burial places into public walks and gardens.

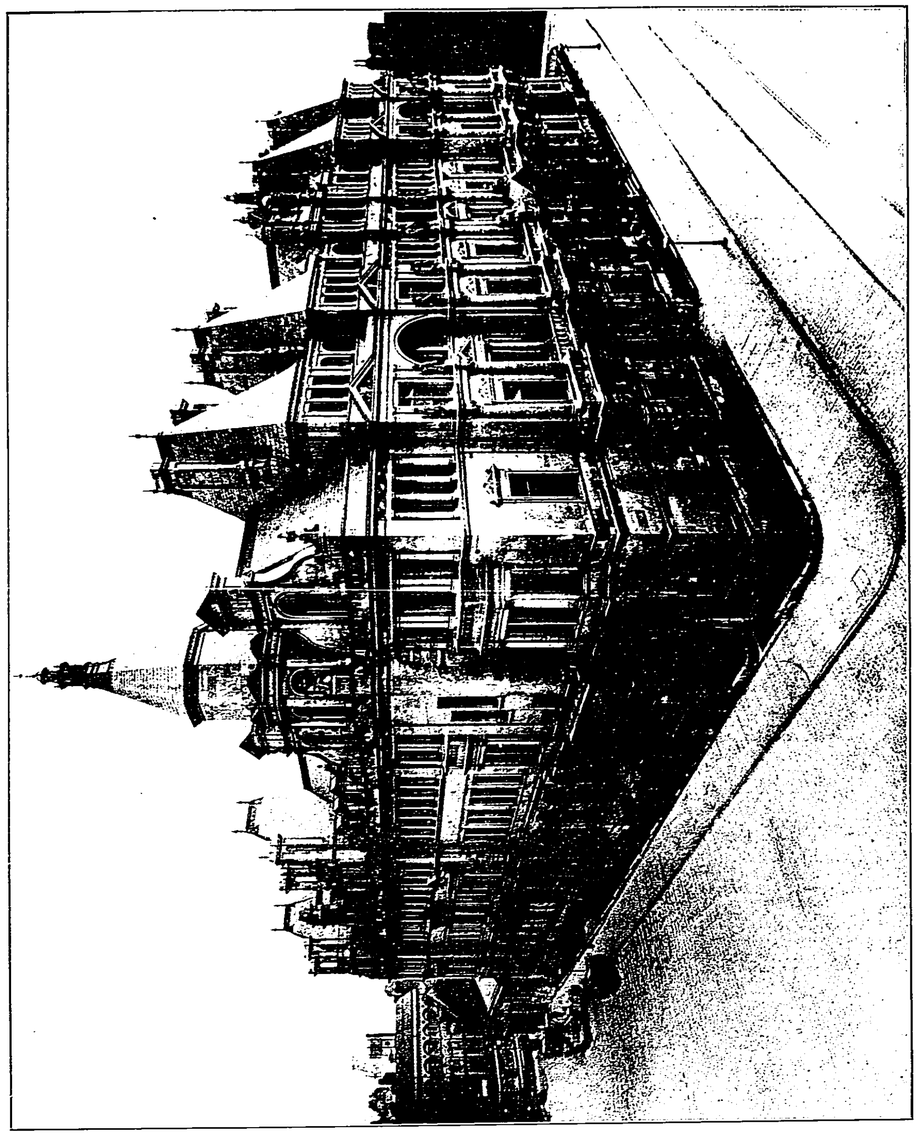
The annual cost of the maintenance of the Parks, Gardens, and Recreation Grounds is about £25,000.

The undermentioned is a complete list of the various Parks, Gardens, and Recreation Grounds, giving the area and expenditure on each.

Park.	Area in Acres.	Cost of Land.	Cost of Laying out.	Totals.
		£	£	£
Sefton Park	269	263,687	146,579	410,266
Newsham Park and Sheil Park	147	43,250	59,221	102,471
Stanley Park	93	117,474	47,014	164,488
Land, Lister Drive	14¾	—	—	—
Wavertree Park	32½	7,741	9,704	17,445
Botanic Gardens	11	4,075	5,687	9,762
Kensington Gardens	18¼	32,520	3,030	35,550
Wavertree Playground	108	—	—	— Gift.
Thurlow Street Recreation Ground	¼	—	396	396
Devonshire Place Do.	½	—	472	472
St. Thomas's Gardens	¼	—	106	106
Carried forward	694½	£468,747	£272,209	£740,956

PARKS, GARDENS, AND RECREATION GROUNDS.—*(Continued.)*

Park.	Area in Acres.	Cost of Land.	Cost of Laying out.	Totals.
		£	£	£
Brought forward	694½	468,747	272,209	740,956
Prince's Boulevard	3	7,918	4,081	11,999
Whitley Gardens	2¾	8,053	1,183	9,236
Aubrey Street Reservoir	1½	—	300	300
St. Martin's Gardens	1¾	—	730	730
Brow Side Recreation Ground	½	2,425	440	2,865
St. Mary's Do.	2	—	95	95
St. Michael's Gardens	1½	—	477	477
St. John's Do.	3½	—	3,720	3,720
St Luke's Do.	1	—	198	198
St. Nicholas' Do.	¾	—	—	— Gift.
Holy Trinity Do.	½	—	613	613
St. Peter's Do.	1¼	—	1,374	1,374
Henderson Green.....	1	662	889	1,551
St. Paul's Gardens	½	—	562	562
Honey's Green Lane Enclosure.....	very small ..	—	—	—
Anfield Recreation Ground.....	1	—	—	— Gift.
Village Green, Wavertree.....	1	—	—	—
Cambridge Playground, Wavertree..	½	—	—	—
St Domingo Recreation Ground	1¼	—	—	—
Kirkdale Recreation Ground	6¼	—	7,498	7,498
St. James' Mount Gardens	4	4,520	6,399	10,919
Baptist Chapel, Myrtle Street.....	very small ..	—	70	70
Rathbone Road Recreation Ground..	6	5,653	—	5,653
Breeze Hill Reservoir.....	2⅔	—	—	—
Rachel Street Recreation Ground....	¼	—	1,000	1,000
Llanrwst Street, &c., Do.	½	—	950	950
Netherfield Road North Do.	¾	2,330	3,680	6,010
Land, Lower Breck Road.....	22½	16,000	—	16,000
St. George's Churchyard, Everton ..	¼	—	—	—
St. James' Gardens	1¼	—	—	—
Falkner Square Gardens	1½	—	—	—
Abercromby Do.	1¾	—	—	—
Great George Do.	1¼	—	—	—
Land, Smithy Lane.....	1¾	—	—	—
Do. Warbreck Moor	3	—	—	—
Do. Clubmoor	25½	—	—	—
Garston Recreation Ground.....	35	—	—	—
Banks Road Do.	4½	—	—	—
	838	£516,308	£305,468	£821,776



LIVERPOOL, HEAD POST OFFICE.

THE GENERAL POST OFFICE.

The General Post Office fronts Victoria Street, and is bounded on the west by Stanley Street, on the east by Sir Thomas Street, and on the south by Whitechapel, the buildings between the last named thoroughfare and the Post Office yard having been purchased by the Postmaster-General, with a view to future extension.

In a plan of Liverpool in 1650, reproduced in this book, Whitechapel is represented by "The Pool," and Stanley Street and Sir Thomas Street by residences of the Stanley and Molyneux families.

The building was designed by Mr. Henry Tanner, F.R.I.B.A., Principal Architect to H.M. Office of Works, and is built of Portland Stone, in a modern adaptation of the French Renaissance style. The pillars are of grey Aberdeen granite, the doorways of Shap granite, and the internal decoration of Hoptonwood marble. The four large stone figures in front of the building represent England, Scotland, Ireland, and Wales, and the smaller figures, Canada and other British dependencies, Commerce, Electricity, &c.

The site, adjoining the course of the old "Pool," is low, but the basement, on a solid concrete foundation, is above the sewer level, and the drainage throughout is perfect. The building is well lighted and ventilated throughout, and there is ample lavatory and sanitary accommodation on each floor, every section of the staff being separately provided for.

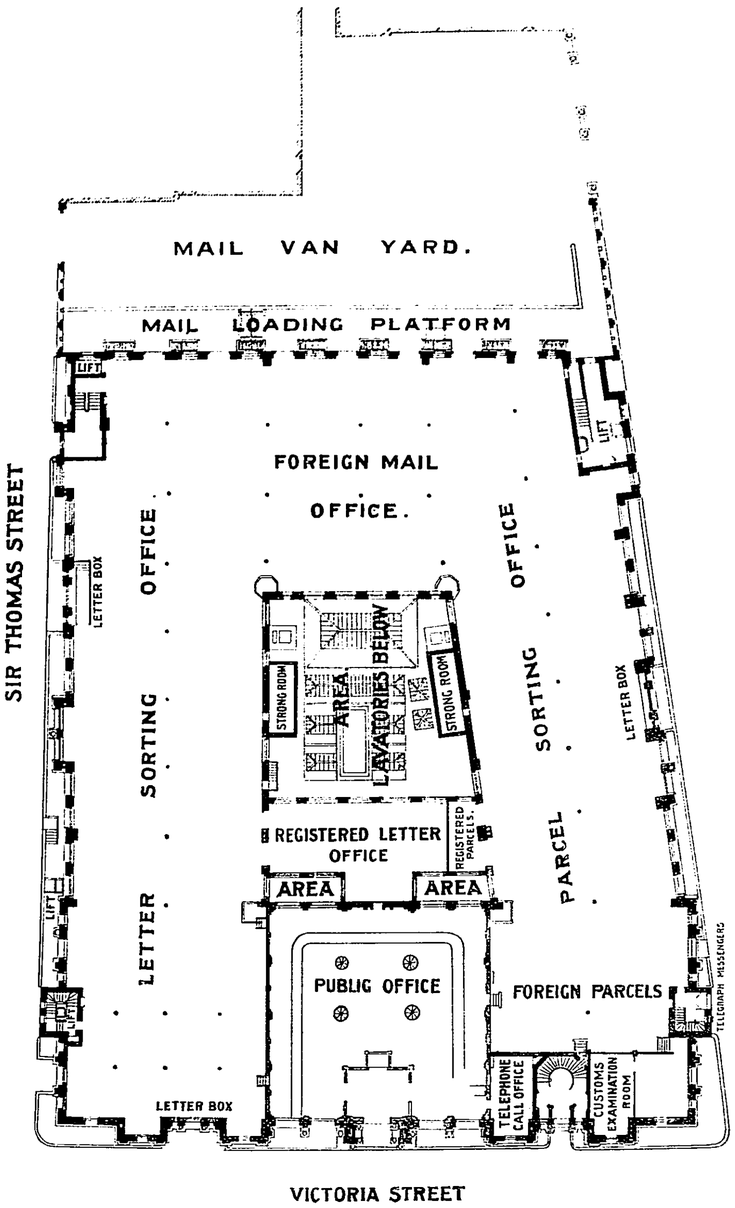
The foundation stone was laid by the Duke of York on the 10th September, 1894, and His Royal Highness also declared the building open on the 19th July, 1899. It has a frontage of 226 feet, and covers nearly two acres of ground. The site cost approximately £200,000—the building £160,000, and the fittings, furniture, and engines £40,000.

This fine building has taken the place of the old Post Office in Canning Place, which was erected on the site of the first Liverpool Dock, and opened in 1839, part of which building is occupied by the Mersey Docks and Harbour Board and the Custom House respectively. The Post Office staff in 1839 included only 73 persons, and the letters did not number more than 103,200 a week. During the 60 years the Post Office was housed in Canning Place its staff increased to 2,462 and the letters, &c., to 4,823,700 a week.

The new building is about double the size of its predecessor, and in the three years that have elapsed since its occupation the work has continued so to increase that over 2,900 persons are now employed in disposing of 5,273,000 letters a week, 75,000 parcels weekly, 8,360,000 telegrams a year, and 1,243,000 trunk telephone calls a year, to say nothing of money order business, sale of licenses, bill stamps and marriage licenses, express services, and other minor branches of work.

The most important part of the basement is the boiler house and engine-room. The former contains four "Lancashire" Boilers, 26 feet by 6 feet 6 inches, fitted with "Vicars'" Mechanical Stokers, which are driven by power from the dynamos.

The boilers supply steam to two 70 h.p. horizontal compound pneumatic engines, by Davey and Paxman, which serve 22 distinct tubes, of a total length of six miles, for conveying telegrams in carriers to and from the principal branch offices and railway stations, and between different parts of the



building. Similar tubes are also provided and worked by the three great Liverpool newspapers, in order to obtain their telegrams as rapidly as possible.

The steam drives four Davey and Paxman "Peache Patent" high speed engines, coupled to four Siemens dynamos, which light the building from top to bottom, the larger rooms by arc lamps, the smaller by glow lamps. The dynamos also charge 300 secondary cells or "accumulators," which are used for conveying the telegraph signals over the 300 wires passing through the Liverpool office, or conducting the human voice to distant parts of the Kingdom over one of the 145 telephone trunk wires. These accumulators have taken the place of 6,000 primary battery cells used at the old office, and their introduction has saved space and lessened cost of maintenance; the dynamos are kept continuously employed—by day for power for all purposes, and by night for light.

The dynamos also supply current to work five lifts, in constant use to raise stores, mails, or passengers; to generate heat for melting the wax used in the sorting offices by means of coils under the wax pots; to move endless bands carrying telegrams along tables in the instrument room, and to aid ventilation by working nine electric fans in different parts of the building. The steam is also used for cooking and boiling water, and the exhaust steam is led under heating cylinders from which the whole building is warmed. The engines also work three powerful pumps, and a "Pulsometer" for removing the water from the basement in case of floods.

In the basement also are rooms for the telegraph messengers, who deliver 4,000 telegrams a day—brought down by pneumatic tube from the Instrument Room on the second floor—kitchens for clerks, stampers, &c., engineering and other stores, mail bag room, and a basket repairing room.

From the accompanying plan of the ground floor some idea may be gained of the arrangements and the work done. The letter sorting office occupies the whole Sir Thomas Street frontage, and measures 244 feet by 64 feet; over 750,000 letters, books, papers, cards, &c., pass through it daily. Mails are received from, and made up for, all the principal towns in the United Kingdom, many travelling post offices, and all the smaller places in the neighbourhood. The letters posted in the city district of Liverpool are also brought into this office, and stamped and sorted by the postmen who collect them. For its local services Liverpool was divided into districts, on the London system, as far back as the year 1864, and town postmen deliver and collect from 17 district and sub-district offices, extending from Blundellsands in the north to Garston in the south, each controlled by an inspector or head postman.

The exceptional interest and importance of the Liverpool Sorting Office lies in its connections with foreign countries and British Colonies, involving the keeping of many records not required at inland offices. Mails to and from the United States pass through the office regularly twice a week. Canada and the West Coast of Africa (British, French, German, Belgian, and Portuguese) look to Liverpool as the Port of exchange for their English mails, and smaller mails are exchanged with Bermuda, the Bahamas, the Falkland Islands, Mexico, New Zealand, Smyrna, Constantinople, the Canary Islands, Madeira, the West Indies, Japan, and almost the whole of Central and South America. Correspondence for these countries is collected at Liverpool from a large part of the United Kingdom, and that in the opposite direction is received at Liverpool in bulk, and thence distributed. Many a trying hour do members of the staff spend on the Landing Stage, waiting for the arrival of belated mail steamers, advised by telegraph from Queenstown or Moville, but delayed by bad weather.

The Parcel Post, a heavy and useful service, occupies the Stanley Street side, and—as with letters—Liverpool is to a great

extent the doorway of England for Foreign and Colonial parcels. America (North, Central, and South), Japan, Malta, and Constantinople, West Africa, and some Island Colonies all exchange parcel mails with Liverpool. Inward Foreign and Colonial parcels are liable to be examined by Customs Officers in the room known as the "King's Warehouse," or Customs Examination Room, in order to detect and levy duty on illicit consignments of tobacco or spirits, or to protect the British author by stopping copyright works.

The first floor contains inquiry, accounts, engineer's, and general administrative offices, as well as a medical officer's room, store rooms, and the returned letter branch, in which 536,000 "dead" letters are disposed of yearly.

The Telegraph Instrument room, 202 feet by 68 feet, occupies the whole frontage on the second floor, and the trunk telephone room, kitchen and dining room, telegraph school, cloak rooms and lavatories, occupy the rest of the space on this floor.

Liverpool almost alone of Provincial Post Offices has direct telegraph wires to foreign cities, and telegrams are sent to Havre, Paris, Bremen, and Hamburg, by means of delicate printing instruments (Hughes) used only in London and Liverpool. Telegrams for these centres are collected at Liverpool from the North of England generally, and messages from the foreign centres are similarly distributed. The North American Cable Companies and the Eastern Telegraph Company also have offices in Liverpool, through which the Post Office here connects the northern portions of the Kingdom telegraphically with a large part of the globe.

The Trunk Telephone speaking, over wires connecting the different local areas of the National Telephone Company, also forms an important and rapidly increasing part of the work of the Post Office.

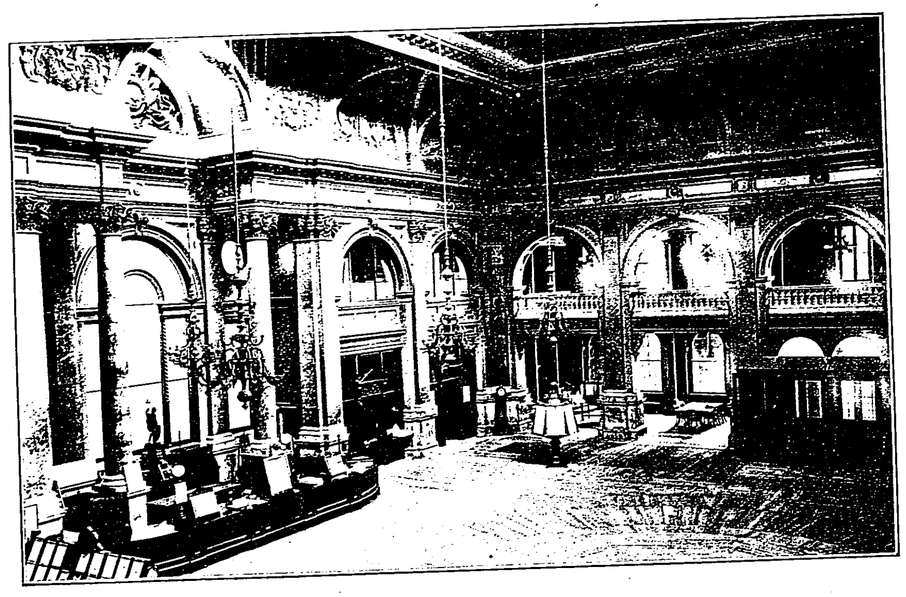
On the third floor are the headquarters of the Telegraph Messengers' Institute, including school, reading and recreation room, and a well equipped gymnasium, under the care of an ex-army drill instructor.

Among mechanical contrivances, "Dey" time machines are used for recording the attendance of large bodies of the staff, and Burroughs' adding machine for assisting to complete the accounts.

Bicycles are extensively used for the delivery of telegrams and express letters, and tricycles (with carriers) for suburban letter and parcel services, and powerful 16 h.p. petrol motor vans, weighing 2 tons and carrying another 1½ tons, are used for a road parcel service between Liverpool and Manchester.



EXCHANGE BUILDINGS AND FLAGS.



EXCHANGE NEWS ROOM.

THE EXCHANGE.

An Exchange has existed in Liverpool certainly since 1673, and may probably be said to have had its origin when, in a Charter granted by King Henry III. in 1229, it was enacted "that the burgesses of the said borough shall have a Mercatorial Guild, with a *hanse* and other liberties." The hanse was primarily the port or town dues payable on merchandise passing through the port, but the term was also employed in the sense of a union or assembly of the Guild, and consequently a Hanse House was built. It stood on the east side of High Street, opposite the east entrance of the present Town Hall, and had originally a thatched roof.

Up to the early years of the last century the lower story, or part of the lower story, of each successive Common Hall of the borough was used as the Merchants' Exchange, which caused the hall to be known as "The Exchange," a title which, when this use ceased, gave place to that of Town Hall.*

The first separate Exchange was built under an Act obtained in 1802, and was completed in 1809. It enclosed on three sides, as does the present building, the area known, from its original pavement, as "The Flags," where until the year 1896 the Cotton Market was held.

Little more than half a century later the building was found unsuited to the times, and the Newsroom inadequate. To make suitable provision for the commercial requirements of the town, the Liverpool Exchange Company was incorporated by Act of Parliament in 1859, and the old building, having been acquired, was pulled down, and the existing buildings erected, the west wing being completed in 1867, and the north and east wings in 1870.

* See the Town Halls of Liverpool, by the late Sir J. A. Picton, F.S.A.

The buildings stand upon the old site, so far as the north and east wings are concerned, but the west wing now extends to Rumford Street, over the ground previously occupied by Exchange Street West and the Old Sessions House. Their total length along Tithebarn Street and Chapel Street is about 420 feet, and they cover an area of 51,000 superficial feet, to which "The Flags" add 23,000 feet. The whole of this total area of 74,000 feet has two floors below the level of "The Flags," excavated out of the red sandstone rock.

The style is that of the French Renaissance, the frontage towards "The Flags" having a bold central tower, and smaller east and west side towers. A well-proportioned rusticated arcade, having red granite columns and carved festoons, is carried along the line of the buildings between the east and west towers. The four figures standing on pedestals, in the blocking course, represent Captain Cook, Mercator, Galileo, and Sir Walter Raleigh. Passages run from this arcade into the adjoining streets, and in that leading from the western portion into Chapel Street will be found, on the left side, over the steps, the foundation stone of the old Exchange. The central tower extends through the north wing, the ground floor forming a triple passage to Oldhall Street, in the construction of which a number of stone columns taken from the old Exchange have been used. On the front, towards Oldhall Street, may be seen four stone columns, also taken from the old building. These columns are monoliths, 21 feet in height, and at the base three feet in diameter. They were quarried at St. James' Mount, and though now 100 years old show no signs of decay. The pediment of the South front has the tympanum filled in with stone carving, the central figure representing Philosophy or Wisdom directing Science and Commerce to extend the benefits of culture, arts and manufactures, and the advantages of trade to all people—the Indian, Persian, Turk, Tartar, African, Chinese and the Polynesian. Science arouses the wild tribes to throw off their sloth, and awakens them to the humanities of civilization.

The News Room, situated in the West wing, is regarded as one of the finest rooms in the North of England.

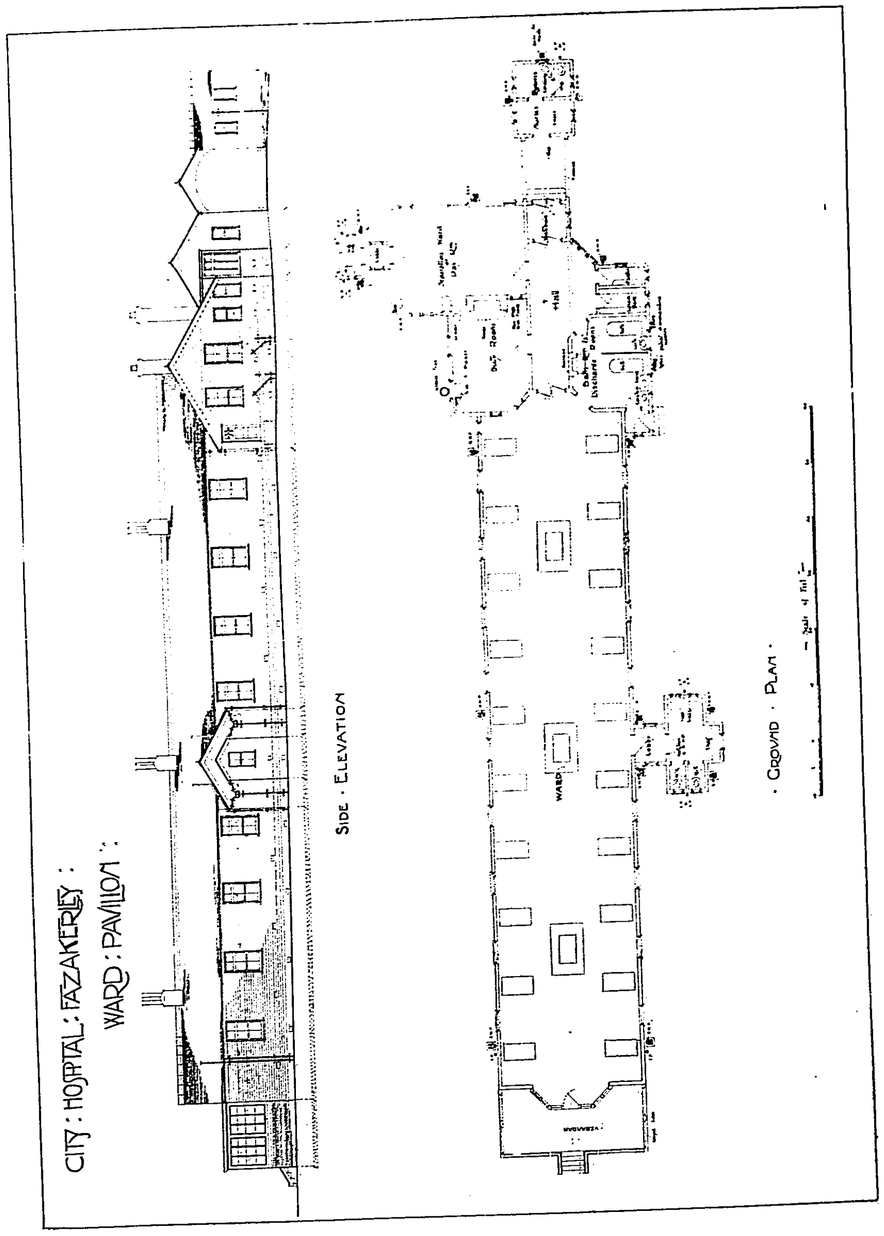
It has a floor area of 14,000 square feet, with galleries at the eastern and western ends. The walls are built of Caen stone, with red marble columns and pilasters, the balustrade of the galleries being formed with base and capping of Bardilla marble and balusters of turned alabaster. The ceiling is richly moulded, with a deep cove, having recessed semi-circular bays, occupied by figure subjects representing Commerce, Navigation, &c., the centre shields of the alternate panels being filled by the coats of arms of various Colonial towns. The height to the ceiling line is 48 feet, and in the centre a large dome, with inner and outer covering of glass, rises to a further height of 30 feet. The interior glass is embossed in colours, with the key pattern as a border. Ventilation is secured by means of a pierced ring at the base of the dome, and an ornamental grating at the apex. Around the dome, in the frieze, are inscribed the words, "O Lord, how manifold are Thy works; in wisdom hast Thou made them all; the earth is full of Thy riches, so is this great and wide sea."

The room is warmed by means of air, drawn in through panels in the granite base of Nelson's Monument and other openings, and after heating, passed through large gratings in the floor at the four corners. Lavatory accommodation is provided on the top floor, with access by means of a lift. The opening of the room took place on the 22nd April, 1867.

The buildings were designed and carried to completion by the late Mr. T. H. Wyatt, of London, his design being selected in competition; and the foundation stone was laid at the corner of Chapel Street and Rumford Street on the 17th September, 1864, by the Chairman of the Exchange Company, the late Mr. Charles Stewart Parker, in the presence of the Mayor and Corporation and the members of the Dock Board.

The stone is marked by a small recessed panel faced with granite, and contains the usual sealed bottle with coins and papers.

On "The Flags" stands the striking bronze monument to Nelson, raised by public subscription, representing him in the act of receiving the fourth crown of victory, and having at the same moment the hand of death laid upon him. Four figures in chains form emblems of enemies vanquished at St. Vincent, the Nile, Copenhagen, and Trafalgar. The spaces between these figures, on the sides of the pedestal, are filled by four bas-reliefs in bronze, representing some of the important naval actions in which the great Admiral was engaged. The monument was completed in 1813, from the designs of Mr. Matthew C. Wyatt, by Mr. Richard Westmacott.



CITY HOSPITAL, FAZAKERLEY. -

The present hospital, which is used for the treatment of infectious diseases, is situated just outside the city boundary (on the Harbreck Estate) at Fazakerley, about five miles from the Town Hall, and is most easily reached by train from the Exchange Station (Lancashire and Yorkshire Railway).

There is accommodation for 150 patients, with porter's lodge, administrative block, laundry, five ward pavilions, isolation pavilion, mortuary and discharge block. The majority of these buildings were erected during an epidemic, and the work was very rapidly performed: a ward pavilion being erected complete in about four weeks. These pavilions are constructed with a brick foundation, timber sides, weather-boarded outside, match-boarded inside, and open timber roof covered with slates. They are heated with double stoves, and the drainage is of the most modern sanitary description. All rain-water is conveyed directly to the Fazakerley Brook, but the soil from the Hospital is treated by the bacteriological process, the effluent, which is very clear, passing off into the brook after treatment.

The administrative block was formerly a dwelling-house known as "Harbreck House," which has been altered and additions made to accommodate the Hospital staff. All the nursing staff and servants are housed in this block, and the whole of the cooking for the Hospital is done therein.

THE NEW HOSPITAL.

It is intended to build a new Hospital in nine ward pavilions and four isolation blocks on the same estate, to the northward of and some distance from the present Hospital, to

accommodate 300 patients. In addition (placed centrally for convenience of administration) will be the administrative block, kitchen block, nurses' home, laundry, and dispensary. The entrance to the Hospital will be in Longmoor Lane, and at this entrance it is proposed to place the doctor's house and porter's lodge. In Lower Lane the discharge block will be placed, whilst close to is the mortuary.

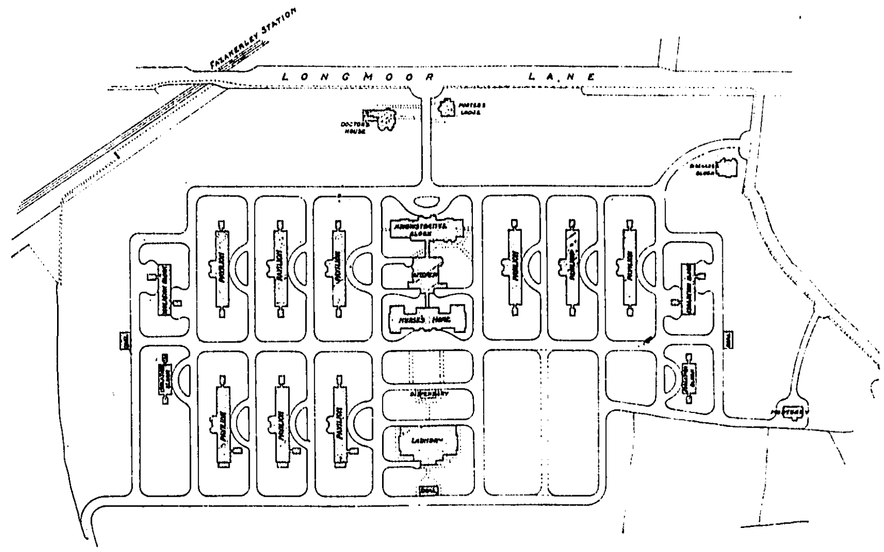
The whole of the buildings will be of brick and stone, and the drainage system will be the same as described for the present Hospital, but part of the sewage will be turned on to the land.

The administrative block will contain the residences of the assistant doctors, matron, assistant matron, and maids, all the nursing staff living near to in the nurses' home. The administrative block, kitchen and nurses' home, will be connected with each other by corridors.

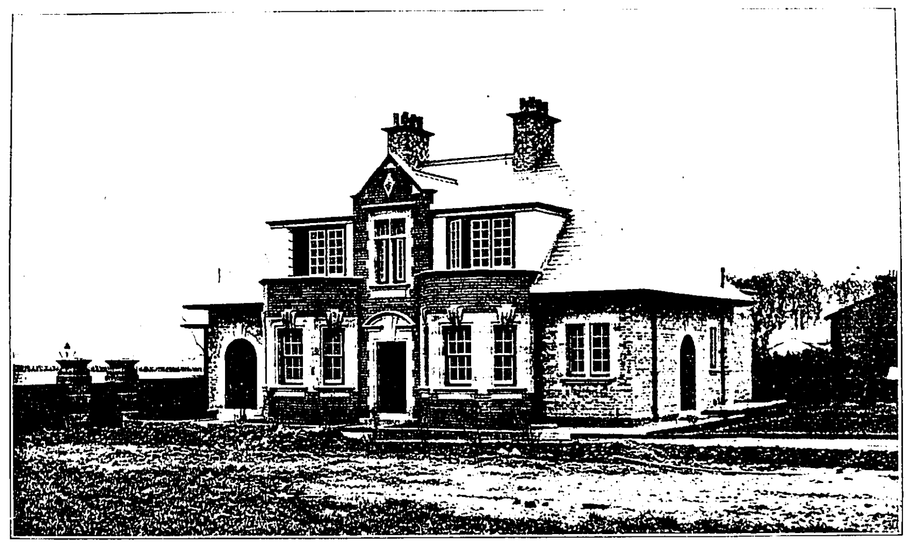
The whole of the cooking for the Hospital (both for staff and patients) will be done in the kitchen block, which is situate between the administrative block and nurses' home, and connected therewith. All the stores for the Hospital will be received and kept in the kitchen block.

The accompanying plan more particularly shows the disposition of the various buildings, both as regards the existing Hospital and the proposed new Hospital.

The cost of the latter, it is estimated, will be about £130,000, exclusive of furniture.

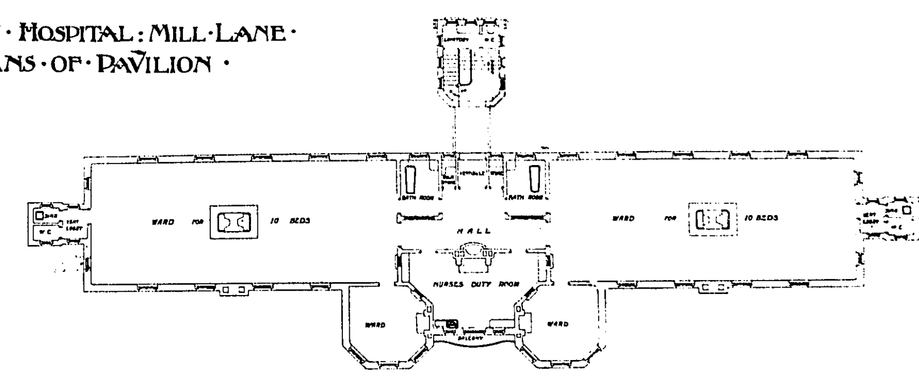


NEW HOSPITAL, FAZAKERLEY.



CITY HOSPITAL, DISCHARGE BLOCK.

· CITY · HOSPITAL : MILL · LANE ·
· PLANS · OF · PAVILION ·



FIRST FLOOR PLAN

GROUND FLOOR PLAN

CITY HOSPITAL SOUTH, GRAFTON STREET.

This Hospital was erected about 15 years ago, from the designs of Messrs. Simpson and Allen, of London, which were the first premiated ones in a public competition. The Hospital is for the treatment of infectious diseases, and provides accommodation for 69 patients. The buildings comprise an administrative block, laundry, disinfecting and discharge blocks, isolation ward for five patients, and two ward pavilions for 32 patients each, the porter's lodge and waiting room being placed at the entrance.

The ward pavilions are two stories in height, and each floor consists of two wards for eight beds each, with nurses' duty room, &c., between, the sanitary annexes being at each end of the wards. The buildings are simple in design, and are built in common local grey bricks, with red pressed dressings and slated roofs, simple in character. They are lighted by electricity, and the wards are heated by double stoves. The plan has proved to be an admirable one for efficiently working the Hospital, both as regards the patients and the staff.

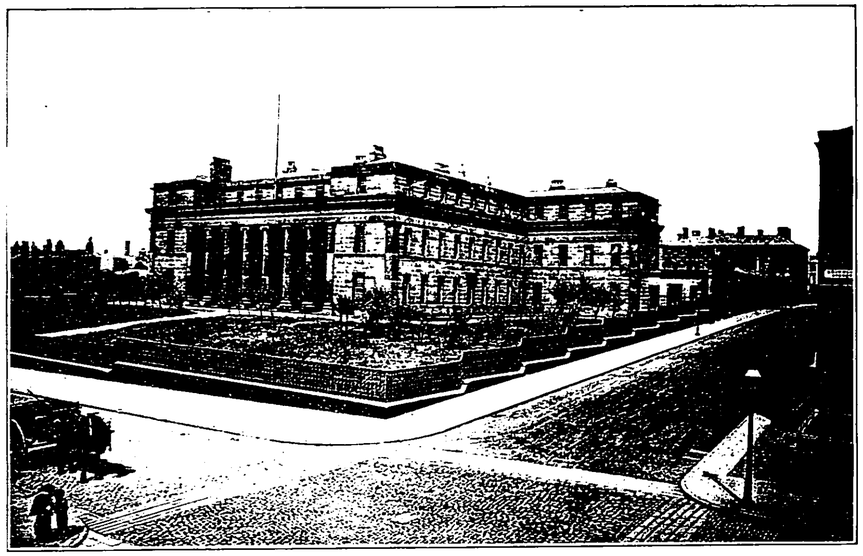
CITY HOSPITAL EAST, MILL LANE, OLD SWAN.

This Hospital, which is used for the treatment of infectious diseases, provides accommodation for 120 patients and staff, and covers an area of about 4½ acres. The buildings comprise two one-story ward pavilions each for twelve patients, one isolation block for eight patients, and two ward pavilions two stories high,

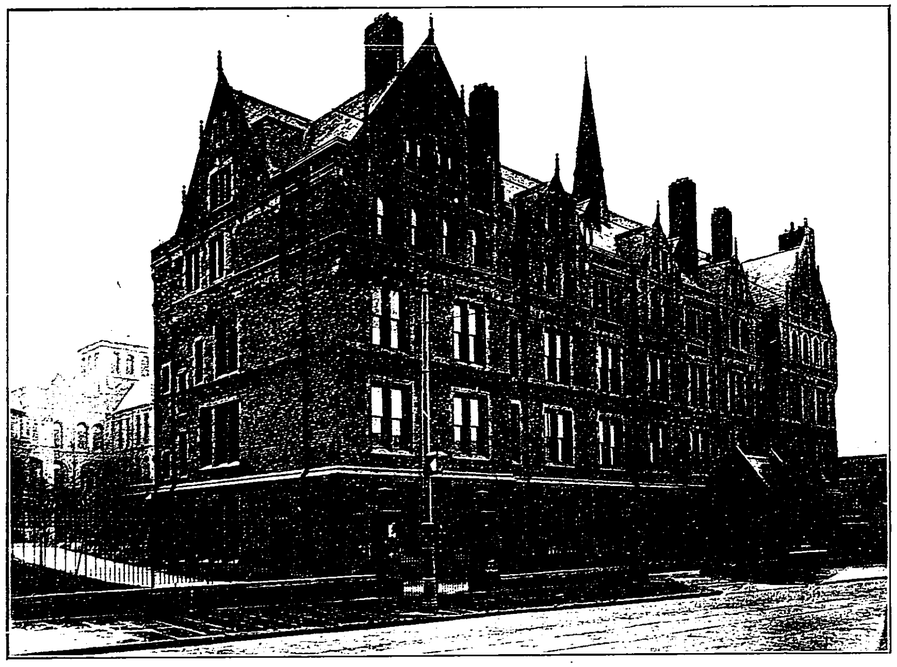
each accommodating 44 patients. The administrative block and the nurses' home are connected by a covered corridor. At the entrance in Mill Lane the porter's lodge and discharge block are situate, and the other buildings within the grounds comprise the laundry, mortuary, and laboratory.

The whole of the buildings are lighted by electricity, and the wards are heated by double stoves and radiators. The two large pavilions differ in plan, one being of what is known locally as the "Brook" type, and the other the "Edinburgh." The "Brook" type consists of a long ward on each floor 120 feet by 26 feet, the entrance being at one end. At the entrance the nurses' duty room, and a small separation ward for two beds is placed, with bathrooms and larders on the opposite side of the corridor. The sanitary annexes for these wards are placed in the centre, and are entered from the ward through a lobby which is disconnected. Accommodation is also provided at the entrance in connection with the staircase to the upper floors for a nurses' robing room, lavatory, &c. At the opposite end of the ward a verandah is provided for each floor.

The "Edinburgh" pavilion consists of two wards on each floor 64 feet long by 26 feet wide. In the centre of these wards is the entrance, bathrooms, hall, and nurses' duty room, a small separation ward being placed on either side of the latter room. The sanitary annexes are situate at the other end of the building on each floor. The upper floor is reached by means of a centrally placed outside staircase, and in connection with this staircase a lavatory is provided on each floor for nurses. The floors of both the "Brook" and "Edinburgh" wards are of pitch pine boards, nailed down to breeze concrete, the floors of the sanitary annexes being tiled. The sanitary fittings throughout are of the best glazed whiteware, and of the most modern description. Externally the buildings are faced with red wire cut bricks with terra cotta dressings, and the roofs are covered with green Westmoreland slates.



SECOND BUILDING. OPENED 1824.



NEW BUILDING. ADMINISTRATIVE BLOCK.

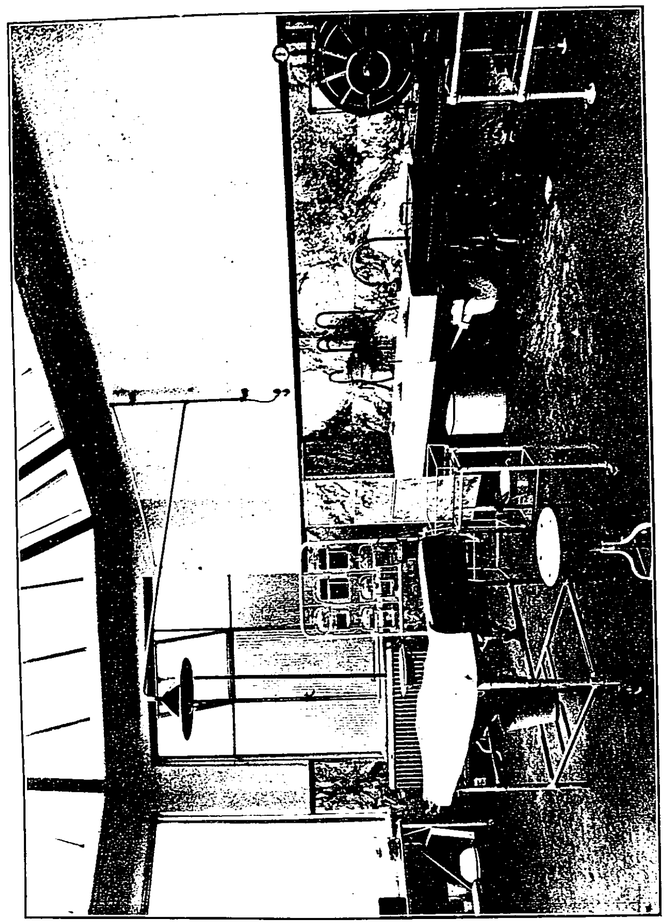
ROYAL INFIRMARY.

In the year 1745 certain benevolent inhabitants of Liverpool determined to establish a "Public Infirmary." The object of this Institution was the reception and treatment "of all poor diseased or hurt persons," "not with any partial view of serving the town only, for which a very small building would have been sufficient, but to make provision for the many objects that appeared in distress from all parts of the nation and Ireland." The Corporation at once fell in with the scheme, and granted a lease for 999 years of a large field, now the site of St. George's Hall. The first building was opened for the admission of patients in 1749, and cost £2,618. About 1750 a portion of the land of the Infirmary was leased off for the erection of "a Hospital for decayed Seamen, their Widows and Children," and in 1792, an asylum for lunatics was also built.

The site of the Infirmary and its adjuncts, having become desirable for the purposes of the improvements contemplated by the Corporation, and the accommodation it offered being inadequate for the demands made upon it, by arrangement a new site (now bounded by Pembroke Place, Brownlow Street, Brownlow Hill, and Ashton Street) was granted by the Corporation, in addition to an annual contribution of two hundred guineas. Plans were prepared, and the foundation stone of the new Hospital was laid on the 27th July, 1821. This building cost £20,426, and was occupied in October, 1824. The demands for admission to the Infirmary having become greatly in excess of its accommodation, the Committee, as a remedy (in 1834), erected a separate building in Ashton Street for the reception of the lock patients, and so relieved the general

wards. A new lunatic asylum was also built in the year 1830. The Institution was now a very complete means of teaching medicine and surgery, and had been acknowledged as such by the Council of the Royal College of Surgeons since 1829. The Medical School in Dover Street was commenced in 1844, and has become one of the most important centres in the provinces for the instruction of medical students. Recently it was absorbed by University College as part of their establishment. In 1862, a Nurses' Home was built on land belonging to the Infirmary as a residence for the staff of the Hospital, and (until 1897) was a governing centre for four district homes, from which the sick poor were nursed in their own homes. It was the gift of the late Mr. William Rathbone. Two new special wards for women were added to the Hospital in 1863, the result of a donation of £10,000 from Mrs. Thornton, of West Derby.

In the year 1881 a portion of the Hospital land occupied by the Lunatic Asylum was acquired by the London and North Western Railway. The purchase money from the Railway Company became the nucleus of a fund for rebuilding the Hospital on more modern lines, and a subscription list to render this possible was instituted. To this the Corporation contributed the handsome sum of £15,000, and further subscriptions, amounting to £55,000, were promised at a public meeting held at the Town Hall in December, 1882. The present Royal Infirmary was commenced in 1887 on the old site, to which large additions had been made by purchase and the closing of two streets by Act of Parliament, with the consent of the Corporation. The foundation stone was laid on 29th October, 1887, by the then Earl of Derby, and the new buildings, upon which (with the enlargement of the site and furnishing) the sum of £181,000 had been expended, was opened free of debt exactly three years subsequently by the late Duke of Clarence. This Hospital contains 300 beds in eight pavilion and four circular Wards, connected by wide corridors, and all are lined with glazed bricks. There are four operation and two lecture theatres, a



ROYAL INFIRMARY. VIEW INSIDE ONE OF THE NEW OPERATION ROOMS

beautiful chapel, a steam laundry, and every accessory for conveniently and economically carrying on the work of the Institution. Two of these theatres have lately been added to the building. They stand side by side above the old one, with its antiquated amphitheatre of seats, with a central lobby giving access to both and an anæsthetic room on either side. They are lighted on three sides with a sloping skylight, giving a wide range calculated to avoid shadows of the operator upon his subject, and a large bow window occupies the north ends providing horizontal illumination. The walls are lined to the height of 5 feet with alabaster, and above that with Parian cement and enamel paint. The floors are covered with a new impervious material. There are electric fittings for night work, novel lavatory arrangements and special steam appliances for sterilizing dressings, instruments, and water. Sir Frederick Treves, when opening these theatres in October last, remarked of them that "he found every modern requirement worked out with one striking feature, that of extraordinary sound practical commonsense."

The building is acknowledged by experts to be an example of what is desirable in hospital construction, and it is constantly visited by those who are interested in such matters. Over 3,000 patients pass through its wards annually, and about 20,000 others receive attention in the Casualty Department.

The title "Royal" was conferred by special dispensation by Her late Majesty Queen Victoria in the year 1851, and the King became a Life Trustee when Prince of Wales in 1865.

ROYAL SOUTHERN HOSPITAL. - -

The Southern and Toxteth Hospital was opened on the 17th January, 1842, during the Mayoralty of Robertson Gladstone, and under the Presidency of Joseph Brooks Yates. The name was altered in 1856 to the Liverpool Southern Hospital, when Francis Shand was Mayor and James Ingram, President.

With increasing traffic along the docks it soon became too small for the requirements of the South End of Liverpool, and steps were taken to found a larger hospital in the vicinity.

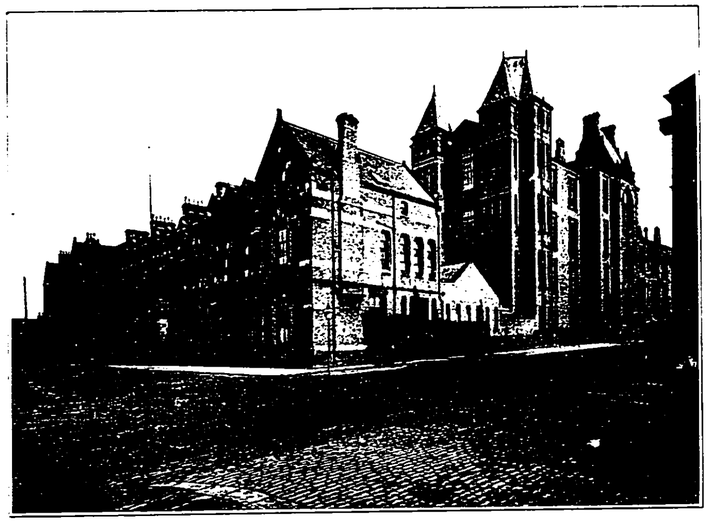
The site selected was at the corner of Hill Street and Caryl Street; a total of 8,140 superficial yards was secured, on which now stand the present buildings, with a home for nurses, engine house, pathological research room, mortuary, &c.

The construction of the new hospital was commenced in 1867, during the Presidency of George Henry Horsfall, when the Earl of Derby laid the foundation-stone, Edward Whitley being Mayor of Liverpool. The architects were Messrs. Culshaw and Sumner, and the building was completed in 1872.

The hospital was opened free from debt on 21st May, 1872, by His Royal Highness Prince Arthur.

His Royal Highness, after passing through and naming different wards, arrived at the Albert Ward, where he declared the hospital open, and, by the gracious permission of Her Majesty, gave it the name of "Royal," so that henceforth it would be known by the name of the "Royal Southern Hospital."

It is worthy of note that the result of a bazaar and fancy fair held in Sefton Park during the week beginning Monday, 20th May, realised, after paying all expenses, the handsome sum of £20,152 13s. 1d. in aid of this charity.

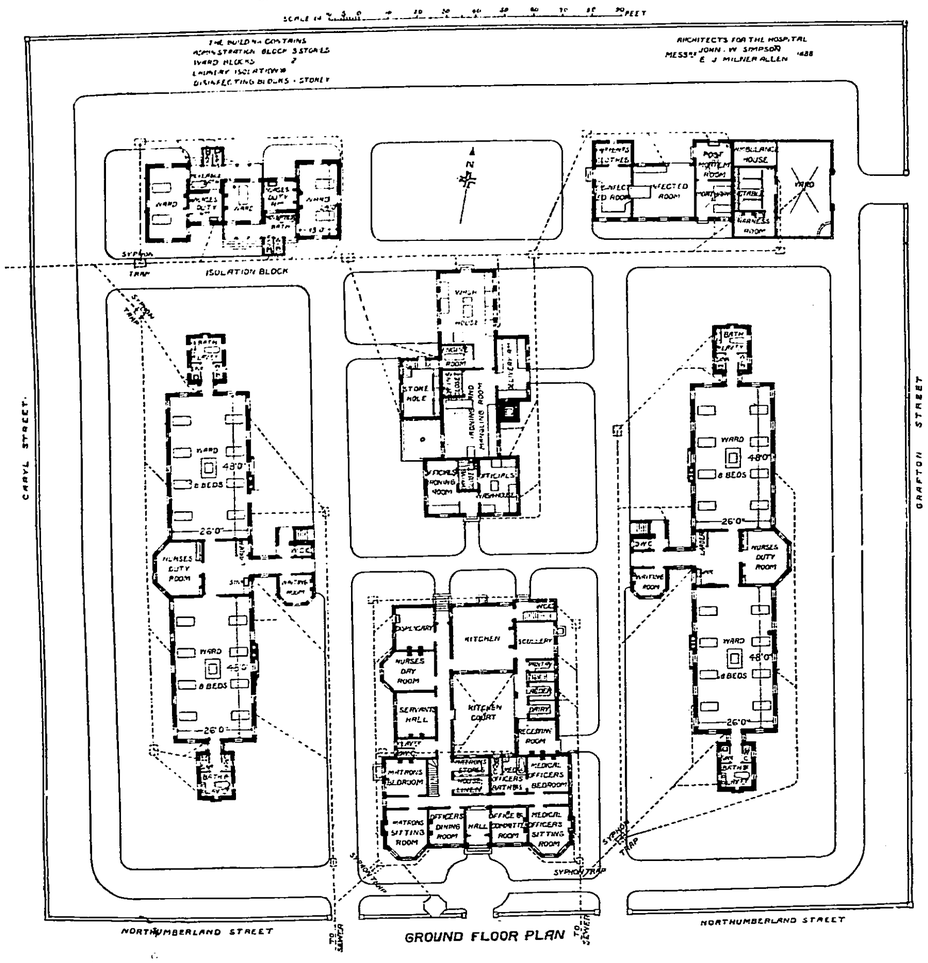


ROYAL SOUTHERN HOSPITAL.



VIEW OF A WARD, ROYAL SOUTHERN HOSPITAL.

CITY OF LIVERPOOL SOUTHERN INFECTIOUS HOSPITAL



The institution contains eleven wards; the larger wards have 26 and the smaller 14 beds each, or 40 beds on a landing.

Since 1872 till now this building and adjuncts, erected at a total cost, including land, of about £55,000, with accommodation for 204 in-patients, has been the only hospital of its kind at the South End of Liverpool, and at times is taxed to its utmost limit.

In 1902 the patients treated in the wards were 2,431, while the total cases treated in the hospital were over 60,458.

The Samuel Henry Thompson landing, devoted to the reception of patients suffering from tropical diseases, continues to do much good, and, since it was opened by Lord Lister in 1899, 552 cases have been received and treated in the ward, many of which were very severe. Nine nurses were trained for colonial nursing.

The nationalities of the patients and the diseases from which they suffered, shows that it is the shipping interests of the port that are concerned in maintaining this department in a thoroughly efficient condition.

The ships of the port are the sole feeders of the ward.

It is interesting to note that, as compared with the year ending 31st December, 1872, the year the hospital was opened, when vessels of 1,013,342 tons used the docks south of the Canning Dock and Basin, there was last year a total tonnage of 2,134,687 tons, or an increase of 1,119,345 tons.

In connection with the hospital there is a fully-equipped horse ambulance, maintained by the Corporation, which is doing a splendid work for the South End of the city. During 1902 there were 458 cases brought by it to the hospital, and, being "at call" on the telephone system, it is always available.

DAVID LEWIS NORTHERN - HOSPITAL. -

This Hospital was built by the David Lewis Trust to replace the old Northern Hospital (built in 1845), and was formally opened on March 13th, 1902, by H.R.H. Princess Louise, Duchess of Argyll.

It is situated on a site containing about 12,000 square yards, and has entrances from Great Howard Street and Leeds Street.

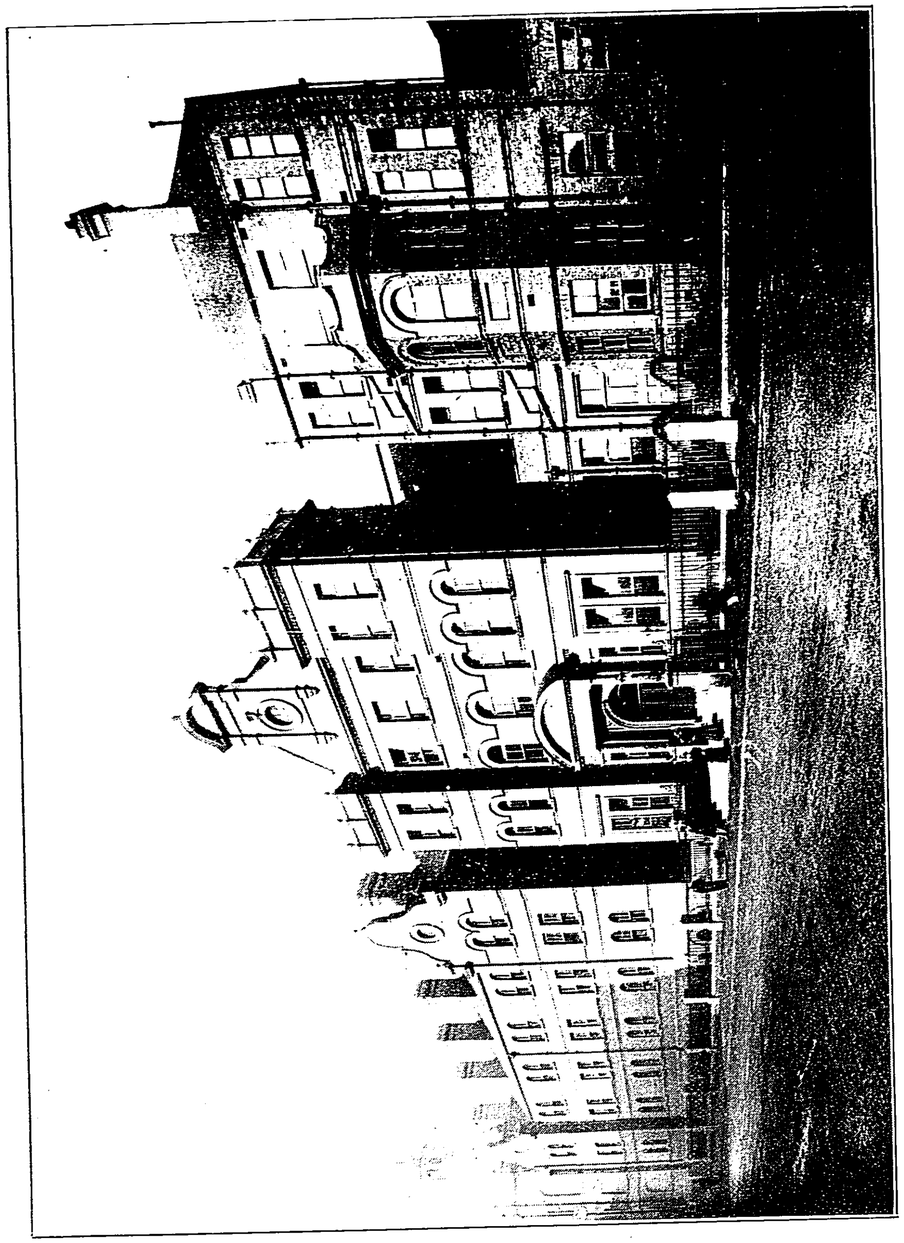
On each floor of the building, and running the whole length of it, is one main corridor, from which there is easy access to all parts of the hospital.

The wards, in which there are about 200 beds, are contained in three pavilions, each three stories in height, one circular and two rectangular; the top circular ward, which has a flat roof forming a play-ground, is devoted to children.

In the small corridor leading to each ward is the Nurses' kitchen with an open safe in the wall, and an inspection window over-looking the ward; and on the opposite side of the corridor are the isolation ward, the dining room for convalescent patients, and the bath rooms in the rectangular pavilions.

The w.c's. are placed in sanitary towers cut off from the wards by short flying bridges, and in the circular pavilions the bath rooms are contained in these towers.

There are in other parts of the hospital special isolation wards opening from the main corridors, but isolated from them.



DAVID LEWIS NORTHERN HOSPITAL.

The operating theatre occupies the first floor of a block of buildings in the rear of the main corridor, with direct communication with the same, and is provided with abundance of light from the sides, in addition to a large top light. The floor is formed of Terrazzo, with a rounded skirting of the same material, and the walls and ceiling are faced with glazed tiles. Ventilation is secured by means of an electric fan, which draws the air through jute screens where it is filtered and washed, and it is afterwards warmed by passing over steam radiators. The theatre is furnished with all the most modern appliances, and communicating with it are an anæsthetising room and an ante room.

Under the theatre is the room devoted to the treatment of lupus by the Finsen light, and communicating with it is a dark room in which are taken photographs by the Röntgen ray apparatus. Beneath this room is situated the Turkish bath.

The administration block is placed in a central position, while the kitchen is on the top floor, and is connected with the store rooms and the main corridors by means of hydraulic lifts.

The accommodation for the reception and treatment of accident cases is conveniently arranged; and the out-patients' department is apart from, though connected with, the rest of the hospital. It has a separate entrance and exit, and contains a large waiting room, round which are grouped the various consulting rooms. A special feature in the planning of this department is that the patients are enabled, after being examined in the consulting rooms, to proceed directly to the dispensary, procure their medicines, and leave the building without again passing through the waiting room.

The mortuary contains a handsome sarcophagus capable of receiving four bodies, and maintained at a constant temperature of about 32 degrees Fah. This building, together with the post-mortem rooms, disinfecting house, &c., are isolated from the main buildings.

Access to these buildings, as also to the ambulance house, stable, boiler house, &c., is given from Leeds Street by means of an inclined road with an easy gradient.

The laundry is fully equipped with modern appliances, and is so arranged that no steam from it can enter the hospital.

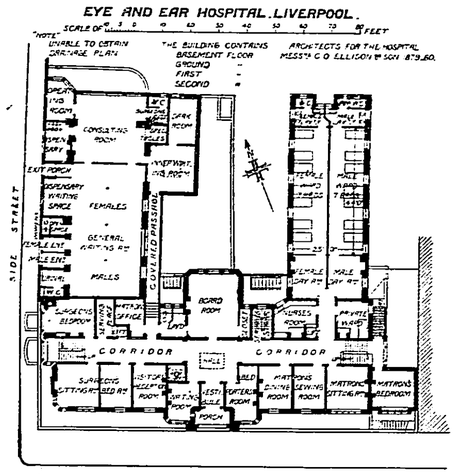
The Nurses' Home is a separate block connected with the main building on the ground floor only. It is three stories in height, and on each floor is a central corridor, on either side of which are the bedrooms giving accommodation for 66 nurses, &c. A sitting room, bath rooms, &c., are provided on each floor.

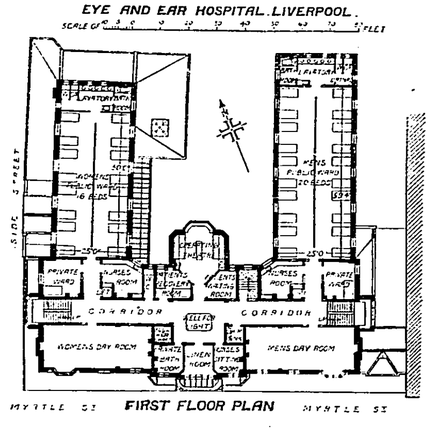
A Chapel, with a handsome wainscot of oak, and a large recreation room are contained in the hospital.

The whole building is lighted by electricity, and is heated by means of ventilating hot water radiators on the low pressure system. In addition to the hot water heating, the wards have central fireplaces back to back.



EYE AND EAR INFIRMARY.





LIVERPOOL EYE AND EAR INFIRMARY.

The Liverpool Ophthalmic Infirmary was founded in August, 1820, in a house at the corner of Wood Street and Slater Street. In 1841, at a public meeting of the town, it was united with the Ear Institution, and assumed its present name of the Liverpool Eye and Ear Infirmary. About this date it moved to a house in Harford Street, Mount Pleasant. In 1851 or 1852 larger premises were secured at the top of Mount Pleasant, and the ever-increasing work of the Charity was carried on there till the removal to the present building in 1881.

The following account of the present building in Myrtle Street is condensed from Sir H. C. Burdett's well-known work "Hospitals and Asylums of the World."

The Infirmary is built in the shape of an ⊔ the principal frontage being in Myrtle Street. This frontage is bisected through its whole length by a corridor with a staircase at each end.

In the basement are the kitchen, offices and storerooms, with furnace for the heating apparatus. There are two covered airing courts, and a space for a laundry.

On the ground floor the front part is devoted to residences for officers; the main entrance, with porter's room and small waiting-room, and the board-room.

The left wing on the ground floor contains the out-patient waiting-room, consultation-room, dark room and dispensary.

On the first floor one wing is arranged to hold fourteen beds, with lavatories, bathrooms, and nurses' kitchens, for female patients; the corresponding wing to hold sixteen beds for males.

On the second floor the wards are arranged in a similar manner.

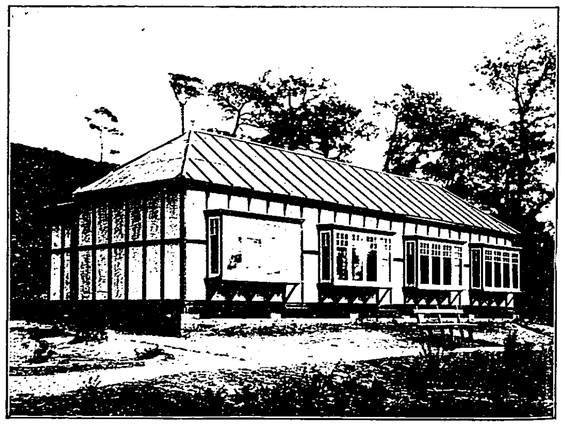
In the front of the building on the first and second floors are day rooms for the patients and nurses' sitting-rooms. At the back of the building, and over the board room, are operating theatres, one on each floor. According to the latest Annual Report 6,698 new eye cases and 2,154 new ear cases were seen and prescribed for 28,617 times in the out-patients' department. There were 694 in-patients during the year 1902, and 613 important operations were performed. It was in this Charity that operations, under chloroform, were first performed in Liverpool.



THE SANATORIUM, DELAMERE.



BUNGALOW.



BUNGALOW.

HOSPITAL FOR CONSUMPTION.

In the year 1863 this Charity was started at a small house in Crown Street. It was, however, soon apparent that not only did a real want, but a great want, exist in Liverpool for such an Institution, and larger premises were taken in Soho Street. After a few years these in their turn were found insufficient, the premises now occupied in Mount Pleasant were secured, and good work has been done, notwithstanding the fact that the premises are quite unsuitable for carrying out the treatment of this great scourge of Consumption. The Committee have now in contemplation the re-building of these premises, and it is hoped that the new Hospital in Mount Pleasant will be ready for occupation by June, 1904.

In their Second Annual Report (1864) the then Honorary Medical Staff reported to the Board of Management—"We feel convinced that unspeakable benefit would arise from the transfer of some of our patients to a Sanatorium outside of Liverpool, and easily approached by rail. This at present may be beyond your means, but we trust the time will shortly arrive when we may have the power to offer such a boon to those really requiring it."

Owing to the many claims upon the citizens for other and which were considered more urgent and immediate demands, the Committee were unable to carry out such a venture until the year 1901, when the President (the late William Rathbone) received an intimation from two respected citizens (Lady Willox and Mr. W. P. Hartley) that they were willing to jointly bear the entire cost of erecting a Sanatorium in the country, as an adjunct to the Mount Pleasant Hospital.

This munificent offer was most gladly availed of, and now there stands erected the first public Sanatorium in connection with a Philanthropic Institution in England. Thus Liverpool has led the way in this connection.

It is beautifully situated on "Rough Hill," in the parish of Kingswood, Delamere Forest, and commands delightful views.

A view of the main building is displayed, together with two of the Bungalows.

Accommodation is provided for forty patients but this falls far short of the number of applicants who seek admission, and a new wing providing for an additional twenty persons is about to be erected.

The Institution is partly self supporting, but of course the charge to patients does not meet by any means the actual cost, which is supplemented by voluntary contributions. The privileges of subscribers are as follows:—

Subscribers of 20 Guineas per annum are supplied with 13 monthly "Recommendation" Forms, each entitling the patient to all the benefits of the Sanatorium for a payment of 12/6 per week.

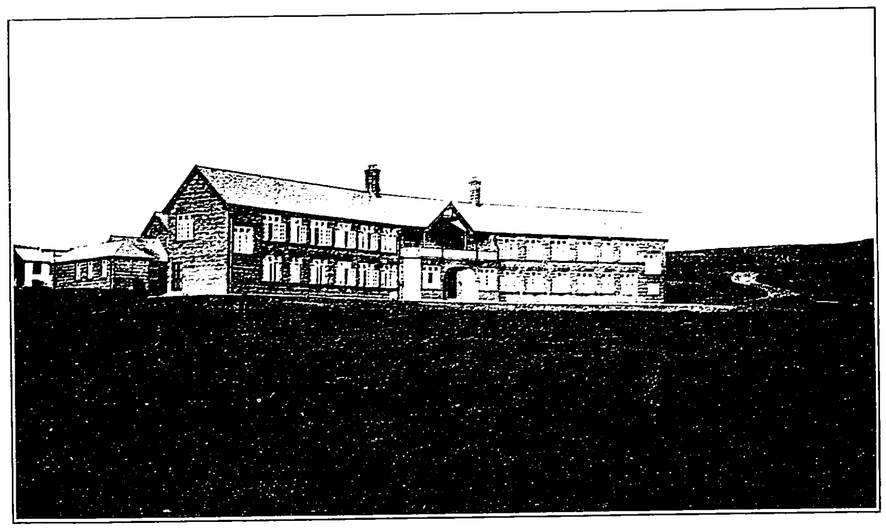
Subscribers of 10 Guineas per annum are supplied with 6 monthly "Recommendation" Forms.

Subscribers of £2 2s. per annum are supplied with 1 monthly "Recommendation." Form.

SANATORIUM, HESWALL.



VIEW FACING WEST.



VIEW FACING SOUTH.

WEST DERBY, LIVERPOOL, AND TOXTETH PARK JOINT HOSPITAL. - - - -

This Hospital for Consumption is situated at Heswall, Cheshire, and is the outcome of a Conference held four years ago between the Guardians of the West Derby Union, the Guardians of the Parish of Liverpool, and the Guardians of the Township of Toxteth Park.

Accommodation has been provided for 24 patients—12 males and 12 females—and the building is capable of extension for double the present number of beds.

The land is 15 acres in extent, and there remains adequate room for further building operations.

The cost of the land, Hospital, and furnishing was £12,000, and this amount was obtained by loan. Including the land, the average cost per bed for the number now provided for would be £500, but excluding the land the figure would be £338.

Administrative departments, and rooms for the Staff, having been provided, it will be observed that in enlarging for the treatment of a greater number of cases the average cost per bed will work out materially less than now.

The site of the Hospital is situated on the hillside at Heswall, well sheltered from the east winds, and commanding extensive views of the Estuary of the Dee and Wales. The buildings are built with the main front facing due south. The administrative block is placed in the centre, and contains the various rooms necessary for the Staff.

Immediately in front on the first floor is an open air Sun Bath, divided for both sexes. On either side of the administrative block are the two wings, two stories high, containing Dormitories for 24 patients, 12 male and 12 female, divided as follows on either side:—2 Dormitories for 3 patients, and 6 Dormitories for 1 patient.

To every patient 1,000 cubic feet of air space is allotted. All the windows are made to open as casements, and all the rooms are heated when necessary during the very inclement weather. All the Dormitories are connected with the administrative block by corridors.

Separate Bath and Lavatory accommodation is provided on each floor for each sex, and separate staircases are provided for the two sexes for ordinary use and in case of fire.

In the rear of the main building is the Dining Hall, connected by corridors, with cross ventilation, and fitted complete with the usual kitchen and other offices.

The Water is supplied from the West Cheshire Water Works, and the drainage is dealt with on up-to-date lines.

A large open Verandah is arranged, running in front of the Sanatorium and facing south, the object being to treat patients in the recumbent position for several hours daily. Wind screens are placed at each end to protect the patients from gales. Small Summer Houses and Moveable Shelters are also arranged in the grounds. The grounds are laid out in their natural state of heather growth, so as to provide gentle walking exercises for the patients, with frequent seats for rest.

The patients spend the whole of the day in the fresh air either outside on the Verandah or in the grounds, or in their bedrooms, according to medical direction. After dark they have

ample and well-appointed day rooms in which to read or otherwise amuse themselves. These day rooms are comfortably warmed and ventilated.

Special provision is made for collecting and destroying all the expectoration of the patients, this being the chief means by which the disease is spread. Each patient is provided with two glass flasks with carefully fitting covers, into which he must spit. When one flask is being cleansed and disinfected the other is in use.

The Sanatorium is complete in every detail, and is admirably equipped for its purpose, *viz.*, to treat consumption in the early or curable stages. It has been in full working order for some time, and so far the results have been most encouraging; the great majority of the patients are visibly improving.

The Nursing Staff is an excellent one; the Matron and the Nurses have their hearts in the work, without which good results must not be expected.

The Committee, advised by their Medical Staff, have spared no trouble nor necessary expenditure to make the Sanatorium perfect in its equipment.

THE LIVERPOOL - DENTAL HOSPITAL.

This Hospital was founded some 40 years ago by the late Mr. W. J. Newman, to afford relief from dental trouble to the deserving poor. Gradually Mr. Newman was joined by other dentists of a like mind, who gave their services, providing their own instruments, and the room was opened every morning.

In the early seventies the opportunity occurred of purchasing the present building in Mount Pleasant.

On the passing of the Dentists' Act, 1878, dental education became compulsory, and, as the number of patients at the Hospital had become considerable, it was decided to establish a Liverpool School of Dental Surgery, in affiliation with the then Liverpool School of Medicine (now affiliated with University College). Under these circumstances it became necessary to increase the accommodation, and about ten years ago an operating room, specially adapted and fitted with every modern appliance, was provided and fitted up with 40 operating chairs. Here, the up-to-date principles and practice of conservative dentistry (by which is meant the saving of natural teeth) are taught and practiced daily. Upwards of 23,000 patients were treated and 10,000 conservative operations were performed during the past year.

In compliance with fresh requirements of the curriculum, a laboratory has been built at the rear of the Hospital, where mechanical dentistry in all its branches is taught and practiced, so that it is now possible for students to obtain at the Liverpool School the full equipment of instruction and practice necessary to prepare them for the dental examinations of the licensing bodies.

The School is self-sustaining. The Dental Hospital is supported by subscriptions and voluntary contributions. The expenditure averages toward £500 a year, and the charity is among the most useful and deserving of all those which Liverpool supports.

HOSPITAL FOR WOMEN, SHAW STREET. - -

This Hospital was opened in 1883, and is exclusively devoted to the treatment of diseases peculiar to women. The Charity has grown out of one of the oldest in Liverpool, namely, the Liverpool Ladies' Charity, founded in 1796. The buildings of the Hospital cost £9,600, and contain 55 beds. Of these six beds are set aside in pay-wards, which are not allowed to be a source of profit. A new operating theatre, fitted with the best and most modern appliances, has recently been opened. The Hospital also serves a large radius outside the Liverpool district, including North Wales, the north of England, and the Colonies.

Probationer-nurses are trained in the Hospital, and a private nursing staff of fully trained nurses is much appreciated by the public. Subscribers' recommendation forms are not required. The admission of in-patients and the attendance on out-patients is regulated by the sufferings and necessities of the patients. Two-thirds of the in-patients are admitted on the direct recommendation of their medical attendants, also not infrequently the latter accompany the members of the surgical staff of the Hospital during their visits.

The Hospital is affiliated with the Victoria University, and the London Conjoint Board of Physicians and Surgeons recognise the clinical instruction given in the Hospital to medical students. Each member of the surgical staff of the Hospital is engaged purely in consulting work.

The Hospital is supported by voluntary contributions. The subscription list is about £700 from over 500 subscribers. As the ordinary expenditure of the Hospital approximates about £4,000,

the Committee of Management depend upon donations, paying patients, private nursing fees, and interest on invested Endowment funds (which latter now amount to £7,542 9s. 6d.) to make up the balance.

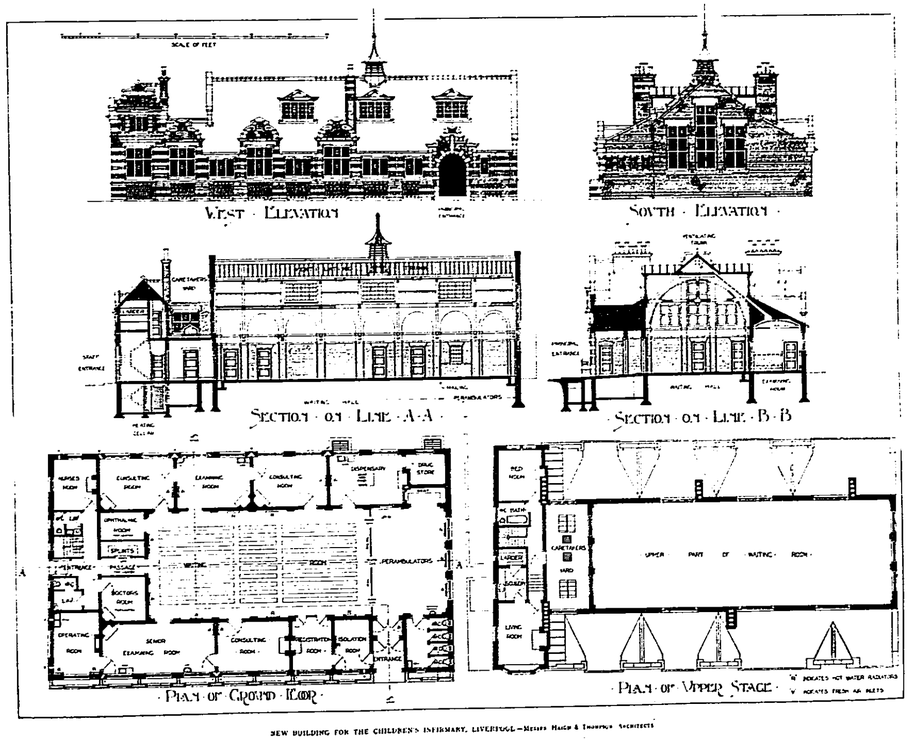
The conduct and organisation of the Charity is, to a large extent, conducted by voluntary work, and the Hospital can justly claim that its percentage of cost of administration to that of maintenance and total expenditure is lower than that of any similar institution in Great Britain.

During the 20 years of the history of the Hospital, ending 31st December, 1902, no fewer than 72,179 patients have been treated at a gross cost of £46,876 5s. 9d. The voluntary payments of patients and private nursing fees have reached the large total of £20,322 11s. 6d. in the same period, showing a net cost of £26,553 14s. 3d., or an average of 7s. 4d. for each patient.

Her Most Gracious Majesty the Queen has, this year, signified her intention of becoming the Patron of the Institution, and the Committee hope that the work of the Hospital will be extended, and its claim upon the public for recognition and support will be greatly strengthened by this recognition from Royalty. Without adequate support from the public, the excellent work of the charity cannot be maintained.



CHILDREN'S INFIRMARY.



NEW BUILDING FOR THE CHILDREN'S INFIRMARY, LIVERPOOL.—Messrs Haigh & Thompson Architects

LIVERPOOL INFIRMARY FOR CHILDREN.

The Liverpool Infirmary for Children is an exceedingly popular and useful institution.

A special feature is the new out-patients' department. This stands apart from the main building. The Patients' Entrance is at the South West angle of the building, approached from the principal thoroughfare called Mulberry Street and exactly opposite the Infirmary. It opens into a space for the accommodation of perambulators and through this communicates directly with a large Waiting Hall. The latter is placed in the centre of the building and round it are grouped the various Consulting, Examining, and Operating Rooms. Near the entrance is a Registration Room adjoining which an Isolation Room is provided from which infectious cases can be removed without their re-entering the main building. The dispensary is suitably placed opposite the principal entrance, to the right of which are also conveniences for the Women and Children.

At the North End of the building, next to Mulberry place, is the entrance for the Staff, near which the various rooms for Doctors and Nurses are situated, with Lavatories and other conveniences. An Ophthalmic Room is provided, also a Store for Splints, &c.

At this end of the building are placed the Heating Cellar in the basement, and on the first floor accommodation for the Keeper and his wife, with a small yard.

The building generally is one story high; the Waiting Hall being higher than the adjoining rooms (and above the Keeper's yard which is on first floor) can therefore be lighted and ventilated on four sides, which is an obvious advantage.

The rooms are warmed by Hot Water, the fresh air passing through the Radiators. Provision is also made for admitting fresh air by means of Leather's Ventilators. All windows have opening casements.

The various rooms have extract ventilators connected with a trunk in the roof which is turned into an automatic ventilator fixed in the centre of ridge to the main roof.

The interior walls are lined with glazed bricks, dado high, having round internal and external angles both horizontal and vertical. All the joints have been finished flush with Parian cement.

The wall surfaces above glazed bricks are rendered in Portland cement, finished with a smooth surface of Parian and painted in White Ripolin. The floors generally are paved with Terrazzo. The front entrance has an inclined plane without steps.

All lavatories, sinks, w.c.'s, &c., are bracketed from walls, without floor supports.

Electric light is used throughout.

The building has been built of Accrington red bricks with Darley Dale stone dressings, the roofs being slated.

THE LIVERPOOL COUNTRY HOSPITAL FOR CHRONIC DISEASES OF CHILDREN.

This Hospital, although only projected in 1898, was opened in 1899 in temporary quarters kindly placed at the disposal of the Committee at an annual rental by the authorities of the Children's Convalescent Home at West Kirby. Here the work has been carried on up to the present time with the most satisfactory results, and a permanent building, which will ultimately accommodate 200 children, is about to be erected on a splendid site overlooking the Dee at Heswall.

The object of the Institution is to provide for the uninterrupted treatment of children suffering from chronic ailments, whether medical or surgical, which cannot be satisfactorily dealt with in the wards of the City Hospitals. There is no time limit, so that all those subjects of chronic ailments, which constitute the major part of the children's cases occupying the wards of the urban Hospitals, are taken in hand and treated from first to last under the very best conditions in the fresh air of the country.

Only those cases are admitted which present a reasonable prospect of being cured or permanently benefited, and no incurable or simply convalescent cases are undertaken.

Patients are admitted mainly from Liverpool and Birkenhead. So far as possible children from other parts of the country have been admitted. A small charge for maintenance is demanded, varying with the means and resources available, but for those unable to pay anything free cots are provided.

While resident in the Hospital the children receive regular instruction from certificated teachers, and in many cases education is thus brought within their reach which was impossible to them while lying helpless at home.

Liverpool has been a pioneer in providing a Hospital of this much needed and unique type, and it is gratifying to note that already similar institutions have been started, or are being advocated, in other parts of the country.

THE LIVERPOOL CONVALESCENT INSTITUTION.

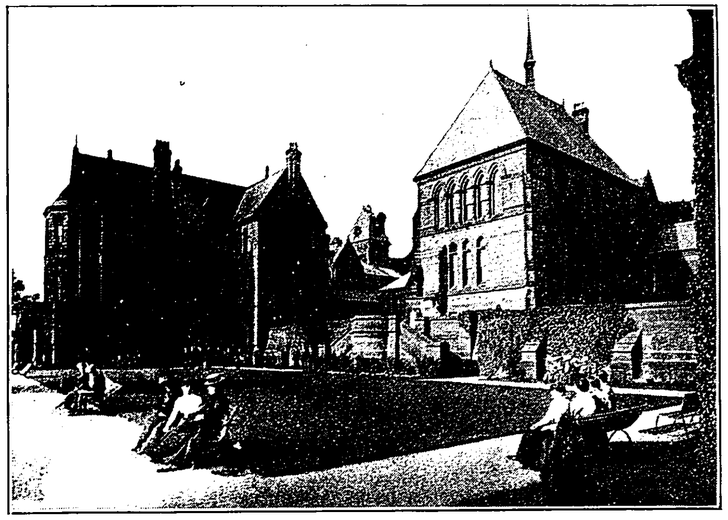
The Liverpool Convalescent Institution, Woolton, owes its origin to the surplus from the Liverpool Cotton District Relief Fund, which under Sanction of the Court of Chancery, accorded in 1868, was applied to the purchase of the estate comprising about twenty acres situated at Woolton, about six miles from Liverpool.

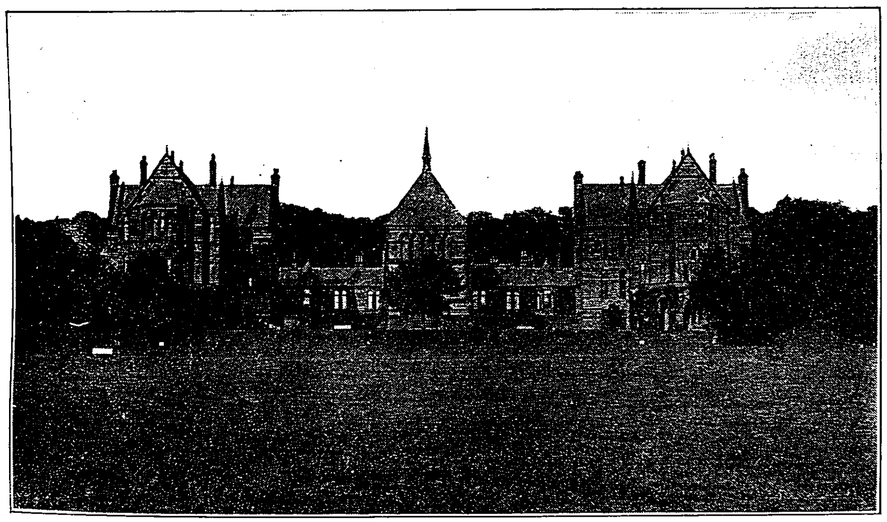
These funds, supplemented by large private donations, have provided for the erection and equipment of the present suite of buildings.

The site is elevated and commands extensive views of the Upper Mersey Estuary and of the Welsh Mountains, its open position renders it admirably suited for the purpose for which the Institution was established.

The work done is supplementary to the treatment in the various Hospitals, and is intended to restore to health and vigour patients who have undergone operations or who have otherwise suffered from infirmity or indisposition. Though largely used by the Hospitals it is also available to persons in failing health who simply need rest, pure air, change of scene, and good diet for complete restoration to strength and active life.

The institution is to a large extent self supporting, patients being admitted at a fixed charge, but if nominated by subscribers, at a lower rate.





CONVALESCENT INSTITUTION, WOOLTON.

The necessity and utility of an establishment of this kind is clearly demonstrated by the increasing number of patients who seek its benefits as shown by the following figures, viz.:—

The number of patients in		1882	was	902.
„	„	1892	„	1,700.
„	„	1902	„	2,672.

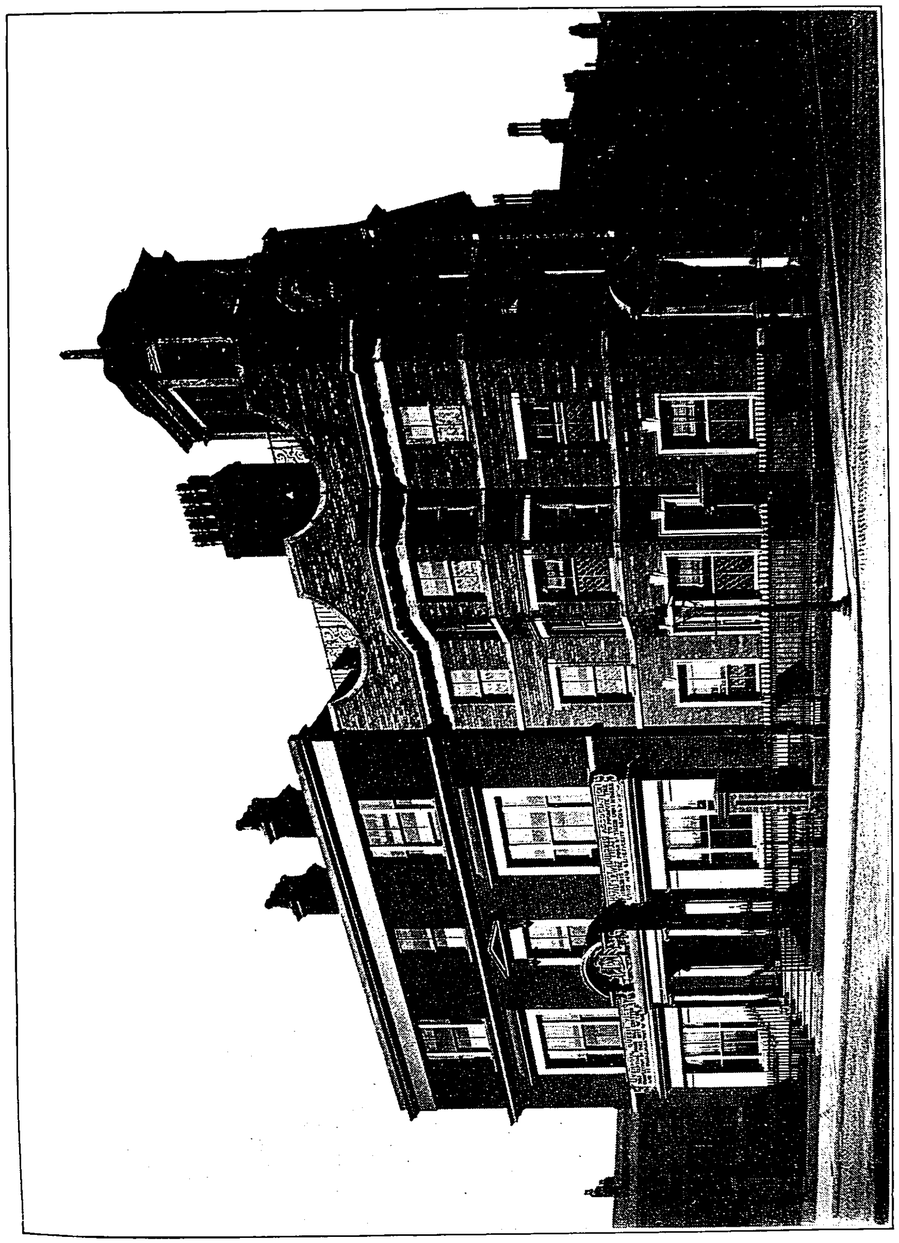
A noteworthy feature is that privileges are accorded to Donors and Subscribers, of which a few are as follows:— A subscriber of twenty guineas per annum, is entitled to nominate for one free bed per year, subscribers of smaller sums are supplied with nomination forms for shorter periods according to the amount subscribed.

LIVERPOOL QUEEN - VICTORIA DISTRICT - NURSING ASSOCIATION.

The employment of skilled nurses to attend the sick poor in their own homes was first commenced in Liverpool in 1859 by the late Mr. William Rathbone. In 1862 a Training School and Home for Nurses was formed in connection with the Royal Infirmary, for the purpose of supplying trained nurses who should be available for the staff of the Infirmary, for district nursing—*i.e.*, nursing the sick poor in their own homes—and private nursing. From 1862 to 1897 the district nursing work was carried on under the direction of the Training School. In 1897, however, it was decided that the proceeds of the fund, collected in the City for the commemoration of Queen Victoria's long reign, should be devoted to the maintenance and extension of the work, and a very generous offer was made by the David Lewis Trust to build a new Central Home, at a total cost not exceeding £10,000.

Under these circumstances it was felt that the time had come when a change should be made in the governing body, and that there should be included in it representatives of the Training School and Home for Nurses, the Royal Infirmary, the Northern and Southern Hospitals, the Lady Superintendents, the subscribers to the Jubilee Commemoration Fund, the David Lewis Trust, and the Hospital Saturday and Sunday Fund Committees. The Liverpool Queen Victoria District Nursing Association was accordingly formed, and on the 8th February, 1898, was duly registered.

The work has grown and increased with the growth of the City, and there are now 45 nurses at work. The whole of the City is divided into districts, and a nurse appointed for each.



QUEEN VICTORIA DISTRICT NURSES' HOME.

The Nurses reside in four homes, each presided over by a fully trained and experienced matron. As far as possible one or more ladies are superintendents of each district. These ladies make themselves responsible for part of the expenses of the district, and also take an interest in the work of the nurse and the management of the home. In some cases they visit the patients.

The matrons inspect the work of the nurses in turn, and once a year or oftener the Inspector appointed by the Queen's Jubilee Institute (to which the Liverpool Association is affiliated) inspects the nurses being trained in the Homes.

The nurses start out in the morning at 8.30, returning to the home for dinner at 1 o'clock. They are then off duty until 4.30, when they have tea, and start for their evening rounds at 5 o'clock. Each nurse visits from 12 to 20 patients per day. The cases are chiefly sent in by the medical men, but anyone may apply at the homes for a nurse; and a post card stating the name and address, sent to the home, is enough to ensure the attendance of a nurse as soon as possible. The nurses never take up a case where there is no medical man in attendance.

Appliances of all kinds, clothes for the patient and for the bed when necessary, lint, bandages, ointments, are supplied from the homes; but the patients are made to pay a small sum for these, or to provide their own whenever possible. Nourishment, when it is necessary for the recovery of the patient, is also supplied—and this is done through the kindness and generosity of the ladies in charge of the districts.

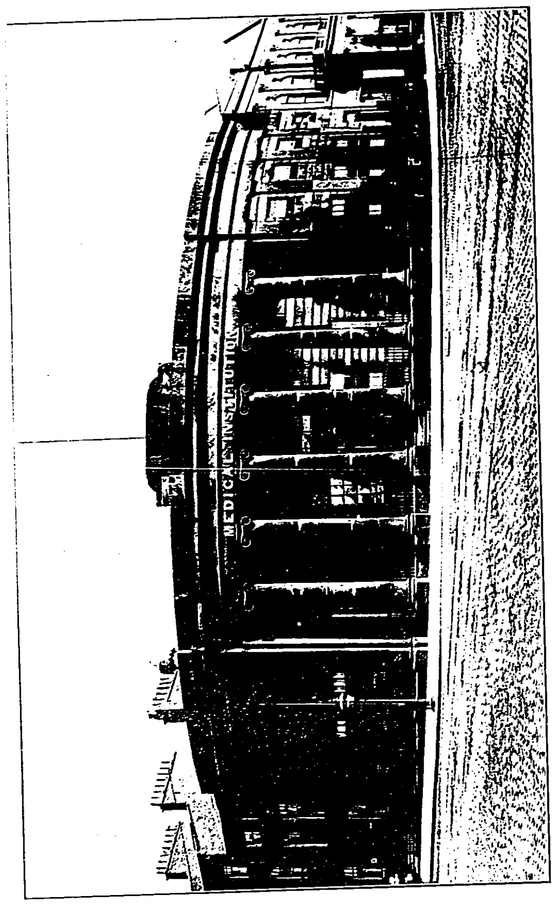
Although the work of the nurses in the first instance is to nurse the patients back to health, it does not end there, for the ideal set before them by the Founder of District Nursing Work is that the whole house and the whole family should be the better for the nurse's visits, and laws of cleanliness and sanitation enforced, while the surroundings both of body and mind are made better.

During 1902 7,250 cases were nursed and 170,918 visits paid.

The cases vary from acute cases requiring constant care to chronic cases requiring only a visit every second day.

The frequent appeals for assistance from those who are in a position to make some payment, although not sufficient to procure the services of a nurse; or from those who, although able to afford the amount required, are not in a position to provide the necessary accommodation for a nurse residing in the house, have made it increasingly evident that there is a very large class for whom as yet very little, if any, provision has been made in the way of skilled nursing. The Association has accordingly provided a staff of nurses who will, for a small fee, visit a patient once or twice a day, be present at operations, and continue in attendance afterwards.

The nurses have during the last three years been paying periodical visits to some of the elementary schools, for the purpose of attending to the minor ailments of the children. This work has proved most useful in improving the attendance of the children, and in preventing the small maladies from which they are suffering becoming serious, and in checking the spread of infection.



MEDICAL INSTITUTION.

THE MEDICAL INSTITUTION.

A Medical Library was founded in this City in the year 1779. In 1837 the Medical and the Pathological Societies, which were independent of one another, amalgamated with the Medical Library, and the present building, known as the Medical Institution, was erected at a cost of about £4,000.

The membership is confined to Registered Medical Practitioners, and numbers about 350, residing in Liverpool and district, the subscription being £2 2s. for town, and £1 1s. for country members—this provides for maintenance and the purchase of books.

The objects of the Institution are the cultivation of Medicine, Surgery, and the collateral branches of science.

The Library contains about 12,000 volumes, including some early editions and valuable folios.

Meetings are held fortnightly from October to the end of April. Special Pathological and Microscopical meetings are also held. The theatre and rooms are adapted for clinical and other demonstrations. The Library is open daily from 10 a.m. to 6 p.m., and is well supplied with English and Continental current medical literature.

CREMATORIUM.

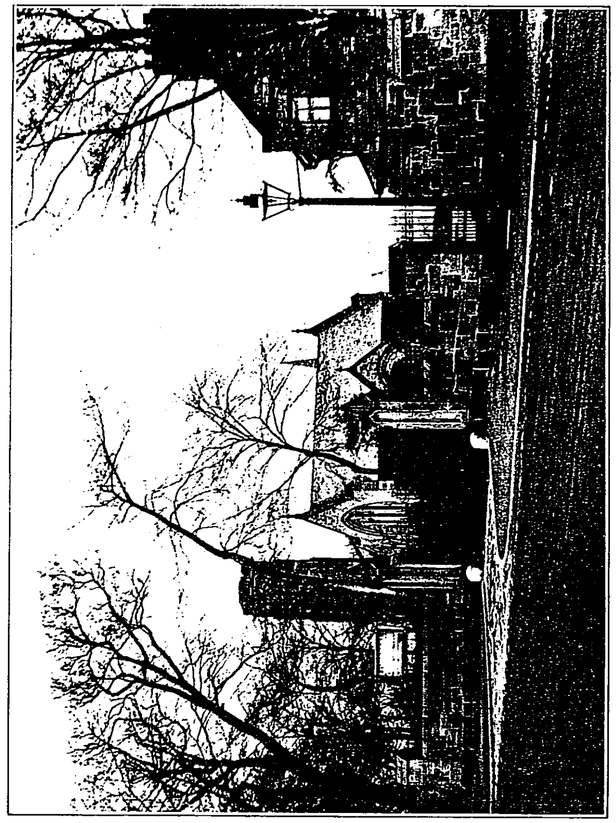
The Crematorium was brought into existence in response to a manifestation of public interest in the question of cremation in the Autumn of 1891. It is under the immediate management of a Council, who act through their Executive Committee.

An entrance from Anfield Cemetery enables the Crematorium to be used in connection with it. This admits of a religious service being performed in any one of the cemetery chapels, and of the body being subsequently cremated without leaving the Cemetery grounds, the ashes in this case being interred in the Cemetery. When it has been arranged for the religious service to be conducted elsewhere, the funeral cortege may pass through the entrance in Priory Road. The ashes may afterwards be taken away by the relatives, and disposed of as they think fit.

The Chapel of the Crematorium building is suitable for a religious service. If it be desired so to use it, intimation must be given to the Manager, and arrangements made for the engagement of an officiating minister.

Urns are provided for the ashes, in which they are placed by the officials, and the cover will be closed with cement in the presence of a representative of the family of the deceased. An urn of simple design is supplied, and the cost included in the charge for cremation. More costly urns, suitable for inscriptions, are supplied if desired.

A Columbarium suitable for the permanent reception of urns is provided in the Crypt of the building. It is so arranged as to admit of niches being closed with marble slabs bearing suitable inscriptions or decorative ornament. Niches of differing sizes, adapted for holding various numbers of urns, can be purchased. If other modes of disposing of the ashes be desired by relatives the Manager gives advice and assistance.



CREMATORIUM, ANFIELD CEMETERY

Bodies may be brought in any description of coffin the relatives prefer. No objection will be made to oak coffins, covered as completely as may be wished with the ordinary metal ornamentation, but it needs no explanation to make clear that when such are used the process of cremation will be a longer one than when the body is brought in a coffin of lighter construction. These latter are recommended, but not wishing to oppose a general sentiment the Manager has arranged the apparatus for any kind of coffin.

The Manager forbids the presence of strangers in the furnace room—not that there is anything to conceal; but the process, which is virtually what goes on more slowly in the grave, cannot be desirable to witness, and allowing it to become a sight for the satisfaction of outsiders' curiosity is the only possible irreverence in the whole process, and this is what must be avoided. The Manager and his Assistant are retired members of the Army Medical Staff Corps, and accustomed to habits of discipline and the maintenance of decorum and order.

THE BLUE COAT HOSPITAL. - -

This is the oldest charitable institution in the City, having been founded in 1708, for the clothing and educating of 40 boys and 10 girls.

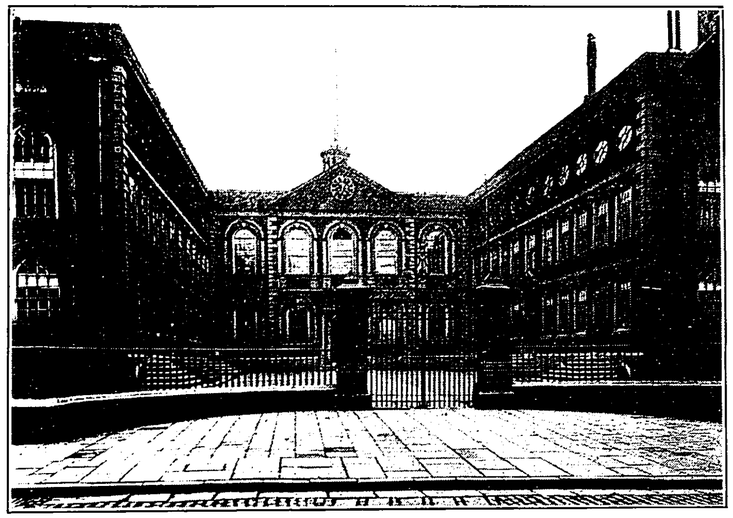
Bryan Blundell, in conjunction with the Rev. Robert Styth, one of the Rectors, originally promoted the Hospital, and was its Treasurer from 1713 until his death in 1756.

That portion of the building which faces School Lane, and which now forms the ancient part of the Hospital was commenced in 1716, and the building was finished and opened in 1718.

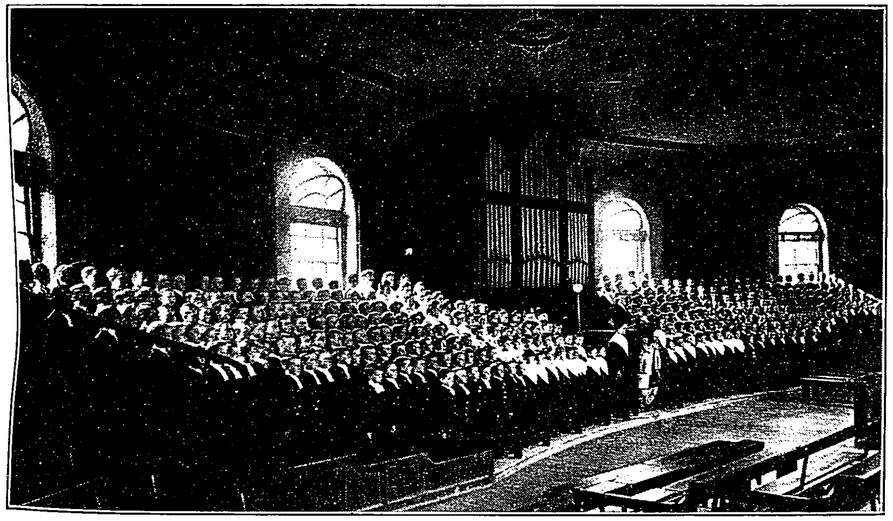
By a decree of the Duchy Court of Lancaster in 1739 the School was vested in 50 Trustees, which number was increased by a later decree in 1803 to 100.

The number of children received into the institution was increased from time to time from the original 50, until 1827, when it became 350, and since that time there has been provision for 250 boys and 100 girls, who are boarded, clothed, educated, and put out to situations with outfits on their leaving, at a cost of about £6,000 per annum.

Fatherless children and orphans are admissible—boys whose mothers are alive at nine years of age, and girls and orphan boys at eight years of age. No child is eligible for admission over the age of twelve years, and it is required that the parent if alive, must have resided within the parliamentary boundaries of the city for twelve months prior to the date of application.



BLUE COAT HOSPITAL.



BLUE COAT CHILDREN IN THE CHAPEL.

A very popular feature at the Hospital is the children's Service, held on Sundays at 4 p.m., in the chapel, a large lofty room over the dining hall, that reminds one of a picture from Hogarth, to which the public and the children's friends are admitted. The Service is conducted solely by the children themselves under the guidance of the head master. That this unique Service has a special attraction for the Liverpool public is shown by the large crowds who attend it, and who avail themselves of the opportunity at the same time of going over the old-fashioned building.

In the year 1838, a society of the "Old Boys," called the Blue Coat Brotherly Society, was formed for the purpose of watching over the early career of the boys after their leaving the School. This was followed in 1857 by a somewhat similar society for the girls, called the "Girls' Provident Fund," established by the Ladies' Committee, and both societies have done valuable work in connection with the school.

In 1899, the trustees unanimously decided to remove the institution to the outskirts of the city, and a site of about eight acres, to the east of Wavertree Playground has been purchased. It is expected that the foundation stone of the new hospital will be laid during the present year, and that in about two years the change of domicile from the old building in School Lane will be made.

The inmates will greatly benefit by the ampler accommodation and freer air to be obtained at the new site.

THE LIVERPOOL - SEAMEN'S ORPHAN INSTITUTION. - -

This Institution was founded in 1869, to feed, clothe, and educate the destitute or necessitous children of all classes of seamen or seafaring men.

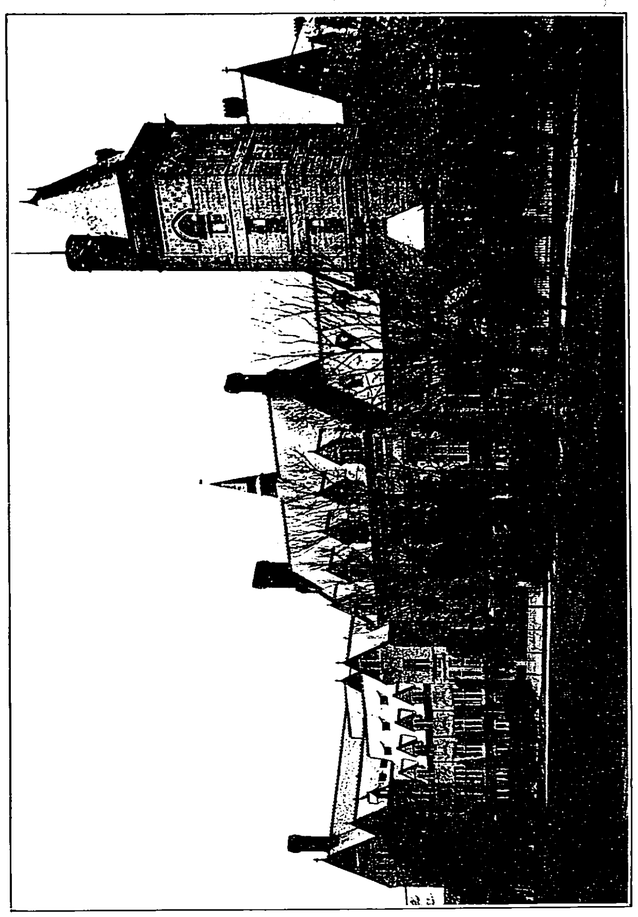
It is not restricted to any nationality, though children of seamen who have sailed five years out of the Port of Liverpool have a preference.

The recipients of relief are divided into two classes, the "Children Admitted," and "Children placed on Out-door List."

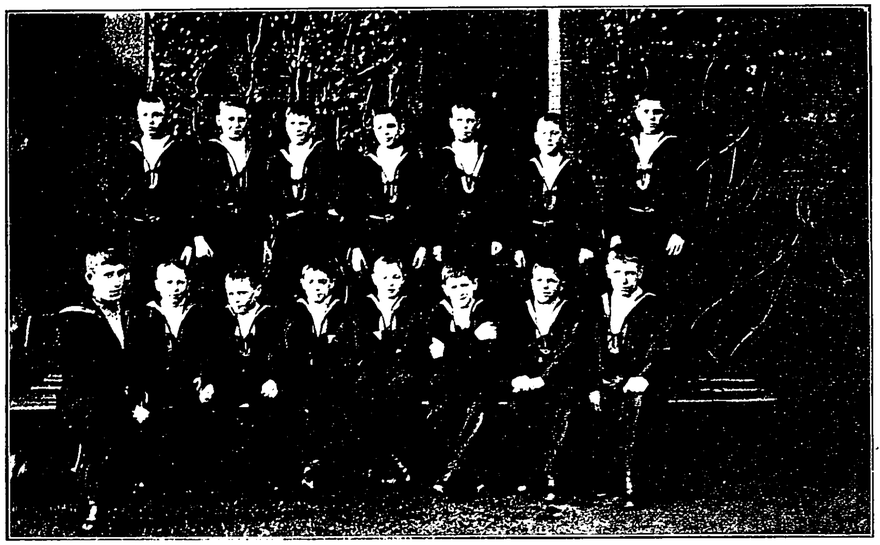
Little explanation is necessary as to the children admitted into the Orphanage; the inability of the widow to support them is the only qualification needed. An application form is filled in, and the widow is visited by the chaplain, who enters all particulars in a journal. The case is then further inquired into by the Committee, who decide what is to be done, and relief of some kind has never been refused in any really destitute case.

The boys are retained to the age of 14, and are then sent out, some to trades, some to sea, some to offices; the railway companies, and other great employers of labour, are always ready to take the Orphanage boys. Type-writing and the art of shorthand, which are taught in the school, are found to be of great aid in obtaining employment.

The girls are (if their mothers wish it) retained until they attain the age of 15, the last year being spent in giving training in all branches of the household work, and the school instruction is continued for a short time each day, at an evening class.



SEAMEN'S ORPHANAGE, NEWSHAM PARK.



BOYS OF SEAMEN'S ORPHANAGE.



GIRLS OF SEAMEN'S ORPHANAGE.

The children on the Out-door list are those whose mothers desire to retain them under their own care. It frequently happens there is not a child in the family old enough for public school life, or religious difficulties may intervene. Again there are deaf and dumb children, and those who are unfortunately mentally incapacitated from receiving instruction. To meet such cases as these, the Committee grant an annual allowance of clothing and boots, and a monthly allowance of ten shillings. Before, however, this sum is paid, the child must produce a school certificate, provided it is capable of attending school.

A very large number of these Orphan children have lost their fathers by the perils of the sea in crossing the Atlantic, and conveying passengers and cargo to and from America. A still larger number of seamen die from diseases contracted by exposure to the weather in all seasons and at all hours; and no more fitting tribute of gratitude can be shown to the Almighty Hand, who brings the ship in safety to her journey's end, than by helping to support the children who are left fatherless by the necessities of a seaman's life.

Children of all religious denominations, and of any age up to 14, are eligible for the benefits of the Institution.

THE SAILORS' HOME, LIVERPOOL.

As the city of Liverpool is largely dependent upon the sea for its commercial prosperity and greatness, the profession of seafaring—the life of a sailor that is—has for more than a century had particular interest for residents in Liverpool. The knowledge of how greatly the town was indebted to sailors who belonged to it, or who came to it from other ports, and of how unsuspecting and good-natured seamen were likely to become victims to the wiles of the evil disposed, led to the founding of the valuable and popular institution known as the Liverpool Sailors' Home.

This institution, which stands on the east side of Canning Place, had its origin in a movement which began about the year 1838, the objects of which were to found a Sailors' Home, Registry, and Savings Bank for the increasing number of seamen who were frequenting the Port of Liverpool through the growth of the shipping trade of the Port.

In February, 1845, the first practical step was taken, rooms being secured in Stanley Buildings, Bath Street, and being opened as a Seamen's Savings Bank, an Office for the Shipping and Discharging of Crews, and as a Sailors' Registry. On the 28th of the same month the late Queen Victoria consented to become patron of the Liverpool Sailors' Home.

As set forth in the official statement of the objects and laws, the immediate objects of the Institution are:—"To provide for seamen frequenting the Port of Liverpool, board, lodging,



SAILORS' HOME.

and medical attendance at a moderate charge; to protect them from imposition and extortion, and to encourage them to husband their hard-earned wages; to promote their moral, intellectual, and professional improvement, and to afford them the opportunity of receiving religious instruction."

The cost of the building, exclusive of land, was £30,000. The architect for the building was Mr. Cunningham. The style of the exterior is Elizabethan, with features suggesting the business of the sailor. The internal arrangements were based on a plan of "flats" and cabins, there being a main hall the full height of the building, with a glazed roof in the centre, and the flats, each with its complement of cabins, lavatories, and offices, being on the upper floors at the sides and round the main hall. Each of the flats was so arranged that its main passage lay along the border of the central hall, the side of the passage bordering the hall being protected by an ornamental rail, each flat, by this arrangement, being open to the central hall and receiving light from the glazed roof.

In the first complete year through which the Sailors' Home was open, the year 1853, 1,822 seamen and 410 apprentices boarded at the institution, 192 of them residing in it at least twice in the same year; the savings bank was largely used by seamen, a balance of £3,079 being in hand on December 31st, 1853. During the year, also, a total sum of £10,364 passed through the hands of the cashier, to be remitted to the friends of seamen or otherwise dealt with at their request, the said sum being in addition to the money placed in the savings bank.

On the evening of April 29th, 1860, through the carelessness of a seaman fire was caused, and the interior of the building was practically destroyed. The restored building was of more modern construction and arrangement internally than the building had been originally. The plan of having a central main hall, extending from the ground floor to a glazed roof, with flats and rows of cabins round the hall, was adhered to.

The Institution has continued to be largely used by seamen as a home when in the Port of Liverpool, as a shipping office and registry, and as a savings bank and an agency for remitting money to relatives. A library was furnished in the first building and was restored in the new building after the fire. Reading rooms, well supplied with newspapers and magazines, have been maintained from the first. Bagatelle boards, draught boards, &c., were provided, and have been in hourly use. In 1881 a clothing store was opened in the building, at which seamen could supply themselves with articles urgently wanted. In 1882 a refreshment bar was introduced, and in the following year a billiard room was opened.

With respect to the work in the interests of seamen done in connection with the Liverpool Sailors' Home, it may be recorded that outdoor officers of the institution meet all incoming vessels, and bring any seamen to the home who may wish to stay at it. Another officer devotes his time to ascertaining what berths will be available, and to assisting seamen to obtain berths. Seamen who enter the Home are advised to deposit their money with the cashier, and to draw upon their accounts as required. On leaving to go to sea, boarders frequently deposit their advance notes or allotment notes with the officials, to be collected and for the amounts to be remitted to wives, parents, or other relatives.

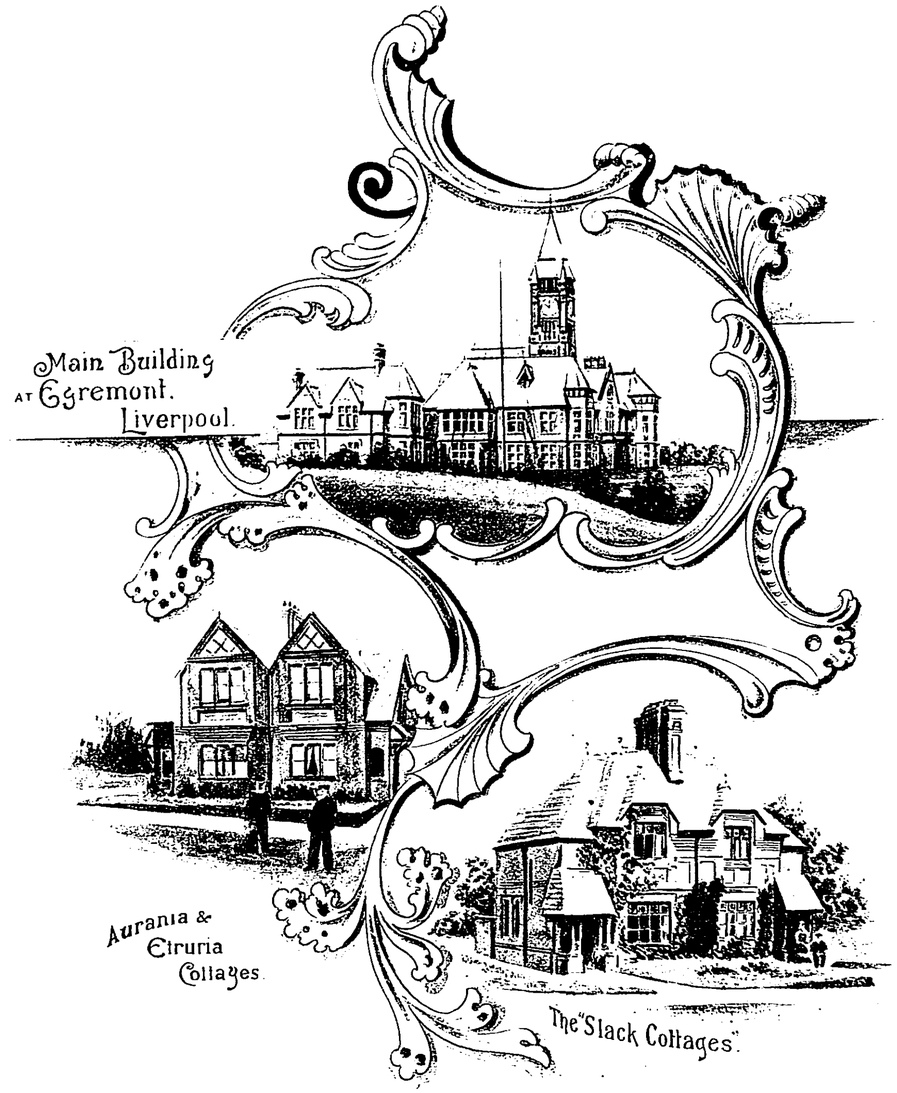
A valuable feature of the work is the receiving of shipwrecked seamen, or of seamen sent home by English Consuls abroad on account of illness. The doors of the Institution are ever open to such, and, with the aid of the Shipwrecked Mariners' Society, seamen so received, are, if necessary, enabled to proceed home, the travelling cost being defrayed by the Society. Mr. Marsden Hanmer, the Manager and Secretary of the Sailors' Home, acts also as the honorary agent of the Shipwrecked Mariners' Society in Liverpool.

Last year (1902) the number of seamen who boarded at the Home was 7,245. The sum deposited with the cashier was £31,073 13s. 3d. The number of shipwrecked seamen received was 281, and 101 seamen were admittted who were sent to Liverpool by H.M. Consuls abroad on account of sickness. The Home is under the control of a Committee, the members of which are, or have been, connected with old and influential shipping companies or mercantile firms in the city of Liverpool, the present Chairman being Mr. W. McC. Nicholson. Among the shipping and mercantile houses of the city the Home has many warm and generous friends, who show their interest in it in various ways. Primarily, interest centres in the seamen who frequent the Port, by whose calling and exertions the great fabric of Liverpool's commercial interests is still being enlarged and made more valuable. As the Sailors' Home is in a very full and especial sense the Sailors' Institution, there is the desire to support it, to see it retains its wide popularity, and to prosper.

LIVERPOOL HOMES - - FOR AGED MARINERS.

Few local Institutions dedicated to the sacred cause of charity exceed in interest that which is devoted to sheltering and maintaining our Aged Mariners. The haven in which many of these worn-out toilers of the sea are anchored, safe from further buffeting of adverse Fortune or angry Neptune, is appropriately situated on the banks of the Mersey. The existence of this admirable institution is almost entirely due to the all-embracing and apparently inexhaustible philanthropy of the late Mr. Wm. Cliff, merchant, of Liverpool. His bounty has freely flowed into many channels, but probably no other result of his widespread benevolence appeals so strongly to our sympathies, or so deeply impresses our imaginations, as the home which he founded for poor old sailors.

Situated on an elevated grass-covered plateau about midway between Egremont and New Brighton, it forms a conspicuous feature in the landscape, and a tour of inspection through the home will well repay the time and trouble expended on the pilgrimage. Passing through the trimly-kept little park which surrounds the building, and acknowledging the salutations of a few old veterans sunning themselves near the gates, we find ourselves at the main entrance to the Institution. Stepping beneath its hospitable portal, we notice in the vestibule a handsome marble tablet, on which is recorded the fact that the building was erected by Mr. Cliff in remembrance of his daughter Rose Webster, and endowed with £5,000 in remembrance of his revered parents.



LIVERPOOL, HOMES FOR AGED MARINERS.

There are sixty-six inmates in the home, the oldest being 88 years of age, but a large proportion of the others are on the borderland of fourscore.

The great dining hall will seat about 200 persons. The hall fulfils a double purpose, for besides being used for meals, Divine Service is held there.

The dormitories consist of small spaces partitioned off from each other, so that the inmates in most cases have separate sleeping rooms, with numbers on the doors corresponding to the order in which the occupant entered the institution. The last comer is 229, which indicates the exact number of inmates who have lived in the house since it was opened in 1882.

The smoking rooms are situated in the basement. In one of them a fine billiard table affords endless amusement to the ancient mariners.

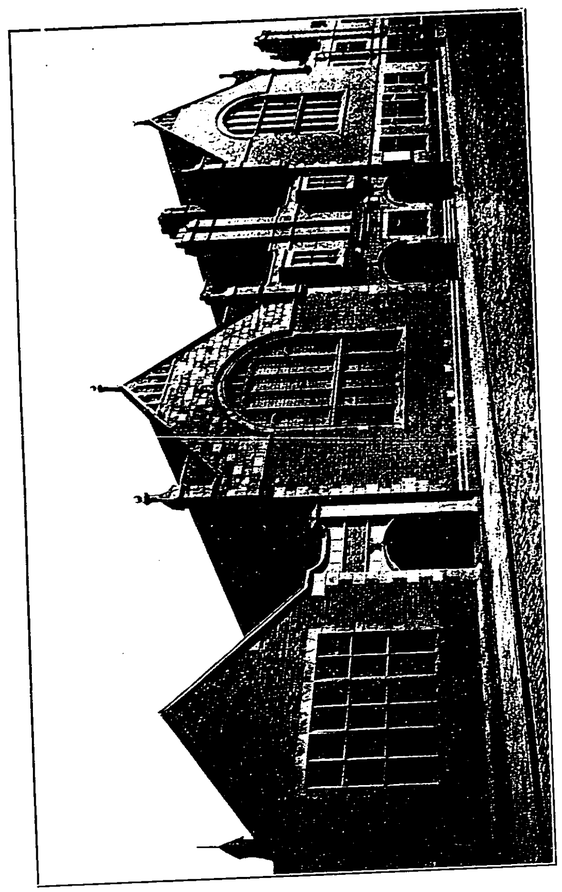
In the joiners' shop, one of the inmates—an old ship's carpenter—does all the joinery work required in the home.

In the park are 28 cottages, which are built in pairs, and from different designs. Two of these have been endowed by Mrs. Frances Grant; two others were built and endowed by Mrs. G. W. Slack; other two were built by Mr. W. H. Dixon, two by Messrs. C. W. Kellock and G. F. Saunders, two by the late Mr. T. B. Forwood, two, named respectively "Aurania" and "Etruria," their erection, furnishing, and endowment, was kindly undertaken by the late Captain W. H. P. Hains by means of contributions from passengers and friends. There are also other blocks bearing the names of "Bacon," "Pickup," "Ashton," "Brocklehurst," "McInnes," "Potter," "Chaddock," and "Hurley." These cottage homes are in the occupation of aged mariners who have wives or relations who can care for them. Whilst in the cottages they are provided with firing, gas and water free, and in some cases the occupant receives a small pension.

At present, the Homes for Aged Mariners, including the cottages, contain 150 inmates. Unmarried men or widowers are alone eligible for admission to the central buildings, yet of these the committee have thus far been enabled to select a sufficient number to utilise the accommodation offered by the Institution. The building has been lavishly equipped. It would be hard to conceive of more thoroughly cheerful quarters than those its inmates enjoy when located in their reading or smoke rooms.

A Hospital has been added to the "Home" by the late Mr. Cliff, at a cost of about £2,000, the architectural design being in harmony with the main building. The comfort which will accrue to the sick and ailing inmates by this boon cannot be over-estimated.

A splendid opportunity was offered in 1893 for enlarging the park, and thus providing space for further buildings of the Cottage Home type. The adjoining land is now secured and already a number of Cottage Homes have been erected thereon. The Council of the Mercantile Marine Service Association are Managers of the Home.



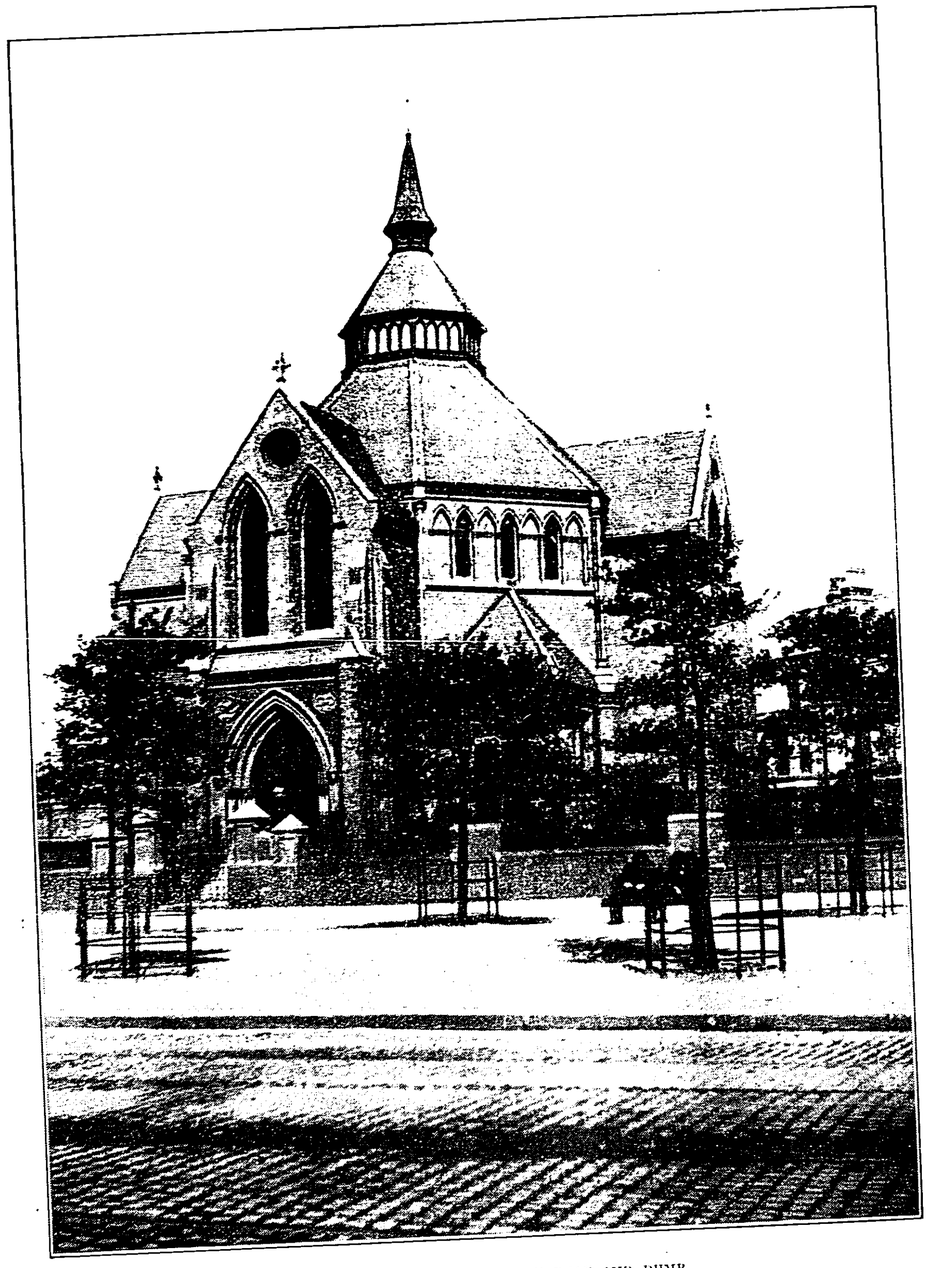
DOMESTIC MISSION.

THE LIVERPOOL DOMESTIC MISSION, MILL STREET. -

This institution was founded in 1836 to minister to the wants of the poor in their own homes. At first the work was carried on solely in the homes of the poor without any building as a centre of activity. But in 1838 a house in Greenland Street was used for a small Ragged School and Mechanics' Institute, under the ministry of the Rev. John Johns, who, in the service of the sick poor, laid down his life during the epidemic of cholera in 1847. As time went on various activities in the interests of the poor sprang into life, necessitating larger premises, which, through the instrumentality of Mr. William Rathbone (the sixth), were erected, in 1854, in Beaufort Street, which was the home of the Mission for nearly 40 years. During this time the work had been steadily increasing, and in 1892 the present commodious and handsome building was erected. It occupies a prominent position in the middle part of Mill Street, and has a frontage of 164 feet, and is built of red brick and Ruabon Terra Cotta. It consists of a Chapel to seat 350, with a good choir and organ chamber and vestry, a fine and spacious entrance hall, a small hall, various class rooms, cloak rooms and lavatories, &c., on the ground floor; a wide staircase leading up to a ladies' parlour, and a large assembly hall, accommodating 600 people, with ladies' and gentlemen's retiring rooms. It has a free reading room for working men, supplied with dailies, illustrated papers and magazines, &c. Attached, with a separate entrance, is a dwelling-house for the resident missionary. The buildings are lighted throughout with electric light, and heated by hot-water pipes and open fire-places.

Through the generosity of Mr. Walter Holland a new wing has just been added, at a cost of £2,000, for a girls' gymnasium and cookery classes, &c. The entire cost has been over £10,000. Among its supporters have been, and are, some of Liverpool's most eminent citizens.

Although its missionaries and most of its workers are Unitarians, the Mission has no proselytizing or sectarian aim; it simply seeks, by personal intercourse with the poor, to help them spiritually and socially, without distinction of sect or creed or party.



THE INSTITUTE FOR THE ADULT DEAF AND DUMB.

THE LIVERPOOL ADULT DEAF AND DUMB - - BENEVOLENT SOCIETY.

It is nearly 39 years since this Society was first established.

Early in 1864, it originated from a pure desire on the part of one who was himself deaf and dumb, to hold a Divine Service in the sign and finger language for the benefit of the 200 deaf and dumb adults in Liverpool and neighbourhood.

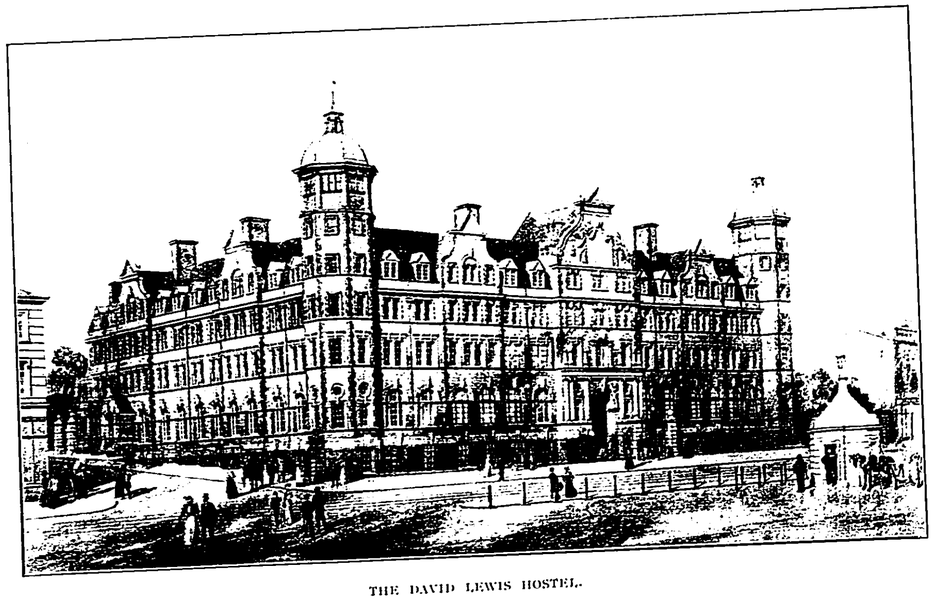
In 1877, Mr. Healey resolved to start a fund for the building of a Church and Institute suitable for the needs of the deaf.

The building comprises a gymnasium, lecture hall, and office, the church being the upper portion. In 1892, Mr. Healey, with the help of Mr. Armour (missionary), started a Young Men's Auxiliary under which auspices several organisations are carried on, such as Football Club, Swimming Club, Chess and Draughts Club, Summer Camp, and others.

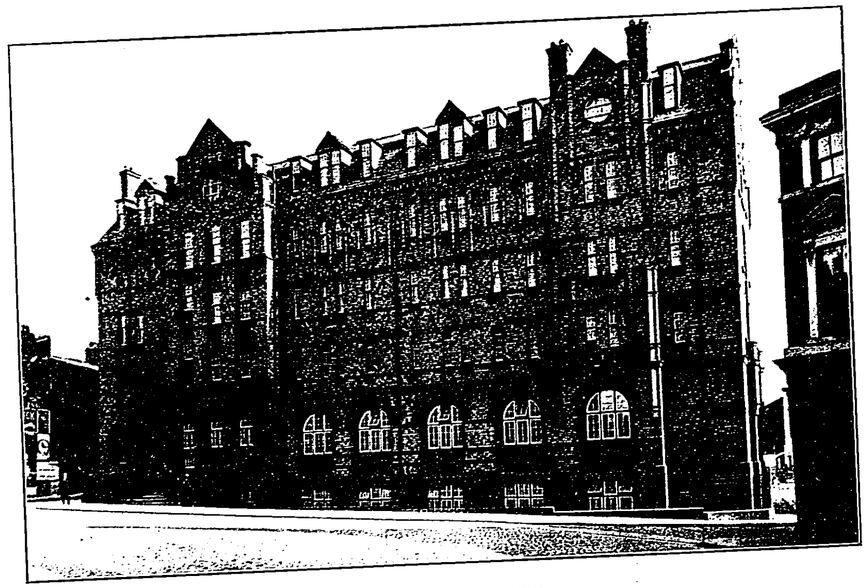
The beneficial ministrations of the Adult Deaf and Dumb Benevolent Society are no longer restricted to Liverpool, but are now extended to the North end of Liverpool, Birkenhead, Widnes, Warrington, and St. Helens. Southport was started in April, 1887, and left as a self-supporting society.

A Home for deaf women and girls was opened in October, 1901, in Upper Parliament Street, by the Countess of Derby, and has verified the need for it, by being full ever since it was started.

It is difficult for the public to realise the exceptional disadvantages of work amongst the deaf. They are, of necessity, a community to themselves, bound together by a common language which is the sad mark of common infirmities. The ordinary avenues of enjoyment are closed to them, and they naturally rely upon each other for intercourse and recreation, while at the same time, their culture and entertainment can only be secured by special provision for that purpose. This inevitably requires increased means and wider sympathies and co-operation.



THE DAVID LEWIS HOSTEL.



BEVINGTON HOUSE HOTEL.

THE DAVID LEWIS WORKMEN'S HOSTEL AND CLUB. - -

This Hostel and Club is being erected by Mr. Ben Wolfe Levy out of the moneys bequeathed to him and his co-legatee by the late Mr. David Lewis.

The situation is an important one, being the land upon which the old St. James' Market stood, having its main frontage to Great George Place, facing to the River.

The Building proper may be described as comprising:—the Workmen's Hostel, which is approached from Nile Street, off Great George Street, through a spacious entrance, guarded as it were by the turn-stile controlled from the office, which is in close proximity to the Master's residence.

The halls, corridors, and staircases are very spacious and roomy, well lighted, and efficiently ventilated, and are constructed fireproof.

The main stair is all of stone and iron, and is 21 feet square, approached from a hall 21 feet by 20 feet.

The reading room is 50 feet by 20 feet. Between this room and the dining room is the provision shop, 20 feet by 15 feet, and serves the two rooms. It is fitted up with every necessary appliance, and with lifts connecting the shop with the spacious kitchens, sculleries, stores, and larders in the basement.

The dining room is 80 feet by 41 feet; well lighted and specially ventilated.

The basement, so called is really the ground floor, as it is very little below the street level, is specially well lighted, and is complete with all necessary appliances for the purposes of a Hostel.

On the upper floors are the men's cubicles, numbering in all nearly 400 separate sleeping apartments; these are arranged in groups approached from the large main staircase by three independent gangways, and with escape stair at each end of the block. All the floors and staircases are fireproof, and provision is made by special appliances for extinguishing of fires. The sanitary arrangements are very complete, including extensive lavatory, washing, and sanitary arrangements, bath and footpans, the latter luxury being much esteemed by the working men.

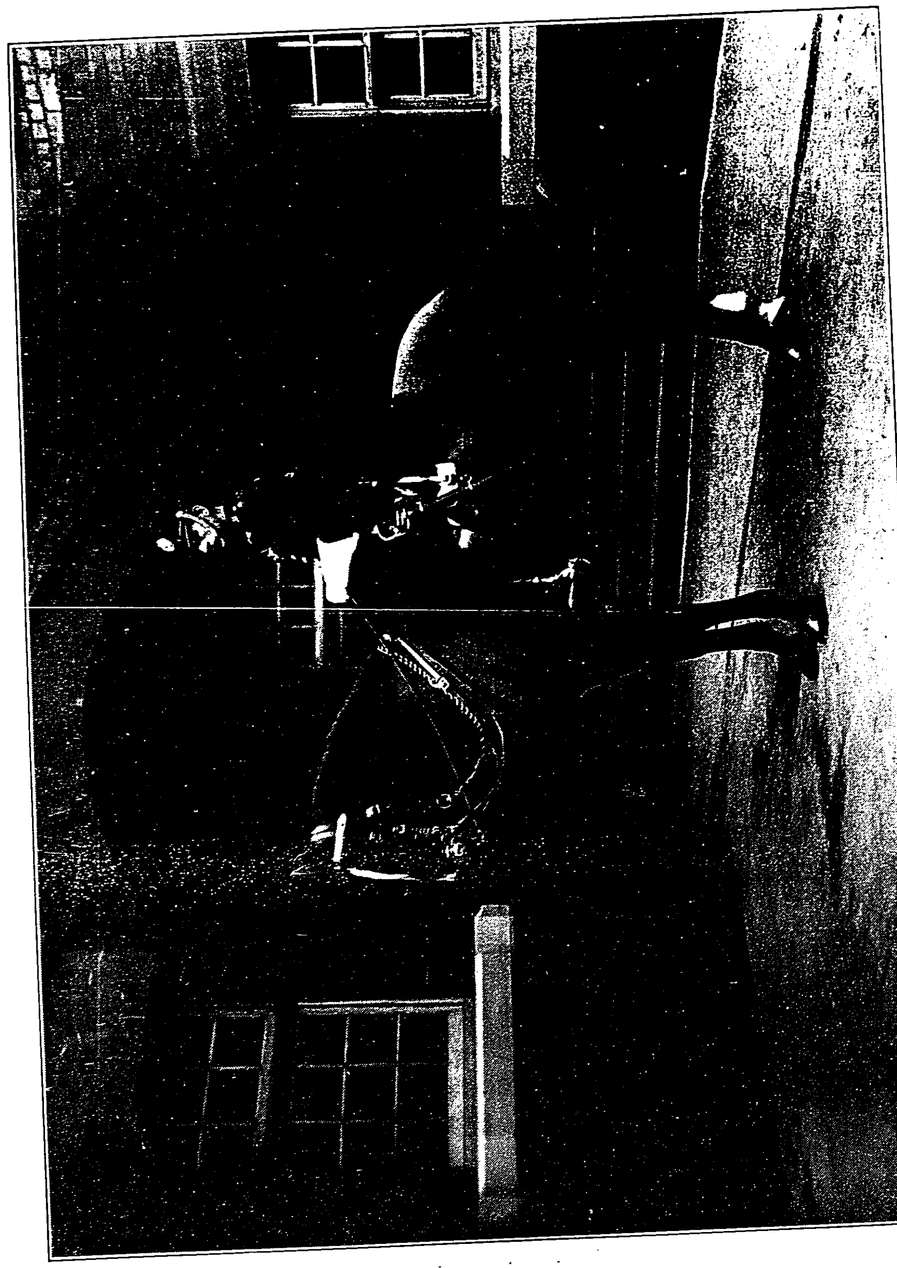
The main entrance to the Workmen's Club and Public Hall, from Great George Place, is over 12 feet wide, forming a fine arched corridor to the entrance hall, 50 feet by 20 feet, and finished in tiles and faience, forming the main approach to the various club and billiard rooms, and also the public hall, which is 90 feet by 42 feet and 35 feet high including a stage 43 feet by 19 feet, complete with green rooms for both sexes. The hall will accommodate about 1,000 people.

The Club consists of a number of large rooms approached from the hall and entrance, and comprises a Billiard Room, 57 feet by 30 feet, two Committee Rooms, three Club Rooms, each 50 feet by 26 feet, with elaborate toilet arrangements. There is also a separate Club Room and toilet facilities for females.

The Club is intended for the use of the inhabitants of the neighbourhood and also for members of the Hostel.

The heating, ventilating, and electric light and other arrangements are of the most modern and efficient description.

The whole of the work is from the designs of J. Francis Doyle, Architect.



LIVERPOOL MOUNTED POLICE CONSTABLE IN FULL DRESS.

POLICE AND FIRE BRIGADE.

The Liverpool City Police number 1,883, including 369 employed at the expense of the Mersey Docks and Harbour Board in policing their docks upon the east side of the river, not only those within the city but those within the Borough of Bootle.

There is a small force of mounted police available for street duty but mostly employed in driving the horsed vehicles, fire-engines, prison-vans, patrol-wagons, and ambulances, and a small force of river police with a steam launch for patrolling the river.

POLICE AND FIRE ALARMS.

Liverpool may be said to be very near America, and that is perhaps the reason why the Watch Committee have adopted some of the mechanical aids to police work which are more common there than in this country. Foremost among such aids may be described the system of Police and Fire Alarms, by which the constable in the street is in touch with his station and can call for assistance of all sorts and may be reached himself if he is wanted.

The illustrations of the box, of which there are 250 through the streets of the city, show that inside a locked door there are six levers, the mere pulling down of which prints automatically at the receiving station, the time, the place of call, and what is wanted.

No. 1 is for a fire with which the first turn-out can cope.

No. 2 is for a fire for which a steam fire engine will be wanted.

No. 3 is for the patrol wagon (another American idea), a covered vehicle always ready to turn out and bring in an incapable or refractory prisoner. Last year 2,016 cases were so dealt with.

No. 4 is for the same with the addition of extra police to cope with a disturbance of the peace.

No 5 is for the horse ambulance, the arrangements for which will be described later.

No. 6 is equivalent to a bell for the telephone which hangs alongside.

At the top is a visual signal by which the passing constable is called to the telephone.

At the bottom is a keyhole by which the constable can peg the clock and report his presence without opening the box.

The door has two keys, the second of which is a master key without which the first cannot be removed, the police have both, but citizens who have the privilege of using the boxes only have the first, by which means a check on improper use of the boxes is secured.

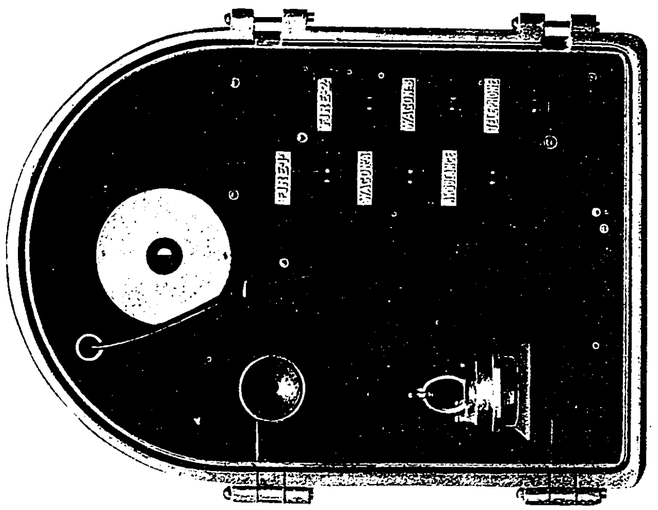
These boxes and the telephones at all the stations have proved of inestimable value to the police.

A switch board for the whole of the municipal telephones is situated at the Central Police Office, but the telephone and alarm box systems are installed and maintained by the National Telephone Company.

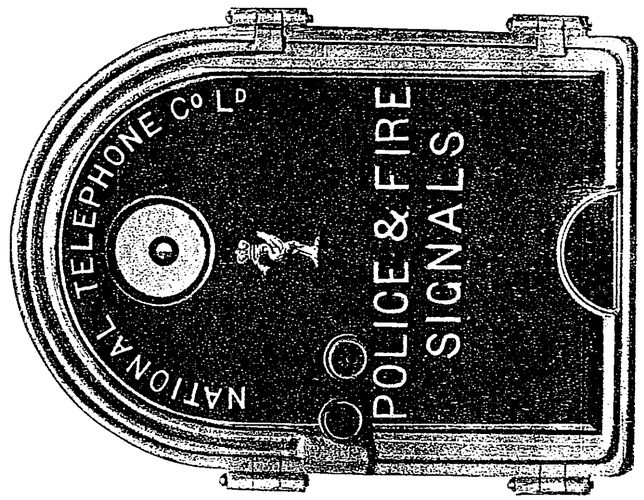
AMBULANCE DUTY.

This will perhaps be of special interest to those for whom this book is prepared. By arrangement between the Watch Committee and the different hospitals a complete system of horse ambulances is provided by the former, the only expense falling on the latter being the provision of ambulance surgeons for the day service and of standing room for the horses and carriages. There are direct telephones between the hospitals and the police stations where the signal boxes report.

View of the Outside and Inside of one of the Signal Boxes.



INSIDE.



OUTSIDE.

LIVERPOOL POLICE AIDED ASSOCIATION FOR CLOTHING DESTITUTE CHILDREN.



BEFORE BEING CLOTHED.



CLOTHED BY THE ASSOCIATION.

For day service the city is divided into five districts, working from four hospitals and one police station; for night service into two districts, working from police stations. The ambulance from a police station is accompanied by a constable trained to give First Aid.

The hospitals are allowed a limited use of the ambulance service for cases other than accidents, provided the patient is not able to pay for a private ambulance.

The ambulances are not let out to well-to-do people, as several firms keep ambulances for hire, and there is, of course, no desire to compete with them.

The number of calls for the ambulances last year was 2,759.

Hand ambulances are kept at all police stations, and every man joining the force is trained to render First Aid before he is discharged to street duty. 1,680 members hold the certificate and 1,246 the medallion of the St. John Ambulance Association. Last year First Aid was given in 699 cases, in 498 of which doctors gave special praise to the treatment, besides which 4,100 people who were taken ill or met with minor accidents in the streets were helped and taken care of.

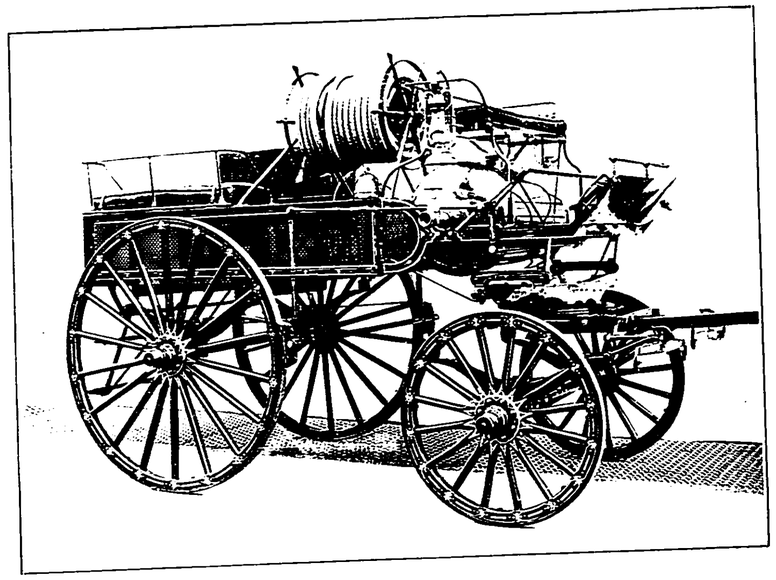
JUVENILES.

The fact that a seafaring life takes so many of the bread-winners away for long periods at a time, together with the want of factories and other means of employment for children, has for many years brought the questions of juvenile protection and juvenile depravity into prominence in Liverpool, and it is an interesting though little-known fact that the Liverpool Society for the Prevention of Cruelty to Children, which, hand-in-hand with the police, carries out the Acts for the Prevention of Cruelty to Children, was the first of its kind and was the parent society from which the National Society sprang.

The large number of children whom want of proper employment drives into the street for a living, led the Watch Committee to apply to Parliament in 1898 for powers to control street trading by children; the powers were granted as an experiment, the success of which has led to similar powers being given to Manchester last year and to their being sought by other towns. Under the Liverpool Corporation Act, 1902, amending a similar Act of 1898, the Council through the Watch Committee grant licenses to children between eleven and sixteen, allowing them to trade in the streets within certain hours and under certain conditions, a child trading without a license can be dealt with under the Industrial Schools Acts, while the person who is responsible for his care is liable to a fine. The Council has power to provide a home for a licensed child who has not a fitting one, and to provide clothes when necessary. Special members of the police force look after the children, and it is satisfactory to say that the last report by the School Board showed that the licensed children made an average of 90 per cent. of possible attendances.

Considering the fact that before these powers were obtained the streets swarmed with poor children, many of whom had no other chance of clothing themselves, the enforcing of the provisions would perhaps at first have caused some suffering, but fortunately in 1895 the Police Aided Clothing Association had been instituted; this is a charitable scheme under which clothes are lent in cases reported by the police, the lending is of course merely a fiction by which the ownership remains with the Association and the police are able to deal with parents who sell or pawn the clothes, but it may be stated that, though the Association during the past eight winters has clothed over 15,000 children, there have not been 20 cases of pawning the clothes.

In many other ways special provision has been made for the care of children; for instance, when in custody they are



LIVERPOOL FIRE BRIGADE CHEMICAL ENGINE.



LIVERPOOL FIRE BRIGADE STEAM FIRE ENGINE "MAXWELL." PUMPS 450 GALLONS PER MINUTE

not kept in the cells, but are sent to the work-house, and are taken to and from the Court in a vehicle differing as much as possible from a prison van.

All the above schemes tend to produce sympathy between the police and the young of the poorest and often the criminal classes, a feeling which is of advantage to both.

The illustrations show a group of children before and after being clothed by the Police Aided Clothing Association.

FIRE PREVENTION AND EXTINCTION.

As the principal fire risks in Liverpool are in the warehouses where merchandise of all sorts is stored for distribution over the kingdom and for shipment all over the world, the City Council has, under the provisions of the several local Acts of Parliament, power to regulate the construction of warehouses, to issue licenses to fit and proper persons to be in charge of them, and to make regulations for the conduct of business. There are also a few special provisions, such as the power to impose a fine upon a person found smoking near cotton, which is largely imported. These all tend to reduce fire risks immensely, but at the same time the Watch Committee, acting as the Committee for the Preservation of Property from Fire, maintain within the police force a Fire Brigade well able to cope with the most serious fire.

The Fire Brigade consists of 69 officers and men employed permanently and assisted as may be necessary by 366 of the ordinary constables trained as firemen. The appliances consist of horsed appliances at five stations, hand appliances at twenty-six police stations, with fourteen escape stations.

Among the appliances attention may be called to the chemical engines; the first of these was bought in Chicago in 1896, and proved so valuable that now the Brigade has six, five horse drawn and one a petrol driven automobile, besides

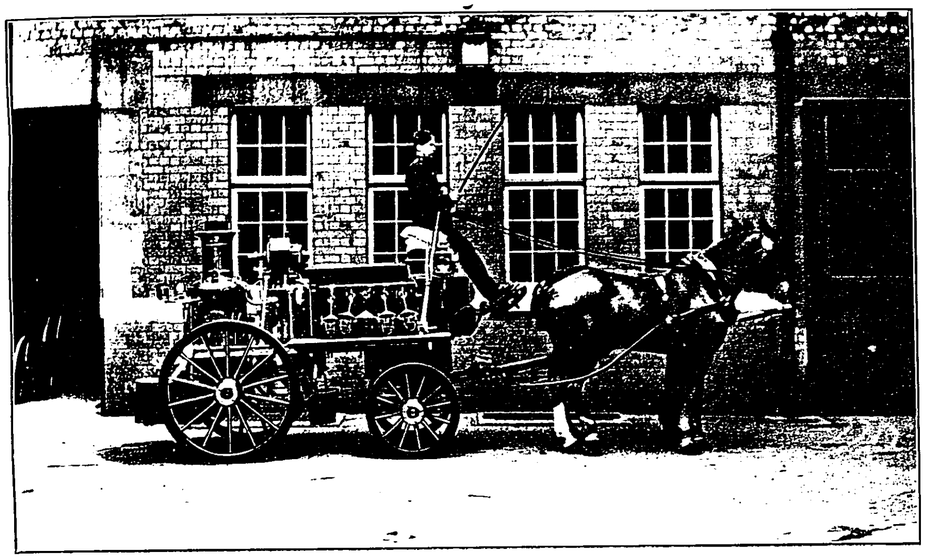
fourteen smaller cylinders with the hand appliances. The engine itself consists of a metal cylinder containing sixty gallons of water with 25 lbs. of bi-carbonate of soda, with 7 lbs. of sulphuric acid contained in an inner glass bottle; to put the engine into use the cylinder is revolved, releasing the acid, and instantaneously charging the water with carbonic acid gas at a pressure of 160 lbs., the mixture, really nothing more than soda water, under complete control leaves the nozzle in the shape of a spray, to a distance of about 40 feet, and speedily extinguishes an ordinary fire without water damage. An instance of the value of these engines may be quoted in a recent fire at a tool shop; the top story and roof were burnt out, but the chemical engine confined the fire to that story; a similar save by water from the mains would have meant that the stock in the other floors would have suffered more from water damage than the top floor did from fire.

Of other appliances worth inspection may be mentioned the smoke helmets to enable a fireman to work with comfort in the thickest smoke, they are supplied with air from a converted steam fire engine, which also runs a dynamo for providing an electric light; the helmets are fitted with telephones maintaining communication between the seat of the fire and the engine.

Of steam fire engines there are eight, with a total capacity of 6,400 gallons a minute, among them being one of 1,800 gallons, the largest engine on wheels in the world. There is also on order an automobile steam fire engine fired with oil fuel. The pressure on the mains, however, is so good that for the average fire there is no call for the use of a steam fire engine.

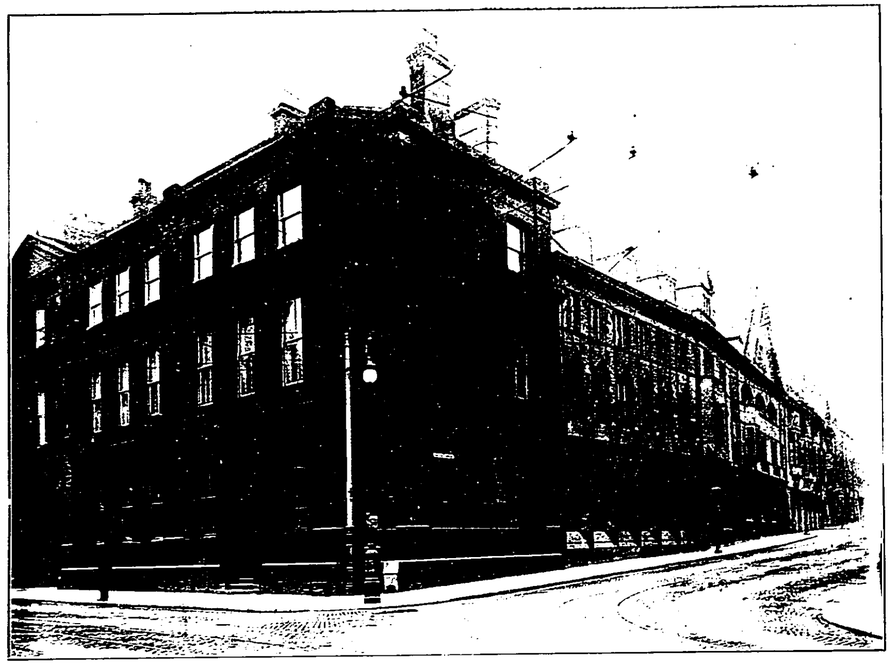
Nearly all repairs and a great many of the smaller devices in use are the work of the brigade, who have a well-equipped shop with electric power.

During the past year the brigade attended 665 fires.





LIVERPOOL FIRE BRIGADE ELECTRIC LIGHT AND AIR PUMPING ENGINE "DUNCAN."



POLICE BUILDINGS, FIRE POLICE STATION, AND OFFICES.



LIVERPOOL FIRE BRIGADE STEAM FIRE ENGINE "HOLT." PUMPS 1,800 GALLONS PER MINUTE.

BUILDINGS AND OFFICES

This is a square, massive building situated in Dale Street and Hatton Garden, and contains the Offices and Courts for the City Magistrates, the Stipendiary Magistrate, City Coroner, and the Head Offices for the Police and the Detective Staff. In the rear is the Main Bridewell.

The new premises of the Fire Police Station and Offices were erected about five years ago at a cost of about £35,000. The engine-house is at the front and has accommodation for six engines, with a first turn-out stable behind for six horses. In the rear of this are the workshops for repairing the fire engines. Over the engine-house and workshops are recreation rooms for the men, lavatories, bath rooms, &c., and a large parade room 81ft. 6in. by 45ft. 6in. for police purposes. Stabling accommodation for 22 horses is also provided in addition to the first turn-out stable, and on the upper floors residences for the Chief of the Fire Brigade and the Chief Superintendent of Police, "A" Division.

VETERINARY SECTION.

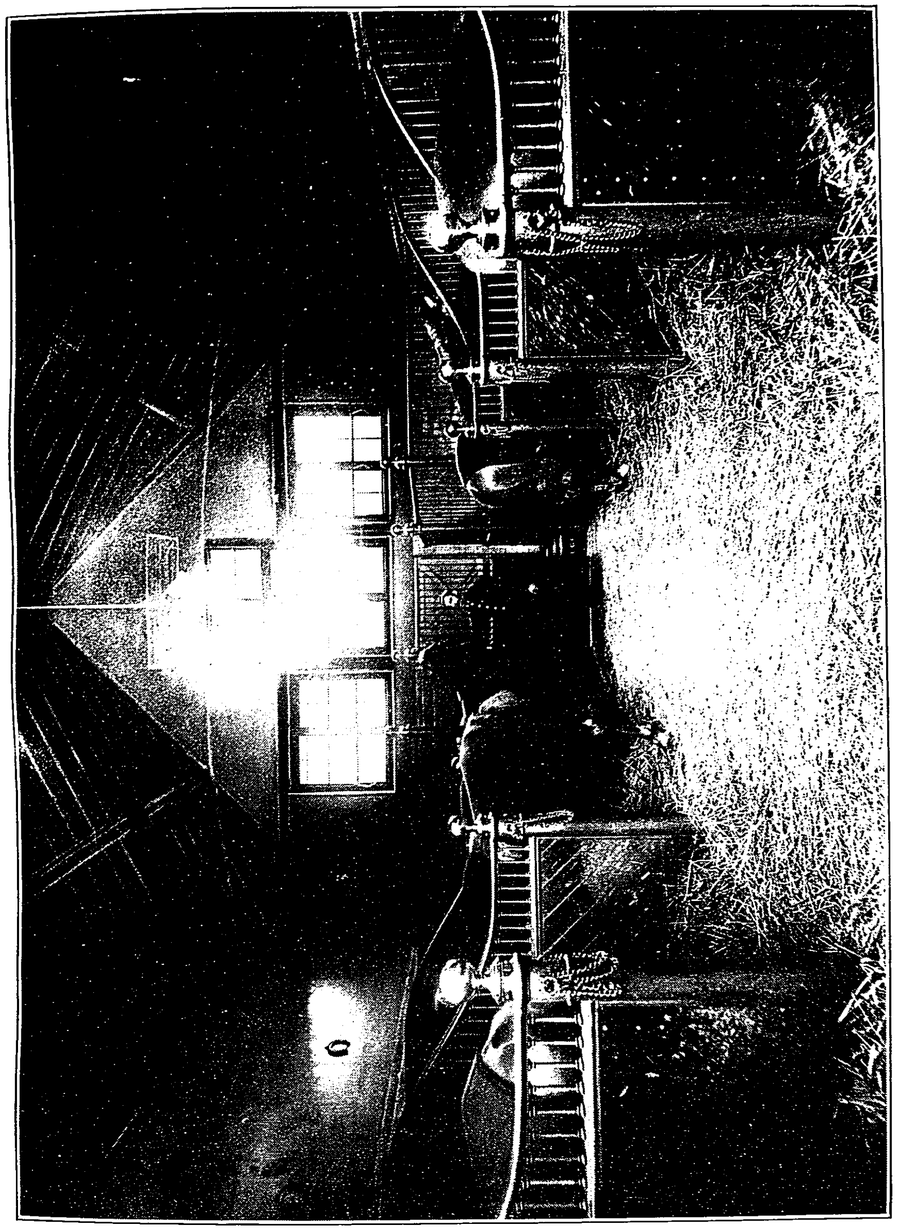
Liverpool is believed to contain the best and most valuable studs of horses to be found in the kingdom.

An enormous amount of traffic is carried on in connection with the system of docks, particularly on the lower roads, running parallel and adjacent to the line of docks. From 8-0 a.m. to 6 p.m., there is an endless and unbroken procession of horses and wagons on either sides of the road passing to and fro at the rate of from two and a half to three miles an hour, whilst the centre of the streets are utilized by an almost constant stream of lighter and faster vehicles. The horses attached to the slow and heavy wagons, &c., are chiefly in teams of two, three and even four, but it is not uncommon to find a larger number drawing huge boilers, immense loads of timber, and other heavy goods. The weights of the loads of course vary, but a common weight to place on a lurry for a team of horses to draw is six or seven tons, sometimes as much as ten tons.

For this work it is necessary that the best and heaviest type of horse be used, and one finds large, upstanding animals, 16½ to 17½ hands high, with plenty of bone, good open sound feet, long silky hair, and near the ground, costing from £50 to £150 each.

In the illustration the cart horses depicted are 17 hands high, and weigh from 17 cwt. to a ton, the horse shown on the right hand side being the heaviest.

Amongst the many fine studs to be found in the city may be mentioned that belonging to the Corporation, who own about four hundred horses, chiefly of the weighty type previously referred to, but also comprising a number of animals of the



HAYMAN GARDEN POLICE STABLES.

hunter class connected with the Mounted Police and Fire Brigade, and the old fashioned type of van horse doing tramway and other lighter work. (See illustrations).

As illustrating the pride that the Liverpool Corporation, Railway Companies, and private teamowners take in their horses, also the love that the public has for them, it may be mentioned that every year a procession is organized by the Corporation, and held on the first Saturday in May. This is known as the Liverpool May Day Parade, and has no equal throughout the country, the owners vieing with one another to produce the best, cleanest and finest dressed animals. Every class of horse owner in the city is in some way represented, bringing the total number of horses on parade to over 2,000.

The value of an annual procession of this description cannot be too highly appreciated. It encourages horseowners to keep up the stamp and breed, and purchase the best class of animals to be found. It also induces the carter to take a much greater interest in the animals entrusted to his care, as he receives a money prize, and the natural consequence is, an inspection finds them in grand condition, with shining and glossy coats, well washed, clean legs, and with a perfect understanding existing between man and beast.

The stables throughout the city are also worthy of mention; a very fine one, that occupied by the chesnut horses of the Liverpool Mounted Police, is situated in Hatton Garden off Dale Street, in the heart of the city, and will amply repay anyone the trouble of visiting. It is furnished throughout with Musgrave's patent fittings, the rack chains, knobs on the heel post, &c., being of brass. Ventilation is on the latest and most approved system and in fact the whole of the sanitary arrangements leave nothing to be desired. Other stables used for heavy draught horses are those belonging to the Health Committee of the Corporation at Smithdown Lane, off Paddington, adjacent to the University College, and those at Gascoyne Street,

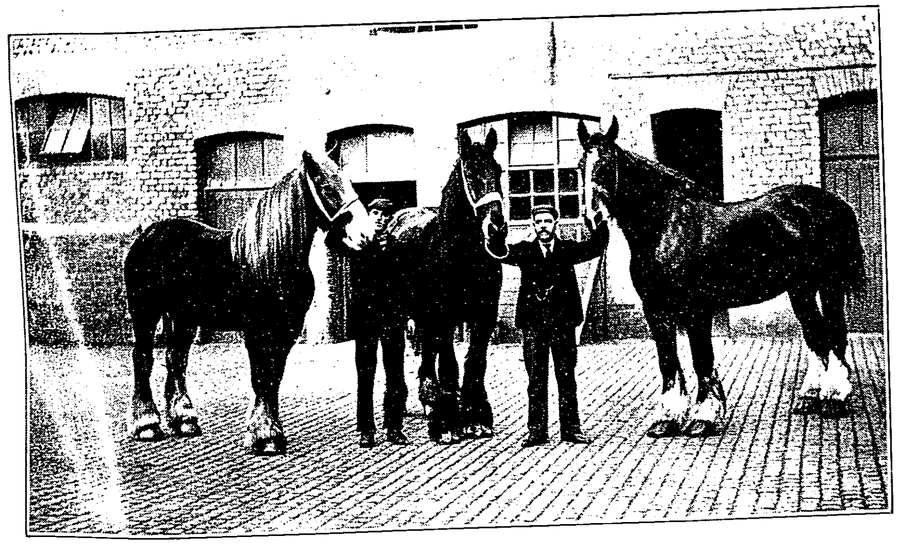
Vauxhall Road, a continuation of Hatton Garden, the latter having accommodation for about 100 horses including a number of special van horses for the ambulance work in connection with the removal of patients, clothing, &c., to the City Hospitals.

Visitors desirous of inspecting types of Canadian horses chiefly of the lighter class, but occasionally of a heavier kind, may gratify their wish by paying a visit to the American Horse Repository at Stanley, next to the Station. This place may be reached by taking the Old Swan tramcar, or by train from Lime Street Station and is about fifteen minutes journey either way. The Sales are held every Tuesday commencing at eleven a.m., and the horses may also be seen on Monday afternoon.

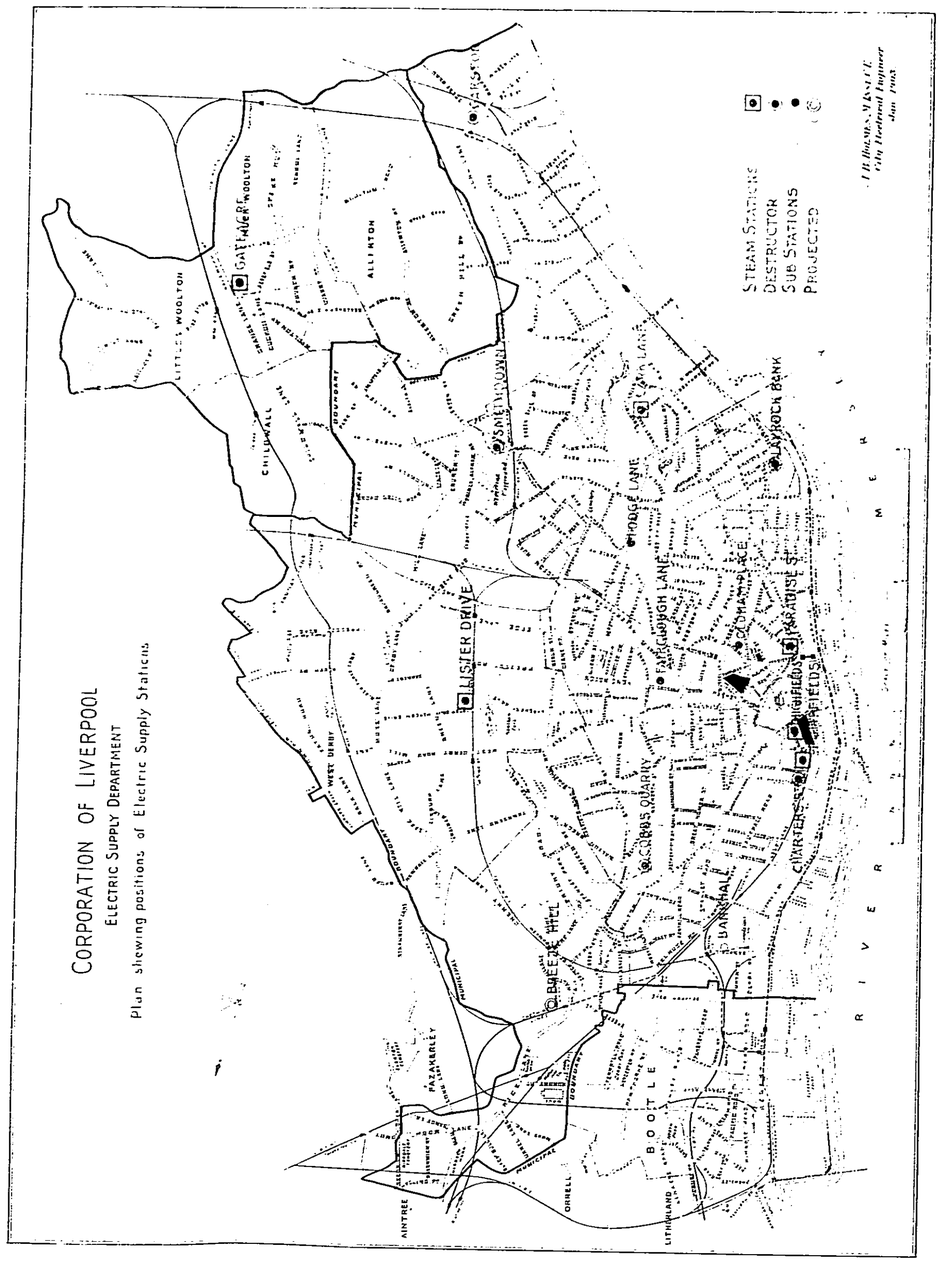
A short distance (about 100 yards) below the Repository is the Stanley Cattle Market, held every Monday throughout the year, also on Thursdays during the summer months. The animals exhibited for sale are chiefly from Ireland and Scotland. In winter from two to five thousand sheep, one to two thousand cattle, and in summer ten to fifteen thousand of the former and five hundred to a thousand of the latter are on view.



REFUSE WAGON AND PRIZE CART HORSE.



TYPES OF CORPORATION DRAUGHT HORSES.



THE ELECTRIC SUPPLY - - DEPARTMENT. -

The Corporation of Liverpool first considered the desirability of lighting the public streets by Electricity in the year 1878. At that period a sample arc lamp had been exhibited in one of the main streets by the British Electric Light Company, and the electric light had also been used by the Dock Board during the construction of a new entrance to the Langton Dock.

In the year 1879, Parliamentary powers were obtained by the Corporation to light the streets by Electricity, but no work was carried out under the powers so obtained, which expired by lapse of time in 1884.

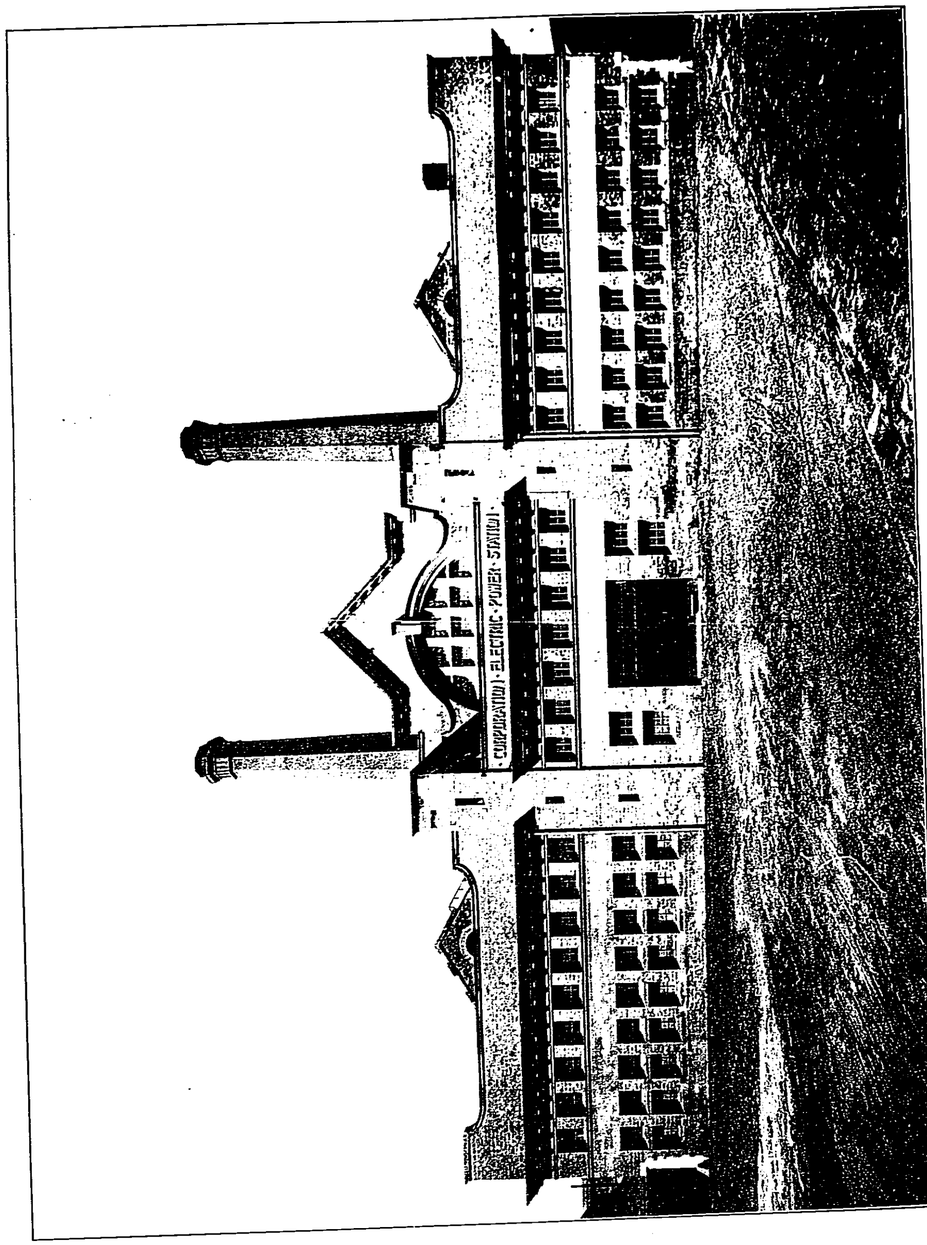
In the year 1879, the Picton Reading Room of the Corporation was lighted by means of three powerful Serrin arc lamps, each supplied from a small Gramme dynamo; and in the following year an offer of the British Electric Light Company was accepted for lighting certain of the main thoroughfares by arc lamps. The attempt to carry out the lighting with overhead wires was unsuccessful, and in 1882 the Company withdrew from the contract.

In 1883, an offer made by the Lancashire Maxim Weston Company to light electrically some of the main streets of the City was accepted, and the following year twenty arc lamps were installed, and the lighting satisfactorily accomplished. The Company, however, did not receive sufficient support to secure its financial success, and in a few months the electric lamps were replaced by gas.

On January 1st, 1883, the Liverpool Electric Supply Company, Limited, was formed, and from this date electtic lighting may be considered to have been established on a satisfactory commercial basis in Liverpool.

In 1884, the Electric Supply Company constructed a small generating station in Rose Street, with plant of about 200 horse-power, from which current was supplied to the Grand and Adelphi Hotels, and to some shops and other business premises, by means of overhead cables. In 1886, a second generating station was built by the Company in Tithebarn Street. In 1888, the Company, with the consent of the Corporation, obtained a License from the Board of Trade to supply electrical energy in a portion of the City, and to use underground mains for the purpose; another generating station was constructed in Harrington Street for this scheme. In the year 1889, a Provisional Order was obtained in place of the License, and in that year the Tithebarn Street station was extended by the acquisition of adjacent premises in Highfield Street. In 1890, the Oldham Place station was constructed. In 1892, a Provisional Order was obtained for a larger portion of the City, and also for the District of Toxteth Park, which was not at that time included within the City boundaries; a station was built at Lark Lane to serve this district, and the supply was commenced the following year. In 1896, a larger station was built in Paradise Street, by which date the small original stations at Rose Street and Harrington Street had been closed.

The career of the Liverpool Electric Supply Company was a prosperous one from the commencement, substantial dividends having been paid each year from its formation. On July 1st, 1896, negotiations, which had been some time in train, culminated in the purchase of the undertaking by the Corporation for the sum of £400,000. In the same year the city boundaries were extended to include Toxteth Park and other out-lying districts, and, at the date of the transfer, electrical energy was being supplied from



PUMPFIELDS ELECTRIC POWER STATION.

the Highfield Street, Paradise Street, Oldham Place, and Lark Lane stations, having a total plant capacity of about 10,000 horse-power. The standard unit of plant, which has been adopted in these stations, consists of a Willans' compound engine of 300 horse-power, mounted on the same bed-plate as a two-pole dynamo, to which it is directly coupled. The plant receives the supply of steam from Lancashire boilers, 28 feet long, and 7 feet 6 inches diameter, working at 120 lbs. pressure. A special feature of these stations is the method of coal delivery, the fuel being shot out of the cart into wrought-iron store hoppers, from which it falls by gravity, without handling, into the hoppers of the mechanical stokers, with which all the boilers are fitted.

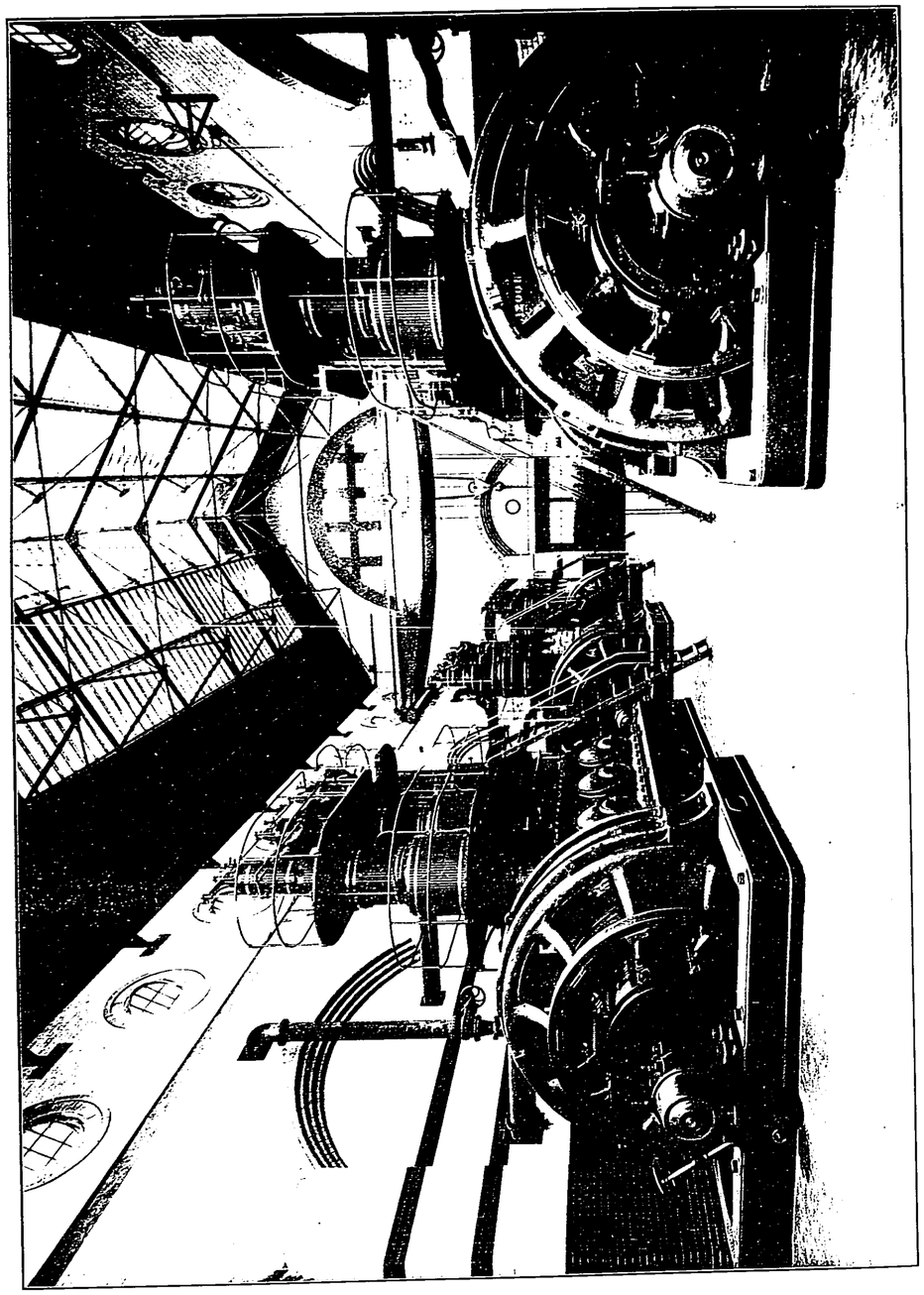
At the time of the acquisition of the Electrical undertaking of the Supply Company, the Corporation obtained a Provisional Order authorising them to supply electrical energy throughout the extended city. Up to this time the pressure of supply had been 110 volts, the distribution being direct current with a two and three-wire system of mains, but arrangements were made as quickly as possible to increase the pressure to 230 volts, and to adopt a three-wire system, with 460 volts between the outers. This change of pressure was carried out at the cost of the Corporation, with the friendly co-operation of the consumers.

In 1897, the Corporation purchased the undertaking of the Liverpool Tramway Company, with the intention of working the lines by electric traction. After careful consideration, it was decided to adopt a direct current system of distribution at a pressure of 460 to 500 volts, so as to enable the same plant to be used both for lighting, and for the tramways. It was found that by the selection of suitable sites, the whole of the city could be supplied from two stations, so situated that almost the whole area of supply would be included within a radius of two and a half miles from one or other of the stations. Favourable sites for the stations were already in the possession of the Corporation at Pumpfields and Lister Drive, and the construction of the necessary buildings was at once proceeded with.

The engine room at each station is 247 feet in length, 52 feet wide, and 37 feet high to the eaves of roof. On either side of the engine room is a boiler-house the same length as the engine room, 51 feet wide, and 26 feet to the eaves, measured from the flue-top at the back of the boilers. A switch room, 16 feet wide, extends the whole width of the building at the front end, with a battery room above, the flat roof of which affords space for the main water tanks. A fitting shop and store room are provided at the side of the switch room, and also a store for boiler-house sundries in the basement.

The foundation of the engine room consists of a layer of concrete 4 feet thick, upon which the engine foundations are constructed in concrete. The engine room floor is composed of steel joists and concrete, covered with red tiles laid in cement, with a border of black tiles round the wall and engine beds. The walls of the engine room and switch room are faced throughout with glazed bricks, the lower portion having a dado in golden brown with teapot-brown capping, the upper portion being ivory white with brown bands. The arches are in green-grey bricks, and all angles to arches and piers are bull-nosed. The engine room is lighted from the roof, and ventilated by a series of circular windows along each side, under the eaves, and by two large semi-circular mullioned and transomed windows in each gable end. The roof is formed with wrought-iron trussed principals, spaced 12 feet apart, with wood purlins, boards, felting, and slates. Skylights and hinged vertical lantern lights run the whole length of the roof; the lantern lights are opened and closed by means of gearing worked from the floor of the engine-house.

The foundations of the boiler-house rest on a bed of concrete, the walls are lined with common brick, and lime-washed, and the roof is constructed with iron principals, with fixed louvres for ventilation; windows are formed in the gables, and in each outside wall. The boiler beds are finished with special seating



PUMPFIELDS ELECTRIC POWER STATION.

blocks and flue covers, so as to reduce, as far as possible, the brick-work in contact with the boiler. The stoke-hole is paved with chequered-blue Staffordshire tiles, on concrete, and the boiler fronts are faced with white glazed bricks.

In the centre of each boiler-house is a chimney 220 feet high, resting on a bed of concrete 35 feet square, and 8 feet thick. The internal diameter of the chimney at the base is 13 feet, and at the top 12 feet 9 inches, The brick walling at the base is five bricks thick, and at the top one and a half bricks. The base portion of the shaft is square, and the upper portion octagonal; the chimney cap is made in terra-cotta, finished with a ring of Yorkshire stone. The doors are constructed of teak, oil polished, except in the boiler-houses, where they are of iron.

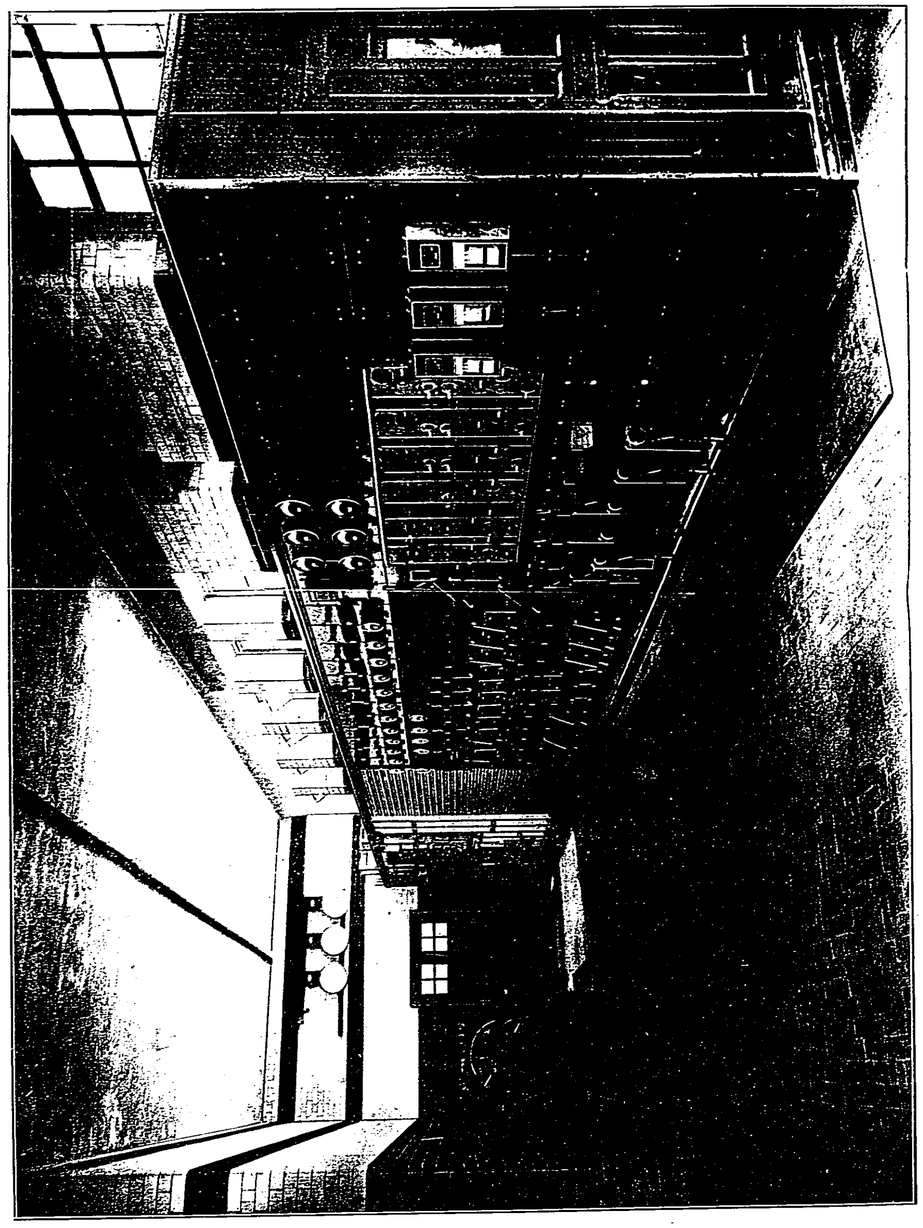
The Pumpfields Station is adjacent to the Leeds and Liverpool Canal, which affords facilities for the delivery of coal by barge direct from the collieries, and for the supply of condensing water. A considerable length of the canal is used as a cooling pond, by carrying the water, when it leaves the condensers, along the Vauxhall Road to an arm of the canal convenient for the purpose. The coal is delivered from the canal barges on to a canvas belt running parallel with, and close to, the canal bank. This belt delivers the coal into a hopper, which directs it on to an inclined belt that raises it from the ground level into the elevated coal-store, extending the whole length of the boiler-houses.

At the Lister Drive station, sidings from the London and North-Western Railway run alongside each boiler-house, and the coal is delivered from the trucks into the storage hoppers communicating with the mechanical stokers. As there are no facilities for a cooling pond at Lister Drive, the condensing water is pumped up into a cooling tower as it leaves the condenser. An Electric Locomotive is used for handling the coal trucks on the sidings. With the exception of the condensing apparatus the plant and general arrangement of the Pumpfields and Lister Drive stations are very similar.

Each boiler-house is divided into two sections by the chimney and pump room, and each section contains seven boilers and a Green's economiser. The main steam pipes are of steel, a non-return valve being fixed at the stop valve of each boiler. The boilers are of the Lancashire type, 30 feet long and 8 feet in diameter, with flues 38 inches diameter, each fitted with five Galloway tubes. The circular seams are double riveted with lap joints, and the longitudinal seams are butt-jointed, with strips inside and outside, and are treble riveted; the shell plates are $\frac{3}{4}$ inch. thick, and the flue plates $\frac{1}{2}$ inch.

The fittings for each boiler comprise an 8 inch steam stop valve, a safety valve for steam and low water, a duplex safety valve, and the usual man hole and water gauge mountings. Mechanical stokers are used of the Vicars or Hodgkinson pattern. Each bank of boilers derives its water supply from a steam-driven feed pump, the exhaust from which passes into a feed-water heater, by which means the feed-water is raised to a temperature of from 90 degrees to 100 degrees Fahrenheit before it passes into the Green's economiser, which is of the usual pattern, with 360 vertical tubes. The main flues are so arranged that the gases from the boilers can pass direct to the chimney, or through the economiser, at will. Each boiler is fitted with an injector, thus affording a complete duplicate system of supply.

The engines are of the Willans' vertical type, compound or triple expansion, running at 230 revolutions per minute, and giving a continuous output of 1,200 indicated horse-power, but capable of developing a maximum of 1,500 indicated horse-power for short periods. The engines are single acting, with three cranks, the crank shaft being 11 inches diameter. The length of stroke is $16\frac{7}{8}$ inches, and the cylinders are 15 inches, $20\frac{1}{2}$ inches, and $34\frac{5}{8}$ inches diameter. All the bearings are lined with white metal, and mineral oil is used for lubricating the cylinders and cranks and bearings, the crank chamber being enclosed. Automatic expansion gear is provided, and a high-speed sensitive governor, with speed-regulating adjustment.



PUMPHELIS ELECTRIC POWER STATION.

The dynamos are Siemens' multipolar machines, mounted on a bed-plate rigidly connected to the engine bed-plate, the armature shaft being carried at one end by a flanged connection to the crank shaft, and at the other end by a massive bearing attached to the bed-plate. The machines are shunt-wound and self-excited, and give an output of 1,420 amperes at 550 volts.

The armature core is built up of charcoal iron, securely fixed on a steel centre. The winding consists of copper bars, individually insulated, and fixed in slots machined into the core. The field magnets, having ten poles, are mounted on a heavy steel ring made in halves; the armature is sufficiently heavy to form the fly-wheel of the engine. The commutator is 57 inches in diameter; the brush holders are made of aluminium, and are mounted on a carrying ring fitted with worm and wheel adjustment; the brushes are of high conductivity carbon.

The ashes are raised from the stoke-holes, by elevators, on to a storage platform, from which they are discharged into the railway wagons, or carts, for removal. Electric Motors are used to drive the mechanical stokers, elevators, and economiser gear.

The plant in each station is divided into four independent sections, each consisting of three engines and dynamos supplied with steam from seven boilers, and an economiser. The total output of each station, when completed, will be 15,000 indicated horse-power. At the end of the station is a switchboard, to which each set of plant is connected, the switchboard being sub-divided into two sections, one for the tramways, and one for the lighting service. By this arrangement it is possible to work any set of plant on either service, and to so regulate the work of the station that each set of plant may be arranged to run the same number of hours annually.

Accumulators are used to equalize the load for the tramways, and to assist in balancing the load on the lighting service, four batteries of 240 cells each being installed, each battery giving

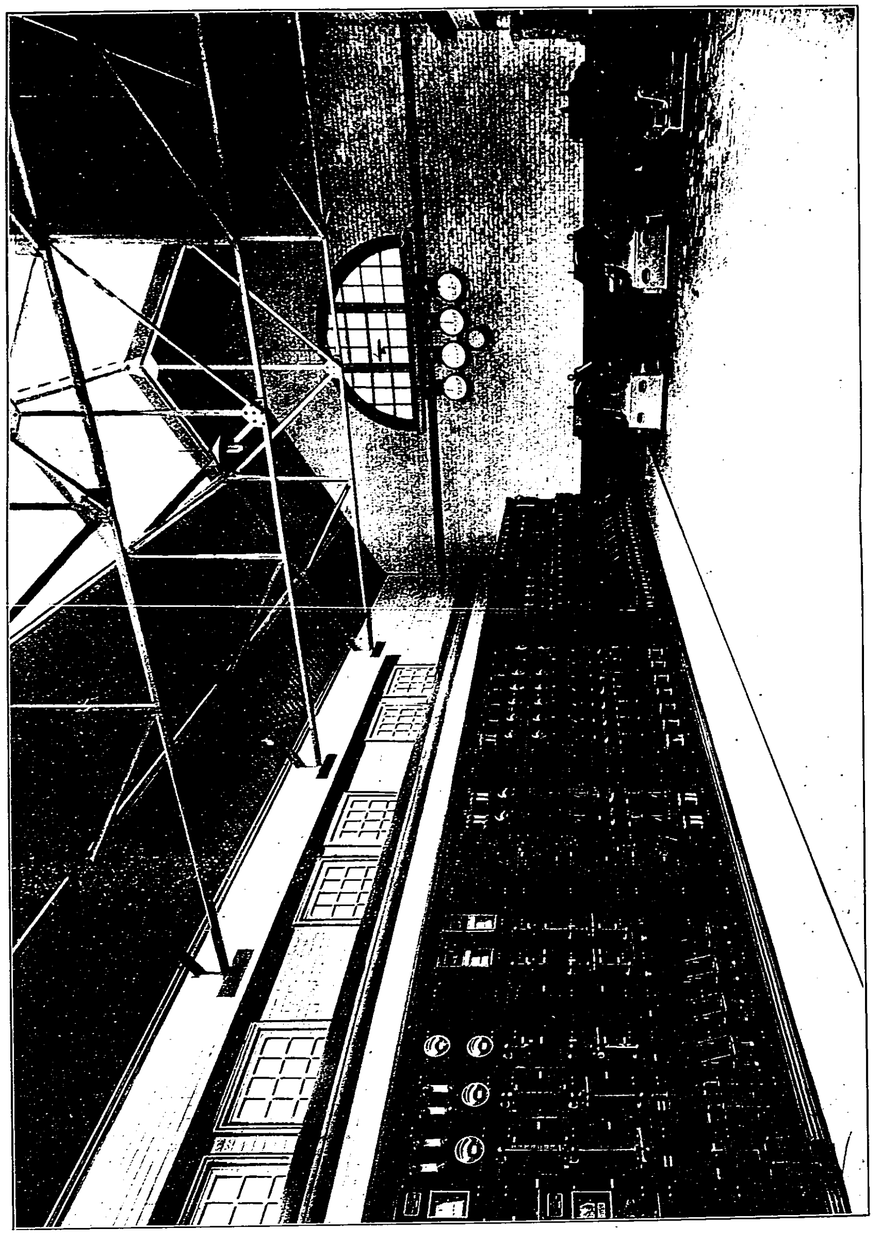
a discharge of 200 amperes for one hour, or 80 amperes for four hours. Balancers are also provided to equalise the load on the three-wire mains, as well as motor generators for charging the accumulators.

The switchboards are fitted with the usual measuring instruments and automatic pressure recorders. The lighting feeding mains are protected by fuses, and the tramway feeding mains by automatic magnetic circuit breakers. The switchboards are also fitted with the instruments required by the Board of Trade for indicating leakage and the fall of pressure in the tramway rails, which form the return conductors.

The buss bars for each service are divided into two parts, and connecting plugs for each dynamo and feeder enable the work of the station to be grouped into four divisions, with the view of limiting, as far as possible, the inconvenience that might be caused by the breakdown of a unit of the generating plant, or by an accident to any portion of the network of distributing mains. Each set of plant is provided with an ammeter and voltmeter for the guidance of the driver, and the current from each dynamo can be cut off, either at the switchboard or at the machine itself. The steam pressure of each bank of boilers is continuously recorded in the engine-room by a registering pressure gauge.

To deal with outlying portions of the area of supply, three of the engines at Lister Drive have been fitted with dynamos giving a three phase current at a pressure of 6,000 volts. Sub-stations, with transforming apparatus to convert the three-phase high tension current into direct current at the ordinary supply pressure, have been constructed at Fairclough Lane, Smithdown Road and Lodge Lane. Similar stations will be constructed in other districts as the demand for electrical energy may render necessary.

Arrangements have been made to utilize the waste heat of the refuse destructors for the electric service of the Corporation.



EDGE LANE SUB-STATION.

With this view engine rooms have been built at the Smithdown Road, Charters Street, Lavrock Bank, and Cobb's Quarry destructors; Willans-Siemens plant of 200 and 360 indicated horse-power has been adopted as the unit in these stations.

In the year 1902, the City boundaries were extended to include Garston, and the supply of Electricity in this district is generated at a Destructor Station. The Liverpool Corporation also supply electrical energy in the adjacent districts of Allerton, Woolton, and Childwall, from a generating station situated at Gateacre.

The underground mains are, for the most part, laid on the Callender solid system, the cables being insulated with vulcanised bitumen and laid in iron troughs in which they are supported on wooden bridges. The troughs are filled in with bitumen and covered over with a layer of concrete. The joint boxes fixed beneath the pavement are filled in with heavy insulating oil. The feeding mains, on the three-wire system, with 460 volts between the outers, are terminated in boxes above the ground level, which contain disconnecting switches and fuses for the distributing mains, which have their origin in these boxes.

The following table shows the annual increase in the supply of electrical energy since the Corporation acquired the undertaking of the Liverpool Electric Supply Company in 1896:—

Year.	Lighting and Power.	Tramways.	Total Units.
1896....	1,452,511	—	1,452,511
1897....	2,188,556	—	2,188,556
1898....	2,812,086	103,609	2,915,695
1899....	3,845,749	1,883,728	5,729.477
1900....	4,888,653	6,675,682	11,564,335
1901....	6,235,634	13,782,508	20,018,142
1902....	7,295,504	15,890,579	23,186,083

The demand for lighting, expressed as the equivalent in 16 candle power lamps, was on January 1st, 1903, 220,924 lamps, and at the same date there were 827 motors of an aggregate power of 2,877 horse-power connected with the supply mains.

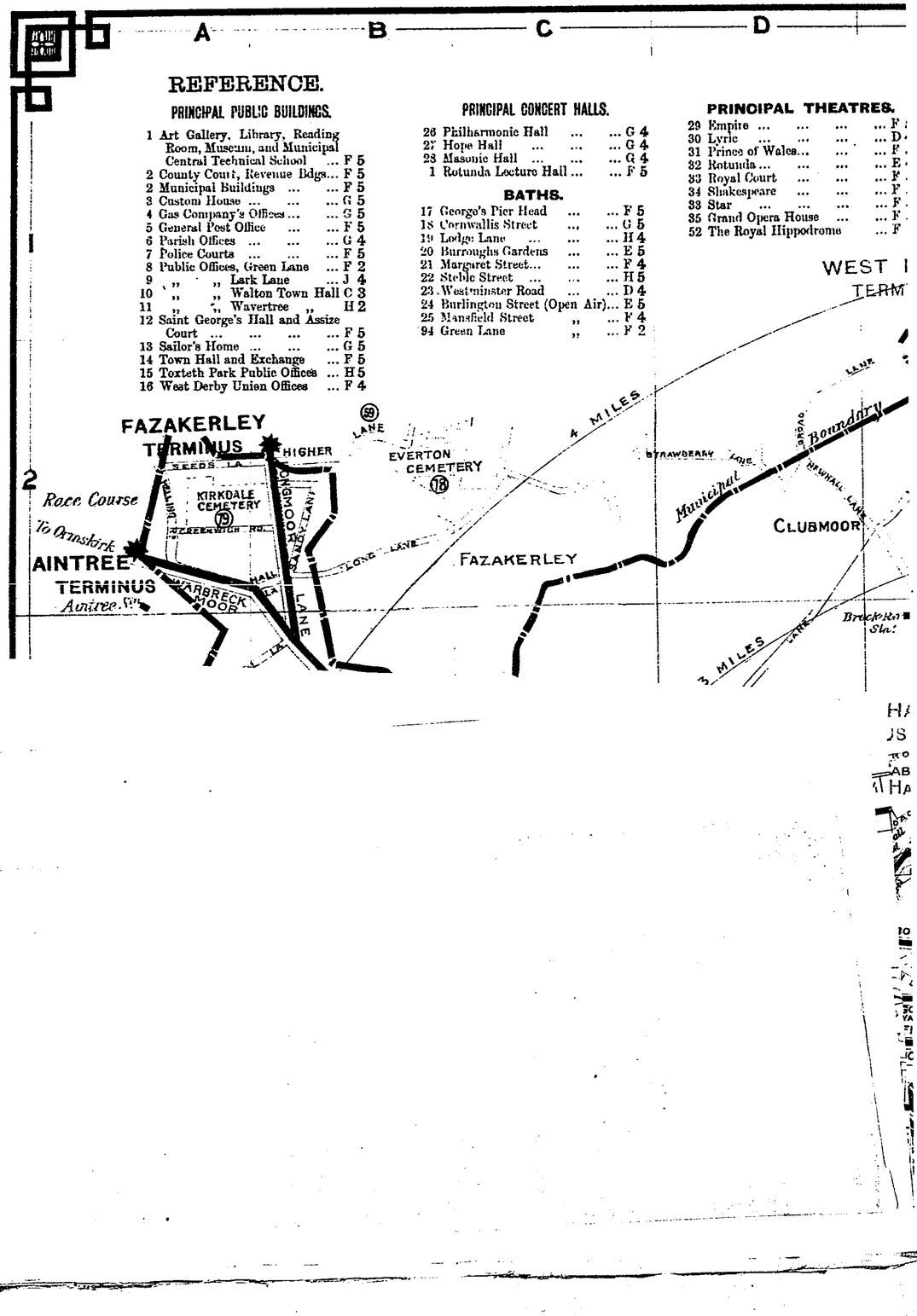
All the principal streets in the more important portions of the City are lighted electrically, 174 arc lamps being used for this purpose.

The prices charged to the public for the supply of electrical energy are as follows:—

For Lighting..	3¾d	per unit	up to	3,000	units per quarter.
	3d	,,	beyond ,,	,,	,,
For Power....	2d	,,	up to ,,	,,	,,
	1½d	,,	beyond ,,	,,	,,

The capital expended on the undertaking up to December 31st, 1902, amounted to £1,336,709, and the surplus of profit, after paying all working costs and charges for interest and sinking fund for the year 1902, exceeded £34,000.

The illustrations indicate the general construction and equipment of the generating stations and sub-stations, and the map shows the districts into which the area of supply is divided, and the positions of the various stations.



LIVERPOOL - CORPORATION TRAMWAYS. -

In introducing the question of the Liverpool Electric Tramways, it would perhaps be as well to give a brief history of the tramways of the city.

During the year 1860 a number of persons applied to the Health Committee of the Corporation for permission to lay down rails in the streets at the expense of the applicants. When the subject was under discussion by the Committee permission was granted by the Road Trustees of the district concerned for the laying of a line of tramways outside the Borough boundary from the Borough boundary to the Old Swan. The section of the rail, however, was such that when laid it formed a kind of trough below the street surface, which resulted in numerous accidents to vehicles and injury to horses, and the line became so great a nuisance that it had to be taken up.

In 1865 a company was formed under the name of the Liverpool Tramway Company, Limited, for the purpose of laying tramways within the streets of the city. Under the Tramways Act, 1868, this company was dissolved and a new company incorporated under the name of the Liverpool Tramways Company, and powers were obtained for laying tramways in a number of thoroughfares. The Act provided for the rails to be laid on a level with the street surface. In November, 1869, a portion of the lines authorised by the Act of 1868 were opened for traffic, and the remaining lines shortly after.

CITY OF LIVERPOOL.

PLAN OF TRAMWAY ROUTES.

1903.

THE NUMBERS ON THE LEFT SIDE OF REFERENCE LIST CORRESPOND WITH THE ENCIRCLED NUMBERS ON PLAN. THE LETTERS ON THE RIGHT SIDE INDICATE THE SQUARE WITHIN WHICH THEY WILL BE FOUND.

THE CIRCULAR LINES INDICATE DISTANCES IN MILES FROM THE TOWN HALL.

TERMINI . . . . . ✸
LOCAL RAILWAY STATIONS . . . . . ▪
ROUTES RADIATING FROM CENTRE OF CITY . . . . . ▬

CROSS CITY ROUTES.
AIGBURTH, AINTREE AND FAZAKERLEY INDICATED
WALTON, LIME STREET AND DINGLE "
WALTON AND PRINCES PARK "
OUTER CIRCULAR ROUTE "

THE ARROWS THUS (→) INDICATE WHERE SINGLE TRACK IS USED AND THE DIRECTION TRAVERSED.

The PENNY Fare extends from the Centre of the City (Pier Head, Old Haymarket, or Castle Street) on any of the radial lines to the PINK edging, with a Penny Fare beyond.

PRINCIPAL HOSPITALS.

56 Children's Infirmary ... ... G 4
57 City Hospital for Infectious Diseases ... ... J 5
58 " " " " E 4
59 " " " " B 2
60 Dental Hospital ... ... G 5
61 Eye and Ear Infirmary ... G 4
62 Northern Hospital (D'vid Lewis) E 5
63 Royal Infirmary ... ... F 4
64 Royal Southern Hospital ... H 5

MARKETS.

85 Cattle Market ... ... F 2
86 North Haymarket and Vegetable Market ... ... E 4
33 St. John's Market ... ... F 5
87 St. Martin's " ... ... E 5
88 Wholesale " ... ... E 4

CEMETERIES.

77 Anfield Cemetery ... ... D 3

SIDE INDICATE THE SQUARE WITHIN WHICH THEY WILL BE FOUND.

THE CIRCULAR LINES INDICATE DISTANCES IN MILES FROM THE TOWN HALL.

THE ARROWS THUS (→) INDICATE WHERE SINGLE TRACK IS USED AND THE DIRECTION TRAVERSED.

The PENNY Fare extends from the Centre of the City (Pier Head, Old Haymarket, or Castle Street) on any of the radial lines to the PINK edging, with a Penny Fare beyond.

REFERENCE.

PRINCIPAL INSTITUTIONS.

35 Athenæum ... ... F 5
36 Balfour Institute ... ... H 3
37 Conservative Club ... ... F 5
38 Florence Institute ... ... J 5
39 Gordon ,, ... D 4
40 Gregson ,, ... H 3
41 Liverpool College ... ... F 4
42 ,, Institute and School of Art ... ... G 5
6 ,, Parish Workhouse ... G 4
43 ,, University College ... G 4
44 ,, School of Cookery ... G 5
45 Lyceum ... ... G 5
46 Reform Club ... ... F 5
47 Toxteth Park Workhouse ... H 3
48 West Derby Union Tramp Wards ... ... E 3
49 ,, Union Workhouse ... C 3
50 Young Men's Christian Assn.... G 5
51 ,, Women's ,, ,, ... G 4

PRINCIPAL HOSPITALS.

56 Children's Infirmary ... ... G 4
57 City Hospital for Infectious Diseases ... ... J 5
58 ,, ,, ,, ,, E 4
59 ,, ,, ,, ,, B 2
50 Dental Hospital ... ... G 5
56 Eye and Ear Infirmary... ... G 4
60 Northern Hospital (D'vid Lewis) E 5
61 Royal Infirmary ... ... F 4
62 Royal Southern Hospital ... H 5
63 Stanley Hospital ... ... D 4
64 West Derby Union Workhouse Hospital ... . F 4

PRINCIPAL RAILWAY STATIONS.

45 Central (Cheshire Lines) ... G 5
29 Lime Street (L. & N. W.) ... F 5
65 Mersey Railway (James St.) ... F 5
45 ,, ,, (Low Level) ... G 5
66 Riverside ... ... F 5
54 Tithebarn Street (L. & Y.) ... F 5

PARKS, &c.

67 Botanic Gardens ... ... G 3
68 Kensington Gardens ... ... F 4
69 Kirkdale Recreation Ground ... D 4
70 Newsham Park ... ... F 3
71 Princes ,, ... J 4
72 St. James' Mount ... ... G 5
73 Sheil Park ... ... F 3
74 Stanley Park ... ... D 3
75 Sefton ,, ... J 4
67 Wavertree Park ... ... G 3
76 ,, Playground ... H 3

MARKETS.

85 Cattle Market ... ... F 2
86 North Haymarket and Vegetable Market ... ... E 4
33 St. John's Market ... ... F 5
87 St. Martin's ,, ... E 5
86 Wholesale ,, ... E 4

CEMETERIES.

77 Anfield Cemetery ... ... D 3
78 Everton ,, ... B 2
79 Kirkdale ,, ... A 2
80 Liverpool Crematorium ... D 3
81 ,, Parish Cemetery ... B 3
82 Necropolis ... ... F 4
72 St. James' Cemetery ... ... G 5
83 St. Mary's ,, (Kirkdale) D 4
84 Toxteth Park ,, ... H 3

Bootle Town Hall
,, Municipal Offices
,, Free Library
88 ,, Museum... ... ... O 4
,, Police Station
,, Baths
89 Bootle Borough Hospital ... C 5
90 Derby Park ... ... B 4
91 North ,, ... B 4
92 South Recreation Ground ... C 4
93 Muncaster Theatre ... ... B 5
94 Public Offices, Garston ... L 3
95 Theatre Royal, ,, ... M 3
96 Hospital for Infectious Diseases ... ... M 2
97 Liverpool Cricket Ground ... L 3
98 Recreation Ground ... ... M 3

PIER HEAD.

SCALE OF MILES

Copyright

CITY OF LIV

PLAN OF TRAMWA

1903

THE NUMBERS ON THE LEFT SIDE WITH THE ENCIRCLED NUMBERS ON SIDE INDICATE THE SQUARE WITHIN W

THE CIRCULAR LINES INDICATE DISTAN

REFERENCE.

PRINCIPAL PUBLIC BUILDINGS.

1	Art Gallery, Library, Reading Room, Museum, and Municipal Central Technical School	F 5
2	County Court, Revenue Bdgs.	F 5
2	Municipal Buildings	F 5
3	Custom House	G 5
4	Gas Company's Offices	G 5
5	General Post Office	F 5
6	Parish Offices	G 4
7	Police Courts	F 5
8	Public Offices, Green Lane	F 2
9	,, ,, Lark Lane	J 4
10	,, ,, Walton Town Hall	C 3
11	,, ,, Wavertree ,,	H 2
12	Saint George's Hall and Assize Court	F 5
13	Sailor's Home	G 5
14	Town Hall and Exchange	F 5
15	Toxteth Park Public Offices	H 5
16	West Derby Union Offices	F 4

PRINCIPAL CONCERT HALLS.

26	Philharmonic Hall	G 4
27	Hope Hall	G 4
28	Masonic Hall	G 4
1	Rotunda Lecture Hall	F 5

BATHS.

17	George's Pier Head	F 5
18	Cornwallis Street	G 5
19	Lodge Lane	H 4
20	Burroughs Gardens	E 5
21	Margaret Street	F 4
22	Steble Street	H 5
23	Westminster Road	D 4
24	Burlington Street (Open Air)	E 5
25	Mansfield Street	F 4
94	Green Lane	F 2

PRINCIPAL THEATRES.

29	Empire	F 5
30	Lyric	D 4
31	Prince of Wales	F 5
32	Rotunda	E 4
33	Royal Court	F 5
34	Shakespeare	F 5
33	Star	F 5
35	Grand Opera House	F 5
52	The Royal Hippodrome	F 4

KNOTTY ASH TERMINUS

TERMINATION OF THE SOUTH LANCASHIRE TRAMWAYS

To Prescot

WEST DERBY TERMINUS

SANDFIELD PARK

OLD SWAN TERMINUS

GREEN LANE TERMINUS

Knotty Ash

Broadgreen Stn.

Broad Green

4 MILES

FAZAKERLEY TERMINUS

Race Course

To Ormskirk

AINTREE TERMINUS

Aintree Stn.

FAZAKERLEY

CLUBMOOR

Municipal Boundary

3 MILES

TUE-BROOK

Tue Brook Stn.

Brook Rd Stn.

Edge Lane Stn.

CATTLE MARKET

WAVERTREE TERMINUS

Wavertree

SMITHDOWN RD. TERMINUS

CABBAGE HALL TERMINUS

NEWSHAM PARK

2 MILES

Botanic Gardens

WAVERTREE PARK

Edge Hill Station

CROXTETH RD. TERMINUS

Sefton Park

Mossley Hill Stn.

Mossley Hill Church

HORSE CAR ROUTE TO Litherland (BRIDGE ROAD)

LINACRE TERMINUS

BOOTLE

WALTON TERMINUS

STANLEY ROAD

STRAND ROAD

SEAFORTH

1 MILE

PRINCES RD. TERMINUS

DINGLE TERMINUS

Princes Park

Aigburth

To Woolton

Calderstones

CALDERSTONE ESTATE

EVERTON CEMETERY

KIRKDALE CEMETERY

ANFIELD CEMETERY

STANLEY PARK

WALTON ON THE HILL STN.

Walton Lane Stn.

Everton Football Ground

West Derby Union Workhouse

Hospital NETHERFIELD

St. Domingo Pit

Necropolis

Kirkdale Stn.

Bootle Stn.

Canada Dock

Princes Park

Sefton Park

Aigburth

Croxteth

Dingle

Wavertree

Edge Hill

Knotty Ash

Broadgreen

Walton

Bootle

Seaforth

8 Public Offices, Green ... ... J 4
9 ,, ,, Lark Lane ... J 4
10 ,, ,, Walton Town Hall C 3
11 ,, ,, Wavertree ,, H 2
12 Saint George's Hall and Assize Court ... ... F 5
13 Sailor's Home ... ... G 5
14 Town Hall and Exchange ... F 5
15 Toxteth Park Public Offices ... H 5
16 West Derby Union Offices ... F 4

22 Steble Street ... ... D 4
23 Westminster Road ... ... D 4
24 Burlington Street (Open Air)... E 5
25 Mansfield Street ,, ... F 4
94 Green Lane ,, ... F 2

FAZAKERLEY TERMINUS
AINTREE TERMINUS
Aintree Sta.
Race Course
To Ormskirk
HIGHER
EVERTON CEMETERY
KIRKDALE CEMETERY
WARBRECK MOOR
BLACK MILL LA.
ORRELL LA.
RICE LANE
LONG LANE
FAZAKERLEY
Municipal Boundary
4 MILES
CLUBMOOR
3 MILES
TUE BROOK
Tue Brook Sta.
Brickfield Sta.
CATTLE MARKET
Stanley Sta.
Edge Lane Sta.
GREEN LANE TERMINUS
OLD SWAN
OLD SWAN TERMINUS
DERBY LANE
PRESCOT ROAD
MILL LANE
MOSS LANE
BROADGREEN ROAD
WAVERTREE TERMINUS
WAVERTREE
CHURCH ROAD
PRINCE ALFRED ROAD
SMITHDOWN RD. TERMINUS
WAVERTREE PLAYGROUND
Wavertree Sta.
Sefton Park Sta.
Mossley Hill Sta
CALDERSTONE ESTATE
HART HILL
ALLERTON
GREEN
CHILDWALL ROAD
DUNBABIN ROAD
WOOLTON ROAD
HEATHFIELD RD.
ALLERTON RD.
PENNY LANE
RAYBURN ROAD
HIGH ST.
WELLINGTON Rd.
GARMOYLE RD.
GREENBANK ROAD
SMITHDOWN
EDGE LANE
PICTON ROAD
SALISBURY ROAD
SPOFFORTH ROAD
NEWSHAM PARK
GARDNER'S DRIVE
Holmin Gardens
WAVERTREE PARK
BOTANIC RD.
NEEDHAM RD.
HOLT RD.
GILEAD ST.
DURNING RD.
RESERVOIR
JUBILEE DR.
TUNNEL ROAD
Edgehill Station
SMITHDOWN CEMETERY
HARTINGTON RD.
CROXTETH RD. TERMINUS
LODGE LANE
KINGSLEY RD
PRINCES PARK TERMINUS
PRINCES ROAD
DINGLE TERMINUS
BELVIDERE RD
ST MICHAELS Sta.
ST MICHAELS RD
SOUTHWOOD RD
CROXTETH DRIVE
ULLET ROAD
PARKFIELD RD.
LINNET LANE
LARK LANE
LIVINGSTON DRIVE
AIGBURTH
AIGBURTH VALE
AIGBURTH DRIVE
SEFTON PARK
MOSSLEY HILL DRIVE
ELMSWOOD
WOODLANDS
SUDLEY
ASHFIELD
CHILDWALL
CHILDWALL ROAD
CHILDWALL Sta.
CHILDWALL ABBEY RD.
CHILDWALL FIELDS
CHILDWALL PRIORY RD.
CHILDWALL VALLEY RD.
CHILDWALL CHURCH
CHILDWALL HALL
CHILDWALL PARK AVE.
CHILDWALL MILL
CHILDWALL MILL LANE
CHILDWALL PRIORY

By the Liverpool Tramways Act, 1871, the Company obtained powers to lay additional tramways. Owing, amongst other matters, to the defective state of the lines the Corporation in 1872 obtained powers to purchase the tramway undertaking within 2½ years on three months' notice. Subsequently the permanent way got into such a bad condition that the Corporation served notices upon the Company to remove the lines from the public streets. Negotiations subsequently ensued which resulted in an agreement, confirmed by the Liverpool Tramways Act, 1875, by which the Corporation reconstructed the lines at the cost of the Company.

In 1879 the Liverpool Tramways Company became amalgamated with the Liverpool Omnibus and Tramway Company under the title of the Liverpool United Tramways and Omnibus Company. In the same year the Company entered into an Agreement under which the Corporation were to purchase the existing lines for £30,000, complete the reconstruction of the various lines, and lease the lines to the Company at a rental of 7½ per cent. upon the purchase money from the date of construction, the lines to be maintained by and at the cost of the Corporation. The Corporation also undertook to construct and maintain the lines sanctioned by the Liverpool Tramways Extensions Provisional Order, 1879, and subsequent Orders, and lease the same to the Company at a rental of 10 per cent. on cost of construction, the Corporation reserving powers to purchase the whole undertaking. The lines were handed over to the Corporation on the 1st January, 1880, and the Company commenced working them shortly afterwards. This arrangement was confirmed under the Liverpool Tramways Act, 1880, and the lease subsequently extended for 21 years from the 1st January, 1884. Under the Liverpool Extensions Order, 1895, a new lease was granted to the Company to expire on the 1st January, 1915, and to include the whole of the lines in the extended city.

PURCHASE OF THE UNDERTAKING.

Owing to questions arising between the Corporation and the Company with regard to the maintenance of the lines and the introduction of mechanical power, the Corporation decided to acquire the undertaking. This was accomplished under the Liverpool Tramways Act, 1897, the amount of the purchase money being £567,375.

On the 1st September, 1897, the Corporation commenced working the lines, comprising 67⅛ miles of track in the City, 6 miles in Bootle, and about ¾ of a mile in Litherland.

After much consideration the Corporation finally decided in favour of adopting the overhead trolley system of electric traction, on the grounds of general efficiency and low initial cost. This system at first met with much opposition, but after the first few months' operation all objections were removed, and the adoption of the overhead trolley system generally met with unanimous approval.

In November, 1898, an experimental electric line between St. George's Church and the Dingle, comprising a length of about 6 miles, was opened, and during the following two years upwards of 100 miles of line were constructed or reconstructed for electric traction, including the old horse lines, together with upwards of 40 miles of new lines for which Parliamentary powers had been obtained.

The paving in all cases has been laid upon a Portland cement concrete foundation six inches in thickness, the setts being granite from North Wales, with the exception of a length of about four miles where Australian hardwood blocks (Jarrah and Karri) have been adopted, and a length of about one mile laid with prismatic oak blocks.

The permanent way for the Electric Tramways consists principally of 60-feet girder rails, weighing 95 lb. per lineal yard, and having a tread of $2\frac{1}{8}$ inches in width, with a groove of 1 inch by 1 inch. Several types of joints have been tried, including the patent joint of Messrs. Dick, Kerr & Company, in which a portion of the fish-plate comes through the top surfaces of the rail; the well-known Falk Weld joint; the Cooper patent rail joint, in which a short section of the rail is placed flange to flange below the joint, and riveted with twelve rivets at the side through the flanges; and also the ordinary fish-plate joint with six one-inch bolts. Where the fish-plate joint has been adopted the method of electric bonding has been by means of two .0000 crown flexible Chicago bonds coming through the fish-plates and riveted into the web of the rail.

The construction of the whole of the permanent way works has been carried out by workmen employed by the Corporation under the direct supervision of the City Engineer, and, no doubt, the very satisfactory progress of these works has been largely due to the fact that much of the special work has been prepared locally by Corporation workmen. Some of the special work has, however, been supplied by the Lorain Steel Company. The junction at Lime Street and London Road, which has been supplied by this company comprises 16 points and is among the most complicated pieces in the United Kingdom.

The overhead conductor in narrow streets is on the span wire system, supported by rosettes attached to buildings on either side of the street, where satisfactory arrangements can be made; but where this cannot be done, side poles are erected, these poles being kept as far as possible close up to building line, this arrangement giving the best appearance, while at the same time interference with pedestrian traffic is reduced to a minimum. Where the streets, however, are sufficiently wide to permit of it, centre poles have been fixed.



SPAN WIRE, WITH ROSETTE CONSTRUCTION, SOUTH CASTLE STREET.



SPAN WIRE, WITH SIDE POLE CONSTRUCTION, LONDON ROAD.

The electrical energy for the tramways is supplied at a pressure of 500 volts from the Electric Power Stations of the Corporation, which also afford a supply for lighting and power. The Pumpfields and Lister Drive Stations each contain plant of 15,000 horse power. The steam is obtained from Lancashire boilers, 30 feet long by 8 feet diameter, working at a pressure of 160 lb. per square inch, and arranged at each station in four groups of seven boilers each. The feed water supply passes through an economiser.

The unit of plant adopted in these stations consists of a Willans engine of 1,200 horse-power, directly connected to a Siemens dynamo, giving an output of 550 volts and 1,450 amperes.

The supply of electrical energy in each station is distributed from two switchboards, one for the Tramway service and one for the lighting service. The dynamos are so connected to the switchboards that any machine may be used at will for either service. The feeding mains for the Tramways are run from the switchboards to the distributing boxes on the Tramways underground on the Callenders solid system.

The switchboards are fitted with the usual measuring instruments and safety appliances, and with the testing apparatus necessary to conform to the Board of Trade regulations.

A battery of accumulators is fixed at each station and is used in parallel with the generating plant. The stations have been designed and equipped by Mr. A. B. Holmes, M. Inst. C.E., City Electrical Engineer, and are under the control of the Electric Power and Lighting Committee, who deliver the energy into the feeder boxes of the Tramways Committee at a fixed price per unit, the average price paid during the year 1902 being 1.19d.

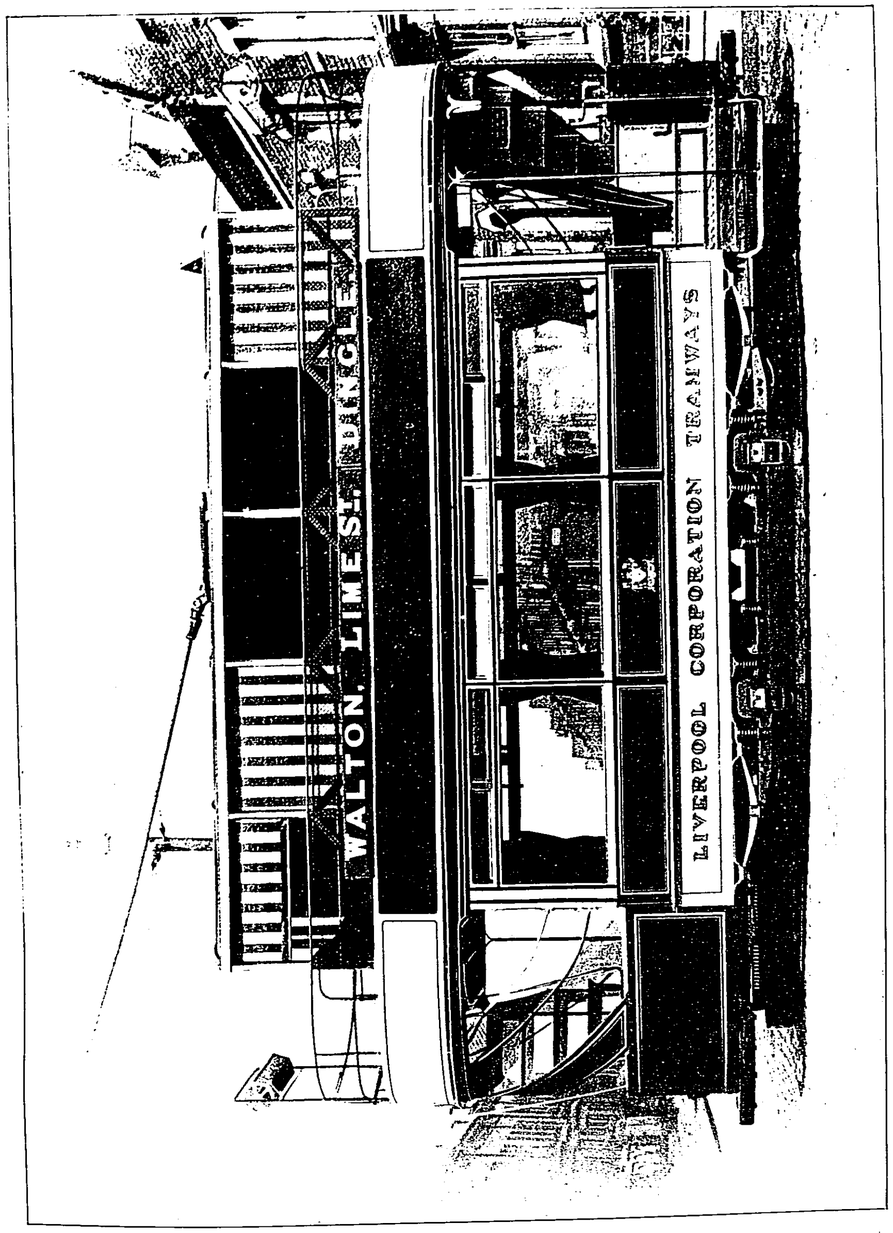
CARS.

The Liverpool Car was designed as a result of experience with the various types of cars available in 1898 and 1899, and has been supplied by Messrs. Dick, Kerr & Co., Limited. It is a double-deck car, 28 feet in length over all, and on a single truck, having a wheel base of 6 feet. It has seating capacity for 56 passengers—22 inside and 34 outside. The staircase has been reversed to render it safe for passengers using it while the car is in motion. The cars are mounted on Brill trucks, with Walker motors and controllers. Each car is fitted with a hand brake and an electric brake. An emergency box is attached to the staircase of each car, containing a section box key, a pair of wire cutters, a pair of rubber gloves, and a short length of rope.

The principal argument in favour of the single deck cars originally adopted was that passengers could be discharged with much greater rapidity than with the double deck type, additional time being occupied in ascending and descending the double deck staircase, which could not be used in the case of infirm or young people while the car was in motion. An effort was, therefore, made to design a staircase which would enable passengers to descend with safety while the car was in motion, so that conductors might reasonably decline to stop a car unless at the request of a passenger on the platform. This was ultimately accomplished by the design of the staircase shown in the illustration, "Liverpool Covered Car fitted with Plough Guard." This type of staircase, being the design of the General Manager, has been largely adopted throughout the country. The cars are fitted with revolving illuminated route indicators, which are found exceptionally useful both during night and day, and serve to light the upper deck of the cars.

COVERS FOR UPPER DECKS OF TRAMCARS.

The General Manager has long taken the view that public requirements could not be adequately met during inclement weather



COVERED TRAM CAR, FITTED WITH PLOUGH GUARD.

without the provision of a top cover for the cars. The seating capacity of the inside of the standard car is 22, against a total seating capacity of 56; therefore in inclement weather only 39 3 per cent. of the total seats can be conveniently used, though it frequently happens at such times that an increased requirement is set up.

Many forms of cover for the upper decks of cars have been tried at various times, in most cases the upper deck being treated similarly to the lower, having a permanent roof with sliding side windows, and closed end screens with doors, and they have principally failed in consequence of their stuffy offensiveness during the summer months.

Outside travelling during a considerable portion of the year is both pleasant and beneficial, and it is well known that a large number of people in the summer months avail themselves of it purely for constitutional purposes. The General Manager has taken out from the meteorological reports prepared for the Department the days during the year on which the rainfall exceeded .05 of an inch, and could be described as any way wet, and the days upon which the temperature was below 35 degrees and could be regarded as cold. Under the first there are 74, and under the second 32, and four of these are concurrent, giving a total of 102 days or 28 per cent., or less than one-third of the year, when outside travelling could be regarded as unpleasant. On the other hand, the number of days when the temperature was 50 degrees or over, when outside travelling would be undoubtedly preferred, amounted to 173 days, or nearly half the year. During the 90 remaining days which were dry, the temperature was over 35 degrees, rendering outside travelling quite practicable. It is, therefore, clear that while a top cover is necessary for less than a third of the year, and may be useful for a further period of about one-fourth of the year, it would be a nuisance for nearly half the year.

The requirements of a top cover are thus shown to be—

1. It must preserve the amenities of outside travelling; and, therefore,

2. It must be capable of being brought in and out of use simply and speedily.

Having these considerations in mind, the General Manager designed the covered car, a number of which have been in service since the 2nd December.

The arrangement has increased the top deck seating accommodation from 34 to 42, and the cover can be placed in or out of use within a minute.

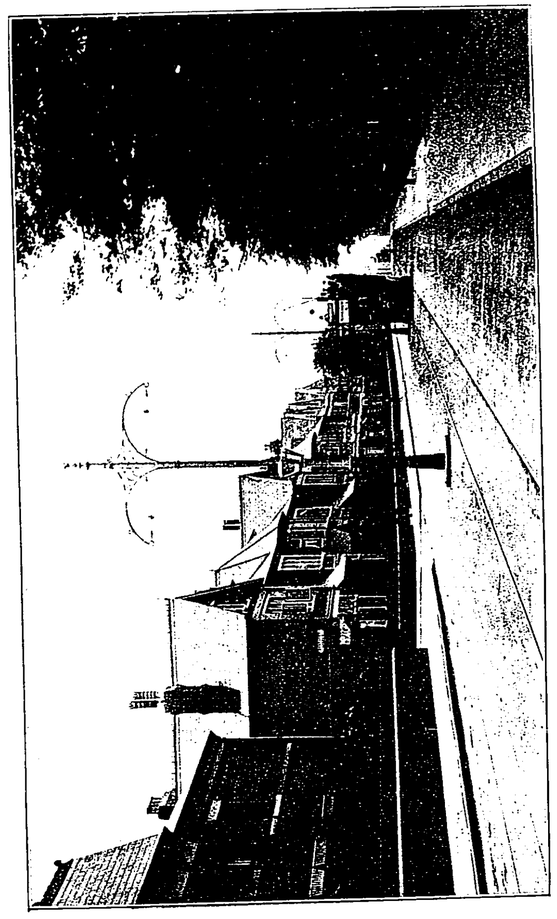
It is clear that their introduction will not only add to the comfort and safety of passengers, but will render it possible to give a far more efficient service with fewer cars.

What is sometimes described as overcrowding consists of allowing nine passengers to stand inside the car instead of driving them to the top in inclement weather. The total seating capacity of the cars during the winter months is largely in excess of the average requirements, but passengers being allowed to stand inside after 22 are seated leads to charges of overcrowding principally by passengers residing at or near the termini who can always secure seats, and who object to intermediate passengers being afforded inside standing accommodation. The top-covered car provides covered seating accommodation for 58 instead of 22 passengers, and its general adoption would render overcrowding or standing quite unnecessary, and with a lighter service.

CLEANSING, DISINFECTING, AND VENTILATING THE CARS.

CLEANING CARS.—The cars are thoroughly cleansed and disinfected daily, the system in vogue being as follows :—

The roof, stairs, inside floor and platforms, are thoroughly swept down and the glass work cleaned, including ventilators



CENTRE POLE CONSTRUCTION, AIGBURTH ROAD.

and illuminated route indicators. The side, end, and rocker panels, together with the dashes, inside and outside stair stringers, are cleaned with oil, the waste afterwards being used for cleaning the trucks. The insides are then thoroughly dusted with soft cotton wipers, and the brass work cleaned and polished. All rocker panels, canopys, and white paint work are washed with soap and water weekly, and the inside of each car is frequently thoroughly washed out with soap and water.

DISINFECTING.—With reference to disinfecting, the insides (seats and floor), together with the roof, top seats, stairs, and platforms, are sprayed with diluted perchloride of mercury daily.

The disinfection consists of one part of perchloride of mercury to 250 parts of water. This method of disinfection was adopted by the General Manager after consultation with the Medical Officer of Health.

The practice of spitting on the Tramcars has been rigourously dealt with under the Bye-law obtained in March of last year, which reads as follows, viz.:—

> "No person shall swear or use obscene or offensive language or conduct himself offensively whilst in or upon any Car, or spit or commit any nuisance in or upon or against any Car or Tramway Station, or premises used in connection with the Tramway system, or in any way wilfully interfere with the comfort of any passenger."

VENTILATION.—Various methods of ventilating the Cars exist, depending largely upon the type of vehicle.

The standard Car, of which there are 344, is fitted with 6 casement lights on each side, above the windows, measuring 2 feet $3\frac{1}{2}$ inches by $8\frac{1}{4}$ inches, hinged at the bottom, and opening inwardly, guiding the incoming air on to the roof of the Car, where it is distributed with the least possible draught. The

four end casement lights are pivotted, and are turned outwards in the direction in which the car is travelling. These and a sliding ventilator, measuring about 1 foot 8 inches by 4½ inches, in the top of the front door of the Car, are only used in hot weather. There are also in use on a number of the Cars what are known as "Leather's Ventilators," which are of the moveable louvre type, three of which are fitted on each side of the Cars above the side windows. In addition, during hot weather both the doors of the Car are opened for the necessary period at the end of each journey. If passengers could be got to agree as to a standard of ventilation the difficulty experienced in meeting their requirements could be overcome, but in practice it is found that the views of passengers as to the ventilation required vary considerably. There are quite as many complaints of excess of fresh air in the Liverpool Cars as of a shortage of it.

LIFEGUARDS.—The question of safeguarding the pedestrian traffic, and the public generally, has received the close attention of the Tramways Committee, and the subject of lifeguards has been finally dealt with. After a long experimental period it was found that nearly all the lifeguards designed for the purpose of picking up bodies failed from time to time, and as a result the General Manager experimented with a type of guard designed to run with a fixed clearance from the road surface to prevent any body getting under it, and for the purpose of pushing it quite clear of the guard as well. The guard is described as the Liverpool Plough Guard, and the Tramways Committee has finally adopted it as the standard type, and nearly the whole of the cars are now fitted with it. Since the introduction of the plough guard it has been effective in every case; 41 persons have been actually under the platforms of the cars fitted with it, and in every instance have escaped without anything approaching serious injury, and all the evidence tends to show that electric traction has not, as is popularly supposed, increased the risk of fatal accidents in the public streets.

The following table is a statement of the fatal cases, and their ratio to passengers carried for the past five years. It will be seen that for the year 1902 the figures were 1 in 13½ millions, and for comparative purposes it may be mentioned that the fatal cases on railways according to the last published returns amounted to 1 in 895,878:—

Year	Passengers carried	Fatal Accidents: Horse	Fatal Accidents: Electric	Ratio to Passengers carried. Approximate
1898	41,772,034	6 4 Passengers 2 Pedestrians	1 Passenger	1 to 6,000,000
1899	63,771,450	3 1 Passenger 2 Pedestrians	5 All Pedestrians	1 to 8,000,000
1900	82,367,958	5 2 Passengers 3 Pedestrians	6 5 Pedestrians 1 thrown from trap in collision	1 to 7,500,000 Horse—1 to 5,000,000 Electric—1 to 10,000,000
1901	101,108,780	—	9 7 Pedestrians 2 Passengers	1 to 11,250,000
1902	109,335,585	—	8 2 Passengers 4 Pedestrians 1 Cyclist 1 Linesman	1 to 13,667,000

CONVEYANCE OF MERCHANDISE.

The tramways are at present used only for passenger traffic, but an important scheme is under discussion for connecting the Liverpool Dock Quays through special lines to the South Lancashire Tramways, which connect the Liverpool system with most of the South-West Lancashire towns.

GROWTH OF THE TRAMWAY SYSTEM.

The following table illustrates the progress of passenger traffic under municipal management in Liverpool, viz. :—

PASSENGERS, MILEAGE, AND RECEIPTS.

PASSENGERS.

	1897*	1898	1899	1900	1901	1902
Electrics	—	785,064	15,853,160	58,068,531	100,076,789	108,906,472
Horse Cars	30,596,229	31,985,158	39,321,946	19,051,875	218,166	74,685
Omnibuses	7,812,855	9,001,812	8,596,344	5,247,552	813,825	354,428
	38,409,084	41,772,035	63,771,450	82,367,958	101,108,780	109,335,585

MILEAGE.

Electrics	—	53,197	1,473,750	5,584,357	10,771,461	11,705,425
Horse Cars	4,674,609	4,736,103	4,758,652	2,571,163	46,247	16,534
Omnibuses	1,328,533	1,490,458	1,368,144	945,346	152,355	68,856
	6,013,182	6,279,754	7,600,546	9,100,866	10,970,063	11,790,815

RECEIPTS.

Electrics	—	£4,087	£77,145	£284,759	£463,164	£504,304
Horse Cars	£239,399	250,975	234,756	105,212	717	278
Omnibuses	51,344	59,145	47,658	27,603	4,502	2,146
	£290,743	£314,207	£359,929	£417,574	£468,383	£506,728

* Last year of Old Company.

During Coronation week the number of passengers carried amounted to 3,128,761. Miles run 255,674. Receipts £15,031 18s. 6½d.

The following is a summary of the principal figures applicable to the Liverpool Tramways, viz. :—

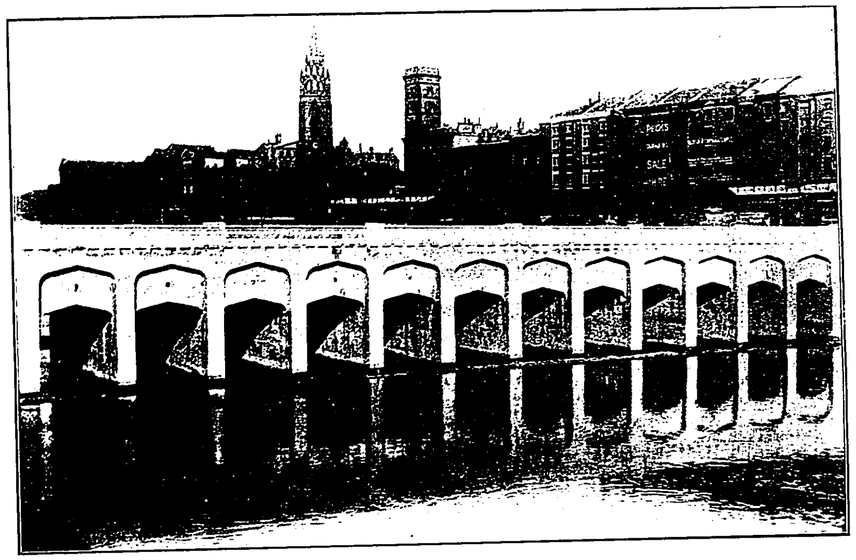
Capital Expenditure	£1,832,977	9 11
Total Revenue, 1902	517,935	5 0
Operating Costs	339,810	19 8
Percentage of Operating Costs to Total Revenue	65 per cent.	
Gross Profits	£178,124	5 4
Percentage of Gross Profits to Capital Expenditure	9.7 per cent.	
Interest and Sinking Fund	£102,627	0 2
Balance	75,497	5 2
Divided as follows:—		
Reserve, Renewal and Depreciation Fund	£50,331	10 2
Transferred to General Rate Account	25,165	15 0
Total Operating Charges per Car Mile	6.884d.	
Interest and Sinking Fund per Car Mile	2,089d.	
Total Charges	8,973d.	
Car Mile Earnings	10.34d.	
Average Fare per Passenger	1.111d.	
Average Length of 1d. Stage	2⅓ miles.	
Length of Track	101 miles.	
Price per Unit	1.199d.	
Number of Employees	2,301.	
Number of Cars	488.	
Number of Cars running in and out of the City per day	7,352.	

There are 21 routes operated by the Tramways Department. A descriptive map of these routes indicating mileage, limits of the penny and twopenny fares, the tramway termini, principal institutions, buildings, railway stations, Parks, Cemeteries, Markets, etc., is appended herewith.

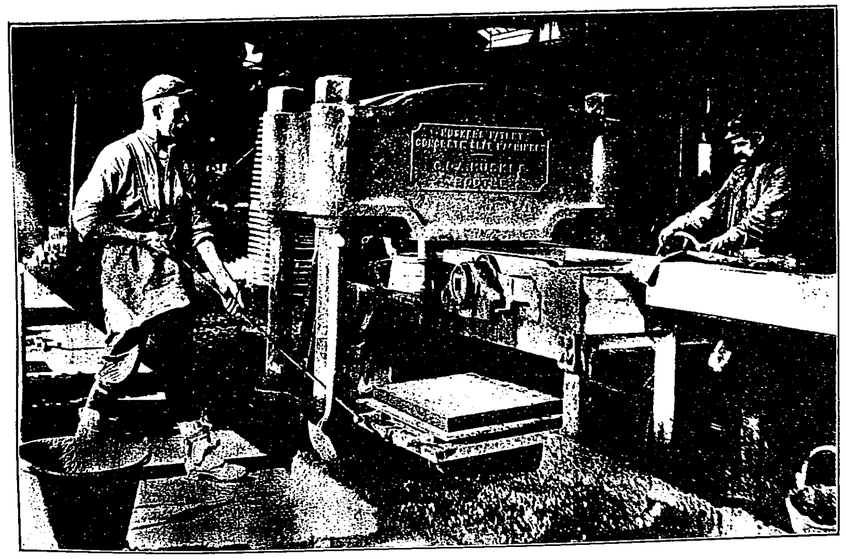
MUNICIPAL ENGINEERING.

Prior to the year 1760 Liverpool on the land side had no outlets for traffic beyond mere bridle paths, but in that year a turnpike or trunk road direct to Prescot and Warrington was constructed, by means of which stage coach communication between Liverpool and the Metropolis was first opened up, the journey occupying four days. This service was no doubt looked upon—both in regard to speed and comfort—as a great advance upon journeying on horseback, which was the only mode of travelling out of the town that had hitherto obtained. The construction of this main road besides affording increased facilities for travelling, also gave a fillip to the production of vehicles suitable for the transit of goods to the inland towns in place of conveying them by packhorses or by canal; and these improved means of transit and inter-communication with other towns greatly assisted in developing and promoting the trade of Liverpool.

A few years later the introduction of steamship traffic—more especially in the cross Atlantic trade—created a demand for further improvements in the facilities for inland transit; and as an outcome of this demand, in the year 1830, the pioneer railway line in the Kingdom for passenger and goods traffic, viz., from Liverpool to Manchester was opened, and from that date to the present the history of quick transit has been one of continuous development and advancement, there being now six main lines of railway having termini in Liverpool, while the Overhead Electric Railway extends the whole length of the line of docks, and Electric Tramways radiate from the centre of the City to the whole of the suburbs.



VIEW OF CONCRETE CONSTRUCTION CARRYING BRUNSWICK STREET OVER THE SITE OF THE GEORGE'S DOCK, LIVERPOOL.



HYDRAULIC PRESS FOR MANUFACTURE OF CONCRETE PAVING SLABS.



VIEW OF TRAMWAY IN COURSE OF CONSTRUCTION.



VIEW SHOWING STREET SURFACE AND TRAMWAY CONSTRUCTION. WATER STREET CONTINUATION.

The streets in Liverpool in the 18th century were narrow and ill-paved; they were laid out on the lines of the present South Castle Street, Castle Street, Lord Street, James Street, Water Street, and Dale Street, but the rapid strides made in the growth of the town led the Local Authorities towards the close of that century to obtain an Act of Parliament for the widening and improving of Castle Street, Water Street, and part of Dale Street, and the improvements authorised by this Act were carried out without delay.

With regard to the surface of the streets generally, the paving of the carriage-ways consisted of rough boulder stones with a channel down the centre; footways were unknown except that perhaps in a few of the principal streets a strip of land on either side laid with angular stones without curbs or channels, tended to reserve it as a footpath for pedestrian traffic. In a few isolated cases in the main thoroughfares short lengths of these strips had been flagged at intervals, but they were considered such curiosities that they were specially pointed out to strangers visiting the town.

In the year 1818, however, the Local Authorities appear to have become convinced of the necessity for improving in some degree upon these roadways and footways, and caused some of the principal streets such as Church Street to be macadamised and the footways flagged; from that time to the present the Municipality has paid great attention to the construction of pavements not only to meet the requirements of the ordinary vehicular and pedestrian traffic, but also to meet the requirements of the enormous weights passing over the streets—ordinary loads on heavy traffic streets frequently amounting to 10 tons on four wheels, and machinery carried on bogies in some instances from 60 to 70 tons.

The first Borough Engineer of Liverpool (the late Mr. James Newlands, M. Inst. C.E.), in a report on general

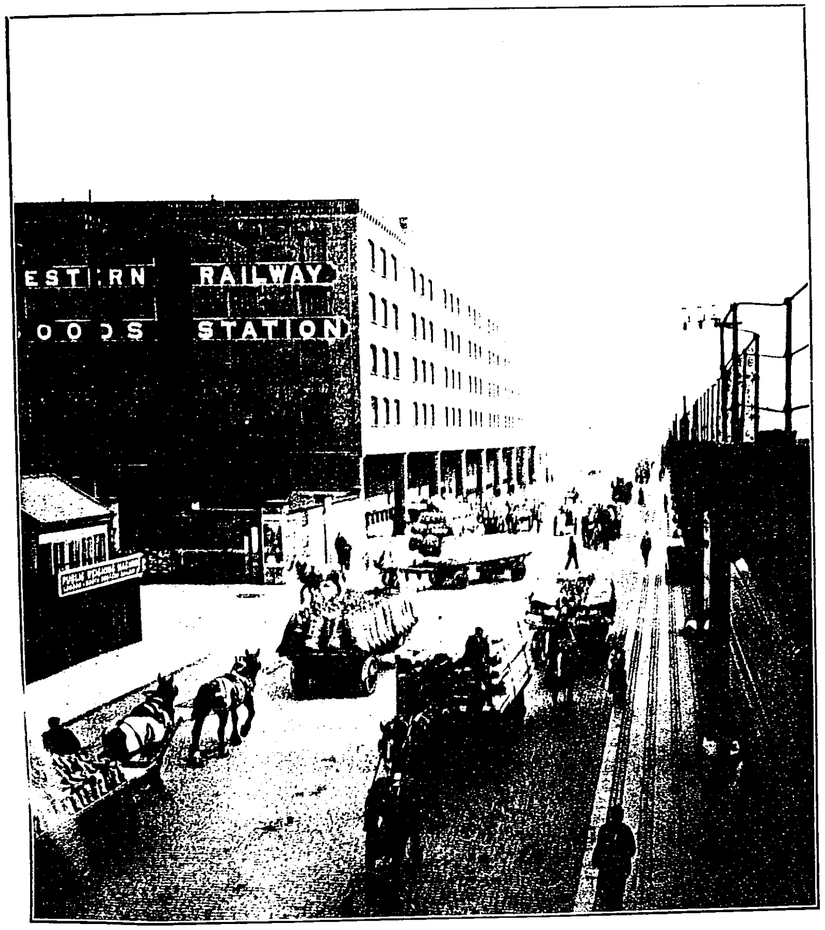
subjects, in the year 1848, strongly recommended the introduction of impervious pavements, but it was not until the year 1872 that the type of impervious pavement now adopted in the city was first actually laid by Mr. G. F. Deacon, M. Inst. C.E. (the then Borough and Water Engineer). This pavement was laid in North John Street with various types of sets, close jointed, grouted with hot pitch and creosote oil, on a Portland cement concrete foundation six inches deep. The softer sets, owing to the heavy traffic in this street, wore down very quickly, but it was only as recently as the year 1899—27 years after—that the harder sets from the granite quarries in North Wales required to be taken up and new sets laid.

The construction of these impervious pavements has since been carried out without intermission, and at the present time practically the same mode of construction is adopted for all heavy traffic streets.

It may be of interest to state that in one street of heavy traffic the number of vehicles passing a given point during 24 hours amounted to 3,300 vehicles.

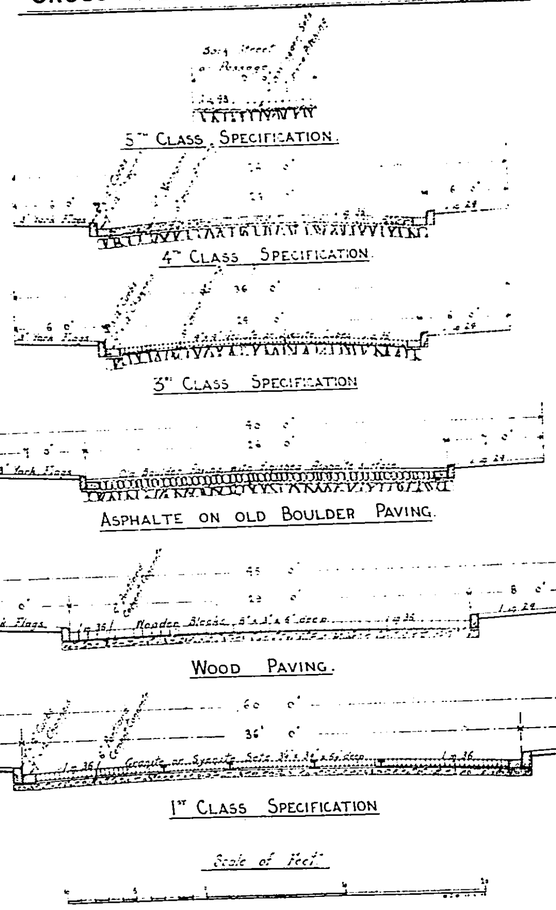
In some of the poorer districts where traffic is lighter, pavements have been laid composed of Trinidad Lake Asphalte, sanitary blocks, and slabs composed of Macadam embedded in concrete, so as to provide surfaces that can be easily cleansed. In the suburban and residential districts, generally speaking the best type of Macadam pavements are laid. The policy of the Corporation for many years past has been to entirely abolish boulder pavements within the shortest possible time, but owing to the large areas laid some time must necessarily elapse before they entirely disappear.

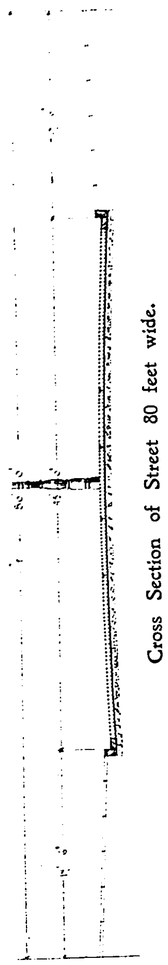
The footways of the city for many years were principally constructed of undressed Lancashire or Yorkshire flags, subsequently with three inch Lancashire or Yorkshire flags of the best quality



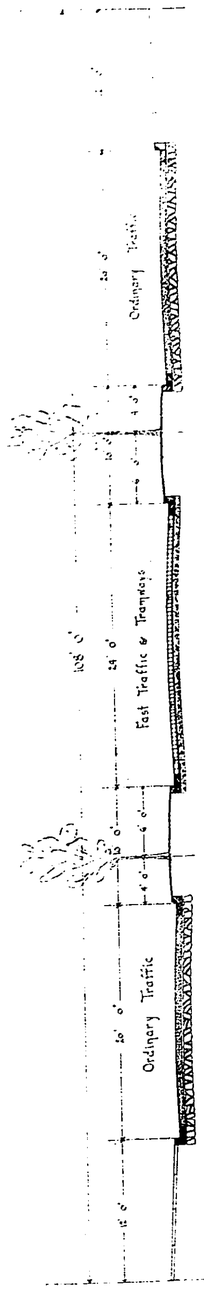
VIEW OF HEAVY TRAFFIC STREET.

Cross Sections of Streets.





Cross Section of Street 80 feet wide.



Cross Section of Street 108 feet wide.

and carefully dressed; but recently the practice has been to construct footways with concrete slabs not less than 2½ inches in thickness, most of these slabs being manufactured by the Corporation at their Destructor Depôts.

The cross section adopted in laying out a new street is shown in the sketch, the maximum crossfall of the carriage way from crown to channel being equal to 1 in 48, and of the footway from building line to edge of curb equal to 1 in 24.

All new Macadam streets laid out in Liverpool, if intended to be adopted by the street authority, are carried out in accordance with standard specifications, which require seven inches of macadam on ten inches hand-pitched foundation, the footwalks to be flagged with approved concrete slabs, and granite channels and curbs.

Where proceedings are taken under the Private Street Works Act, 1892, the works are carried out by the Corporation in accordance with the same standard specifications at the expense of the owners. All back passages are required to be laid out not less than nine feet wide, and paved with sets on a hand-pitched foundation.

The Corporation have during recent years given much attention to the widening of main thoroughfares, radiating from the central portions of the city, and these thoroughfares are gradually being widened to a minimum of 60 feet.

Under powers recently obtained, the Corporation may require buildings to be set back to any distance not exceeding 40 feet from the centre line of the street, and these powers are likely to be of great assistance in securing wide thoroughfares in the outskirts of the city; and in this connection the Corporation have recently arranged for widening streets to a minimum width of 80 feet, on the lines of the type shown in the sketch.

The total length of roadways in the City exclusive of back passages (which may be taken as the same length as the roads) is 456 miles, comprising 384 miles of adopted streets and 72 miles of unadopted streets.

The areas of the various descriptions of pavements in the adopted streets are approximately as follows:—

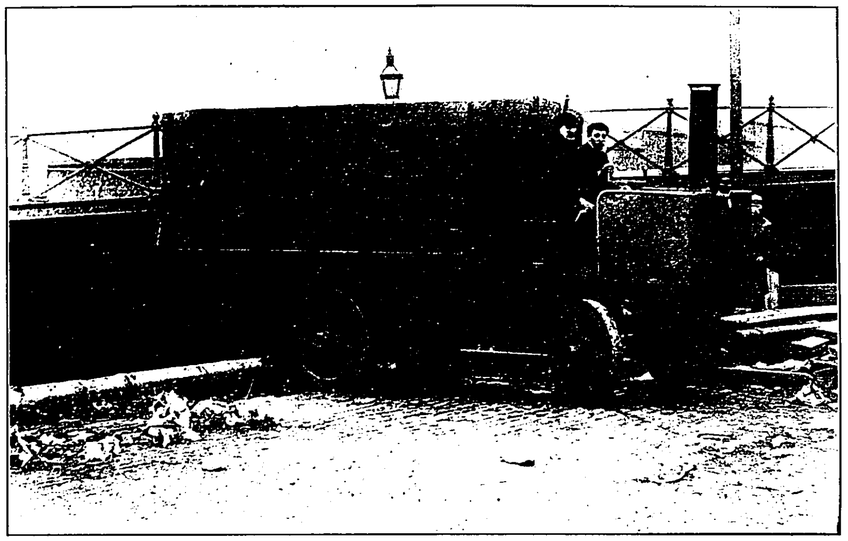
	Square Yards.
Set Pavements	2,477,673
Asphalte „	34,040
Wood „	118,413
Miscellaneous	1,234,916
Macadam	1,607,440

The whole of the public street works in the city are carried out by Corporation workmen under the direct supervision of the City Engineer's Department.

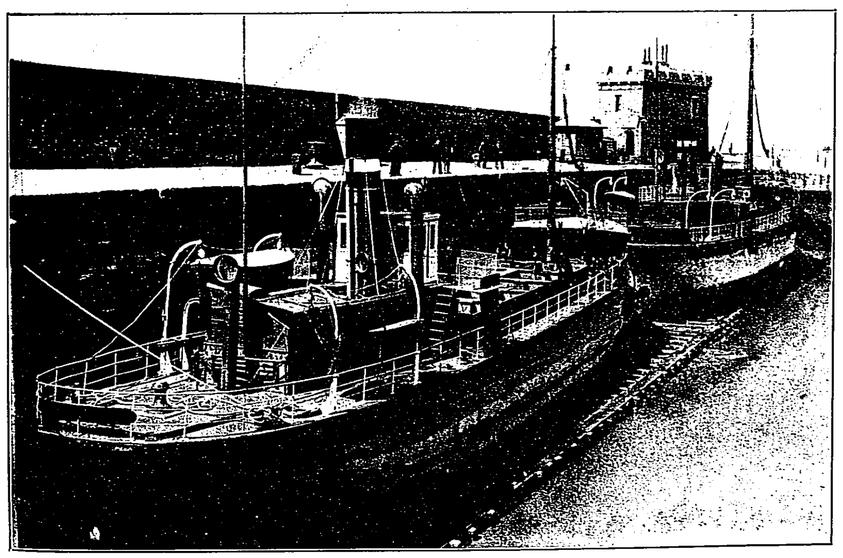
COLLECTION AND DISPOSAL OF REFUSE.

Prior to the year 1867 the work of the removal and disposal of nightsoil, mixed with cinder ash and domestic refuse, were executed by contract, but since that year the Corporation have with their own staff carried out the whole of the scavenging and cleansing operations of the City, and have erected large stables and workshops, and maintain a large stud of horses in each of the stables. Two wharves on the banks of the Leeds and Liverpool Canal, adjoining the Lancashire and Yorkshire Railway, and five other wharves, are utilized for the deposit of refuse pending its disposal.

The wet midden system at one time generally existed in the town, but about the year 1863 the Local Authority decided that the privy system should be converted into the water carriage system; and at the present time Liverpool is practically a water-closeted town throughout. Before the adoption of the water carriage system the practice was to collect the night-soil between the hours of 10 p.m. and 6 a.m., and cart it to depôts where it was disposed of to farmers.



STEAM MOTOR DUST WAGON. CARRYING CAPACITY FOUR TONS.



STEAM HOPPER BARGES "ALPHA" AND "BETA."

Up to the year 1870 little difficulty was experienced in the disposal of dry ashpit refuse in many available disused stone quarries and excavated lands, but, owing to the increase of buildings, objection was raised to this mode of disposal, and arrangements were made with farmers and others on the banks of the Canal, distant 10 miles from Liverpool, to take refuse for manurial purposes.

The Corporation also rented several acres of marsh land, abutting the margin of Bromborough Pool, in Cheshire, the level of which it was proposed to raise 20 feet, and cover over with soil in sections for purposes of cultivation. By these various means between the years 1874 and 1885 upwards of 800,000 tons of refuse were disposed of.

Meanwhile, the Corporation had under consideration a number of schemes, with a view to a permanent solution of the problem of refuse disposal, amongst others considered being (1) destruction by burning; (2) reclamation of land from the sea near the mouth of the River Dee; (3) depositing on the foreshore near Ainsdale and Formby; (4) depositing over the entire area of Carr Hall Farm, and (5) disposal at sea.

It was ultimately decided to convey the refuse to sea by steam hopper barges to a point outside the bar of the River Mersey, 23 miles distant from the Liverpool Landing Stage. Two steam hopper barges, named "Alpha" and "Beta," were built, the "Alpha" in 1880, and the "Beta" in 1884. These vessels which have a speed of 10 knots per hour, and are capable of carrying about 330 and 400 tons of refuse respectively, are still on their stations.

In the year 1890 it was found that the quantities of refuse collected had so much increased, that the then means of disposal available were insufficient, and it was decided, in order to supplement them and as an experiment, that all the lighter materials should be destroyed by fire, and accordingly a 12-cell

Destructor of the "Fryer" type was installed at the Chisenhale Street Depôt. The experiment proving successful, the Corporation decided to extend this method of disposal, and at the present time they have six Destructor installations in operation, viz., Charters Street, Rathbone Road, Smithdown Road, St. Domingo Road, Speke Road and Lavrock Bank. These Destructors now form the principal method of disposing of the refuse, and they comprise an aggregate of 53 cells capable of dealing with 4,000 tons of refuse per week.

One of the Destructor Installations may be shortly described as follows:—

The installation consists of a series of furnaces or cells constructed of bricks and lined with firebricks above the level of the firebars on which the refuse is burnt with the assistance of a strong forced blast. The collecting carts and wagons are brought by an inclined roadway to a platform commanding the top of the cells and they are here tipped into charging trucks which are divided vertically into compartments. The flame and hot gases arising from the combustion of the refuse in the furnaces are allowed to circulate through Water Tube Boilers, and the steam thus generated is used in the manufacture of Mortar, and Concrete Paving Slabs; and for electric lighting and tramway traction purposes—an output of 1,133,000 units of energy having been reached by the St. Domingo Destructor during the past year. The clinker, after being crushed, is used for concrete purposes to the extent of about 20,000 tons per annum.

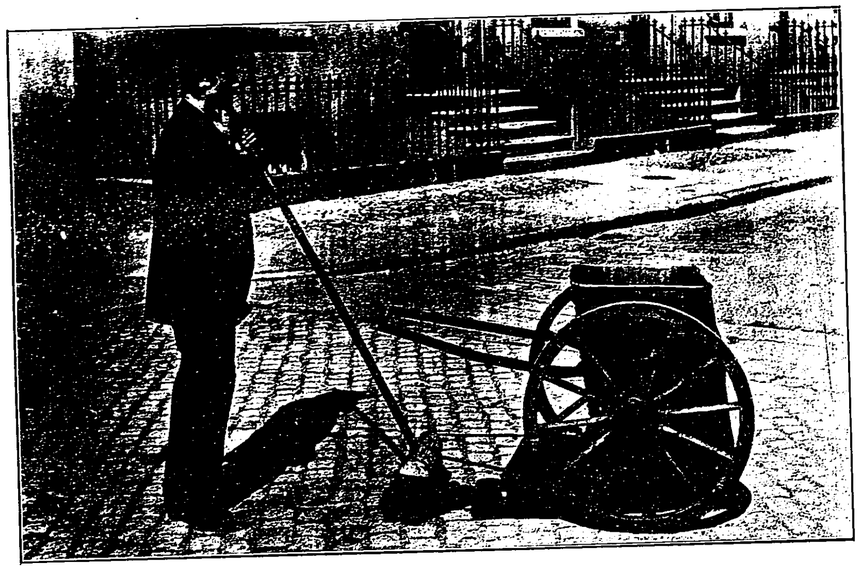
The quantity of refuse dealt with annually amounts approximately to 350,000 tons, consisting of ashes, street sweepings, abbatoir offal, &c. In the removal of this material 180 horses are constantly employed.

MOTOR WAGONS.

Motor Dust Wagons have recently been introduced in connection with the collection of refuse, each wagon being



STREET WASHING BY HOSE FROM HYDRANT.



STREET ORDERLY BOY AND BIN.

capable of carrying a load of 4 tons and of running daily an average of 24 miles. One of these vehicles was used during the summer season of the past year for street watering purposes, and its speed was found to be very useful for promptly laying dust in the central portions of the City. This vehicle has also been fitted with a gravel distributing body for use on the granite paved streets under certain conditions of weather, and has been found very effective.

The streets of the City are swept on the average once daily, while imperviously paved streets are in addition washed with hose and jet twice weekly.

In some of the poorer districts of the City both the streets and passages are washed so as to remove from the surface any material deposited thereon which may be injurious to health, and all street gullies are cleansed or flushed at least once fortnightly. These measures have been found very effective in practice and advantageous Sanitary improvements.

The cleansing of the central business portions of the City during the day is entrusted to Street Orderly Boys, each of whom is provided with a Galvanised Iron Bin resting on a two-wheeled truck. The Bin can be readily removed from the truck and the contents emptied into a cart which passes through the main streets at short intervals — the accumulation of material in fixed receptacles thus being avoided.

With a view to abolishing the evils of large ashpits, and the consequent contamination of the atmosphere at the back of smaller property, and to avoid the inconvenience and heavy cost of collection, an Improved Fixed Sanitary Ashbin was designed by the City Engineer and adopted by the Health Committee in the year 1898. This type of bin may be shortly described as follows:—

The bin, frame and cover, are of simple construction. The frame is built into the back passage wall of the premises,

much in the same way as the frame for ordinary doors for ashpits. The bin itself fits into this frame and projects slightly into the yard of the house, so that ashes and refuse may be deposited therein by the occupier more easily than into an ashpit. Before the bin can be removed, it is necessary to apply a specially designed handle, which engages with the studs projecting on either side of the bin, and also to lift the bin and its contents at least six inches.

Where these bins are fixed a weekly collection is made of their contents, and at the present time about 15,000 of these bins are fixed in the City.

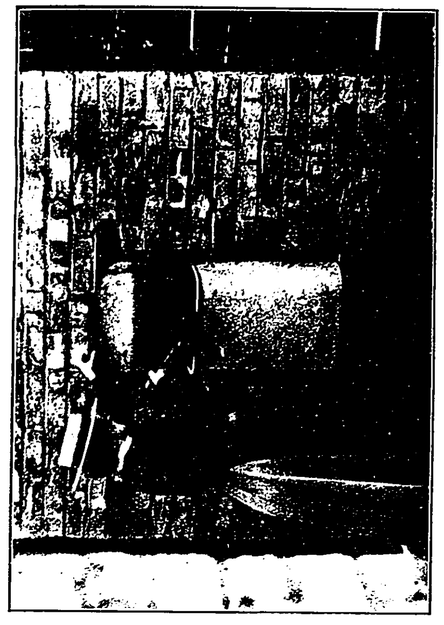
A similar arrangement of bin, but with the frame fixed in a concrete flag, has been found very useful in courts and narrow streets where the improved house bins cannot be fixed. The ashes from the houses as well as the street sweepings are put in these bins, and a very frequent collection given.

SEWERAGE SYSTEM.

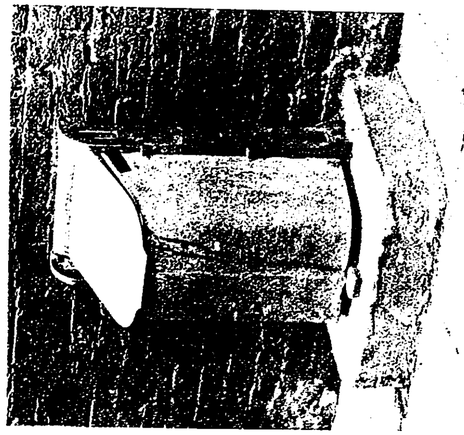
The history of the present extensive sewerage system in operation in the City dates from the year 1846, when an Act was obtained for the paving, sewering, and drainage of the town, and in pursuance of the provisions of this Act the then Borough Engineer in the year 1848, prepared a report on the sanitary condition of the town, and submitted a complete scheme of sewerage and drainage, the large sewers proposed being egg-shaped, of brick construction, and moulded to the radii of the curves; and the smaller sewers of glazed stoneware.

Shortly before the year 1871 there was an agitation in the town with regard to the condition and ventilation of the sewers, and in accordance with a request made by the Town Council the eminent sanitarians, Doctors Parkes and Sanderson, in that year presented a report, in which they recommended:

(1) "That a complete and exhaustive inquiry be made as to the existence of deposits in the sewers, and



VIEW FROM INSIDE OF YARD, SHOWING IMPROVED SANITARY ASHBIN.



VIEW OF STREET ASHBIN.



VIEW OF IMPROVED SANITARY ASHBIN FROM PASSAGE.



VIEW, SHOWING OPERATION OF EMPTYING BIN INTO DUST CART.

that in all cases in which such deposits are, in the opinion of the Borough Engineer, dependent on defective construction, defective inclination, or insufficient supply of water, the works necessary for the remedy of these defects be immediately commenced."

(2) "In those cases in which the foul condition of the sewers appear to be unavoidable, *e.g.*, in those sewers affected by the tide, we recommend ventilation. For this purpose we think that spacious and lofty shafts afford the only effective means."

These matters were carefully investigated, and in the year 1873 Mr. Deacon submitted a report recommending that as soon as the sewers were freed from deposit and repaired where defective so as to be self-cleansing, they should be ventilated by means of gratings fixed on the manholes or ventilating shafts, as the case might be, placed over the sewer at a distance not greater than 100 yards apart; also that proper provision should be made for flushing the branch drains at their upper ends, all gullies not converted into water-trapped gullies to be altered, and all water-trapped gullies capable of easy improvement to be so improved; and that in confined situations ventilating shafts should be fixed where permission could be obtained, advantage being taken of any existing tall shafts.

This work was ordered by the Council to be carried out, and was carried on continuously until the whole of the sewers were put into a thoroughly sound condition and properly ventilated; and all new sewers have since that time been ventilated as constructed.

With the exception of areas in the suburban districts of West Derby and Walton the whole of the sewage of the City is discharged into the estuary of the River Mersey by 17 outfall sewers of large dimensions—these outfall sewers having a drainage

area of 10,323 acres. All main sewers are constructed of brickwork and branch and passage sewers of stoneware pipes. Main sewers are constructed so as to be self-cleansing with very few exceptions. Where not self-cleansing the sewers are periodically flushed by means of large movable tanks of water placed over a manhole on the sewer—each tank containing about 2,000 gallons, the contents being discharged through a bottom valve in 28 seconds.

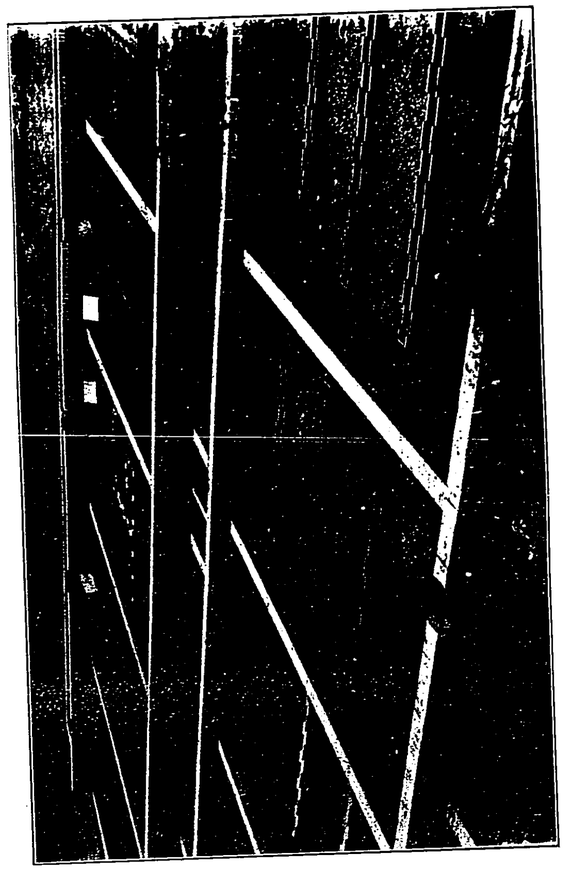
Water closets are universal within the City, except in the cases of some of the districts recently added, and in these districts the privies are being abolished.

The drains are ventilated by shafts carried above the eaves of the adjoining property.

Passage sewers are flushed at least four times annually, either from chambers at the head of the sewer or by hose connected with hydrants fixed in convenient positions. Drains of hospitals, public elementary schools, and other public institutions, are flushed at intervals varying from a fortnight to three months. Private drains are flushed periodically twice a year at a cost to the Corporation of approximately £4,500 per annum, and any additional special flushing necessary is done on payment of a nominal charge.

In a district of the City where large chemical works exist, an acid proof sewer 1,900 yards long has been specially constructed to receive hot water and chemical refuse, which discharge into it at a temperature of 132° Fahrenheit. This sewer has been laid 13 years, and at the present time is in perfect condition, notwithstanding the severe test to which it has been put.

Certain areas in the suburban districts of West Derby and Walton, which were incorporated in the City in 1895 under Parliamentary powers, are drained to two sewage farms—which adjoin each other—owned by the Corporation, and known as the Walton and West Derby Sewage Farms.



VIEW OF FILTER BEDS, WEST DERBY SEWAGE FARM.

These sewage farms are on the broad irrigation system, assisted by bacterial and storm water beds.

The West Derby Sewage Farm has an area of 207 acres, and receives the sewage of about 30,000 inhabitants spread over an area of about 2,877 acres.

The Walton Sewage Farm comprises an area of 185 acres, and takes the sewage of 35,000 inhabitants spread over an area of 1,749 acres.

On both the West Derby and Walton Farms the crops consist principally of rye-grass, cabbages, potatoes, mangel wurzels, and beetroot, the income from the produce covering the working expenses of the farms.

There are 820 miles of sewers in the City, comprising:—

416 miles of brick and pipe sewers.
78 ,, ,, main outfalls.
326 ,, ,, passage sewers.

Prior to the year 1879 sewerage works were executed by contract, but since that date these works have been carried out by workmen in the employ of the Corporation under the direct supervision of their officials.

THE BUILDING SURVEYOR'S DEPARTMENT. - - -

The work of this department of the Corporation service consists chiefly of the supervision and regulation of buildings and building-work within the city, so far at least as concerns the general construction and sanitary arrangements of the buildings.

This work touches at many points the administration of the departments of the City Engineer and the Medical Officer of Health, the three departments being in constant co-operation in matters which affect the public health of the city.

The commencement of the era of sanitary legislation may be placed between 1836 and 1846. In these beginnings Liverpool had almost, if not quite, the foremost place. In 1840 there was passed "An Act for altering, amending, consolidating and enlarging the provisions of certain Acts relating to the Regulation of Buildings in the Borough of Liverpool."

Two years later that Act was replaced by "An Act for the promotion of the Health of the Inhabitants of the Borough of Liverpool, and the better Regulation of Buildings in the said Borough." This statute, generally known as "The Liverpool Building Act, 1842," really formed to a large extent the basis of our modern sanitary powers; and many of its provisions are still in force.

Provision was made for the appointment of a Health Committee of the City Council, to be assisted by the Building Surveyor (or Surveyors) of the Borough, whose special duties were to cause the regulations of the Act and the rules of the Committee to be strictly observed. The primary objects of the

statute may be stated, in the words of a more modern Act, as being the control of the construction of buildings, for ensuring stability and the prevention of fires, and for purposes of health. The enactment was, in fact, a Building Act and a Sanitary Act, both in one; and for its time it was an original and progressive piece of legislation.

The chief objects in which the Liverpool Building Act, 1842, aimed at improving the sanitary condition of dwellings were these:—

Increased Width of Streets and Courts;
Prohibition of certain Cellar Dwellings;
Ventilation of Rooms;
Provision of Sanitary Conveniences.

This legislation of 1842, as to width of streets and courts, was the first of its kind in Liverpool, and probably in the whole country.

The unhealthiness of the old court houses was aggravated by the fact that many of them were cellar dwellings. In the Building Act, 1842, therefore, it was laid down that no cellar under a court house should be occupied as a dwelling-place. It was also enacted that all other cellars should cease to be occupied as separate dwellings unless certain structural requirements were observed. The erection of new cellar dwellings was stopped in effect by enacting that no house should be built without one room of 108 square feet on the ground floor.

The least height for inhabited rooms was fixed at 8 feet, and each ordinary room was required to have a window of at least 15 square feet, to open at top and bottom.

It was enacted that every house, new or old, should have what are now called "sanitary conveniences," but it was allowed that one of these might serve for several court houses.

These were the chief points, specially affecting the sanitary construction of dwelling houses, dealt with by the Liverpool Building Act, 1842.

In 1864 local legislation of still greater importance was effected. An additional Sanitary Amendment Act of that year imposed further requirements as to the construction of new courts, and empowered the Corporation to demolish the objectionable old courts by legal process, at the public expense. Under this statute, extensive and costly demolitions of insanitary property have been carried on with little intermission since 1864.*

It is not intended to describe the many and various points in which the duties of the Department are concerned with the construction and arrangement of buildings. It must suffice to remark (on the whole subject) that the powers of the Corporation have so developed in character and increased in number that the provisions administered by this Department are now to be found in 22 Acts of Parliament and five sets of Bye-laws.†

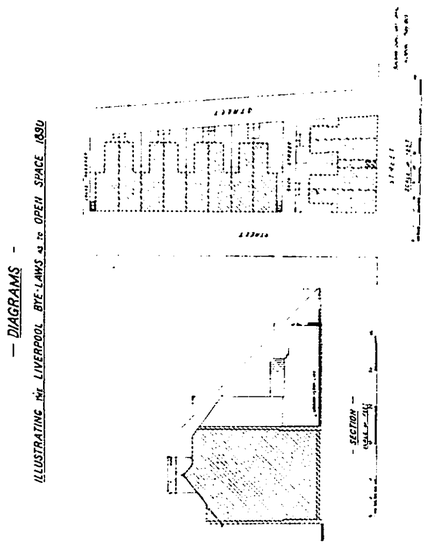
The health provisions of the Liverpool Acts of 1864 were perhaps exceeded in importance by a short "Bye-law," made in the same year, on the subject of "Open Space in connection with Dwelling-houses." Until this time, ordinary houses in streets had been built with little or no regard to ventilation at the rear.

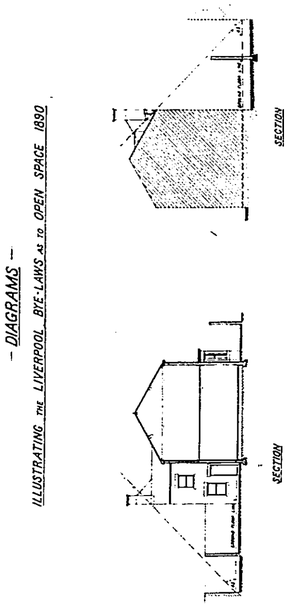
But the "Bye-law as to Open Space, 1864," prescribed that every new house of two stories in height should have an open yard at the rear or side containing at least 150 square feet, with a distance of 15 feet across between the back of the house and the opposite property; or the distance across in the case of a three-story house must be at least 20 feet, and for a house of more than three stories 25 feet.

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*These demolitions have been under the direction sometimes of the City Engineer's Department, sometimes of the Corporation Surveyor's Department; and the erection of new dwellings (under the Artizans and Labourers' Dwellings Acts and the Housing of the Working Classes Acts) has been carried on at intervals by the City Engineer's, the Building Surveyor's, and the Corporation Surveyor's Departments. An interesting article on the subject appears on another page of this Hand Book.

†See a "Manual of the Building Regulations in force in the City of Liverpool, arranged and annotated by Wm. Goldstraw, City Building Surveyor. Second Edition, revised and enlarged, Liverpool, 1902." See also the Annual Reports of the City Building Surveyor on the work of his Department, for the years 1898 to 1903.





This salutary bye-law remained in force until 1890 (when a new bye-law was passed); and by that time there had been built in accordance with it about 33,000 houses, which, at five persons to each house, will accommodate 165,000 persons, or about one-third of the whole population of the Borough at that date.

In the years that followed, additional and improved powers were given to the Corporation by various local Acts: by the important "Public Health Act, 1875," and by the "Liverpool Improvement Act, 1882," which was a valuable amendment and extension of the "Liverpool Building Act, 1842."

The next sanitary measure, however, bearing on the present subject of open spaces was the "Liverpool Corporation Act, 1889." The chief sanitary provision in that Act has been of more real importance than anyone not officially concerned seems to be aware of. It is the prohibition of any erection on the then existing open spaces or yards in connection with dwelling-houses, unless in accordance with certain "regulations." The effect is that every such open space formed prior to that date, whether originally required by law or not, must now be preserved, within certain limits, unless the Corporation consent to some modification in the particular case. Few things of the kind could be more valuable.

These "regulations" as to open space were afterwards applied with great advantage to all new houses by the adoption of a new "Bye-law" on the subject in 1890.*

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* LIVERPOOL BYE-LAWS AS TO OPEN SPACE, 1890.

Omitting certain provisoes and exceptions, the following are the chief requirements:—

"Every new dwelling-house * * * shall * * * have at the rear thereof an open space immediately adjoining and exclusively belonging thereto, and extending throughout the rear thereof, and of an aggregate extent of not less than 150 square feet * * * *.

"The distance across such open space or across such open space and not exceeding 9 feet of any street immediately adjoining thereto, measured at right angles from any wall of such house which abuts on the open space, shall * * * * be not less than the height of such wall above the ground floor of the house * * * *.

"Such open space * * * * shall, on each of three sides thereof, adjoin another open space exclusively belonging to a dwelling-house, or adjoin a street having a direct communication at each end with a street not less than 25 feet wide; unless such open space * * * is of an aggregate extent of not less than 500 square feet * * * *."

In this Bye-law there are two distinctive features which are worthy of note. The first is that the distance across the open space to be provided at the rear of every house must be not less than the height of the rear wall of the house, so that the house must not rise above a line drawn at an angle of 45 degrees from the line of the opposite property at the rear. The second distinctive feature is that the open space required (minimum, 150 square feet) must on each of three sides abut on a similar open space or on a street.

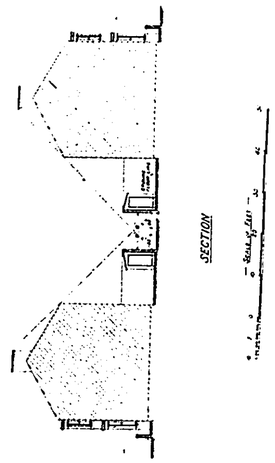
The chief result is that the open space—unless in some special case where it contains 500 square feet—can never be blocked in by adjoining buildings, but must always share in and contribute to the through ventilation along the rear of all the adjacent houses. And a secondary result is that rows of houses must now be separated from other buildings by cross-passages, which break the continuity of the solid frontages, and assist the circulation of air.

There does not appear to be any other town which has a bye-law possessing these characteristics.

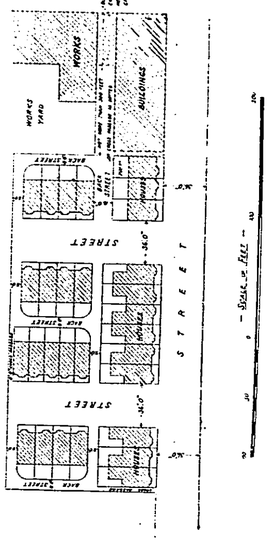
One of the main distinctive principles of the Liverpool bye-law—that of a limiting angle—is in force in the Metropolis by virtue of the "London Building Act, 1894." That Act is said to be the largest private measure ever carried through Parliament, and was the subject of an exhaustive Parliamentary inquiry and contest, extending over several months. The London County Council examined all the building regulations in force in England, with the result that they pronounced the Liverpool bye-law as to open space to be the best regulation on the subject which had been devised for a large town.

These two features of the Liverpool bye-law—the limiting angle of 45 degrees and the continuity of open spaces and back streets—have given a special character to those parts of

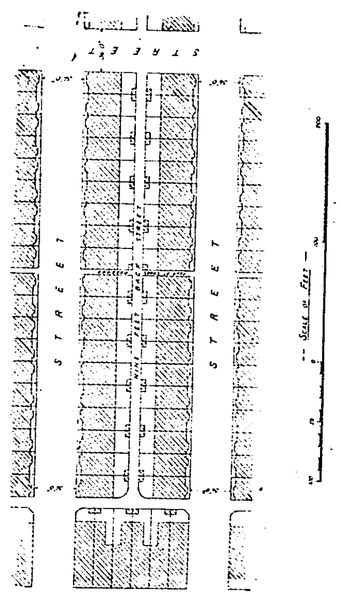
— DIAGRAM
ILLUSTRATING THE LIVERPOOL BYE-LAWS AS TO OPEN SPACE 1890
AND THE BYE-LAWS AS TO NEW STREETS 1892



— DIAGRAM —
ILLUSTRATING THE LIVERPOOL BYE-LAWS AS TO OPEN SPACE 1890
AND THE BYE-LAWS AS TO NEW STREETS 1892



— DIAGRAM —
ILLUSTRATING THE LIVERPOOL BYE-LAWS AS TO OPEN SPACE 1890
AND THE BYE-LAWS AS TO NEW STREETS 1892



the city where middle class and working people live, and have even affected the designs of the labourers' dwellings which in recent years have been erected by the Corporation.

The number of new dwelling-houses erected under this bye-law of 1890 up to the end of the year 1902 amounts to 14,953, a number capable of accommodating 10.7 per cent. of the present population of the City—exclusive of Garston, which was incorporated with Liverpool in November, 1902.

The houses erected in accordance with present Open Space Regulations, may be divided as under:—

Houses of rentals	under £12 per annum	796
,, ,,	from £12 to £25 per annum	10,419
,, ,,	from £25 to £35 per annum	3,003
,, ,,	from £35 upwards	735
		14,953

Table showing the number of houses erected under the Bye-laws as to open space, made in 1890.

Year.	No. of Houses Erected.	No. of Houses of Rentals under £12 per Annum.	No. of Houses of Rentals from £12 to £25 per Annum.		No. of Houses of Rentals from £25 to £35 per Annum.	No. of Houses of Rentals over £35 per Annum.
				Rentals £12 to £18	Rentals £18 to £25	
1890	397	190	180		2	25
1891	371	112	250		5	4
1892	441	14	386		14	27
1893	333	4	294		34	1
1894	377	—	355		22	—
1895	247	—	225		21	1
1896	1,199	7	944		204	44
1897	1,656	95	1,138		389	34
1898	1,977	63	1,276		539	99
1899	2,358	4	821	769	607	157
1900	1,573	—	436	602	402	133
1901	1,963	222	558	633	441	109
1902	2,061	85	590	962	323	101
	14,953	796	10,419		3,003	735

MARKETS.

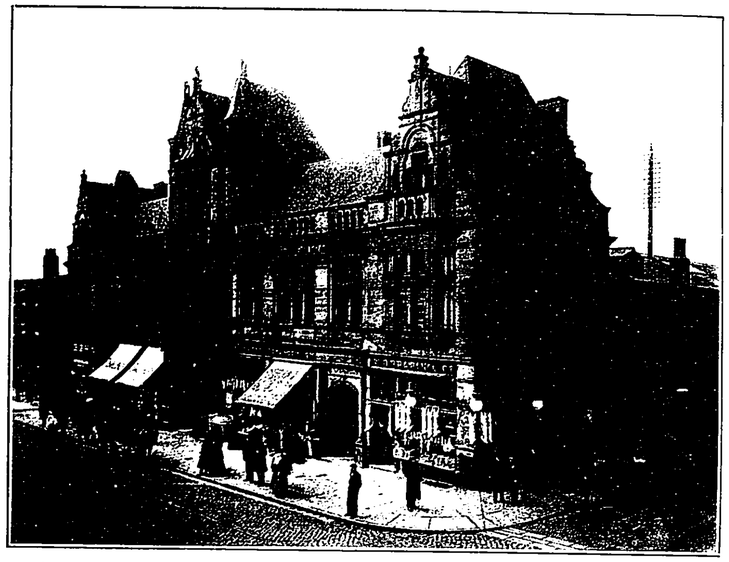
A Charter of Queen Anne, dated the 2nd June, 1709, granted "to our beloved and faithful the Mayor, Bailiffs, and Burgesses of our Town of Liverpool that they and their successors may have, hold, and keep within the Town aforesaid one new market, together with all and all manner of lawful and reasonable tolls, profits, advantages, and emoluments whatsoever to such market belonging, incident, or appertaining. To be perceived, received, and enjoyed by them the aforesaid Mayor, Bailiffs, and Burgesses of the Town aforesaid and their successors from time to time for ever."

In the year 1786 the Corporation obtained an Act of Parliament which enacted that the Common Council of the Town should have power to order such public squares and streets in the Town as they should think proper to be used as and for public market places.

In the year 1819 the Corporation obtained a further Act of Parliament which authorised the levying of specified tolls and stallages in all existing and future markets, and also empowered the Corporation to make such byelaws as they should think fit for regulating, ordering, and governing the markets. This power to make byelaws, uncontrolled by any Government Department, has been exercised by the Corporation with great benefit to the markets, for in many cases the byelaws are suitable only for local requirements, and it is an advantage to be able to adopt them without interference or delay.

Since the passing of the Act of 1819 additional Parliamentary powers have at various times been obtained for the government of the markets.

The existing markets belonging to the Corporation are six in number, and they were erected at a cost, including purchase of land, of £284,144.



EXTERIOR OF ST. JOHN'S MARKET.



INTERIOR OF ST. JOHN'S MARKET.

The markets are under the control of a Markets Committee, appointed by the City Council in November each year, and such Committee are by resolution of the Council empowered to keep in repair and manage the markets, and to enforce all bye-laws, rules, orders, and regulations from time to time made affecting the markets and fairs of the City.

The Committee hold a meeting every week in order to deal with the various matters entrusted to them by the Council.

The general management of the markets is placed in the hands of an official, who is designated Clerk and Superintendent, and this official is responsible to the Committee for the government of the markets, and for carrying into effect their instructions relating thereto.

The system of letting shops and stalls in the markets is by tender. When premises become vacant they are billed to be let, and tenders are invited, and these tenders are submitted to the Committee at their weekly meetings.

The total income of the markets in 1902 amounted to £36,075, and the expenditure to £19,822, thus leaving a profit of £16,253, which was applied in relief of the City rate.

The following is a brief description of the various markets :—

ST. JOHN'S MARKET.

This market was erected in the year 1822, at a cost of £48,503. It covers an area of 8,024 square yards, and occupies a prominent situation near the centre of the City. The market is appropriated for the sale of fruit, flowers, vegetables, and other garden produce, meat, poultry, rabbits, and all sorts of provisions, except fresh or uncured fish. Spaces are also reserved for the occupation of farmers who attend the market every Saturday to sell produce from their farms.

The market, owing to its convenient situation, is extensively used by the public, who find it a great advantage to be able

to purchase under one roof most of the articles of food required for daily consumption.

In connection with St. John's Market, but held in adjacent streets, are two uncovered markets, one for the sale of live poultry and birds, and the other for the sale of pedlars' wares, and other manufactured goods and articles. The poultry and bird market is held every day in the week, and the pedlars' market every Saturday, and, although the business of these markets is at times attended with great discomfort and inconvenience in consequence of there being no protection from the weather, the markets are, nevertheless, very popular, and well patronised by the public. In the course of a few years the progress of public improvements in the City may possibly necessitate the closing of these street markets, and with them will disappear the only remaining examples of the type of market which commonly existed before modern demands called for greater comfort and convenience.

RETAIL FISH MARKET.

This market was erected in the year 1835, at a cost of £30,389. It covers an area of 2,200 square yards, and is situate in close proximity to St. John's Market. The market is appropriated for the sale by retail of fish and game, and a large trade is carried on, principally in the early mornings, with occupiers of hotels and restaurants, and also with shop-keepers who require various kinds of fish in small quantities. Many private householders are also supplied, the market being very attractive by reason of the great quantity and variety of fish displayed for sale.

WHOLESALE FISH MARKET.

This market was erected in the year 1886 at a cost of £45,215. It covers an area of 2,285 square yards, and adjoins the Retail Fish Market, there being a connecting passage

between the two markets. The market is appropriated for the sale by wholesale of fish, game, rabbits, and poultry. The principal trade is in fish, for which the market is the great distributing centre for the whole of Liverpool and the surrounding district. There are daily consignments of fish from Grimsby, Hull, and other fishing centres, and also from steam trawlers which discharge at Liverpool. The weight of fish offered for sale in the market in 1902 was estimated to be 15,432 tons, and satisfactory evidence of the good condition in which the fish arrives is furnished by the fact that the total quantity destroyed during the year as unfit for food was only 36 tons.

WHOLESALE VEGETABLE, FRUIT, AND HAY MARKET.

This market was established in the year 1839, and was at that period of very small dimensions, but it has since been extended from time to time, and now covers an area of 22,150 square yards, the total cost of the establishment being £96,094. The market is situate on the north side of the City, and is appropriated for the sale by wholesale of all kinds of farm and garden produce. A large proportion of this produce is brought for sale by the growers, and consumers have, therefore, the opportunity of obtaining their requirements direct from the producers. The estimated weight of vegetables and other produce, exclusive of fruit, brought to the market for sale during 1902 was 88,490 tons. In the fruit section of the market there are daily consignments of English and Foreign fruit and vegetables, and a very large trade is carried on, principally with shop keepers.

ST. MARTIN'S MARKET.

This market was erected in the year 1826, at a cost of £25,743. It covers an area of 4,080 square yards, and is situate on the north side of the city. The market is appropriated for the sale of provisions and of pedlars' wares and other

manufactured goods and articles. For a long time after the establishment of the market a large provision trade was carried on, but in recent years this business has greatly diminished, and the market is now almost entirely occupied by general dealers, whose principal business is the sale of second-hand clothing. These dealers provide for the requirements of a great number of poor persons, many of whom reside in the vicinity of the market, and the Corporation have granted the use of stalls and spaces at very low rents. This market, from a financial point of view, is the least prosperous of the Corporation markets, but it is serving a useful purpose by supplying the wants of the poorest class of the community.

CATTLE MARKET.

This market was established in the year 1832 by a private company, who obtained Parliamentary powers for that purpose. It is situate on the east side of the City, and covers an area of 37,000 square yards. The market was carried on by the company until the year 1900, when the Corporation, having considered it desirable that the cattle trade of the City should be placed under municipal control, purchased by agreement the undertaking at a cost, including expenses of transfer, of £38,200. The agreement was subsequently approved by Parliament. Since the market passed into the hands of the Corporation there has been a considerable increase of trade, the total number of animals offered for sale in 1902 being 551,897, as compared with 454,828 in the last year of the company's management. Most of the animals offered for sale in the market are sent from Ireland by boat direct to Liverpool, and are then driven from the landing place to the market, a distance of about three miles.

SANITARY ADMINISTRATION.

In view of the circumstance that special Articles in this volume are devoted to such features of sanitary administration as Hospitals, Housing of the Poor, Baths and Wash-houses, Parks and Recreation Grounds, &c., it would be foreign to the scope of the work to enter further into detailed accounts of the general sanitation of the City. These details are fully dealt with in the Annual Reports of the Medical Officer of Health of the City, and these reports are readily available for persons specially interested in them.

It may be well, however, to allude briefly to one or two exceptional points, which experience has proved to be useful.

With Regard to Appointments on the Sanitary Staff.—All appointments are made from candidates who furnish proof of being specially qualified for the duties which they will be called upon to discharge. In order that facilities may be given to candidates to acquire the necessary knowledge, courses of instruction have been arranged at Ashton Hall, and are largely attended by intending candidates for sanitary appointments, not only in this City, but elsewhere, and also by teachers, plumbers, and others interested in sanitation. The work of the staff is so arranged that over-lapping shall be minimised, and at the same time specially qualified men shall be employed for special duties.

Notices to remedy insanitary conditions are served on the reports made by the Inspectors for general sanitary purposes, and in order to economise time, if these notices are not complied with

within a reasonable period, they are taken in hand by the Prosecuting Inspectors, whose duty it is to take all further steps which may be necessary, and to attend the Police Court. Apart from the saving of time, this method also has the advantage of exercising a check and supervision upon the reports of the District Inspectors.

Owing to the delays and difficulties which arose from time to time in complying with notices served by the Health Department upon owners to strip the wall paper from the walls of infected rooms, this work has been undertaken by the Disinfecting Staff.

The wall paper, which, previous to being stripped off, is sprayed with a solution of perchloride of mercury, is conveyed in sacks specially provided for the purpose to the Refuse Destructor and burnt.

As soon as the infected wall paper has been stripped, and the house is ready for re-papering or other work, an intimation of the fact is sent to the owner.

THE EMIGRATION TRADE is a feature of the Port of Liverpool, and there are large numbers of houses in the City kept for the temporary accommodation of emigrants. Most of these are worked in conjunction with the great shipping companies, but they are all of them under the supervision of the Sanitary Authority.

INFANTILE MORTALITY is a feature in certain parts of the City which for many years has arrested the attention of the Sanitary Authority. It has been the subject of continual investigation, and amongst other measures taken with a view to lessen the evil has been the establishment of depôts for the supply of sterilised and humanised milk. There is no question, whatever, as to the utility of this work.

CHEMICAL ANALYSES.—In addition to chemical analyses under the Sale of Food and Drugs Act, the Corporation some years ago appointed a bacteriologist for the purpose of making bacteriological examinations of food-stuffs, water, &c. This officer is appointed under the terms of the Sale of Food and Drugs Act, so that provided the requirements of that Act can be fulfilled in point of time, bacteriological impurities can be dealt with in the same way as chemical impurities.

SOME DETAILS OF THE METHOD OF DEALING WITH INFECTIOUS DISEASE IN SCHOOLS deserve mention.—It is of the utmost importance, in order to prevent the extension of infectious disease in schools, that, when sickness exists at the homes of the scholars, the earliest possible information shall be given to the Head Master, the Head Mistress, or Principal.

Usually the first intimation of such sickness is received by the Medical Officer, under the terms of the Notification Act, which, however, does not include measles and whooping-cough, both of which are liable to spread extensively amongst children of school age. These cases are notified by the school attendance officers, by inspectors, by parents, by doctors, and others. It is part of the duty of the District Inspector to forthwith warn the parents, or those in charge, that the children must be kept from school until fourteen days after the necessary disinfection has been carried out. The inspector leaves a postcard at the house, addressed to the Medical Officer of Health, to be filled up and forwarded by the parent or other responsible person, as soon as the doctor in attendance states that the disinfection may be proceeded with.

The information obtained by the Inspector is duly entered in a permanent register, and also sent by postcard the same day to the Head Teacher of the school the children attend.

After the recovery or death of the patient or his removal to hospital, the house and bedding are disinfected by the officers of the Public Health Department.

At the expiration of a fortnight from the date of disinfection, the School Visitor is notified to visit the house, and if no sickness of any kind has occurred in the interval intimation is sent to the Head Teacher of the school to re-admit the children.

In the case of measles and chicken pox, disinfection is carried out with the consent of the occupier of the house; the children are not allowed to return to school until a fortnight after the sickness has ceased to exist.

In cases of whooping-cough, ringworm, &c., only the affected child is kept from school. Ringworm, scabies, and ophthalmia may last indefinitely unless properly dealt with, and no child with any trace of these diseases should be admitted to school.

The notices sent to the schools for the purpose of notifying the existence of infectious disease at the home of a pupil are accepted by the Government Education Department, also by the Liverpool Council of Education, as a valid reason for the non-attendance of the children at school, and qualify them to receive any benefits which regular attendance would have entitled them to.

When necessary, a certificate is furnished to the school authorities, stating that the pupil was absent on account of infectious sickness at home.

It must be borne in mind that the methods now described are directed to the suppression of infectious disease, and although the child may be free from infection, and therefore, so far as the

risk of infection is concerned, may with perfect safety return to school, yet it must be remembered that the child may not be sufficiently recovered physically to undertake at once the full work and discipline which attendance at school entails. The permission of the Health Department to return to school, therefore, implies nothing further than freedom from infection.

It may be regarded as a rule, that all children suffering from an infectious disorder should be excluded from school so long as they are likely to retain any infection; this condition is one which may involve exclusion for some time after the patient is apparently convalescent.

It is equally necessary that children coming from houses, any inmate of which is suffering from infectious sickness, should also be excluded, because in the great majority of instances, if not in all of them, it is impossible to effectually isolate a case of infectious sickness in an ordinary household, especially within the homes of children of the class who attend the public elementary schools.

Hardship really is minimised by a careful application of the powers to exclude individual scholars, because unless this is attended to it is quite possible that disease may rapidly spread to an extent which would render it necessary to close the school altogether.

It is extremely difficult, if not impossible, to lay down absolute rules as to when, and for how long a time, schools should be closed. The nature of the disease, its character, the numbers of the pupils affected, will all be factors in determining the point, as well as the nature of proof that the sources of infection are actually at the school.

It is plain, for example, that if 10 per cent. of the children attending a school are absent on account of typhus fever, the aspect is more grave than if the same number of children are absent from measles, and the more formidable character of the one form of disease would call for more stringent action than in the case of the other; yet in either case it would be necessary to adopt as rigorous means as possible to exclude scholars from infected houses in the first instance, and it would probably be found in that way that the disease would be checked without resorting to closure of the school.

Much depends upon the amount and the promptness of the information which the Medical Officer of Health is able to gain in regard to the circumstances of the school children and their homes: and the promptness with which action can be taken.

The existence of infectious disease in a locality is by no means *per se* to be looked upon as a ground for closing the schools, and again still less is the existence of isolated cases of sickness amongst the pupils.

What applies to public elementary schools (Board Schools and Denominational Schools) also applies to Sunday Schools and Private Schools. Although these latter establishments are not subject to the same regulation by the Sanitary Authority as the others, yet the Public Health Act does make certain provisions which are applicable to schools of every kind, and the managers of these establishments are as a rule perfectly willing to act upon the suggestions which the Sanitary Authority may find it necessary to offer.

When it does become expedient to close schools it is desirable that the time specified should be a minimum, because, if it appears necessary, a notice extending the period can be given before the expiration of the time originally stated.

THE PRESENT STAFF of the Medical Officer of Health of the City consists of the following:—

*	Chief Sanitary Inspector	1
*	Deputy Chief Sanitary Inspector	1
*	Prosecuting Sanitary Inspectors	7
*	Inspectors for General Sanitary Purposes	30
*	Female Inspectors for General Sanitary Purposes	8
§	Inspectors of Meat and Animals	4
	„ under the Diseases of Animals Act	2
**	„ of Fish and Fruit	4
***	„ under the Sale of Food and Drugs Act	3
*	„ „ Workshop and Shop Hours Act	3
†	„ —Smoke	3
‡	„ —Ambulance	4
	„ —Disinfecting and Wall Stripping Staff	25
	Superintendents of Disinfecting Apparatus	2
*	Chief Inspector of Common Lodging and Sub-let Houses	1
***	Inspectors of Common Lodging and Sub-let Houses	12
*	Inspector of Canal Boats	1
*	„ Bakehouses	1
*	Inspectors of Cowsheds and Milkshops	2
	Notice Servers	3
	Permanent Clerical Staff	22
	Temporary Assistants	5

In every case Officers are selected for these positions, whose previous training and occupation have been such as to fit them for the special duties they are called upon to discharge. Those marked * are required to hold the Certificate of the Sanitary Institute of Great Britain or a Certificate equivalent thereto; those marked † have Marine Engineers' First Class Certificates, and the ‡ Superintendent Ambulance Inspector holds

Sanitary Certificate, and also the Certificate of St. John Ambulance Association. ** Fishmongers by trade. § Butchers by trade; candidates are submitted to practical examination upon the lines which have been indicated in the Report of the Royal Commission upon Tuberculosis. *** Several hold the Certificate of the Sanitary Institute, or an equivalent thereto.

SANITARY ADMINISTRATION OF THE PORT.

The Port Sanitary District of Liverpool extends from Formby Point to Dungeon Point on the Lancashire side, then crossing the River Mersey in a straight line to Ince Ferry it is continued to New Brighton on the Cheshire shore, and thence to the mouth of the River Dee at Hilbre Point.

Two or three miles from the mouth, the River Mersey narrows to about three-quarters of a mile, but it widens out again, making an average width at the Port approximately 1¼ miles.

By an Order of the Local Government Board, the Council of the City of Liverpool is constituted the Port Sanitary Authority for the Port of Liverpool, and the powers so conferred upon the City Council are delegated, as far as they legally may be, to a Special Committee called the Port Sanitary and Hospitals Committee.

The contributing Riparian Authorities are the Urban Sanitary Authorities of Birkenhead and Bootle, and the Urban District Councils of Bromborough, Lower Bebington and Wallasey.

Article IV. of the Order constituting the Port of Liverpool states that:—"For the purposes of this Order, the following sections (which are quoted in the Order) of the Public Health Act, 1875; the Public Health (Officers) Act, 1884; the Public

Health (Ships, &c.) Act, 1885; the Public Health (Members and Officers) Act, 1885; and the Public Health Acts Amendment Act, 1890, shall apply; and the Port Sanitary Authority shall have, exercise, perform, and be subject to all the powers, rights, duties, capacities, liabilities and obligations of an Urban Sanitary Authority under the same sections, so far as those sections are applicable to the waters within the jurisdiction of the said Port Sanitary Authority, or to ships coming or being within the said jurisdiction, or to persons upon any such ship, or brought by any such ship within the said jurisdiction, or to goods or things upon any such ship, or to goods or things landed from any such ship, and being within the said jurisdiction, and which, in the opinion of the said Authority, or their Medical Officer of Health, require to be disinfected or distroyed."

Vessels approaching the Port, and requiring medical aid, can speak the Formby Lightship, which is situated in the main channel 10½ miles out, and their approach is telephoned to the Port Sanitary Offices situated on the Prince's Pierhead.

Ships arriving in the Mersey, and requiring inspection, are, as a rule, dealt with during a period of four hours each tide, viz., two hours before high water and two hours after, but as a matter of convenience vessels arriving after the tides are dealt with as soon after arrival as possible.

The boarding station is nominally off the Landing Stage; this is also the nominal Customs boarding station, but in order to save tides and prevent delay, the Sanitary Officers and Customs Authorities board vessels in all parts of the river, and many vessels are boarded on entrance into the docks, having, of course, previously been hailed as to the state of health on board.

While the chief functions of the Customs Officers are those which their title implies, yet a great amount of service is rendered

by them in protecting the public health, and certain obligations are imposed upon the Customs Staff in connection with sanitary administration, by the Orders of the Local Government Board.

The Customs Authorities are usually the first to receive intimation of sickness on board vessels, either by telegraph from Point Lynas, Moville or Queenstown, or by speaking vessels in the river, and all information is immediately reported to the Port Sanitary Offices.

The Mersey Docks and Harbour Board, which controls the docks on both sides of the river (excluding Garston), is fully alive to the necessity for keeping the docks and city free from all serious forms of infectious disease. This Board assists the Port Sanitary Authority in preventing the entrance into dock of any vessel infected or suspected to be infected with certain forms of dangerous infectious disorder, until she has been boarded by the Port Medical Officer, and the Captain has received a certificate to the effect that the ship has been examined, and may be permitted to dock. This certificate is handed to the Dockmaster.

Vessels bound for Manchester, and coming from ports infected with cholera, plague or yellow fever, are dealt with by the Liverpool Port Sanitary Authority under an Order of the Local Government Board.

Vessels having serious infectious disease on board, or in an infected condition, are sent to the appointed quarantine ground, which lies some two miles up the river, and adjacent to this is situated the Port Sanitary Hospital.

Patients suffering from infectious disease and requiring removal to that hospital, are conveyed either by tug, or in the ship's boat to the hospital jetty, and landed. The majority of patients, however, are treated in the City Infectious Hospitals, and are removed from the dock after the vessel has been berthed. The infected bedding, &c., are enclosed in carbolised sheets and

placed on board the tug. The most convenient places for landing this bedding for conveyance to the City Disinfecting Establishment are the Waterloo Steps or the Albert Wall, places very little frequented by the public. A considerable amount of infected clothing, &c., can also be disinfected at the new disinfecting stove at the Port Sanitary Hospital. The tug engaged in the landing of infected clothing is subsequently thoroughly disinfected.

The entire Ambulance and Disinfecting Staff of the City are at the disposal of the Port Authority, with results as efficacious as if the Authority employed a separate and distinct staff for ambulance and disinfecting purposes.

Patients suffering from general sickness of a non-infectious nature are, as a rule, landed and removed from the dock when the ship has been berthed.

The City Hospitals are, as a rule, used for the reception of all sea-borne cases of infectious disease, excepting those dealt with under the Local Government Board Order of 1896, which are removed to the Port Hospital at New Ferry. This is a more convenient course to adopt than to send all sea-borne cases to the Port Hospital.

The Port Hospital is well isolated, and close to the river Mersey, and during the early part of the year 1902, it was extended and made more suitable for the reception and nursing of patients.

Each pavilion has a suitable lavatory and bathroom, and at each end a discharging room, which can also be used as a small isolation ward. The wards are heated by means of stoves.

The nurses' quarters are suitable, and situated a short distance from the wards, close to the keeper's house.

Instructions with reference to infectious disease are printed in half-a-dozen different languages, and given to the various shipping firms for distribution amongst their captains, to Consuls, &c., and are also left on board foreign ships.

This information has been supplemented during the last few years with specific instructions relating to plague and the destruction of rats.

Regarding ships arriving from countries infected with cholera, plague or yellow fever, these are dealt with under special orders of the Local Government Board, which were issued on November 9th, 1896.

In connection with plague, attention is directed mainly to foreign ports; inquiries are always made, and precautions taken in regard to rats on board ships coming from the East.

The prevalence of cholera in the East adds considerably to the duties of inspection. Not only is a personal examination of the crews made, but also inquiries into the general state of health during the voyage, as to whether any cases of diarrhœa or bowel complaint have occurred on board. The water supply and tanks are carefully inspected, and directions given as to the care with which water and fresh vegetables ought to be used in countries where cholera occurs.

To obtain the certificate of examination, vessels coming into the Port of Liverpool must come to off the Landing Stage, and if necessary anchor there until dealt with. One of the Medical Staff of the Port visits and inspects the vessel, and if satisfied, will issue a docking certificate.

The Mersey Docks and Harbour Board has made arrangements for their officers to communicate from Formby Lightship as the vessel is passing inwards.

The inspection of ships in dock for structural and sanitary defects affecting the health of crews, is carried out by fully trained inspectors, who are thoroughly conversant with marine matters. They also carry out the fumigation and disinfection of ships, and attend the clearances of emigrants by the Board of Trade Medical Officer, taking charge of any cases of infectious disease, which may have been rejected.

INSANITARY PROPERTY AND REHOUSING. - -

The attention of the Corporation of Liverpool was as early as the year 1842 directed to the defective housing conditions under which a large percentage of the poorer classes lived, but owing to the absence of definite knowledge in matters affecting the public health and to the absence of any public opinion in the matter, only very short and ineffective measures were adopted to remedy the evil.

With the advance in sanitary knowledge however, backed up by a more enlightened public opinion, the Corporation in 1864 seemed to be fully alive to the number of insanitary houses that existed in Liverpool.

In the year 1863 a Special Committee of the Council drew the attention of the Council to the condition of the courts and alleys in the town, and recommended that an amendment of the Liverpool Sanitary Act, 1842, should be sought, and also that, if necessary, an additional rate for the purpose be obtained, such rate not to exceed 1d. in the £.

It is interesting to note the conclusions arrived at by the Committee in dealing with this matter, and the results which they hoped to obtain. The words of the Committee were as follows :—" Your Sub-Committee feel confident that, by the judicious employment of a fund thus raised, the comfort and happiness of the poorer portion of the labouring class may be greatly promoted, much pecuniary loss to them from sickness and inability to work prevented, the public health improved, and the rate of mortality for the borough diminished."

The Council approved the recommendation of this Committee, and application was accordingly made to Parliament to amend the local act of 1842, which eventually resulted in the passing of the "Liverpool Sanitary Amendment Act, 1864."

This Act has been amended from time to time, but the great bulk of the work which the Corporation has done, has been carried out under its provisions.

In fact it was not until last year that the Corporation adopted "The Housing of the Working Classes Act, 1890," for the purpose of dealing with two areas.

The provisions of the Sanitary Amendment Act, 1864, are very important, and no town in the kingdom possesses such extensive powers for dealing with this class of property as is possessed by Liverpool.

The powers may be briefly summarised as under :—

1.—The Medical Officer of Health can report to the Council that certain houses (specifying them) are unfit for human habitation.

2.—The Council, after approving the Report, must send the same to the Clerk of the Peace, and notice of the Report must be given to the owners of the properties included therein.

3.—The Report is then brought before the Grand Jury at Quarter Sessions, who, after hearing evidence, and viewing the property, decide whether or not the houses mentioned in the Report are insanitary and ought to be demolished. If they decide in favour of demolition, their doing so is called a "Presentment."

4.—The owners have a right of appeal to Quarter Sessions from the decision of the Grand Jury.

When the properties have been presented by the Grand Jury they are acquired by Agreement or Arbitration in the same

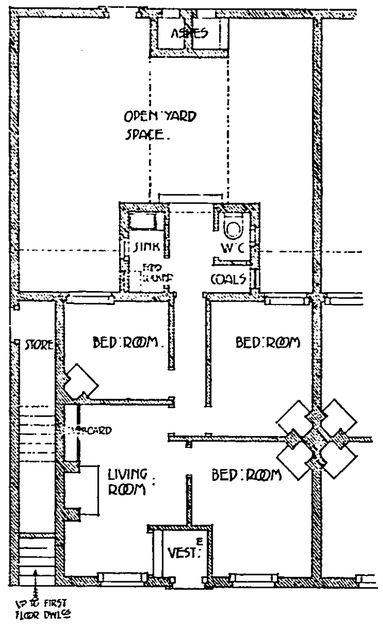
DEVONIA STREET DWELLINGS, SHOWING RECREATION ROOM.

DRYDEN STREET DWELLINGS, SHOWING RECREATION ROOM.

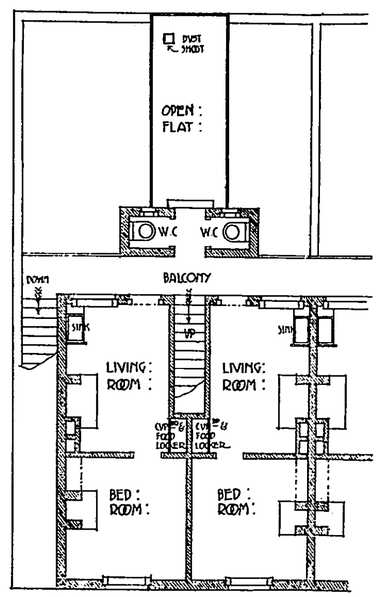
TYPE : A :

CITY OF LIVERPOOL

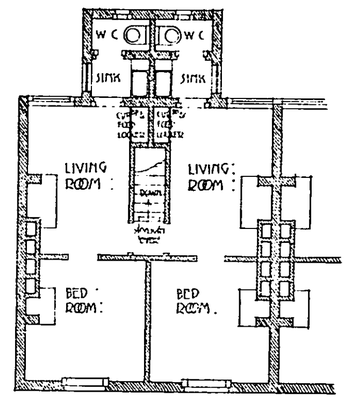
LABOURERS : DWELLINGS :
DRYDEN : & : RACHEL : STREET :



GROUND : FLOOR : PLAN :



FIRST : FLOOR : PLAN :



SECOND : FLOOR : PLAN :

SCALE : EIGHT : FEET : EQUALS : ONE : INCH :

0 10 20 30 40 50 60 70

SURVEYORS DEPT : LIVERPOOL 1900 :

manner as under the "Housing of the Working Classes Act, 1890," save that under the Local Act, the owner has a right to elect to retain the site, and to be compensated only for demolition of the buildings.

The advantages of proceeding under the Local Act are:—

1.—The simplicity, despatch and cheapness of obtaining a Presentment by the Grand Jury that certain houses are unfit for human habitation and ought to be demolished.

2.—The fact that the Corporation have the conduct of the whole of the proceedings without the necessity of having to apply to the Local Government Board for a Provisional Order.

The disadvantages of proceeding under the Local Act are:—

1.—The owners can elect to retain the site.

2.—No properties other than those used for habitation can be acquired, and then only such as are in themselves insanitary.

From a consideration of these two obvious disadvantages it would, at first sight, appear that it might be difficult to obtain a large area suitable for rebuilding, and that the Corporation might be saddled with a number of isolated plots of land which could not be utilised, and might be difficult to dispose of.

In general practice, however, it has been found that the Corporation has been enabled to purchase the sites, and in some few cases where they have not been able to do this they were afterwards enabled to acquire the sites by agreement under Part 3 of the "Housing of the Working Classes Act, 1890."

On the whole this Act has worked exceedingly well for the City, and has been of immense advantage in dealing with insanitary property.

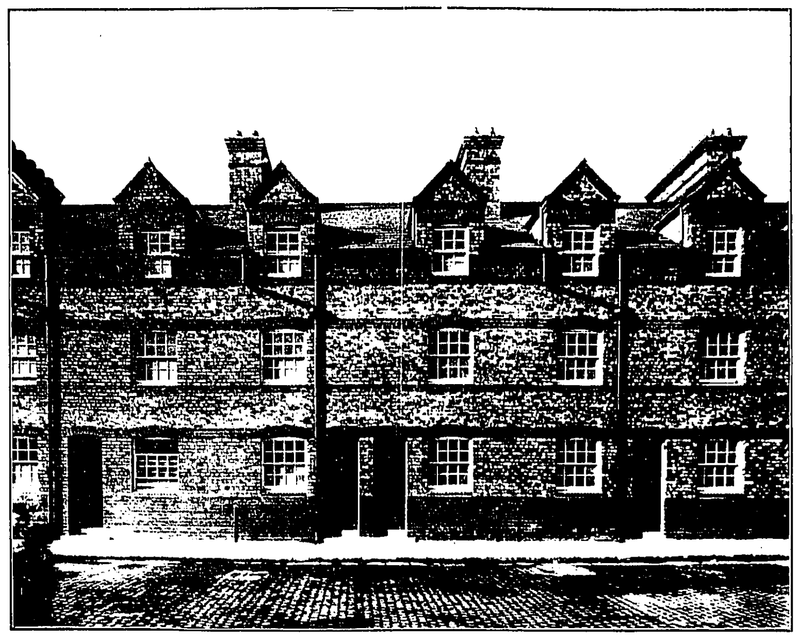
In the passing of the Bill through Parliament for amending the "Liverpool Sanitary Amendment Act, 1864," it was stated in evidence by the then City Engineer that the number of insanitary houses in Liverpool at that time was 18,610, comprising 3,173 courts, the average number of houses for each court being very nearly six, and the average number of persons occupying each house being above six, and that one-fifth of the entire population of the then Borough inhabited these places.

The number of houses at that time which were insanitary was probably much under-estimated, for during the period of nearly 40 years which has elapsed since the passing of this Act, the views of medical men and others have greatly broadened as to what constitutes an insanitary house, and on the basis of the modern idea of an insanitary house, it is estimated that at that time there would have been in the then borough about 22,000 houses which did not meet the requirements of sanitation.

These have been dealt with from that period as follows:—

	Houses.
Acquired under the Local Act of 1864, about....	8,150
Demolished for trade and other purposes, about..	4,000
A recent street to street examination of the City discloses the fact that the number of structurally insanitary houses, as gauged by modern views, remaining to be dealt with is	9,943
	22,093

A typical Liverpool Court has been described as "a strip of land with a frontage of 30 feet to a narrow street by 60 feet in depth, abutting at the far end upon the high walls of warehouses or manufactories. Fronting and opening on to the street two three-story houses were built. Under the floor of one of the rooms of the front house is a tunnel or passage 3 feet wide and 5 to 6 feet high, to give access to the land in the rear. On this



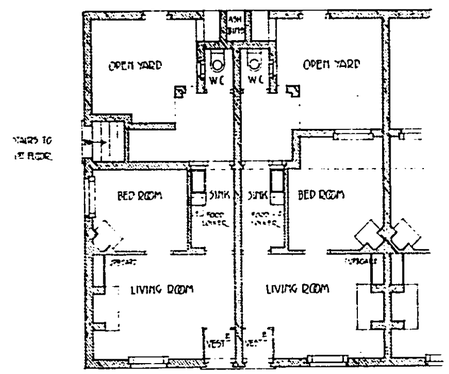
DRYDEN STREET DWELLINGS.

DRYDEN : STREET : DWELLINGS.

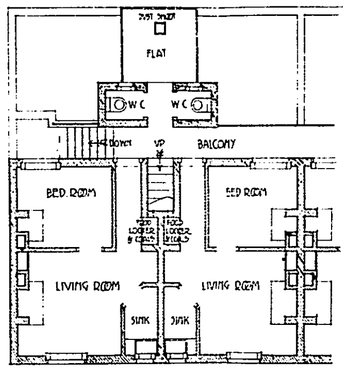
TYPE : B :

CITY : OF : LIVERPOOL

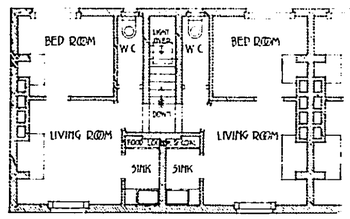
LABOVRERS : DWELLINGS :
DRYDEN : & : RACHEL : STREET :



GROVND : FLOOR : PLAN :



FIRST : FLOOR : PLAN :



SECOND : FLOOR : PLAN :

SCALE EIGHT FEET
EQUALS : ONE INCH

10 5 0 10 20 30 40 50 60 70

SURVEYORS DEPT
LIVERPOOL 1900

strip of back land, only 30 feet wide, are placed two rows of three-story houses facing each other with their backs against other houses, each with a frontage of 11 feet, and the same in depth including walls; thus leaving barely 9 feet from window to window. Some sixty to seventy souls are crowded into this court, having to depend for their breath of life upon this narrow well of stagnant air."

In addition to this, probably only two conveniences were provided, one placed at each end of the court, and in full view of all the residents of the court. A single stop tap for water formed the only supply, and there was an absolute absence of a circulation of air, and, of course, no yard space whatever.

Even in some of the courts of more modern construction, while the tunnel entrance is done away with, one end of each alternate court has been blocked up by houses thus preventing what is so essential, viz :—a circulation of air through each court.

The annual death rate of many of the areas dealt with by the Corporation has ranged from 35 to 65 per thousand.

The cost of dealing with the demolition of insanitary property up to the present time has been about £395,000.

In all 17 Presentments have been made by the Corporation under the Local Act, the first being dated 13th January, 1865, and the last 17th July, 1901.

In the year 1875 the Corporation also dealt with a large area known as Nash Grove (under the Artizans and Labourers' Dwellings Improvement Act, 1875), which contained a population of about 1,310 persons.

In the year 1885 the first effort, with the single exception of St. Martin's Cottages, which were erected in 1869, was made by the Corporation to provide for those who were dispossessed.

St. Martin's Cottages, although only slightly over 30 years old, are not of the type of house which the Corporation would

now build. In fact the erection of dwellings similar to the middle blocks of these cottages would now be impossible under existing Bye-laws.

In 1885 the Corporation erected Victoria Square Dwellings, and in 1890 there were also erected labourers' dwellings in Juvenal Street. These contained 371 tenements, to accommodate a total of 1,382 people.

After the erection of these dwellings, it was still felt that nothing had been done to provide for the actual persons who had been dispossessed, the rents charged in the new dwellings being beyond the means of those who had been dispossessed from the insanitary houses which formerly occupied the site; it must be borne in mind that three-fourths of the dispossessed tenants were only paying a rent of about 2s. 6d. or at the most 3s., for which amount they got a court house, containing three rooms, a description of which has been given.

Since 1896 all dwellings erected by the Corporation have been reserved exclusively for tenants who have been dispossessed.

The adoption of this principle has in many cases necessitated dwellings being kept unoccupied for a considerable time, notwithstanding the fact that in every case the Corporation dwellings could readily have been let, but not to the right class of tenant.

The Housing Committee, however, stood firm in their resolve, and the dispossessed tenant alone is accepted.

The erection of dwellings for the dispossessed followed in rapid succession, until at the present time they comprise:—

Dryden Street Dwellings	erected in	1901..	182	Tenements.
Kempston Street	„	„ 1902..	79	„
Fontenoy Street	„	„ 1902..	16	„
Kew and Newsham Streets	„	„ 1902..	114	„
Adlington Street	„	„ 1903..	255	„

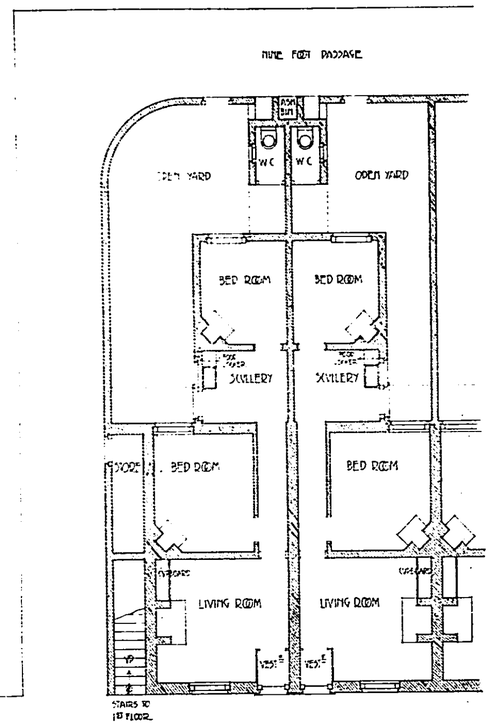
MEDIUM SIZED HOUSES, CROMPTON STREET, WELLINGS.

KEMPSTON STREET DWELLINGS.

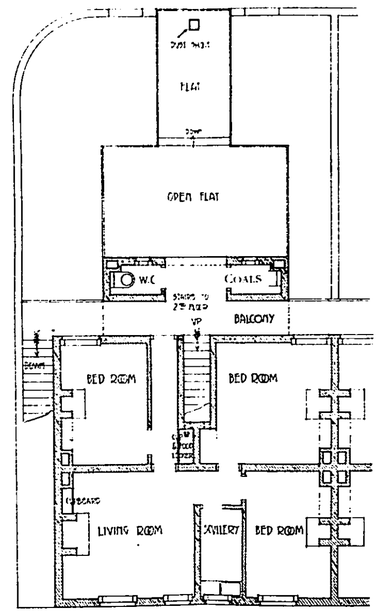
TYPE C.

CITY OF LIVERPOOL

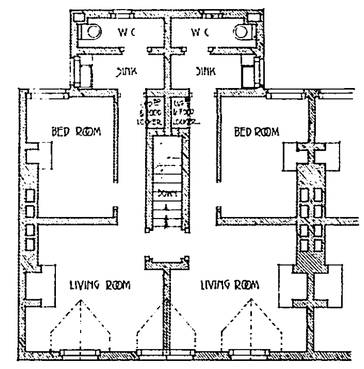
LABOURERS' DWELLINGS:
KEMPSTON STREET ETC.



GROUND : FLOOR : PLAN :



FIRST : FLOOR : PLAN :



SECOND : FLOOR : PLAN :

SCALE : EIGHT : FEET : EQUALS : ONE : INCH :

10 5 0 10 20 30 40 50 60 70

SURVEYORS. DEPT.
LIVERPOOL. 1901.

In addition to which there are further dwellings on the eve of completion in Gildart's Gardens and Arley Street (149), and also on two sites formerly occupied by tramway stables, one in Upper Stanhope Street and the other in Mill Street, providing for 115 tenements.

A return compiled by the Medical Officer of Health and the writer in 1899, disclosed the fact that, notwithstanding 793 dwellings which had been erected by private enterprise on land sold by the Corporation for the purpose, and that the Corporation only had to provide for 50 per cent. of the dispossessed population, there was a deficiency of 3,056 persons for whom it was necessary to provide accommodation.

The City Council cheerfully accepted the proposition of the Local Government Board that this deficiency must be met before further demolitions are proceeded with, and in October, 1899, gave the necessary assurance to the Local Government Board.

Most of these dwellings are erected on land which has been acquired under the Local Act, supplemented by several purchases of land acquired under Part 3 of the Housing of the Working Classes Act, 1890.

The total cost of erecting all the above dwellings when completed will probably amount to about £243,000.

With regard to the financial aspect the present charge for demolition amounts to £17,100 per annum, while for Housing purposes it is £4,200 per annum, making a total of £21,300 per annum, which is equal to a rate of $1\frac{3}{4}$d. in the £.

Of course the net rents accruing from the various properties have been deducted in arriving at the above figures.

It must, however, be borne in mind that a considerable portion of the rate for housing purposes represents a Sinking

Fund for a varying period of years, and at the end of the various periods the ratepayers will come into possession of very valuable assets in the shape of good dwellings.

In February, 1903, the City Council adopted a scheme for the erection of dwellings on the Hornby Street area, the total number of tenements provided being 450, a number which, when completed will make the scheme by far the largest individual scheme carried out by the Corporation.

It is estimated that the cost of this scheme including the land will be £150,000, of which sum rather more than one-half represents the cost of the buildings.

Based on a rental of:—

One roomed houses .....2s. per week.
Two ,, ,, ...3s. ,, ,,
Three ,, ,, ...4s. ,, ,,
Four ,, ,, ...5s. ,, ,,

and allowing 40 per cent. for outgoings, it is estimated that the scheme will pay 3 per cent. net after valuing the land for housing purposes at 12s. per yard. This being the case, it may be assumed, that the cost to the ratepayers will only be the cost of providing the necessary Sinking Fund.

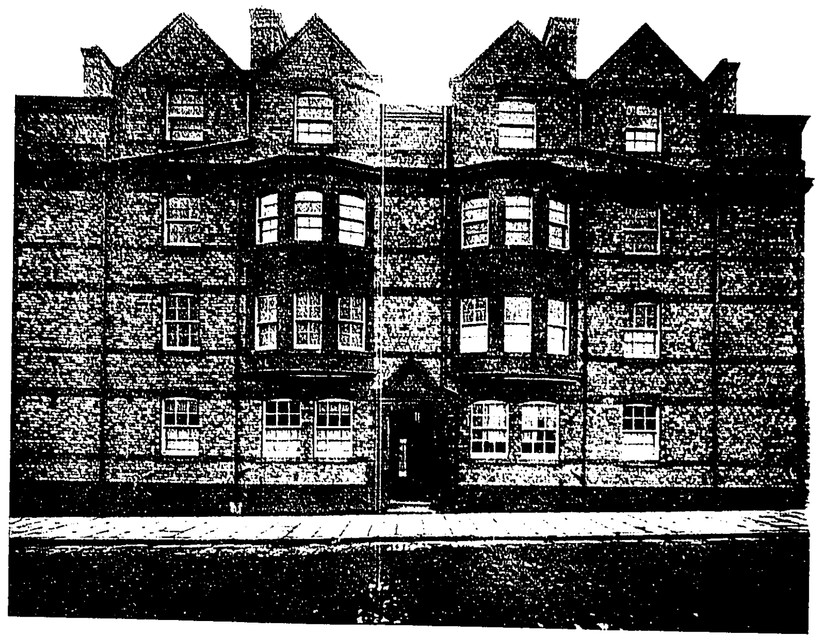
The total number of tenements which can be erected on this area is 450 (including Keeper's House), providing for 2,446 persons, while the number of persons dispossessed is 2,431.

The following is a list and description of each of the dwellings, and these are summarised on a subsequent page:—

ST. MARTIN'S COTTAGES.

Erected out of Funds of Capital Personal Estate. Opened 1869.

These dwellings are comprised in six blocks—four outer blocks, five stories in height, and two inner blocks, three stories in height, the whole containing 123 tenements, and one house for the Superintendent, with office and workshop.

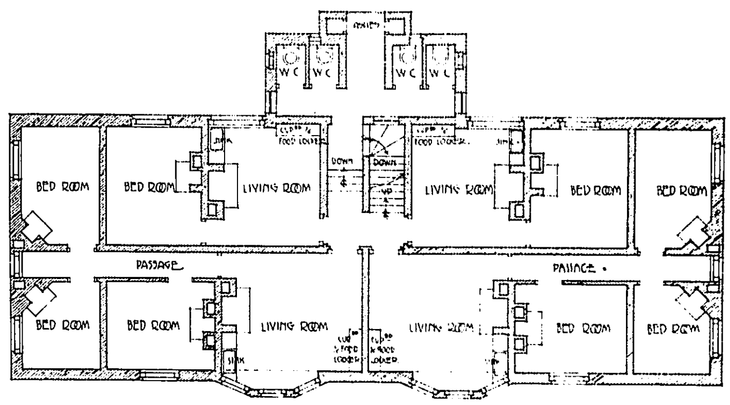


FONTENOY STREET DWELLINGS.

TYPE : D :

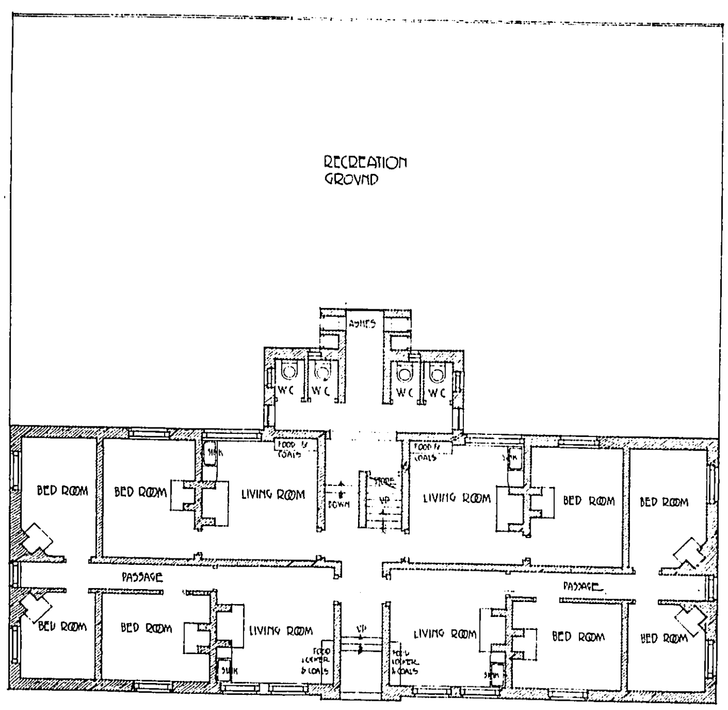
CITY OF LIVERPOOL

LABOURERS : DWELLINGS :
FONTENOY : STREET :



UPPER : FLOORS : PLAN :

SCALE . EIGHT . FEET .
EQUALS . ONE . INCH .



THE MAIN ENTRANCE

GROUND : FLOOR : PLAN :

SURVEYORS . DEPT
LIVERPOOL . 1901.

The sizes of the rooms are generally as follows:—Four-roomed dwellings, living room, 13ft. by 11ft. 6in., one bedroom 12ft. 6in. by 8ft. 6in., and two other bedrooms, 9ft. 6in. by 8ft. 6in., and 8ft. by 8ft. respectively. In the three-roomed dwellings, the living room is about 11ft. 6in. by 7ft. 6in., one bedroom 12ft. by 8ft. 6in., another bedroom 11ft. 6in. by 6ft. 6in., while in the two-roomed dwellings the living room is 11ft. 6in. by 9ft. 9in., and bedroom 11ft. by 8ft.

The rooms in each tenement have a clear height of 9 feet.

Gas is laid on and supplied to each tenement, if required, through automatic meter.

Each tenement is provided with scullery and separate w.c., and in two blocks washing boilers have been provided.

The land cost 18s. per square yard, and there being 3,290 square yards (including interest) =	£3,172	16	0
Buildings ..... =	£14,756	0	0
Total cost of land and buildings =	£17,928	16	0

Total Gross Rental per week	£21	16	6
" " " " annum	£1,134	19	0

(Inclusive of Superintendent's Residence).

The total gross rental of the dwellings for ten years (1893-1902) amounted to £12,388 16s., of which there was actually received a sum of £11,313 2s. 9d., equal to over 91 per cent. The empties accounted for £773 15s. 6d., while the irrecoverable arrears amounted to £277 17s. 6d., the accumulated arrears from tenants still occupying being £53 7s. 6d.

Average percentage for 10 years ....£1 18s. 11¾d.

VICTORIA SQUARE DWELLINGS.

Erected on portion of area cleared under the "Artizans and Labourers' Dwellings Improvement Act, 1875." (Opened December, 1885.)

These dwellings are comprised in five five-story blocks, containing 269 tenements, one house for Superintendent, with office, and 12 shops.

The one-room tenements are 12ft. by 12ft. In the two-roomed tenements, the living room is 13ft. by 12ft. 4in., and the bedroom 15ft. 3in. by 9ft. 7in. In the three-roomed tenements, the living-room is 13ft. by 12ft. 4in., one bedroom 15ft. 3in. by 9ft. 7in., and the other bedroom 13ft. by 8ft. 6in.

The rooms in each tenement have a clear height of 9 feet.

On each landing, sinks have been provided, as well as a laundry, with boiler and wash-places, for the use of the tenants of four dwellings in common, and there are also two w.c.'s, each common to two tenements.

Gas is laid on to each tenement, and supplied, if required, through automatic meters.

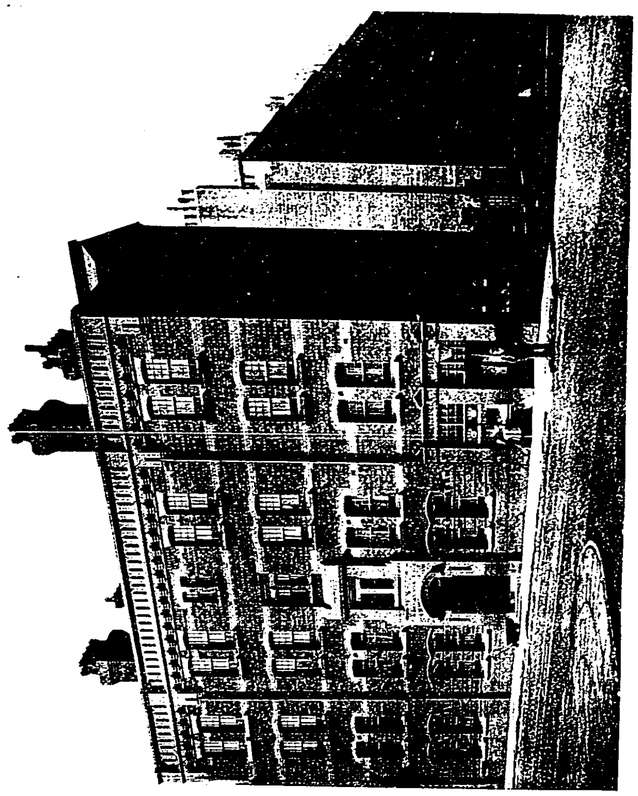
The estimated value of the land (*i.e.*, the price at which it was considered it could have been sold for commercial purposes) is 22s. 6d. per square yard, and the area being 9,000 square yards, the cost of the land is taken at	= £10,125
The total cost of the buildings	= £57,952
Estimated cost of land and buildings	= £68,077

The rents of the tenements are as under, viz. :—

GROUND, FIRST AND SECOND FLOORS.

4	Three-roomed dwellings.....	at 5s. 6d.	per week.
59	,, ,, ,, ...	5s. 3d.	,,
5	Two ,, ,, ...	4s. 6d.	,,
12	,, ,, ,, ...	4s. 3d.	,,
58	,, ,, ,, ...	4s. 0d.	,,
3	,, ,, ,, ...	3s. 9d.	,,
3	,, ,, ,, ...	3s. 6d.	,,

And Superintendent's Residence (at nominal rental, 1s. per annum).



JUVENAL DWELLINGS, CAZNEAU STREET.

THIRD AND TOP FLOORS.

2	Three-roomed	dwellings.....	at 5s. 0d.	per week.
21	,,	,, ,, ...	4s. 9d.	,,
5	Two	,, ,, ...	4s. 0d.	,,
2	,,	,, ,, ...	3s. 9d.	,,
11	,,	,, ,, ...	3s. 6d.	,,
61	,,	,, ,, ...	3s. 3d.	,,
2	,,	,, ,, ...	3s. 0d.	,,
21	One	,, ,, ...	1s. 9d.	,,

Total number of rooms, 611 (Including Superintendent's house and office).

Total Gross Rental of Tenements Per Week.... £53 15s. 9d.

" " ,, ,, ,, Annum..£2,797 0s. 0d.
(Including Superintendent's Residence)

Total Gross Rental of Shops per Annum..... £234 0s. 0d.

The total gross rental of the dwellings and shops for 10 years (1893-1902) amounted to £32,021 13s. 8d. for which there was actually received the sum of £30,357 8s. 2d., equal to over 94 per cent. The empties during the period mentioned accounted for £1,047 7s. 7d., while the irrecoverable arrears amounted to £810 11s. 8d., the accumulated arrears from tenants still occupying being £59 15s 6d.

COMPARATIVE STATEMENT FROM YEAR 1893 to YEAR 1902.

Year.	Receipts. £ s. d.	Payments. £ s. d.	Net Receipts. £ s. d.	Percentage Realised. £ s. d.
1893	2,993 0 6 ..	1,205 3 10 ..	1,787 16 8 ..	2 12 6
1894	2,976 10 9 ..	1,331 8 6 ..	1,645 2 3 ..	2 8 11
1895	2,998 10 5 ..	†1,825 4 6 ..	1,173 5 11 ..	1 14 5
1896	3,075 15 1 ..	1,357 0 5 ..	1,718 14 8 ..	2 10 5
1897	2,990 1 8 ..	1,494 16 7 ..	1,495 5 1 ..	2 3 11
1898	3,050 8 9 ..	1,496 9 8 ..	1,553 19 1 ..	2 5 9½
1899 ....(*a*)	3,003 15 11 ..	1,389 18 0 ..	1,613 17 11 ..	2 7 4¾
1900 ....(*b*)	2,974 16 6 ..	†1,799 14 10 ..	1,175 1 8 ..	1 14 6
1901	2,968 9 0 ..	1,349 11 2 ..	1,618 17 10 ..	2 7 6¾
1902	3,028 7 3 ..	(*c*)1,586 15 6 ..	1,459 11 9 ..	2 2 10½

Average percentage for ten years.....£2 4s. 10d.

Items marked thus (†) include cost of outside painting, and of work at entrances, staircases, landings and passages.

(*a*) Owing to introduction of automatic meters, the rents were reduced 3d. per tenement per week.

(*b*) Superintendent's house enlarged, for which purpose two tenements were absorbed, involving a reduction in the total gross rental of £22 15s. per annum.

(*c*) Includes cost of providing new Lamps at entrances, handrails to staircases and repairs to carriageway, &c.

LABOURERS' DWELLINGS, JUVENAL STREET.

Erected on portion of area cleared under the "Artizans and Labourers' Dwellings Improvement Act, 1875." Completed December, 1890.

These dwellings are comprised in four blocks, three of which are four stories in height, and one three stories high, containing altogether 101 tenements and one shop, with which one of the dwellings is let.

The sizes of the rooms vary considerably, but generally they are as follows, viz.:—One-room tenements 14ft. 3in. by 11ft.; two-roomed tenements, living room 14ft. by 11ft., and bedroom 12ft. by 11ft.; three-roomed tenements, living room 14ft. by 12ft. 3in., one bedroom 14ft. 3in. by 14ft., and another bedroom 14ft. by 9ft. 9in.

The rooms in each tenement have a clear height of from 9ft. to 9ft. 3in.

Gas is supplied, if required, by means of automatic meters.

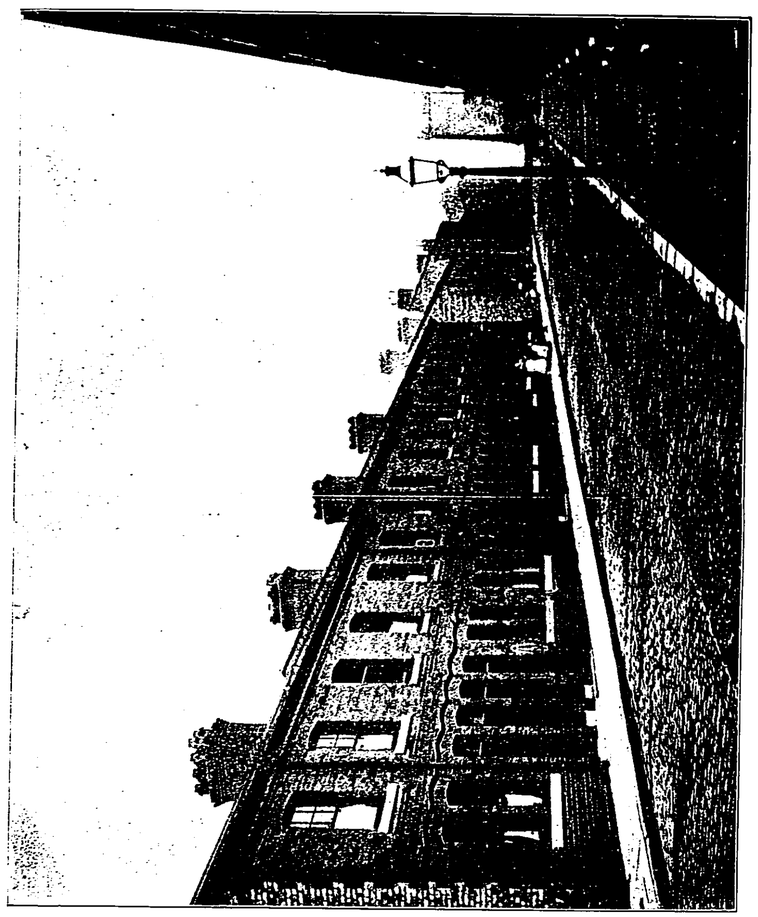
The sinks are in the living rooms of these tenements, and w.c.'s (common to two or three families) are provided on each landing, the laundries (for use of tenants of each block in common) being on the roofs, the flat portions of which also afford drying accommodation.

The estimated value of the land (if sold for commercial purposes) is 24s. per square yard, and the area being 2,538 square yards, the cost is taken at	= £3,045
The total cost of the buildings	= £13,121
Estimated cost of land and buildings	= £16,166

The rents of the tenements are approximate to those of Victoria Square.

Total Gross Rental of Tenements per week	£16	7	3
,, ,, ,, ,, ,, annum ..	£850	17	0
,, ,, ,, Shop, &c., ,, ,, ..	£28	0	0

The total gross rental of the dwellings and shop for the ten years (1893-1902) amounted to £9,364 19s. 8d., of which there was actually received a sum of £8,755 15s. 4d., equal to over 93 per cent.



ARLEY STREET DWELLINGS.

The empties during the same period accounted for £307 10s. 5d., while the irrecoverable arrears amounted to £368 0s. 8d., the accumulated arrears from tenants still occupying being £19 8s. 3d.

Average percentage for 10 years .....£3 1s. 1¾d.

ARLEY STREET DWELLINGS.

Site acquired under "Liverpool Sanitary Amendment Act, 1864," and Dwellings erected under the "Housing of the Working Classes Act, 1890, Part III." Opened June, 1897.

These dwellings, which comprise 38 double tenements, are reserved for housing persons who have been dispossessed by the Corporation. The dwellings are two stories high, each floor forming a separate flat, and each tenement has a separate entrance, direct from the street. The average sizes of the rooms are as follow:—

GROUND FLOOR.

Living-room.....	14ft.	by	13ft. 6in.
Bedroom	14ft.	by	9ft.
with bed recess	6ft. 8in.	by	4ft. 6in.
Scullery and Yard.....	7ft. 3in.	by	7ft.

UPPER FLOOR.

Living-room.....	14ft.	by	10ft.
One Bedroom	14ft.	by	8ft.
Another Bedroom	14ft.	by	5ft. 3in.
with bed recess	6ft. 6in.	by	3ft.
Scullery.....	7ft. 3in.	by	7ft.

Separate w.c.'s are provided, and the rooms in each tenement have a clear height of 8ft. 6in.

Gas is laid on and supplied, if required, by means of Automatic Meters.

The estimated value of land (if sold to builders for the erection of houses) is 12s. per square yard, and the area being 1,850 square yards the cost is taken at ..	=	£1,110 0 0
The cost of buildings (estimated).....	=	£6,212 4 10
Total cost of land and buildings	=	£7,322 4 10

The rentals are as under:—

GROUND FLOOR.

2 Two-roomed tenements ..... at 5s. od. per week each.
15 „ „ ..... 4s. 6d. „
2 „ „ ..... 4s. od. „

UPPER FLOOR.

2 Three-roomed tenements ..... at 5s. 6d. per week each.
15 „ „ „ ..... 5s. od. „
2 Two „ „ ..... 4s. 6d. „

Total number of rooms, 93.

Total gross rental per week.... £9 os. 6d.
„ „ „ „ annum..£469 6s. od.

The total gross rental (1897-1902) amounted to £2,345 11s. 9d. of which there was actually received a sum of £2,185 os. 6d. equal to over 93 per cent. The empties accounted for £104 os. 6d. while the irrecoverable arrears amounted to £43 9s., the accumulated arrears from tenants still occupying being £13 1s. 9d.

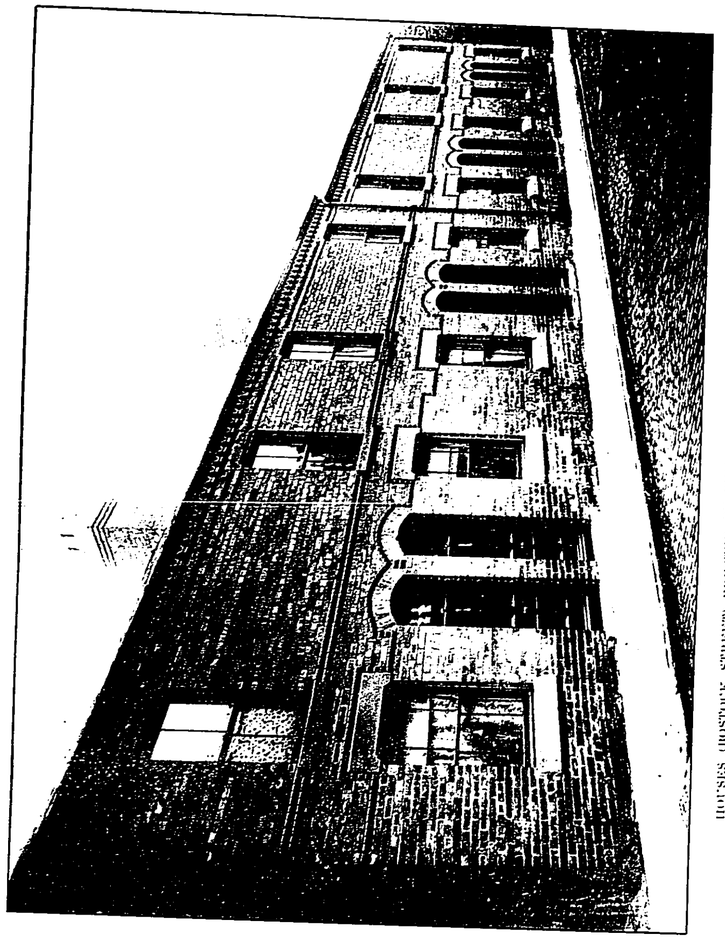
Note.—4 New houses were added in 1902, and were available for occupation for only part of that year.

COMPARATIVE STATEMENT FROM YEAR 1898 TO 1902.

Year.	Receipts.			Payments.			Net Receipts.			Percentage Realised.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1898 ..	385	15	6	100	10	2	285	5	4	4	10	$2\frac{2}{4}$
1899 ..	400	9	6	126	18	2	273	11	4	4	6	$6\frac{1}{4}$
1900 ..	405	19	9	108	18	3	297	1	6	4	13	$11\frac{1}{4}$
1901 ..	399	13	6	†158	13	4	241	0	2	3	16	$2\frac{3}{4}$
1902 ..	*401	17	9	128	10	10	273	6	11	3	14	$6\frac{3}{4}$

Average percentage for 5 years.....£4 4s. $3\frac{3}{4}$d.

* 4 Dwellings available for only part of the year 1902.
† Including cost of outside painting.



HOUSES (HOSTOCK STREET) ERECTED BY BUILDER ON LAND SOLD BY CORPORATION.
SITE FORMERLY OCCUPIED BY INSANITARY PROPERTY.

GILDART'S GARDENS DWELLINGS

(INCLUDING KEARNEY PLACE AND PURCELL PLACE).

Site acquired under the Liverpool Sanitary Amendment Act, 1864, and Dwellings Erected under the "Housing of the Working Classes Act, 1890, Part III."

Opened April, 1897.

These dwellings (which are reserved for persons who have been dispossessed through the demolition of insanitary houses) are of three types, comprised in five blocks, each three stories in height, the total number of tenements being 88, one of which is occupied by a Caretaker.

The sizes of the rooms vary considerably, but generally they are as follows:—

GROUND FLOOR.

Living Room .....12ft. 3in. by 11ft.
Bedroom .....11ft. 3in. by 9ft. 4in.

FIRST AND SECOND FLOORS.

Living Room .....15ft. by 11ft.
Bedroom ..... 9ft. 3in. by 8ft.

The rooms in each tenement have a clear height of 8ft., except those on the second floors, where the height is greater, being carried into the roof.

The estimated value of land (if sold to builders) is 12s. per square yard, and the area being 3,048 square yards, the cost is taken at.....	=	£1,828 16 0
The cost of buildings.....	=	£7,687 15 2
Total cost of land and buildings	=	£9,516 11 2

The rentals are as under, viz.:—

GROUND FLOOR.

1 Three-roomed tenement .....at 4s. 6d. per week.
1 „ „ „ (Caretaker's house) 1s. 0d. „
26 Two „ „ ..... 3s. 6d. „
(Each of above tenements has separate yard, scullery, and w.c.)

FIRST AND SECOND FLOORS.

12 Two-roomed tenements.....at 2s. 9d. per week.
40 „ „ „ ..... 2s. 6d. „
8 „ „ „ ..... 2s. 3d. „

(In each of these tenements a sink and separate w.c. have been provided.)

Total number of rooms, 178.

Total gross rental per week.... £12 7s. 6d.
„ „ „ per annum ..£643 10s. 0d.

The total gross rental (1897-1902) amounted to £3,278 19s. 9d. of which there was actually received the sum of £3,047 13s. 1d. equal to over 92 per cent. The empties for the same period accounted for £63 9s. 3d., while the irrecoverable arrears amounted to £123 4s. 11d., the accumulated arrears from tenants still occupying being £44 12s. 6d.

Average percentage for 5 years....£3 5s. 11¾d.

DRYDEN STREET DWELLINGS.

(INCLUDING RACHEL STREET).

Site acquired under the "Liverpool Sanitary Amendment Act, 1864," and Dwellings erected under the "Housing of the Working Classes Act, 1890, Part III." (Completed April, 1901).

These dwellings (which are reserved for persons dispossessed from houses demolished by the Corporation) are of two types, comprised in seven blocks, and there are 182 dwellings in all, this number including a keeper's house, in addition to which there is provided a Recreation Room for the use of the tenants in common, and an office.

The whole of the tenements are provided with a hot water supply (a new feature in connection with municipal dwellings in Liverpool).

Gas is laid on to each tenement, and supplied, if required, by means of automatic meters.

The sizes of the rooms in the respective tenements are as follows, viz.:—

4-roomed tenements,	Living room .....15ft.	by 10ft. 6in.
	2 Bedrooms each ..12ft.	by 10ft. 9in.
	Another Bedroom.. 9ft. 3in.	by 9ft.
3-roomed tenements,	Living room .....15ft.	by 10ft. 6in.
	One Bedroom ....12ft.	by 10ft. 9in.
	One Bedroom ....12ft.	by 9ft. 6in.
2-roomed tenements (ground floor)	Living room .....15ft.	by 10ft. 9in.
	Bedroom .....11ft. 6in.	by 10ft.
2-roomed tenements (1st & 2nd floors)	Living room .....11ft.	by 11ft.
	Bedroom .....10ft.	by 8ft. 6in.

The rooms on the ground and first floors have a clear height of 8 feet, while in those on the second floor the height is greater, viz., 9 feet 6 inches, owing to being partly in the roof.

The estimated value of Land (if sold to Builders) is 12s. per square yard, and the area being 6,055 square yards, the cost is taken at	£3,644 0 0
Buildings (including hot water supply)	£26,554 7 0
	£30,187 7 0

The rents of the respective tenements are as under, viz.:

GROUND FLOOR.

5 Four-roomed tenements .....at 6s. 0d. per week each.
1 „ „ (caretaker's house) 1d. „ (nominal)
16 Three „ „ ....at 4s. 6d. „ each.
28 Two „ „ .....at 4s. 0d. „ „

FIRST AND SECOND FLOORS.

132 Two-roomed tenements .....at 3s. 0d. per week each.

Total number of rooms, 392.

Total gross rental, per week..... £30 10s. 1d.
„ „ „ „ annum.....£1,586 4s. 4d.

The total gross rental of these dwellings received for the portion of the year 1901, during which the respective tenements were available for letting, and for the whole of 1902, amounted to £2,328 18s. 1d., of which there was actually received a sum of £1,840 0s. 9d., equal to over 77 per cent. The empties for the same period accounted for £302 8s., while the irrecoverable arrears amounted to £100 15s. 3d. the accumulated arrears of tenants still occupying being £85 11s. 6d.

STATEMENT.

Year.	Receipts.	Payments.	Nett Receipts.	Percentage per annum.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1902.	.. 1214 10 6	.. 542 13 0	.. 671 17 6	.. 2 4 6

KEMPSTON STREET DWELLINGS.

(INCLUDING GILDART STREET AND CONSTANCE STREET.)

Erected under the "Housing of the Working Classes Act, 1890, Part III."

Opened February, 1902.

These dwellings, numbering 79 in all, are reserved for the housing of persons dispossessed by the Corporation.

The average sizes of the rooms are as follows, viz.:—Four-roomed tenements, living room, 14ft. by 13ft., one bedroom, 12ft. 8in. by 12ft., another bedroom, 12ft. 10in. by 9ft., and a third bedroom, 13ft. by 8ft. 9in., each bedroom also having a recess about 3ft. 6in. by 2ft. 4in. In the three-roomed tenements, the living room averages 13ft. 10in. by 12ft. 6in., one bedroom 12ft. by 10ft. 4in., and another bedroom, 11ft. 4in. by 9ft., while in the two-roomed tenements, the living rooms are 14ft. 5in. by 12ft. 9in., and bedrooms 12ft. 5in. by 9ft. 2in.

In the tenements on the ground and first floors the rooms have a clear height of 9ft. 2in., while on the second floor, the height is 10ft. 6in.

Gas is laid on and supplied, if required, to each tenement through automatic meter.

The cost is as under, viz.:—

Land (3,810 square yards) ....£122 10s.
(Annual payment to Estate Committee.)
Buildings (Estimated) £17,285

The rents are as under, viz.:—

GROUND FLOOR.

29 Three-roomed tenements ....at 5s. 0d. per week, each.
1 „ „ tenement occupied by caretaker .....at 1d. „

(Each of these tenements has separate scullery, yard, and w.c.)

FIRST AND SECOND FLOORS.

11 Four-roomed tenements .....at 6s. 0d. per week each.
30 Two „ „ ..... 3s. 3d. „ „

(Each of these tenements has separate scullery and w.c.)

8 Two-roomed tenements .....at 3s. 6d. per week each.

Total number of rooms, 210.

Total gross rental, per week .... £16 16s. 7d.
„ „ „ „ annum....£875 2s. 4d.

The total gross rental of these Dwellings received in 1902 for the period during which they were available for letting amounted to £696 5s. 6d., and there was actually collected £454 1s. 9d. Irrecoverable arrears amounted to £11 1s. 6d., while the accumulated arrears of tenants still in occupation amounts to £21 2s.

FONTENOY STREET DWELLINGS.

Erected under "Housing of the Working Classes Act, 1890, Part III."

(Opened February, 1902.)

These dwellings (which are reserved for persons dispossessed by the Corporation) are comprised in one block, four stories high, containing eight four-roomed and eight two-roomed tenements, or 16 in all.

The sizes of the rooms in the four-roomed tenements are as follows, viz.:—Living room, 14ft. by 12ft. 3in., one bedroom 11ft. by 9ft., another bedroom 12ft. 3in. by 7ft. 9in., third bedroom 9ft. by 7ft. 9in., while in the two-roomed tenements the living room measures 12ft. 3in. by 11ft. 6in., and the bedroom 12ft. 3in. by 9ft. 6in.

The height of the rooms is 8ft. 10in. in the clear.

Each living room contains a sink and a food locker, ventilated from the outer air.

A separate w.c. is also provided to each tenement.

Gas is laid on to each tenement and supplied by means of automatic meters.

The cost is as under, viz.:—

Land 560 square yards at 12s. ..... *(Valued for Housing Purposes.)*	£336 0 0
Buildings	£3,081 14 0
	£3,417 14 0

Total gross rental, per week ..... £3 14s. od.
" " " " annum ....£192 8s. od.

The total gross rental of these Dwellings received in 1902, during the period for which the respective tenements were available for letting, amounted to £177 12s. od., and there was actually received £151 3s. 6d. The irrecoverable arrears accounted for £2 16s. 3d., while the accumulated arrears, of tenants still in occupation, amounts to £7 1s.

KEW STREET DWELLINGS.

(INCLUDING NEWSHAM STREET).

Site acquired under "The Liverpool Sanitary Amendment Act, 1864," and Dwellings erected under "The Housing of the Working Classes Act, 1890, Part III." (Opened 1903).

These dwellings (which are reserved for persons dispossessed from insanitary houses, &c.) are comprised in three blocks, each three stories high, containing 114 tenements, inclusive of Caretaker's quarters.

Each tenement of two and three rooms on the ground floor has separate scullery, yard, and w.c., while the four-roomed tenements, situate on the first floor, are provided with separate sculleries, w.c.'s.,

and coal places; the two-roomed tenements on the first and second floors having separate w.c.'s, and all tenements on the first and second floors having the use (in common) of the flats opening from the balconies, as yards.

Gas is laid on to each tenement and supplied, if required, by means of automatic meters.

Food Lockers and accommodation for storage of fuel is also provided in each tenement.

On the ground and first floors the rooms have a clear height of 8 feet, while in those on the second floor the height is greater, viz., 9 feet 6 inches owing to being partly in the roof.

The estimated cost is as under, viz.:—

Land (3,897 square yards at 12s. per yard) ..	£2,338 4 0
Buildings	£20,000 0 0
	£22,338 4 0

The rents of the respective tenements are as follows, viz.:—

GROUND FLOOR.

19	Three-roomed tenements	at 5s.	per week.
1	" " " Caretaker's house..	1d.	" (nominal).
17	Two " "	4s.	"

FIRST FLOOR.

9	Four-roomed tenements	6s. od.	per week.
8	Three-roomed "	4s. 6d.	"
17	Two-roomed "	3s. od.	"

SECOND FLOOR.

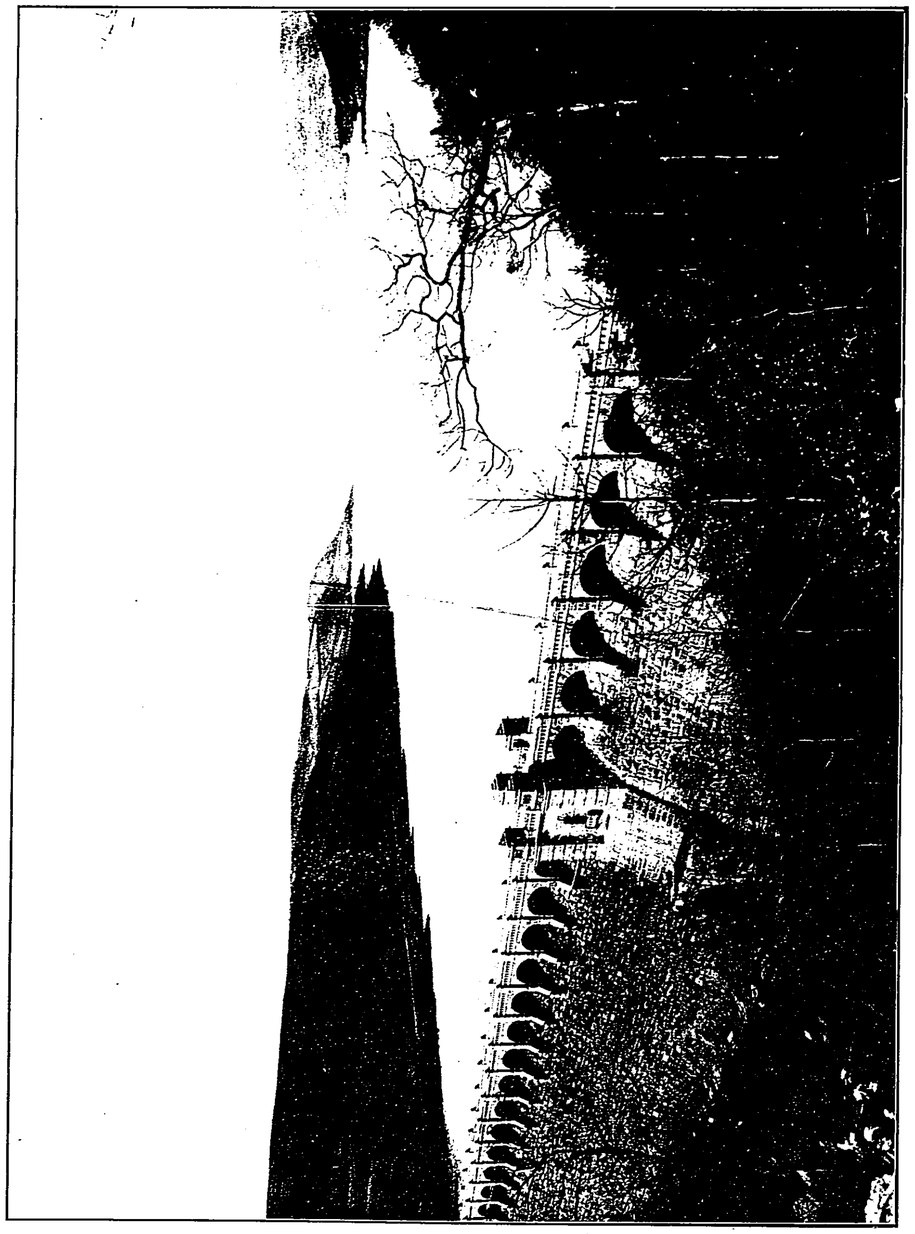
8	Three-roomed tenements	4s. od.	"
35	Two-roomed "	2s. 9d.	"

Total gross rental per week..... £21 12 4
" " " per annum £1,124 1 4

ARTIZANS AND LABOURERS' DWELLINGS.

TABLE SHOWING NUMBER OF ROOMS, &c., AND RENTS CHARGED (INCLUDING SHOPS).

DWELLINGS.	Number of Tenements.	Number of Rooms.	TENEMENTS OF								Shops.		Gross Annual Rental.
			One Room		Two Rooms		Three Rooms		Four Rooms		Number Available	Rents	
			Number Available	Rents per Week.	Number Available	Rents per Week.	Number Available	Rents per Week.	Number Available	Rents per Week.			
Erected—													
St. Martin's Cottages	125	316	—	—	72	2/6 to 3/6	36	3/6 to 4/6	15	4/6 to 5/6	—	—	£1134 19 0
							1 office	and Supts.	house	1/- per	annum		
Victoria Square	270	611	21	1/9	162	3/- to 4/6	86	4/9 to 5/6	—	—	12	£18/20	3031 0 0
				Supts.	house a	nd office,	equal t	o 8 rooms	s, 1/- pe	r annum	per	annum	
Juvenal Dwellings	101	160	45	2/- to 3/9	53	3/6 to 5/3	3	5/6	—	—	1	£28	878 17 0
						1 let with shop					per	annum	
Arley Street	38	93	—	—	21	4/- & 5/-	17	5/- & 5/6	—	—	—	—	469 6 0
Gildart's Gardens	88	178	—	—	86	2/3 to 3/6	1	4/6	—	—	—	—	643 10 0
							1 (Caret	aker) 1/-					
Dryden Street	182	392	—	—	160	3/- & 4/-	16	4/6	5	6/-	—	—	1586 4 4
									1 (Caret	aker) 1d			
Kempston Street	79	210	—	—	38	3/3 & 3/6	29	5/-	11	6/-	—	—	875 2 4
							1 (Caret	aker) 1d					
Fountenoy Street	16	48	—	—	8	3/3 to 3/9	—	—	8	5/- to 6/-	—	—	192 8 0
Kew Street	114	282	—	—	69	2/9 3/-	35	4/- to 5/-	9	6/-	—	—	1124 1 4
							1 (Caret	aker) 1d					
In course of Erection—													
Adlington Street Area	255	617	48	—	62	—	135	—	10	—	—	—	2500 0 0 Approximate
			And Ke	eper's h	ouse								
Gildart's Gardens area	141	348	31	—	22	—	79	—	9	—	—	—	1512 8 0 Approximate
Arley Street	8	20	—	—	4	—	4	—	—	—	—	—	
Upper Stanhope Street	60	144	20	—	8	—	20	—	12	—	—	—	588 0 0 Approximate
Mill Street	55	136	19	—	6	—	15	—	15	—	—	—	555 0 0 Approximate
In contemplation—													
Hornby Street area	451	1218	42	—	90	—	276	—	42	—	7	—	4521 8 0 Approximate
			Includ	ing Ke	eper's h	ouse of	5 rooms.						
Upper Mann Street	108	260	16	—	32	—	60	—	—	—	—	—	956 16 0 Approximate
Clive St. and Shelley St.	90	252	—	—	36	—	36	—	18	—	—	—	985 0 0 Approximate
Eldon Street	12	36	—	—	—	—	12	4/-	—	—	—	—	124 16 0 Approximate
Total	2193	5321	242	—	929	—	863	—	155	—	20	—	£21678 16 0



LAKE VYRNWY.

THE LIVERPOOL WATER WORKS.

A SHORT HISTORY OF THE WORKS.

EARLY SOURCES OF SUPPLY.—At the beginning of the last century the only sources of water supply in Liverpool were shallow wells scooped out of the New Red Sandstone. The principal supply was obtained from a public well or spring known as Fall Well, which was situated near the south end of the land now occupied by St. George's Hall. In the course of time, as the population increased, carts were employed for carrying the water, and tin cans were used for distributing it from the carts. At the end of the eighteenth century there were sixty watercarts in use. Each cart is said to have delivered about ten loads per day, so that the total quantity distributed in one day would be about 100,000 gallons. In the poorer districts there were constant brawls and contentions around the water barrels, and the intermittent, imperfect, and uncertain character of the supply led to much uncleanliness and disease. The carts were described as "dangerous vehicles, perpetually encumbering the streets, and often either stopping the narrow ones up entirely or unexpectedly crossing the way of passengers, as they seldom proceed but in a zigzag direction."

In the year 1786 an Act was passed for, among other objects, "supplying the Town of Liverpool with fresh and wholesome water," and the Corporation were empowered to contract with the owners of any land situate within the town for the liberty of digging for and collecting springs or fountains, and erecting dams, cisterns, reservoirs, engines, buildings, or other devices for the raising of water and conducting the

same into the town. The Common Council, under the powers conferred upon them by this Act, opened a subscription to raise money for the execution of the necessary works. The sum of £95,324 was subscribed, and the works were commenced in 1799 by sinking a well in Berry Street. Another well was sunk in Hotham Street, Copperas Hill.

In 1799 a private Act (39 George III., c. 56) was obtained incorporating a company entitled "The Company of Proprietors of the Liverpool Waterworks" for "better supplying the Town and Port of Liverpool with water from certain streams in the Parish of Bootle."

In 1822 a private Act was passed to incorporate a company, subsequently known as the Liverpool and Harrington Company, to take over the powers contained in the Act of 1786, and to construct works for the supply of the town and port.

Thus two rival Companies came into existence and entered into competition for customers. During the first years of their existence they laid pipes side by side in the same streets, and tried to win customers by the usual devices of rival tradesmen. But they soon discovered that this competition would be ruinous to both, and they agreed to divide the area of supply, so that within the defined limits each Company should have a monopoly and be free to make any charge that the Acts of Parliament would permit.

WORKS OF THE COMPANIES.—The works of the Company of Proprietors were situated in Bootle Village, about three miles from Liverpool, and consisted of three shallow lodges excavated in the sandstone, and eleven bore-holes varying in diameter from 4 inches to 12 inches and in depth from 73 to 600 feet. Four steam engines, having a total of 220 horse power were employed to raise and distribute the water.

The Liverpool and Harrington Company obtained their supply from five wells sunk in the sandstone in and around

the town. The following table gives a list of their wells with the dates of construction and other particulars:—

Year.	Position.	No. of Wells.	Depth in feet.	Bore Holes. Depth. Feet.	Bore Holes. Dia. Inch.	Horse Power of Engine.
1800	Copperas Hill	3	144	—	—	30
1800	Bevington Bush	2	156	—	—	40
1823	Soho	2	156	256	6	30
1828	Toxteth Park	2	156	198	4	30
1841	Windsor	2	210	—	—	50

The following extract from the Health of Towns Commission, 1844, describes the position at that time:—

> "The water which is supplied by the Companies is extremely pure and good; which, indeed, is the case with all the water raised from springs in this vicinity; and no complaint is ever made of its quality. It is carried under the streets in iron pipes, and there are branches into the private cisterns."
>
> "In the poorer neighbourhoods there is usually a cock in each court, and the inhabitants carry it and store it in jugs or wooden vessels from day to day; but, compared with the dense population, the supply is totally inadequate, as the turncocks of the Company cannot allow it to run a sufficient length of time, and many of the inhabitants of the poor (whether from this circumstance, or from inherent habits of filth, I do not venture to say) have never had their boarded floors properly scoured since the houses were erected. Many of the poor beg water, many steal it; and if the Companies were to prosecute all such cases, I apprehend that a magistrate would not find time for much other employment. The complaints as to the scarcity of water in cases of fire, and also as to the present prices of that much needed commodity, are both loud and general, but the Companies, who have a valuable property in the monopoly, and whose shares are at such a high premium, do not see fit to lower their prices; and so long as both Companies have a mutual understanding they may advance the price, or make specific agreements as favourable to themselves as they choose."

SANITARY AND PUBLIC PURPOSES.—The danger to the prosperity of the town from the deficient supply became so serious that the matter was at length taken in hand by the Highway Commissioners, and in 1843 they promoted a Bill to provide for

an independent supply for watering the streets, cleansing the sewers, and for extinguishing fires. By the Bill the Commissioners sought power to erect steam engines to raise water out of the River Mersey, to erect tanks and reservoirs, and to lay mains and pipes in the streets; also to supply any private or public bath, or any inhabitants, with such water.

The Committee of the House of Commons found the preamble proved, but passed the following resolutions:—

> 1st. "That it is the opinion of the Committee that it is essential that an additional supply of water should be afforded to the town of Liverpool, to be applied to the extinguishing of fires and certain other public purposes, and to be kept distinct from the supply for domestic purposes."
>
> 2nd. "That evils are incident to the employment of salt water generally and exclusively to the extinguishing of fires, which it appears to the Committee desirable, if possible, to avoid incurring."
>
> 3rd. "That an additional supply of fresh water, available and sufficient for the prompt and effectual extinction of fires, can be best afforded by laying a new system of mains, and larger in dimensions than those generally used by the Harrington Company, which (new) mains shall be kept continually charged."

Thus, a Bill promoted for the purpose of enabling the Commissioners to supply the town with salt water became, by the action of Parliament, an Act for a new supply of fresh water, and resulted in the sinking of the famous Green Lane Well.

The scheme as ultimately carried out comprised the sinking of a deep well at Green Lane, Old Swan, the construction of a service reservoir at Kensington, and the laying of several miles of special fire and public supply mains.

In the year 1846 all the powers of the Highway Commissioners were transferred to the Town Council.

In the same year the Council, as the result of a long agitation for a better water supply, engaged three engineers to investigate and report upon various schemes that were proposed.

Their attention was especially directed to the water-yielding capabilities of the new red sandstone, and they came to the conclusion that a sufficient supply for the requirements of the town could not be obtained from that source. Mr. Hawksley prepared a scheme, afterwards known as the Rivington Pike scheme, for impounding the upper waters of the Rivers Douglas and Roddlesworth in Lancashire. This was adopted by the Council, and in 1847 the Corporation promoted and obtained an Act of Parliament by which they were empowered to carry out the Rivington Works, and also to purchase by arbitration the undertakings of the two Water Companies.

PURCHASE OF WATER COMPANIES.—Immediately on the passing of the Act the works of the two Companies were transferred to the Corporation at a price fixed by an Arbitrator. The following extract from the report of the Commissioners who conducted the preliminary Parliamentary inquiry with respect to the Bill of 1847 shows the state of things that prevailed under the Companies:—

> "In some cases the water is not supplied for a longer time than for a quarter of an hour to half an hour, and that only on alternate days; that the water is sometimes laid on as late as eleven o'clock at night, and as early as six o'clock in the morning; that the supply is not sufficient for domestic purposes; and that frequent complaints are made as to the uncertainty of water coming in; that in numerous instances the supply is by a standpipe or tap, from which the inhabitants of the courts have to be supplied during the time the water is on; that they are therefore obliged to store what they can thus obtain in jars and casks; that in many cases they have to beg for water, and in others to borrow it; and Dr. Duncan says that in some cases the want of water causes people to use it over again, and he has known water so kept to emit an offensive smell from having been so often used."

OPPOSITION TO RIVINGTON.—Notwithstanding the passing of the Act of 1847 the advocates of sandstone wells continued their strenuous opposition to the Rivington scheme. Public feeling was greatly excited on the subject, and eventually, on the 9th November, 1849, all the questions at issue were referred by the Council to Mr. Robert Stephenson, who, after a long and exhaustive inquiry, reported in March, 1850, in favour of proceeding with the Rivington Works, and adversely to the new red sandstone.

The construction of the Rivington Reservoirs was commenced in 1852, and the water was first delivered into Liverpool in August, 1857.

Between the date of Mr. Stephenson's inquiry and the completion of the Rivington works, considerable additions were made to the local supply by sinking and boring in the red sandstone to meet the growing demands for water.

CONSTANT SERVICE.—The Act of 1847 incorporated the Water Works Clauses Act of the same year and under its provisions the Corporation were required to give a constant supply. They were not, however, in a position to do this until after the introduction of the Rivington Water. The provisions as to constant supply and high pressure were subsequently modified by a clause in the Liverpool Water Works Act, 1862, which enacted that "the water to be supplied by the Corporation under the Waterworks Act and this Act respectively need not be laid on under a pressure or supplied to an elevation greater than can be afforded by gravitation from their works."

CONTINUED USE OF WELL WATER.—When the Rivington Works were projected it was expected that the water to be obtained from that source would entirely supersede the local supply from the Sandstone, and that the cost of pumping from the wells would be saved. When, however, the Rivington water was first brought into Liverpool, its brown colour was so

distasteful to people accustomed to bright well water, that great dissatisfaction was expressed; and after much agitation and discussion the Council decided to continue the use of the principal wells, and to mix the sandstone water with the Rivington water before distribution. The objectionable colour of the Rivington supply disappeared as the reservoirs and filter-beds attained a normal condition of efficiency, but, owing to the very rapid increase in the consumption of water, it soon became necessary to retain the wells to supplement the Rivington supply, the yield of both sources being required to satisfy the demands of the consumers. The supply of well water is continued to the present day; but, with the exception of Windsor, all the wells that formerly belonged to the Companies have been abandoned.

SCARCITY OF WATER.—In 1864 there commenced a period of protracted drought, which affected so seriously the yield of the Rivington watershed that in the month of July, 1865, it became impossible to continue a constant supply. The scarcity of water in the summer and autumn of the year 1865 produced disastrous results. The consumption was restricted in every possible way; trade was impeded, sanitary requirements were neglected, public baths and wash-houses were closed, and the death rate from diseases caused or aggravated by a deficiency of water became abnormally high; The Medical Officer of Health for the Borough, the late Dr. Trench, in evidence before a Committee of the House of Commons, stated that hundreds of lives would have been saved during that season if there had been an increased supply.

For some time before this drought the attention of the Water Committee had been directed to the rapidity with which the demand for water was overtaking their resources; and in June, 1865, the then Water Engineer, Mr. Thomas Duncan, advised the Corporation to make an application to Parliament for power to purchase compensation water at Rivington and to construct additional works.

Accordingly, in the session of 1866, powers were sought and obtained for—

1. The compulsory purchase of compensation water discharged into the River Roddlesworth under the Act of 1847.

2. The construction of a new reservoir at Rivington, in the Yarrow Valley.

3. The construction of two new filter-beds at Rivington.

4. The sinking of two new wells; one at Dudlow Lane and one at Bootle.

By the same Act the Corporation was relieved from the obligation to give a constant supply imposed by section 15 of the Waterworks Clauses Act "during any year in any part of the first six months whereof the water in the Rivington Reservoirs shall be reduced to one-half the quantity they are capable of containing."

In November, 1873, the late Mr. Joseph Jackson, of Bolton, who after Mr. Duncan's death was temporarily appointed engineer of the Rivington Works, was instructed to report as to sources from which an increased supply could be derived. His report was referred to Mr. Bateman and Mr. Hawkesley to report separately upon the schemes dealt with, and in May, 1876, the Water Committee recommended the Council to adopt a scheme for obtaining water from Lake Windermere. The Council postponed the consideration of the Committee's recommendation, and decided in favour of a proposal brought forward by the advocates of the new red sandstone to sink an experimental deep bore-hole at Bootle. The experiment thus sanctioned comprised the boring of a hole 24 inches in diameter and 1,000 feet deep, and the fixing

of a water-tight joint at an impervious division in the rock, to separate the upper from the lower waters, so that the yield of the old well should not be influenced by pumping from the new bore-hole; also to supply engines and place pumps within the bore-hole, at 400 feet from the surface, capable of drawing from it a daily supply of one and a half million gallons.

In order to make the test as complete as possible, the Corporation subsequently allowed the promoters to carry the boring down to a depth of 1,302 feet from the surface. The works were completed in August, 1879, but when the engines were started, the net yield of the bore-hole was found to be only 290,000 gallons per day, instead of the 1,500,000 gallons expected by the promoters. An interesting fact connected with this boring is that after the water had been flowing from it for about ten years, masses of tangled spongy matter were seen issuing continuously from the hole, and a deposit resembling iron rust was noticed on the surrounding rock. The Analytical Chemist to the Corporation (Professor Campbell Brown), reported that he found in the water strings of bacteria, clear and nearly colourless in their earlier forms, but appearing to develop into tangled gelatinous and filamentous masses, enclosing in their meshes particles of sand, and becoming ultimately tinged with iron rust, which they seemed to extract from the water; also spores of bacteria. The bacteria came from a depth exceeding 700 feet below the surface, and they were, probably, harmless; but as they might have proved troublesome, especially in the summer, it was thought desirable to plug the hole. This was done, and all trace of the bacteria disappeared, though an adjoining 6-inch bore hole, exceeding 600 feet in depth, was left open.

Difficulty of supplying Liverpool.—A glance at the map of England will show that, owing to the geographical position of Liverpool and the spread of manufacturing industries in Lancashire, there are peculiar difficulties in the way of

procuring a large supply of unpolluted fresh water. To the north a low flat country borders on the open sea. To the south lies the River Mersey, and over that the well-populated Wirral peninsula. To the west is the broad estuary of the Mersey, and to the east every river of importance in Lancashire and Cheshire is either fully utilized or is seriously polluted by sewage. A supply of pure river water must, therefore, be sought at a considerable distance.

For more than half-a-century the mountain districts of North Wales, which are visible from Liverpool, had attracted attention as being naturally adapted to afford an abundant supply of water, and as offering special facilities for the collection of good water by reason of the heavy rainfall and the sparseness of the population. In the year 1846, Sir Robert Rawlinson recommended Bala Lake as a source of supply, and the recommendation, in a modified form, was repeated by Mr. Duncan in 1866.

THE RIVER VRYNWY.—Towards the end of the year 1876 the attention of the Water Committee was called to the advantages of the River Vyrnwy, in Montgomeryshire, as a source of supply for Liverpool. Mr. Bateman had in 1865 proposed to collect the upper waters of that river as part of a large scheme for the supply of London. Mr. G. F. Deacon (then Borough and Water Engineer) was instructed to report upon the subject, and also as to a proposal to procure a supply from Lake Haweswater. The conclusion at which he arrived was that a reservoir to be constructed on the upper portion of the River Vyrnwy possessed all the more important advantages of Haweswater with some advantages which Haweswater did not possess. Mr. Bateman and Mr. Hawksley, from whom separate reports were obtained, gave opinions favourable to the Vyrnwy scheme, and it was finally adopted by the Water Committee on the 4th June, 1879, and by the City Council on the 29th July, 1879.

An Act of Parliament giving the necessary powers for carrying out the project was passed on the 6th August, 1880. No time was lost in proceeeding with the works.

INTERIM DIFFICULTIES.—When the construction of the Vyrnwy works was commenced, the available water resources of the Corporation were barely sufficient to meet the demands for domestic and trade purposes. As the years passed on and the demands continued to increase, the difficulty of maintaining an adequate supply became greater. In 1884 a period of unprecedented drought began. The yield at Rivington was less than in the drought of 1864-7. The supply to the city had to be reduced first to twelve and then to eight hours per day. Strenuous efforts were made to prevent all waste and undue consumption; hose supplies for gardens were prohibited. New bore-holes were sunk in the Wells at Dudlow Lane and Windsor. A supplementary supply of salt water was introduced for public purposes. Special mains were laid through the central parts of the city to the Public Baths. From these mains salt water was supplied for street sprinkling, sewer-flushing, and for the swimming baths.

The additional supplies thus obtained were not sufficient, even with higher rainfalls, to permit of an uninterrupted constant service being given.

TEMPORARY SUPPLY FROM VYRNWY.—The impounding of water in the Vyrnwy Reservoir was commenced on the 28th November, 1888. The water rose to the overflow level on the 25th November, 1889, and the process of filling, therefore, occupied almost exactly twelve months. In July, 1891, water was first sent through the Vyrnwy Aqueduct to Liverpool, a temporary line of 12-inch steel pipes having been laid across the bed of the Mersey for the purpose, pending the completion of the tunnel. These pipes were abandoned in March, 1892, and a line of 12-inch cast-iron pipes was laid through the partly-finished tunnel.

COMPLETION OF THE VYRNWY WORKS.—On the 14th July, 1892, the completed Works were formally opened by H.R.H. the Duke of Connaught.

NEW WORKS SINCE 1892.—The following is a short description of the principal new works that have been carried out since the year 1892 :—

A line of $4\frac{1}{2}$ miles of cast iron pipes, 3 feet 4 inches internal diameter, for the conveyance of Vyrnwy water from Prescot to Knotty Ash.

A line of $2\frac{3}{4}$ miles of cast iron pipes, 3 feet diameter, from Knotty Ash to the Kensington Reservoirs, in continuation of the above.

A line of 4 miles of cast iron pipes, 2 feet diameter, from Knotty Ash to Breeze Hill, Walton, for the better supply of the northern parts of the district.

A line of $3\frac{3}{4}$ miles of cast iron pipes, varying in diameter from 2 feet to 15 inches, from Old Swan to the Parkhill Reservoir, Toxteth Park, for the better supply of the eastern and southern parts of the city and suburbs.

All of these pipes had bored and turned joints.

A covered service reservoir, holding six million gallons, at the top of Breeze Hill, Walton.

A high level pumping engine at Aubrey Street, capable of lifting 5,000 gallons per minute, or 7,200,000 gallons per day.

New workshops and central store yard, and new establishment for testing and stamping water fittings, at Pall Mall.

Three additional filter beds at Oswestry, on the Vyrnwy Aqueduct, each capable of filtering two million gallons per day.

Two additional filter beds at Chorley, for the better supply of the Borough of Chorley, and the Urban District of Standish.

A line of 30 miles of 21 inches diameter cast iron pipes from the Vyrnwy Aqueduct, in Delamere, Cheshire, to the Urban District of Wallasey, in Cheshire, to supply that District with water.

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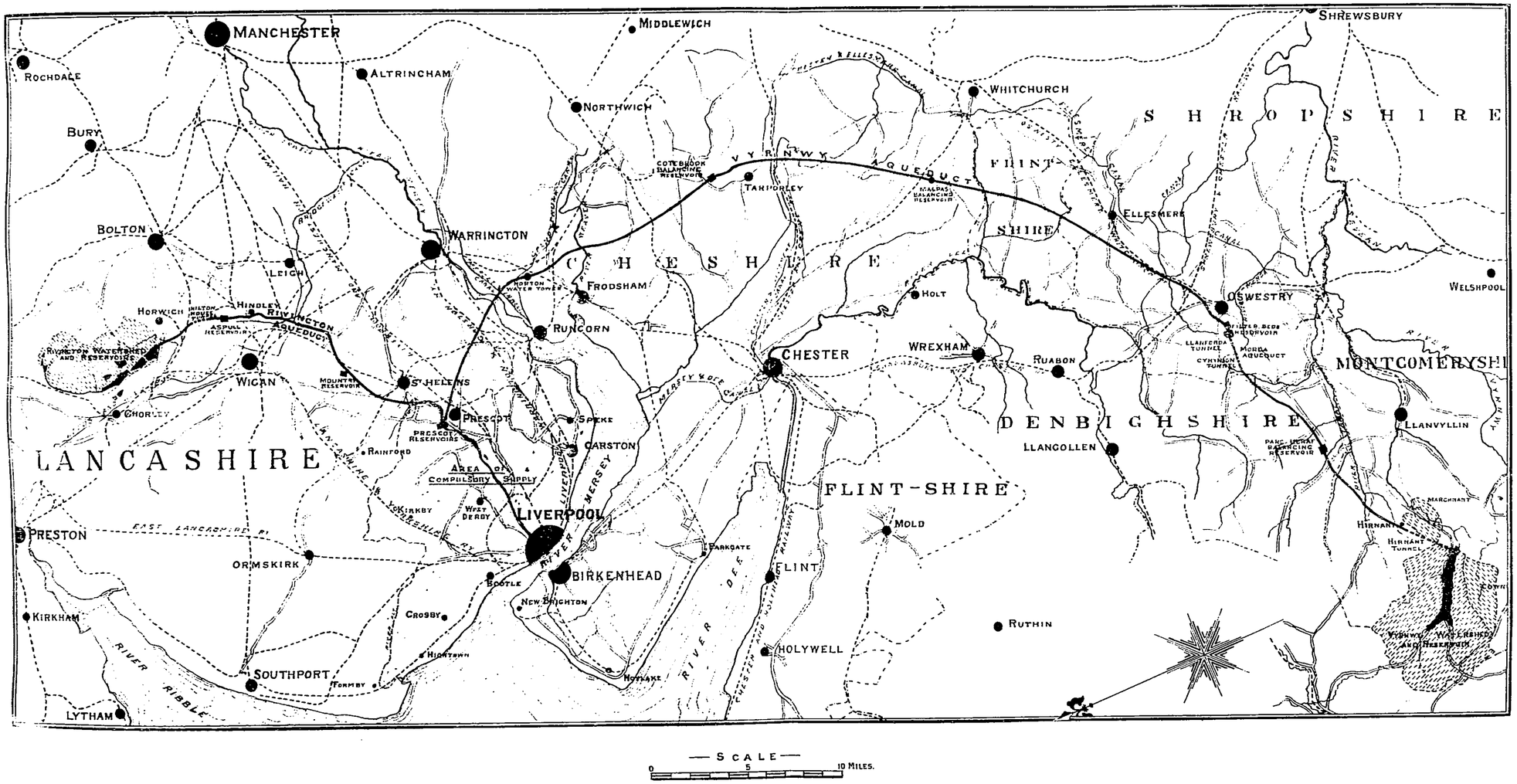
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PLAN OF RIVINGTON AND VYRNWY RESERVOIRS AND AQUEDUCTS.



The following new works are now in course of construction :—

An additional storage reservoir at Prescot, adjoining Knowsley Park, and eight miles from the Liverpool Town Hall. This reservoir covers an area of 34 acres, and will hold when full 100,000,000 gallons. Its object is to increase the volume of water available for use in the event of temporary stoppages for repairs on the Rivington and Vyrnwy Aqueducts.

A tunnel, 7 feet diameter, and works connected therewith (a small dam, an open water course, inlet and outlet works) for conveying the upper waters of the River Cowny, in Montgomeryshire, into Lake Vyrnwy. The total length of the conduit is 1 mile and 391 yards. These works are now approaching completion.

A tunnel, 7 feet diameter, for conveying to Lake Vyrnwy the River Marchnant, another tributary of the River Vyrnwy. This work has only recently been commenced.

SECOND INSTALMENT OF VYRNWY WATER.—For some years it has been apparent to the Water Committee that the time was rapidly approaching when it would be necessary to bring a second instalment of water from Lake Vyrnwy so as to be ready to meet the growing demands of their district. In July and October, 1898, and in January, 1899, the Committee gave instructions for the preparation of plans and estimates for the construction of a second pipe line from Lake Vyrnwy to Prescot. Plans were submitted in September, 1899, and estimates of cost in December, 1898, and again in October, 1899. Action was delayed by the state of the iron market, but the authority of the City Council to proceed with the second line was obtained on the 22nd January, 1902, and a tender for the first section of pipes (Norton to Prescot) was accepted on the 5th March, 1902, and a tender for the laying of these pipes was accepted on the 16th April, 1902. Subsequently the Committee entered into contracts for three more sections of pipe line, viz.:—Cotebrook to Norton (11 miles), Malpas to Cotebrook (11½ miles), and Hirnant to Oswestry (13¼ miles).

All of these are now in hand.

LIMITS OF SUPPLY.

The area of compulsory supply is defined by the Liverpool Waterworks Act, 1847, section 46, as including "the Borough of Liverpool, and the several parishes, townships, or places following :—Bootle, Bootle-cum-Linacre, Litherland, Seaforth, Crosby, Great Crosby, Little Crosby, Sefton, Netherton, Aintree, Orrell, Orrell-with-Ford, Walton, Walton-on-the-Hill, Fazakerley, West Derby, Thingwall, Childwall, Little Woolton, Much Woolton, Wavertree, Allerton, Gateacre, Aigburth, Garston, Toxteth Park, Halewood, Huyton, Roby, and Huyton-with-Roby."

By section 9 of the Liverpool Corporation Waterworks (Deviations) Act, 1852, these limits were extended so as to include the town of Prescot and the neighbourhood thereof, and also "upon such terms and conditions as shall be mutually agreed upon, the towns of Hindley and Ashton-in-Makerfield or the neighbourhood thereof respectively."

The Corporation are also, by the Chorley Waterworks Transfer Act, 1856, the Water Authority for the Parish of Chorley. The purchase of the Chorley Works became necessary in consequence of the Rivington Works interfering with the source of supply acquired by the Chorley Water Company under their Act of 1846.

By section 11 of the Liverpool Waterworks and Improvement Act, 1887, powers were conferred upon the Corporation to—

> "Supply water by agreement in bulk or otherwise, and for domestic or other purposes, to any local or sanitary authorities, company or person, any part of whose district or premises is situate within twenty miles of the Vyrnwy or Rivington Aqueducts, on such terms and conditions in all respects, and for such periods, as the Corporation and such local and sanitary authority, company or person may from time to time agree; provided that nothing in this section shall authorize the Corporation to supply water within or for use within the limits of supply of any sanitary or local

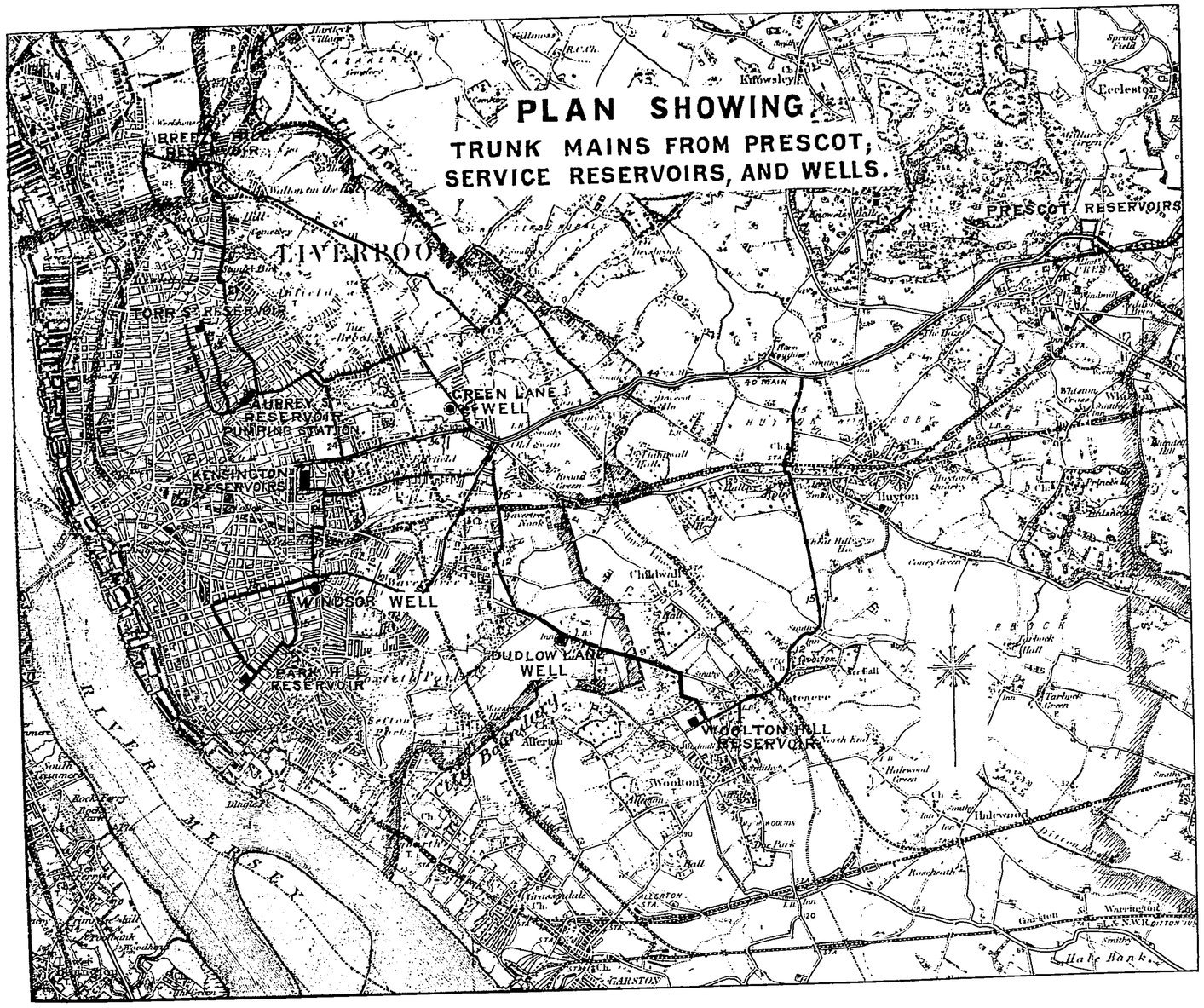
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authority, company or corporation, except with the consent of such authority, company, or corporation, nor shall the Corporation under any such agreement supply water so as to interfere with their giving a proper supply for all purposes to persons within their limits of supply."

"Provided always that any agreement made in pursuance of this section shall reserve to the Corporation the right to determine the same on giving such notice as they think proper, not being longer than five years."

The following clause for the protection of the Corporation of Manchester was inserted in the Act:—

"The Corporation shall not under the powers of this Act directly or indirectly supply water to any local or sanitary authority or person for use or consumption in any part of the district or premises of such authority or person lying to the north or north-east of the red line shown upon the plan, signed by Joseph Parry, Engineer for the Corporation, and George Henry Hill, the Engineer for the Manchester Corporation, and a copy of which plan, signed by the Right Honourable Earl Bathurst, the Chairman of the Committee of the House of Lords to which the Bill for this Act was referred, has been deposited in the office of the Clerk of the Parliaments. But this section shall not apply to a supply of water by the Corporation to the Mayor, Alderman and Burgesses of the Borough of Wigan and their water supply district."

The red line referred to starts from a point about three miles north-east of Southport, and proceeds in an almost straight line to Kenyon Junction, thence it crosses the Chester and Altrincham Railway at a point about a mile north-east of Plumbley, and terminates at the point where the three Counties of Chester, Derby and Stafford meet.

AREAS AND POPULATION.—The area of the city is 23·29 square miles, and the total area of the compulsory limits of supply as defined by the Acts above quoted is 115 square miles. The area supplied in bulk (outside of the compulsory limits) is about 100 square miles, so that, altogether, the Corporation supply water to an area of 215 square miles.

The population within the compulsory limits in and around Liverpool, according to the last census (1901) was 839,601, and is now (1903) about 860,000.

The population of Chorley and of districts supplied in bulk is about 155,000, making the total population supplied from the Liverpool Works over one million.

DESCRIPTION OF THE COMPLETED WORKS.

Wells in the New Red Sandstone.

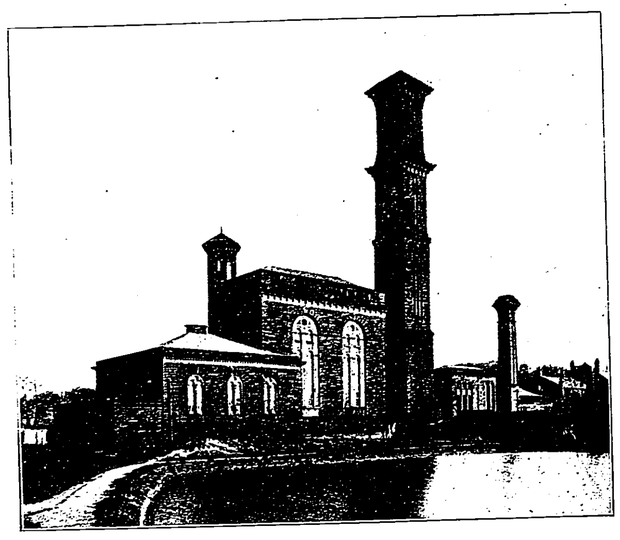
The positions of the public wells now in use are shown on a map included among the illustrations. Geologically, they are all in the pebble beds of the new red sandstone formation.

Windsor.—The Windsor Well, sunk in the year 1846, is situated at the corner of Beaumont Street and Lodge Lane, and consists of two shafts sunk to a depth of 210 feet below the surface of the ground. Headings have been driven from the shafts, having a total cubic capacity of 507,000 feet. In the year 1850 a 4-inch bore-hole was sunk to a depth of 189 feet from the bottom of the well. In 1853 this hole was enlarged to 6 inches diameter and carried down to 210 feet. In 1856 it was further extended to a depth of 244 feet. No further extension took place until the year 1888, when, the yield having fallen off to 814,000 gallons per day, a new bore-hole, 6 inches diameter, was sunk to a depth of 380 feet from the bottom of the well. This boring increased the yield of the well to 1,260,000 gallons per day. The engine is of the Cornish type, and the condensing water is utilized at the adjoining Lodge Lane Swimming Baths.

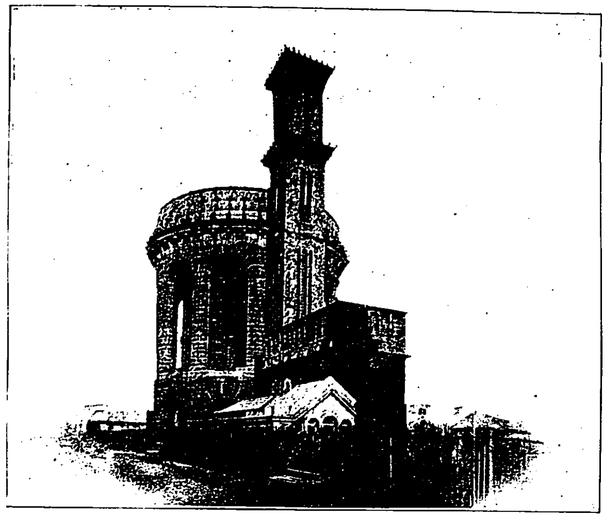
Green Lane Well.—At this station there are four shafts. The total depth of the well below the surface is 185 feet, and headings have been driven which hold about 72,500 cubic feet. There are two bore-holes. The first boring was made in 1852; deepened in 1853; and further deepened and enlarged in 1856. The total depth of the hole is 199 feet



THE OLDE FALL WELL.
Photo. by Brown, Barnes & Bell (Headman's Pictorial Relics).

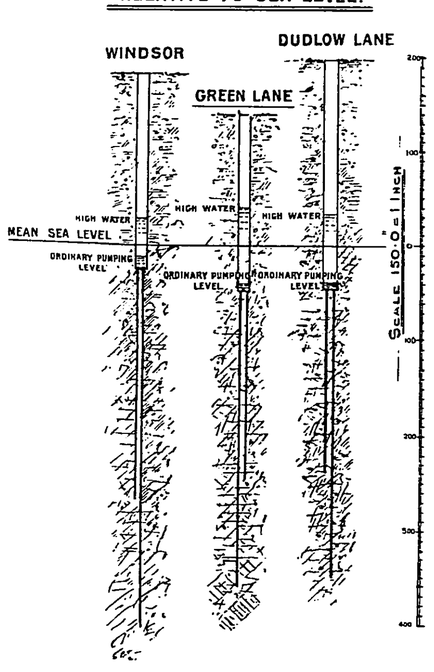


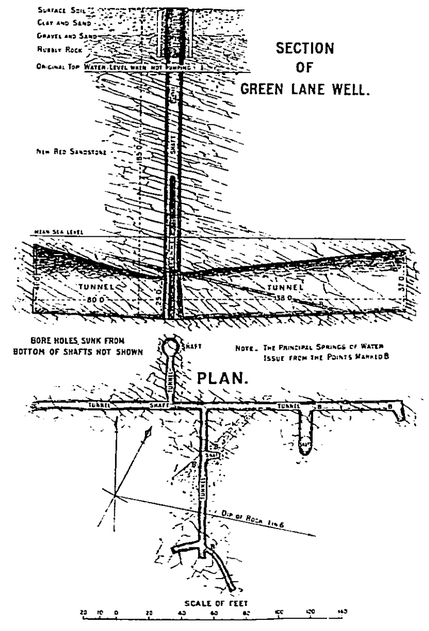
DUDLOW LANE PUMPING STATION.



HIGH LEVEL PUMPING STATION, AUBREY STREET.

DIAGRAM OF WELLS RELATIVE TO SEA LEVEL.





7 inches from the bottom of the well, and the diameter is 9 inches, diminishing to 7 inches near the bottom. These successive borings increased the yield of the well from 1,203,324 gallons per day to 3,374,453 gallons per day. The second bore-hole, sunk in 1869, is 18 inches diameter, and has been carried down to a depth of 310 feet below the bottom of the well. The immediate yield of this last boring was 816,000 gallons per day. Full particulars of the gradual falling off in the yield of this and other wells have been given in various printed reports, and a very complete abstract is to be found in the proceedings before the House of Commons Committee on the Water Bill of 1880. The present yield of the well and bore-holes is 2,750,000 gallons per day.

ENGINES AT GREEN LANE.

Name of Engine.	Description of Engine.	Date of erection	Cylinder.		Pump.		Water raised per stroke.	Maximum lift.
			Diameter	Maximum stroke.	Diameter	Maximum stroke.		
			Ins.	Ft. in.	Ins.	Ft. in.	Gallons	Feet.
John Holmes	Cornish	1846	50	8 $11\frac{3}{8}$	17	8 $11\frac{3}{8}$	83·5	293
George Holt	,,	1852	52	9 0	19	9 0	104·3	293
Joseph Cooper	Double action crank condensing	1855*	34	6 1	17	4 0	39	310

* Originally erected at Bootle in 1837, and transferred to Green Lane in 1855. The engine has therefore been working for sixty-six years.

All three engines are fitted with jet condensers, and some of the condensing water is used in a public swimming bath.

DUDLOW LANE WELL.—This well adjoins the Woolton Road in Wavertree. There are two shafts, carried down to a depth of 247 feet 3 inches below the surface of the ground, and from these shafts headings have been driven, having a total area of 141,500 cubic feet. The original bore-hole, completed in 1870, is 18 inches diameter and 196 feet deep. In the year 1888 a second bore-hole, 6 inches diameter and 300 feet in

depth, was sunk. This bore-hole passed through the pebble beds and penetrated the lower soft sandstone. The original yield of the well and bore-hole was 1,435,000 gallons per day. In 1888 it had fallen off to 1,208,631 gallons per day. By the sinking of the 6-inch bore-hole the yield was increased to 1,443,125 gallons per day. This has since fallen off to 1,207,000 gallons per day,

The engine is of the Cornish type, and the quantity of water raised per stroke is 125 gallons. The maximum height to which water is lifted is 363 feet, the mean working load being about 350 feet. There are four Cornish boilers, each 22 feet by 6 feet 6 inches diameter. The engine is fitted with a jet condenser, and the condensed water flows into cooling ponds, having a total area of 17,060 square feet.

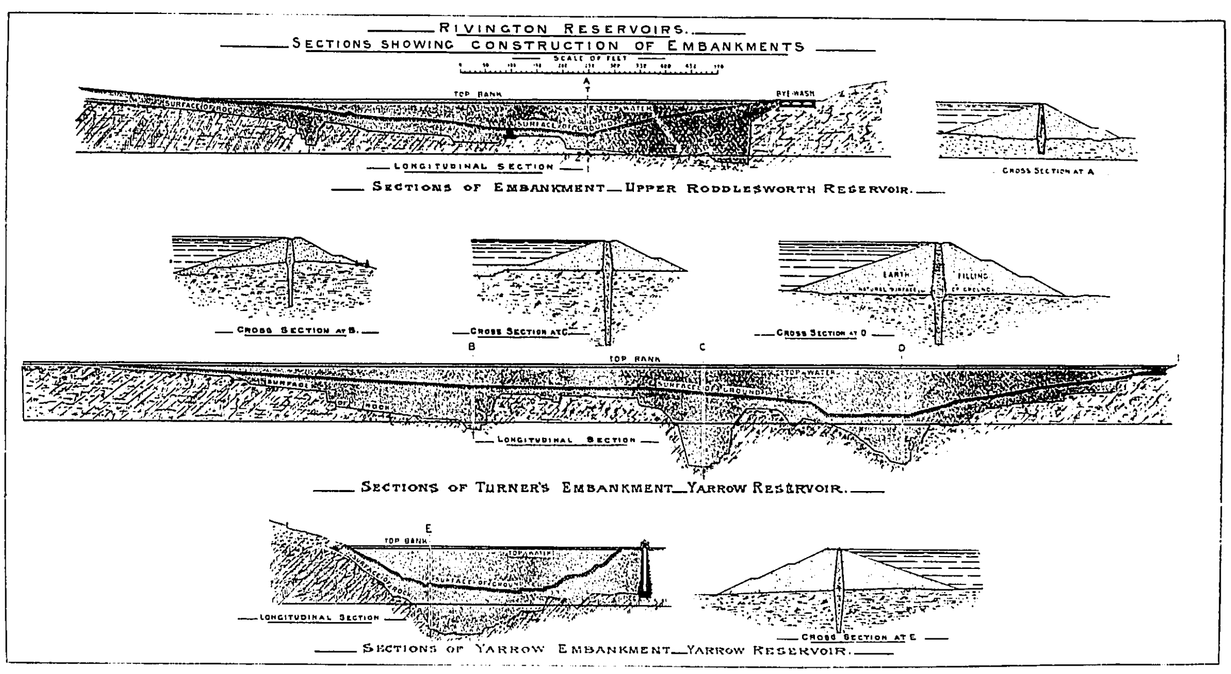
THE RIVINGTON WORKS.

WATERSHED AND RESERVOIRS.—The gathering ground at Rivington comprises 9,873 acres of thinly inhabited hill and moorland on the Millstone Grit Formation, lying between Bolton and Blackburn. The elevation ranges from 450 feet O.D. to 1,500 feet O.D. The principal streams are the Roddlesworth, Rake, Yarrow, and Douglas, and the rainfall is collected into reservoirs formed by earth embankments carried across the natural valleys. The area and contents of each reservoir and the principal dimensions of the embankments are given in the subjoined table :—

Name of Reservoirs	Area in Acres.	Contents in Million Gallons.	Embankments. Length. Feet.	Greatest Depth in Feet.	Width of the Bye Washes. Feet.
Roddlesworth Upper	26·0	178	1,190	69	69
" Lower	16·4	99·7	590	81	98
Rake	13·8	79·9	1,500	84	105
Anglezark	191·6	1,019	3,550	46	20
Chorley	10·1	48·3	990	39	222
Rivington, Upper & Lower	275·0	1,841	6,280	61	100
Yarrow	65·0	839·2	2,894	103	—
Filter Beds	5·82	—	—	—	—



RIVINGTON WATER WORKS.
VIEW FROM S.E. SIDE OF ANGLEZARK RESERVOIR, LOOKING SOUTH.



There are thus eight reservoirs, and they contain, when full, 4,105,000,000 gallons. Their total surface area at the overflow level is 598 acres, and their total length, measured along the top water lines, is 5½ miles. The total length of the embankments is over 3 miles. The highest embankment is that of the Yarrow (Leicester Vale) Reservoir, which is 103 feet above the bottom of the valley. The deepest puddle trench is also at the Yarrow Reservoir (Turner's bank). Here the trench had to be carried down to a depth of 167 feet below the natural surface before a solid foundation could be obtained; the total height from the bottom of the foundation to the top of the dam being 257 feet.

FILTER BEDS.—All the water for the supply of Liverpool is filtered through sand filters. The original works consisted of six beds, having a total surface area of 182,982 square feet, and two open filtered water tanks, holding 8,384,000 gallons.

In 1875 two beds were added, having an area of 71,302 square feet, making the total filtering area of the eight beds 254,284 square feet. The filtering material consists of 2 feet 6 inches of sand laid on the top of layers of gravel, varying in size from 4 inches diameter to ⅛ inch diameter.

The average rate of filtration is 2,250,000 gallons per day per acre of sand surface, or 8¼ cubic feet per square foot per day.

RIVINGTON AQUEDUCT WORKS.

HORWICH TO PRESCOT.—The overflow level of the tanks from which water is drawn off to the Rivington Aqueduct is 378.85 O.D.

The aqueduct is divided into four sections. The first division, 3⅛ miles in length, commences at the filtered water tanks and terminates in a balancing reservoir at Aspull Moor. For the first 1⅞ miles the water is conveyed in cast-iron pipes

44 inches internal diameter. The pipes then reach a hill over which the water could not flow by gravitation, and consequently a tunnel has been driven.

This tunnel is 1,476 yards in length. It is lined with brickwork, and for 1,190 yards is oval in section, the invert being circular to a radius of 5 feet, and the total height 6 feet 6 inches. For 286 yards, where the depth of cover is small, the section is circular, 5 feet in diameter. They are eight brick-lined shafts on the line of tunnel,, and the maximum depth to the invert from the top of the shafts is 55 feet. From the end of the tunnel the water is again conveyed by 44 inch pipes to the Aspull Reservoir.

The second section of the aqueduct is from the Aspull Moor Reservoir to a balancing reservoir, near Garswood. The length of this division is nearly eight miles, and consists entirely of pipes.

The third section, a length of 6¼ miles, is from Montrey House Reservoir to Prescot Reservoir. It also consists entirely of pipes, and passes through the borough of St. Helens.

PRESCOT TO KENSINGTON.—From Prescot the water is conveyed to the Kensington Service Reservoirs, in the city, by two lines of pipes, one line of 44 inch pipes forming part of the original works, and a duplicate line 36 inches diameter, laid in the year 1864.

MECHANICAL APPLIANCES ON THE PIPE LINE.—At the outlets of the two balancing reservoirs and of the Prescot Reservoir there are self-acting valves, each so contrived that in the event of a serious leakage on the pipe line the movement of a suspended disc releases a trigger, and causes the valve to close. There are also throttle-valves on the same automatic principle at the entrance to the Hilton House tunnel, and at three points between Aspull and Montrey. Screw stopcocks operated by hand are provided at the inlet and outlet sides of the reservoirs, and at convenient distances along the aqueduct.

AQUEDUCT RESERVOIRS.—In the following table particulars are given of the Reservoirs on the Rivington Pipe Line :—

Name of Reservoir.	Depth in Feet.		Contents when full. Gallons.
Aspull Moor.....	14	....	7,708,000
Montrey House	12	....	8,144,000
Prescot No. 1	16	....	38,945,000
Do. No. 2.....	16	....	40,254,000
Do. Strainers and Clear Water Tank	....	....	8,397,000

VYRNWY WORKS.

YIELD.—The Vyrnwy scheme has been designed to supply Liverpool with 40 million gallons per day, and the Lake and tunnels have been constructed for that quantity. The water is to be conveyed to Liverpool in three instalments of 13⅓ million gallons each, and pipes for the second instalment are now being laid.

GATHERING GROUND.—The total area from which the Corporation can impound water under the powers contained in the Act of 1880 is 22,742 acres. This includes two streams, the Cowny and the Marchnant, tributaries of the River Vyrnwy, that have not yet been utilised. The Cowny has a drainage area of 3,092 acres above the point of diversion, and the Marchnant a drainage area of 1,650 acres. The drainage area of the River Vyrnwy, above the dam, is 18,000 acres.

To convey the waters of the Cowny into Lake Vyrnwy, a tunnel 7 feet in diameter and 2,151 yards in length, has been driven. There is also a length of 107 yards of open watercourse at the inlet end, making the total length of the conduit 2,275 yards, or approximately one mile and a quarter. A tunnel of the same diameter and 2,442 yards long is now being driven to bring the waters of the River Marchnant into the Lake.

RESERVOIR.—As a site for a reservoir, the Vyrnwy Valley at Llanwddyn possessed exceptional advantages. There is little doubt that in ancient times a lake formed by glacial action

existed on the same spot. The striated surfaces, which were exposed when the alluvium was removed for the foundations of the modern dam, bore distinct marks of the ice movements, and traces of the same action are visible in other parts of the valley. On this same bar of rock the new masonry wall has been built. The plan shows the comparative narrowness of the outlet that had to be closed in order to form a sheet of water nearly five miles in length and half a mile in width.

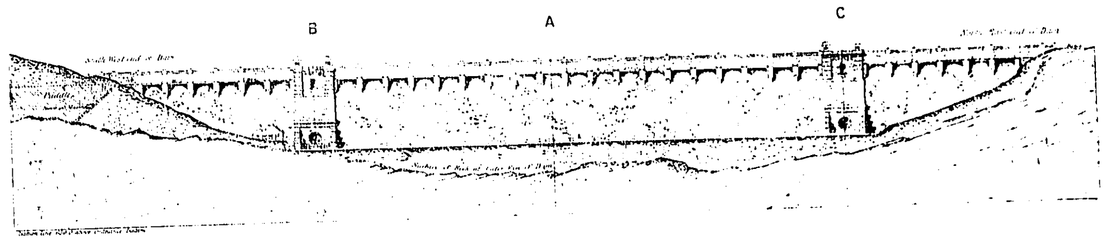
The trench opened for the foundation of the wall was, at the widest part, 130 feet across, and the maximum depth of the excavation, measured from the bottom of the valley, was 60 feet. The excavations were carried down through the alluvial deposits and glacial drift to solid water-tight rock, the Caradoc beds of the Lower Silurian Formation.

Dimensions of the masonry dam—

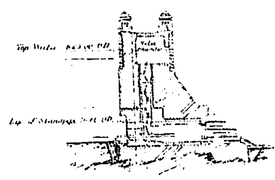
	Feet.
Length of the dam across valley from rock-face to rock-face	1,172
Height from old river-bed to overflow	84
Greatest thickness at base	127
Maximum depth of foundation below natural surface	60
Greatest height of wall from bottom of foundation to overflow	144
Greatest height from bottom of foundation to coping of parapet-wall	161
Number of cubic yards of masonry in wall	260,000
Width of roadway over wall	19 feet 10 inches
Total weight of masonry in wall	510,000 tons
Amount of excavation for foundations	220,890 cubic yards

Dimensions of Lake—

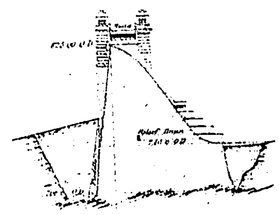
Area	1,121 acres
Length	4¾ miles
Available contents	12,131,000,000 gallons



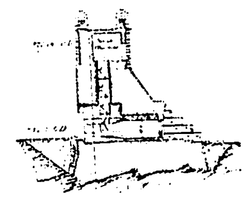
FRONT ELEVATION OF DAM.



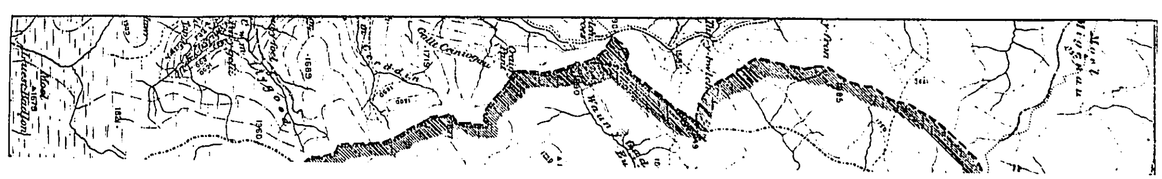
SECTION AT B



SECTION AT A.



SECTION AT C.

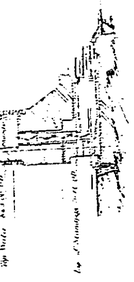




SECTION AT C.



SECTION AT A.

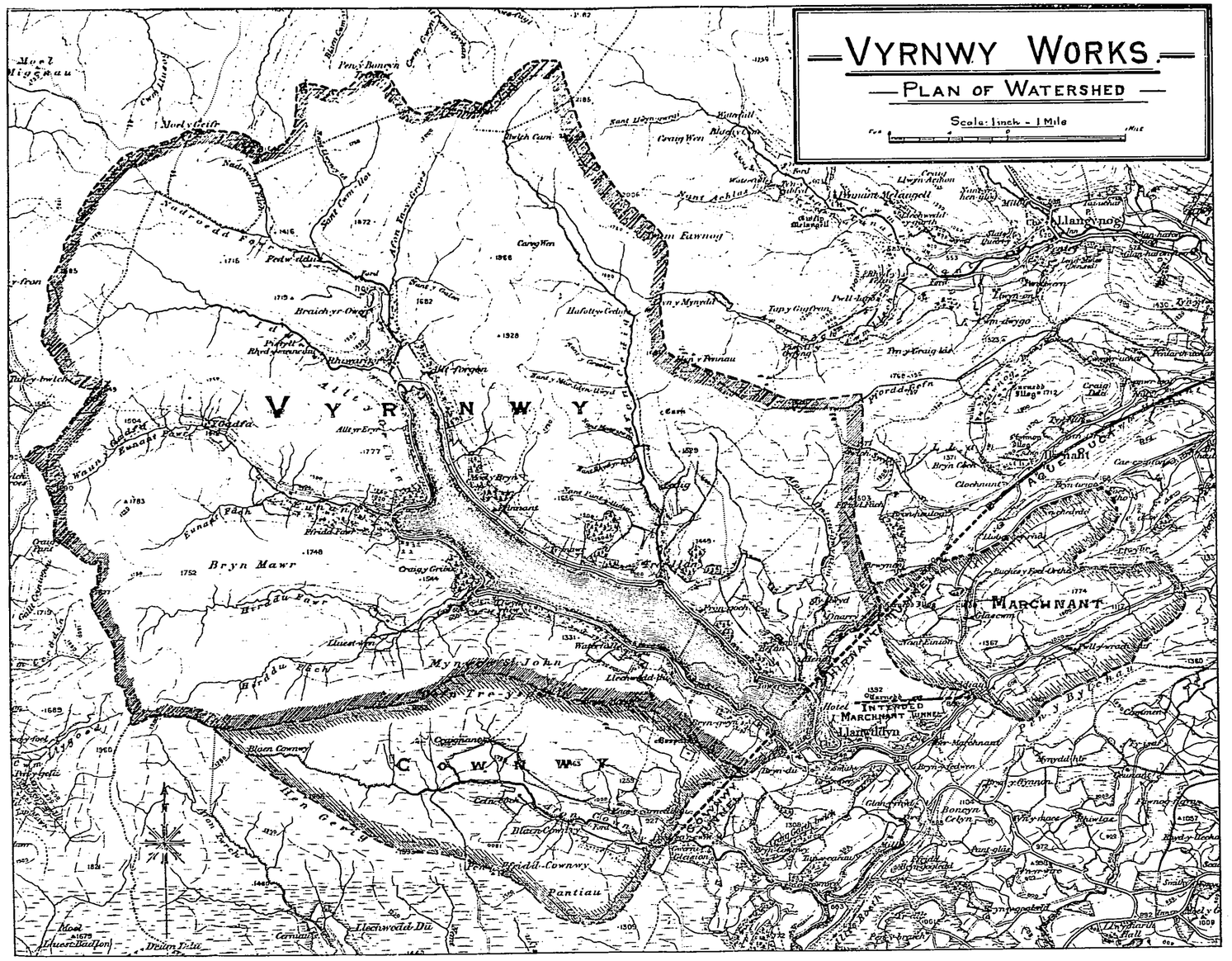


SECTION AT B

VYRNWY WORKS.

PLAN OF WATERSHED

Scale: 1 inch = 1 Mile


VYRNWY
COWNWY
Bryn Mawr
Pantiau
MARCHNANT
Llanwddyn
Llanwddyn Station
Hotel
INTENDED
MARCHNANT
Llanwddyn
Mynydd St. John
Llechwedd Du
Mynydd Tre-Jorwerth
Pen y Bannau
Pen y Bryniau Cownwy
Afon Eunant
Afon Hirnant
Afon Cownwy
Afon Twrch
Afon Eiddew Fach
Afon Eiddew Fawr
Afon Tarenig
Nant Achlas
Nant Llwyn-yr-hwch
Nant Ffynnon Wen
Nant Cwm-llwyd
Nant Cwm-dwygo
Nant Cwm-dwr
Nant Cwm-Ceiswyn
Nant Cwm-Ceiswyn Bach
Nant Cwm-Ceiswyn Fawr
Nant Cwm-Ceiswyn Isaf
Nant Cwm-Ceiswyn Uchaf
Nant Cwm-Ceiswyn Canol

The stone used for building was similar in character to the rock foundation, and was obtained from a quarry distant about a mile and a quarter. The progress of building operations was necessarily slow, because of the mass of materials to be prepared, transported, and manipulated, and long interruptions through frost and storm. With the exception of the stone and sand, all material used—such as cement, bricks, timber, iron, machinery, plant, coal —had to be carted over ten miles of hilly roads from the nearest Cambrian Railway station.

The erection of a masonry wall instead of an earth embankment, permitted of an important departure in the method of dealing with overflows and flood-waters and instead of a separate by-wash built at the side of the valley, the wall itself has been utilised as an overflow. The length of the sill at the ordinary overflow level is 456 feet, and there is a further length of 288 feet at a higher level, making a total available overflow of 744 feet.

On the top of the dam a roadway, 21 feet wide, connects the two sides of the valley, and is carried on thirty-one elliptical arches, each having a span of 24 feet.

To deliver water from the lake to the river below the dam, two discharge culverts pass through the wall, and during the building were used as temporary passages for the river.

Compensation Water.—When the Corporation applied to Parliament for powers to carry out the Vyrnwy scheme, there was the usual opposition by persons interested in the rivers. Some of these opponents were satisfied with money compensation, but the principal consideration imposed was that the Corporation "shall for ever cause to flow and be discharged from the Vyrnwy Reservoir into the River Vyrnwy not less than ten million gallons of water per day of twenty-four hours in a regular, equal, constant and continuous supply, and shall also, in the eight months between the last day of February and the first day of

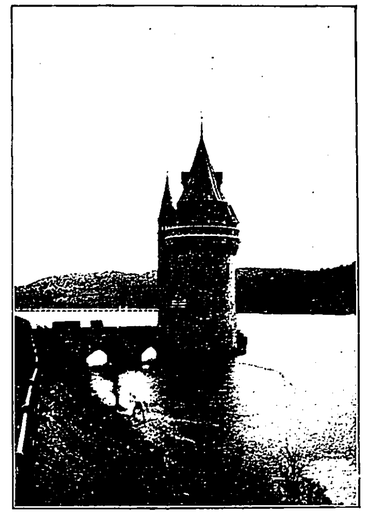
November of every year, discharge for flushing purposes . . . . not exceeding in the whole, in any year, 1,280,000,000 gallons" —at the rate of forty million gallons per day for thirty-two days. The aggregate volume of compensation water is, therefore, equal to an average flow throughout the year of 13,500,000 gallons per day. This is equal to more than five times the dry-weather flow of the rivers.

The daily compensation water is measured through a rectangular orifice 3.12 feet in length by 1 foot in depth. The head of water required over the centre of the orifice, to discharge the stipulated quantity, is 1.492 feet.

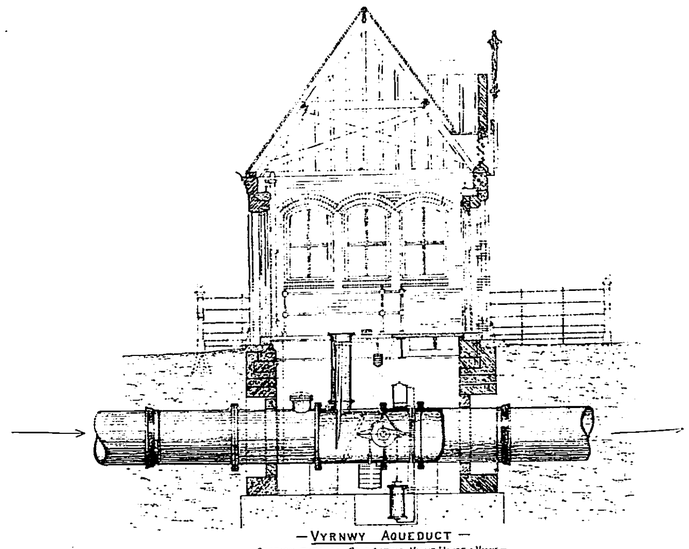
The monthly compensation water is measured through four similar orifices built into masonry at the end of the south discharge culvert.

ROADS AROUND THE LAKE.—The principal road in the valley, before the advent of the Liverpool Corporation, was a narrow highway connecting the counties of Merioneth and Montgomery. It ran through the sequestered village of Llanwddyn, a scattered group of forty old-world cottages, a sixteenth-century church, three Nonconformist chapels, and a National school. The entire village and several miles of the road were submerged; and in order to maintain through communication the Corporation constructed 12 miles of new roads around the lake.

THE VYRNWY TOWER.—The Tower is the gateway to the Aqueduct. It has been built in deep water nearly three-quarters of a mile from the foot of the lake, and is connected with the public road on the north-east side by a causeway carried on four arches. The water is drawn out of the lake into the tower through two columns of 36-inch diameter steel tubes, divided into lengths of nine feet, faced with gun metal, and so arranged and guided that water may be drawn off between any two of the 9-feet lengths. At the bottom of the tower there are three openings connected with the Aqueduct and controlled by



VYRNWY TOWER.
ARCHES OF DAM IN THE DISTANCE.



—VYRNWY AQUEDUCT—
—SECTION THROUGH SELF ACTING VALVE HOUSE & VALVE—

throttle-valves. Over these openings are placed cylindrical screens or strainers of fine copper wire gauze, each 9 feet 3 inches in diameter by 25 feet in height, and therefore presenting a total surface area of nearly 2,000 square feet. When the accumulation of suspended matters on the surface of one of the strainers impedes the flow of water to such an extent as to call for cleaning, the disc-valve at the bottom is closed, the strainer lifted by hydraulic power into a chamber above the top water-line, and washed by revolving jets which, in a couple of minutes, thoroughly remove all impurities.

From the tower the first part of the Aqueduct consists of 730 yards of concrete culvert, circular in section, four feet diameter, built in the valley-bottom. The culvert terminates in a shaft at the entrance to the Hirnant Tunnel 30 chains from the dam. The lowest level at which water can be drawn off for Liverpool at the tower is 52 feet below the overflow level of the lake, but a low-level culvert permits of water being drawn off to a depth of 56 feet.

AQUEDUCT TO LIVERPOOL.—The total length of the Aqueduct from the Hirnant Shaft to Prescot is 68 miles, and it consists of—

Tunnels to convey 40 million gallons per day	$4\frac{1}{8}$ Miles.
Pipes for first instalment of $13\frac{1}{3}$ million gallons per day	$63\frac{3}{4}$ Miles.

Easements have been acquired of sufficient width for the three lines of pipes.

CAST-IRON PIPES.—The cast-iron pipes are each 12 feet in length, jointed with lead and yarn. The diameters have been slightly varied to suit the levels of the balancing reservoirs.

At distances of about $2\frac{1}{2}$ miles apart stop-cocks have been provided. Similar valves have been placed at the inlets and outlets of the balancing reservoirs. There are also eleven valves which close automatically whenever the velocity is

temporarily increased by a big leakage. Automatic valves on the same principle have been fixed at the outlets of the Parc Uchaf and Cotebrook Reservoirs, and in the Oswestry Valve-chamber.

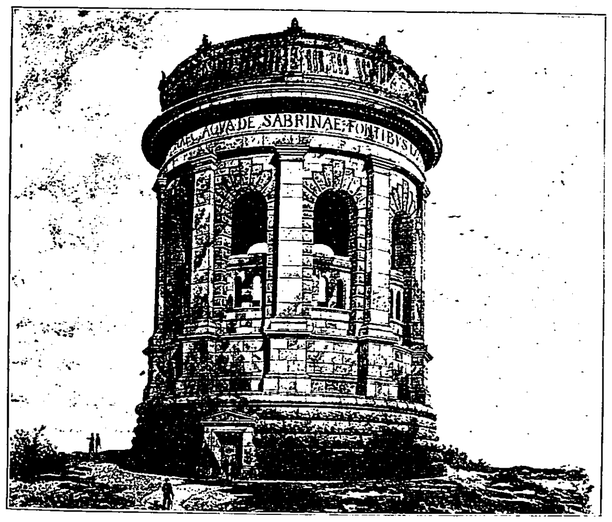
The Aqueduct is divided into six sections by balancing reservoirs or tanks.

The first section commences at the Hirnant Inlet Shaft by a tunnel $2\frac{1}{2}$ miles long and 7 feet in diameter. This is for the most part in slate rock, and about one-sixth of it is lined with brickwork, the remaining five-sixths being unlined. At the outlet end of the tunnel is a small masonry well, where the pipe-line begins. From the Hirnant Tunnel to the Parc Uchaf Balancing Reservoir, a distance of $7\frac{1}{4}$ miles, the pipes vary in internal diameter from 42 inches to 42.6 inches, and in thickness from 1 inch to 1.6 inches, the external diameters being kept uniform.

The second section is from Parc Uchaf to the Oswestry (Llanforda) Reservoir, and consists of $7\frac{1}{4}$ miles of cast-iron pipes and $1\frac{3}{4}$ miles of tunnel. The pipes terminate at the Cynynion and Morda Hills, through which tunnels have been driven, each of 7 feet diameter. In constructing these tunnels it was not thought necessary to line more than 1,236 lineal yards out of a total of 3,088, the remaining 1,852 yards being apparently in sound, hard rock, but after water had been passing through for some years, a leakage from one of the tunnels led to the discovery of a considerable quantity of mud and fallen rock lying on the inverts of the unlined parts. The mud was found to have been mainly produced by the action of the water dissolving the lime in the slaty rock and destroying its coherence. Professor Campbell Brown, who analysed samples of the rock and mud, was of opinion that, while the solution of carbonate of lime in the porous slaty rock was the chief cause of disintegration, it was not the only cause. He found that the rock contained fine particles of iron pyrites, which were oxidised by exposure to air and water. Sulphate was formed, partly disintegrating the



FILTER BEDS. RIVINGTON.



NORTON TOWER. VYRNWY AQUEDUCT.

rock, which was ultimately washed away by water. Under these circumstances it was clearly desirable to line the tunnels throughout, and to do so without loss of time, as every year's delay would increase the difficulty of shutting off the supply for work in the tunnels. The lining was accordingly commenced in June, 1893, and completed in March, 1895.

FILTER BEDS.—At the end of the Llanforda Tunnel advantage has been taken of a natural basin to construct a reservoir which holds forty-six million gallons, and from this reservoir the water is drawn off to the filter beds. There is also a bye-pass around the reservoir, through which the filter beds can be supplied direct from the tunnel.

After filtration the water passes into a tank holding $2\frac{3}{4}$ million gallons, and thence into a valve chamber, where it is measured through a disc gauge and drawn off for Liverpool.

At the Oswestry valve chamber the third section of pipe line commences, terminating at Malpas, a distance of 17.68 miles. The fourth section is from Malpas to Cotebrook (11.58 miles), and the fifth from Cotebrook to an elevated tank at Norton (11 miles). There is no suitable land in the neighbourhood at the elevation required for a reservoir at the natural surface, and consequently a masonry tower has been built, on the top of which the tank has been placed.

From Norton the pipes are continued to their terminus at Prescot, a distance of $9\frac{1}{4}$ miles.

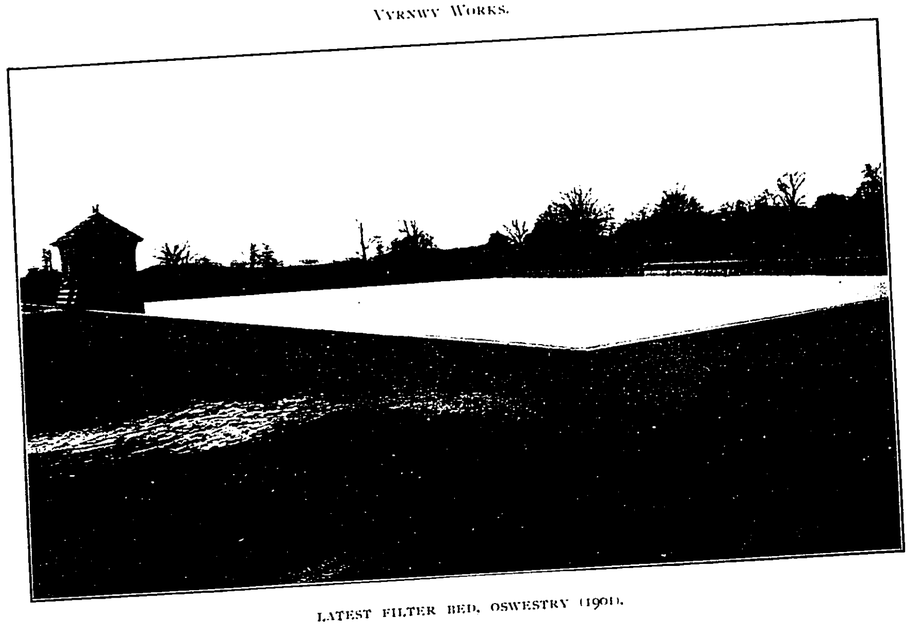
In laying out the Vyrnwy scheme, the method of crossing the Mersey was necessarily an important factor. The position shown on the Parliamentary Plans was chosen because of the facility with which pipes could be placed in the bed of the river; the intention being that a trench to contain the pipes should be formed by dredging or by hydraulic jets in the sand—a comparatively easy and inexpensive method of crossing such a waterway. This plan was opposed by persons interested in the navigation above Runcorn, and chiefly by the town of Warrington. Influenced by this opposition the House of

Commons' Committee inserted a clause empowering the Board of Trade to determine at what depth the Aqueduct should be laid. In due course an inquiry was held, and the depth fixed at such a level in relation to the river-bed as to make the construction of a tunnel inevitable. The tunnel is 267 yards in length and is 9 feet in diameter between the flanges of the cast-iron segments of which it is formed. Through the tunnel steel pipes of 32 inches internal diameter have been laid.

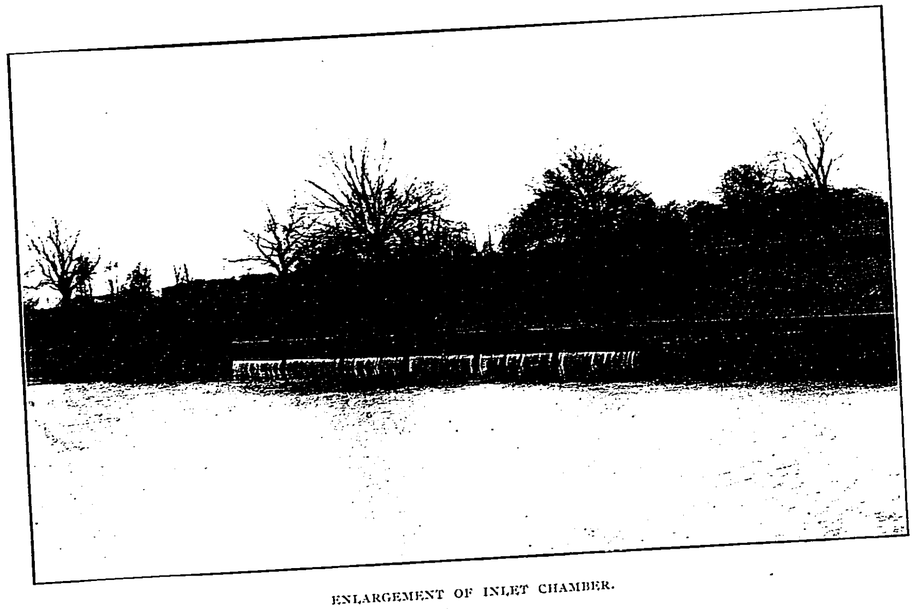
At the point where the Aqueduct crosses the Mersey, the Manchester Ship Canal runs parallel to the river at a distance of a few yards from its left bank. A brickwork tunnel 12 feet in diameter has been built under the Canal to enclose the pipes. The pipes are steel, 36 inches diameter.

Obstructions in the Pipes.—In the section of pipe line between Vyrnwy and Oswestry difficulties have been experienced from the existence of growths or deposits, which for a time seriously impeded the flow of water. These obstructions have been the subject of long investigation, and are fully described in the Annual Report for 1901. It will be sufficient here to quote the final conclusions of Professors Campbell Brown and Boyce, who made the chemical and bacteriological examinations. Professor Boyce reported :—

> "Very numerous examinations have been made by me of the black deposit which coats the pipes from Vyrnwy to Oswestry. Microscopical examination shows that it is composed of amorphous matter of a spongy, gelatinous nature, and of a deep golden brown colour. In this material numerous silicious and other particles are embedded as well as delicate hyphae resembling those of Cladothrix. In many instances it is clear that the hyphae are surrounded with a gelatinous envelope which becomes pigmented by the iron and manganese salts present. But the deposit in the pipes, as far as my observations go, is a genuine deposit and not a growth of a special organism. It is formed by the particles in suspension in the unfiltered water gradually settling out, just as they do in the river bed. This is confirmed by the fact that the same deposit is found in Lake Vyrnwy, on the copper gauze screen at the filtering tower, and in the unfiltered reservoir at Oswestry. In the filtered water the deposit is very greatly reduced. The nature of the gelatinous iron and maganese impregnated material still requires solution ; it may be a gelatinous precipitate of these metals with organic matter.'



LATEST FILTER BED, OSWESTRY (1901).



ENLARGEMENT OF INLET CHAMBER.

Dr. Campbell Brown arrived at the conclusion that the deposits were of three kinds:—

> "1.—Incrustations on the inner surface of the pipes derived mainly from corrosion of the pipes.
>
> "2.—Growth of organisms on the inner surface, which not only lessens the sectional area of the water channel, but further retards the flow by greatly increasing friction or adhesion of the water.
>
> "3.—Accumulations of *débris* attached to these organisms, consisting of both mineral and organic substances."

Both the chemical and bacteriological reports show no deposits or growths to have been found in the pipes conveying the filtered water from Oswestry to Liverpool. This proves the importance of placing the filter beds as nearly as possible to the source of supply.

FILTRATION.—The water from Lake Vyrnwy is filtered at Oswestry through sand filters. Eight filter beds have been constructed for the first instalment. Each of these is approximately 8-10ths of an acre in area at the top of the sand layer. The total filtering area is 282,721 square feet. The thickness of sand in six of the beds is 2 feet, under which there are 12 inches in thickness of gravel. In the two beds last constructed the thickness of sand has been increased to 2 feet 6 inches, the depth of gravel being 12 inches, as in the other beds. The average rate of filtration during the year 1902 was 8.48 cubic feet per square foot of filtering area per day, or 2,302,775 gallons per acre per day.

The filtered water is delivered into a small clear water tank and thence passed into a valve chamber whence it is drawn off to Liverpool. At the inlet to the pipe-line in the valve chamber there is a disc gauge, by which the rate of delivery is measured and recorded on a diagram driven by clock-work.

TELEPHONE AND SIGNALLING SERVICE.

The whole of the Rivington and Vyrnwy Works and the pumping stations in and around the city are in communication with the head office in Liverpool by means of a private telephone and signalling system installed in the years 1891-3. For speaking there is a double line forming a metallic circuit. The signalling system includes the ringing of alarm bells on the closing of self-acting valves, or when an overflow occurs at places where there should be no overflow, or when an excessive change of pressure takes place in important pipe lines.

The pumping and high level stations, fire stations, and many of the turncocks' residences in and around the city are similarly in telephonic communication.

These telephone lines and electrical alarm systems have in practice proved to be extremely useful. They permit of a much more effective control being exercised than would otherwise be possible, and the instantaneous signalling of fractures on the pipe lines has been of great advantage in preventing damage and in facilitating the work of repair. And when work is in progress the men in charge can, by means of portable telephones, establish temporary communication throughout the system, and send reports to the head office.

WORKS FOR DISTRIBUTION.

The mains for the distribution of gravitation water within the compulsory limits start from the Prescot Reservoirs, the overflow level of which is 276.94 feet above Ordnance datum.

There are three principal mains from Prescot to the city, one of 44 inches internal diameter laid in the year 1856 as part of the Rivington scheme; a duplicate pipe-line 36 inches diameter laid in 1863; and a line of pipes 40 inches diameter laid in 1896. These mains communicate with the service reservoirs

in and around Liverpool, as shown on the accompanying plan. The same plan shows the relative positions of the wells and pumping stations.

The depths, contents, dates of construction, and areas of the service reservoirs are given in the following table:—

Name.	Date of construction.	Depth of water.	Contents in gallons.	Level of overflow. O.D.
	Year.	Feet.		
Kensington, No. 1	1844	15	9,136,650	219
Do. No. 2	1853	15	7,221,193	219
Aubrey Street	1854	12	4,545,390	216
High Park Street	1853	12	1,750,000	196
Torr Street	1840	15	659,000	198
Dudlow Lane	1864	12	1,014,000	210
Woolton	1864	12	1,164,000	298
Breeze Hill	1897	15	6,007,318	159

FIRE MAINS AND HYDRANTS.—In addition to the ordinary distributing mains from which domestic and trade supplies are given, there are special fire-mains laid throughout the business parts of the city and the Borough of Bootle, to which hydrants have been attached for extinguishing fires. These pipes are, for the most part, from 12 to 6 inches diameter, and from them jets of water can be thrown by direct pressure over the tops of the highest warehouses. There are altogether 12,350 fire hydrants (2,929 of which are laid in pairs) and 798 plugs on the existing mains and services within the compulsory limits. The wooden plugs that were once universal are gradually being replaced. Those still remaining are in rural districts or at the dead ends of small distributing mains.

The fire service of Liverpool is probably of unequalled excellence.

Frequently when large fires occur in the warehouse districts as many as twenty powerful jets are thrown direct from the mains, a stream of water amounting to over 200,000 gallons per hour. As these mains are constantly charged under pressure, the water is always ready for use, and can be brought to bear upon a fire as quickly as the hose-pipe can be attached to the hydrant.

The total length of mains and pipes laid in the public highways within the compulsory limits is 810 miles.

CONSTANT SERVICE.—Throughout the area of supply the water is constantly laid on under pressure, and interruptions of the service only occur when the water has to be shut off temporarily for repairs or alterations. Stoppages for connecting new communication pipes with the iron mains have been rendered unnecessary by the use of machines for tapping under pressure.

Nearly the whole of the area within the compulsory limits can be supplied by gravitation from the Prescot Reservoirs, but there are some parts of the district that cannot be so supplied, and for which special provision has to be made to raise the water by pumping. One of these is Prescot itself. Here the water is pumped to a tank, the overflow level of which is 315.4 feet O.D. Another high-level district extends from Edge Hill to Everton Church, and embraces a population of about 172,000. A third district for which special pumping is required extends from Woolton to Mossley Hill, and contains a population of about 10,000.

For the supply of the Edge Hill and Everton district a high-level pumping station was erected in 1857, at the corner of Aubrey Street and Margaret Street. The water is pumped into a circular cast iron tank supported on masonry pillars. The tank is 90 feet above the ground level, and holds 250,000 gallons. The top water level is 309 feet above O.D. The engines and boilers originally provided for this service were removed two years ago to make room for an engine and boiler of a modern type and of larger capacity. There are now two pumping engines at the Aubrey Street Station. One, erected in the year 1863, is of the Cornish type, and lifts 276 gallons per stroke.

The second engine, erected in 1897, is a triple expansion rotative surface condensing pumping engine capable of lifting 300,000 gallons per hour. It has steam jacketed cylinders 15, 23, 38 inches diameter, respectively, by 3 feet stroke, and beneath each cylinder is a pump with plunger 22 inches diameter. Steam is

supplied by two Lancashire boilers, each 20 feet long by 6 feet 8 inches diameter, with two flues 2 feet 6 inches diameter, working to a pressure of 130 lbs. per square inch. The engine is fitted with an economiser and a surface condenser.

The Woolton district is supplied from a high level station at the corner of Woolton Road and Dudlow Lane.

The first engine was erected in 1864, before the Dudlow Lane Well was sunk. It is a rotative beam engine, and in 1896 it was converted into a compound engine, capable of pumping 37,500 gallons per hour. Steam is supplied by a boiler of marine type. This engine lifts to the Woolton Hill Reservoir the gravitation water supplied from the Prescot mains. The deep well at Dudlow Lane, elsewhere described, is provided with a separate engine, and the Woolton Hill Reservoir can be supplied from either of these sources.

QUALITY OF THE WATER.

Chemical Examinations of the water obtained from the several sources of supply are regularly made by Professor Campbell Brown, and special examinations are also made from time to time of samples taken from different parts of the watersheds and wells. The latest reports of Dr. Brown on samples from the sources of supply are as follows:—

RESULTS OF ANALYSES expressed in Parts per 100,000.

DESCRIPTION.	Total Solid Matters in Solution.	Organic Carbon	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates.	Total combined Nitrogen.	Chlorine.	Oxygen Consumed.		Hardness.
								In 15 Mins.	In 3 Hours.	
Vyrnwy	5·04	·218	·033	·002	·000	·035	·9	·098	·175	0°·9
Rivington	10·12	·166	·026	·003	·000	·029	1·6	·038	·086	3°·9
Mixed Water, Dale Street	8·48	·138	·022	·001	·065	·088	1·2	·062	·123	3°·5
Green Lane Well	32·4	·025	·006	·000	·707	·713	3·3	·000	·000	18°·9
Dudlow Lane Well	18·5	·021	·006	·000	·786	·792	3·0	·000	·000	6°·9
Windsor Well ..	39·36	·019	·011	·000	·874	·885	4·2	·001	·002	27°·7

The bacteriological work in connection with the department is carried out by the Corporation Bacteriologist, Professor Boyce, F.R.S.

By means of daily and regular periodical analyses, the whole of the water supply is kept under constant bacteriological supervision. This is attained by analysing the filtered water taken from the mains and cisterns, the water supplied from the wells, and the Rivington and Vyrnwy supplies. The unfiltered water is analysed by samples taken from the reservoirs and lakes, from the streams of the watersheds, and from the fissures in the wells. In this manner only it is possible to detect contamination throughout such a vast system of water supply as that of the City of Liverpool. In addition to the routine analyses, investigations are undertaken in conjunction with the Water Engineer in order to throw light upon biological problems in connection with filtration, deposits in pipes, colouration of water, etc. The system of biological investigations carried out by the Water Department is the most complete of its kind in the country, and the degree of purity of the water supplied to the City is well shown from the following figures:—

1900	19	Bacteria present per c.c.
1901	22	" "
1902	39	" "

CONSUMPTION OF WATER.

In the year 1850, less than three years after the acquisition of the undertaking, the Corporation abolished the separate charges that had previously been made for water closets and private baths. A free supply of water encouraged the introduction of these important sanitary appliances and assisted in the abolition of the common privy. Water closets have long been in general use in Liverpool, and fixed private baths are provided in workmen's cottages, as well as in houses of a better class.

The Corporation require a tap to be placed in every new house on the leading pipe from the main, in order that water may be drawn for drinking and culinary purposes without passing through a cistern.

QUANTITY DISTRIBUTED 1902.—The total quantity of water distributed from the Liverpool Works during the year ending 31st December, 1902, was 10,559,813,000 gallons, being an average per day of 29,010,000 gallons. This was obtained from the different sources of supply in the following proportions:—

	Gallons.
From Wells	1,352,834,000
" Rivington	3,863,491,000
" Vyrnwy	5,228,162,000
" Salt Water.....	115,326,000
Total.....	10,559,813,000

This total includes water supplied to the town of Chorley and water sold in bulk to places along the Rivington and Vyrnwy Aqueducts.

The quantity consumed during the same period within the compulsory limits (including the City, the borough of Bootle, and surrounding townships) was 9,825,140,000 gallons, being an average per day of 26,992,000 gallons.

An Analysis of this consumption is given below:—

	Average per day. Total gallons.	Estimated rate per head of Population. Gallons.
Domestic supplies, including Hotels, Public-houses, Warehouses, Offices, Shops, and all waste	15,763,000	18.536
Supplies to Workhouses, Industrial Schools, &c.	571,000	0.672
Trade supplies by Meter	6,651,000	7.822
Supplies to Shipping	492,000	0.578
Miscellaneous Trade Supplies by Assessment	1,552,000	1.825
Public supplies for flushing Sewers and Drains, watering and Washing Streets, Baths, and Wash-houses, Fountains, Cattle Troughs, Urinals, &c.	1,554,000	1.827
Extinguishing Fires	17,000	0.020
Salt water supplies	317,000	0.372
Water for Condensing at Pumping Stations	75,000	0.087
Total	26,992,000	31.739

Fluctuations of Demand.—In judging of the ability of Water Authorities to meet the demands of their consumers it is the maximum and not the average consumption that must be taken into account. This difference between the maximum and the average must be provided for either by storage Reservoirs near to the point of distribution or by making the Aqueducts from the sources of supply of sufficient capacity to satisfy the maximum demand.

The average rate of daily consumption in the City of Liverpool and surrounding district for the year 1902, excluding the salt water supplies, was 26,675,000 gallons.

	Galls. per day.
But the maximum consumption in one day of the summer (15th July) amounted to	31,578,000
The average per day during the week of highest summer consumption was (week ending 5th July)	28,987,000
The average per day during four high summer weeks was	28,168,000
The maximum consumption in one day in the winter season (19th February) was	34,188,000
The average per day during the highest winter week was (week ending 22nd February)	31,443,000
The minimum consumption in any one day was (Sunday, 19th May)	18,406,000

The average consumption for the extinction of fires represents very inadequately the occasional demands for this service. At large fires that occasionally occur in the City the quantity of water used exceeds 16,000,000 gallons.

Growth of Demand since 1846.—The next table shows the growth of the consumption since the works were acquired by the Corporation.

Consumption of Water.—Years 1846 to 1902.

Year.	Population supplied.	Number of Water Tenants.	Average No. of gallons consumed per day for all purposes.	Rate per head per day in gallons.
	Works in possession of Private Companies.			
1846	339,115	50,995	2,794,520	8·24
1847	Works transferred to the Corporation.			
1851	420,106	57,284	4,516,571	10·75
1857	Rivington Supply introduced.			
1858	—	71,050	10,786,422	—
1861	504,117	80,069	14,470,358	28·70
1871	594,152	107,854	17,442,752	29·36
1881	704,330	135,745	17,500,272	24·84
1891	748,753	158,511	18,908,000	25·25
1892	Vyrnwy Supply introduced.			
1895	781,245	159,579	23,049,000	29·50
1896	798,781	160,087	22,501,000	28·49
1897	798,853	161,241	23,142,000	28·97
1898	808,475	163,083	23,529,000	29·10
1899	818,668	165,207	25,522,000	31·17
1900	829,446	167,399	25,886,000	31·21
1901	841,174	169,391	26,225,000	31·18
1902	850,407	171,086	26,992,000	31·74

WATER FOR TRADE AND MANUFACTURING PURPOSES.—The demand for water for trade purposes has increased more rapidly than the growth of population.

In the year 1861 (four years after the introduction of the Rivington Water) the quantity supplied by meter for manufacturing, trade and shipping was 293,493,189 gallons, being at the rate of 1.6 gallons per head per day of the entire population. In 1881, the quantity supplied for the same purposes was 1,302,068,100 or 5.07 gallons per head per day of the population. Last year the Trade and Shipping supplies by meter had increased to 2,670,121,000 gallons, or 8.6 per head of the population.

HYDRAULIC POWER.—Between forty and fifty years ago direct pressure from the Corporation mains was employed to work hydraulic cranes at the Albert Dock Warehouses.

Since then considerable use has been made of the pressure in the mains as motive power, chiefly for warehouse lifts and organ blowing. The quantity of water so used last year (1902) was 125,000,000 gallons delivered to 162 machines.

The Hydraulic Power Company have by an arrangement with the Corporation laid mains over a considerable part of the City, and with their pressure of between 700 and 800 lbs. per square inch, can, where the conditions are favourable, give a more economical service than the relatively low pressure of the ordinary water mains.

PRIVATE WELLS AND CANAL WATERS.—No description of the water supply of Liverpool would be complete without some allusion to the large quantity obtained by manufacturers and others from private wells sunk in the sandstone and from the Leeds and Liverpool Canal. In a report of October, 1892, on the "Price of Water for Trade Purposes," the results of an investigation were given, from which it appeared that there were 57 private wells in use, chiefly in the City, yielding an average total daily quantity of 7,557,516 gallons. An approximate estimate was also given of 11,726,000 gallons per day as representing

the quantity taken from the Canal, and 716,751 gallons per day as the probable average daily quantity pumped from the River Mersey. The total average daily supply from these three sources is, therefore, about 20,000,000 gallons.

PREVENTION OF WASTE.—As now organised, the city and suburban townships are divided, for the purposes of waste detection and prevention, into 260 districts, the number of houses in each district varying from 200 to 1,500. At the point of junction between the principal or trunk main and the distributing or service main a waste water meter is fixed. Attached to this meter is a revolving drum, driven by clockwork, upon which is placed a paper diagram. On this diagram a pencil draws a continuous line, which shows the volume of water passing through the meter. The movements of the pencil thus present a picture of the movements of the water, and show at a glance if anything unusual has happened. At night in a residential district the line drawn by the pen between the hours of 1 a.m. and 4 a.m., is an approximate measure of the waste taking place, and from the diagrams brought to the office a selection is daily made of the most wasteful districts for examination. The method of examination is briefly as follows:—Two night inspectors are sent into a district, and commence operations between 11 p.m. and midnight. They each carry a steel bar, which they use as a stethoscope. By applying the bar to every stop-cock, hydrant and valve, to which access can be had from the surface of the street or footway, their practised ear can in the silence of the night easily distinguish the sound of water escaping from a defect or flowing through the lead communication pipes. If water is heard passing through any stop-cock that cock is closed, and a note made of the fact and of the time. Should the noise not cease when the stop-cock has been closed the leakage exists on the street side. If the shutting of the stop-cock cuts off flowing water the quantity so cut off is at the same moment indicated on the meter diagram. After all the stop-cocks on which noises have been heard have been closed

the diagram is examined, and if there is still a considerable quantity of water flowing into the district further examinations are made and the surfaces of the streets over the mains are sounded to detect any underground leakage that may be taking place. The number of hidden underground leakages discovered by sounding is very remarkable, and many hundreds of sketches have been made, showing how water from defective pipes has been found flowing into drains and sewers without any surface indication of the waste. When the night inspectors have completed their examination they return to the office and write a list of noises they have noted. A press copy is made and handed to a day inspector, who investigates the reports. He generally discovers defective fittings or underground pipe leakages to account for the night noises.

The great advantage of this system of night inspections preceding the day inspections is that it enables the waste in a district to be quickly dealt with by confining the attention of the inspectors to places where leakages actually exist. Experience has proved that in any given district all the waste is taking place in about 4 per cent. of the houses. Apart from the detection of waste, house-to-house inspections are, however, occasionally necessary.

RESULTS OF INSPECTIONS.—The following statements show the number of premises visited by the waste water inspectors, and the defects discovered in pipes and fittings, during the year 1902 :—

NUMBER OF PREMISES VISITED.

FIRST INSPECTIONS.						Re-Inspections after Notices.	TOTAL NO. OF INSPECTIONS.
Examinations after Night Reports.	House to House Inspections.	Complaint Office Reports.	New Plumbing Work.	Building alterations.	W.C. Conversions.		
157,435	1,901	14,813	16,324	490	201	21,968	213,132

DEFECTS DISCOVERED.

Corporation Pipes.	Private pipes.	Draw-off cocks, Screw-down cocks, Plug cocks, and Standpipes.	Ball-cocks in store cisterns.	Water Closet Cisterns.		Total No. of defects.	No. of defects repaired by Inspector at the time of inspection.
				Valves.	Ball-cocks.		
676	10,949	13,956	358	9,807	4,553	40,299	17,278

TESTING AND STAMPING FITTINGS.—The department for the Testing and Stamping of Fittings contributes in a very important degree to the prevention of waste by ensuring the use of appliances of the best quality.

In the subjoined table particulars are given of the fittings that passed through the hands of the testing officer during the year 1902.

The fees charged cover the expenditure incurred in maintaining the establishment.

Description of Fittings.	Number of Fittings Tested.
Draw-off cocks and stop-cocks	44,678
Ball-cocks	7,566
Cisterns with ball-cocks	7,331
Cisterns without ball-cocks.....	178
Total.....	59,753

CAPITAL EXPENDITURE ON THE LIVERPOOL WATER WORKS, TO 31ST DECEMBER, 1902.

(Figures furnished by Controller and Auditor of Accounts.)

		£	s.	d.
1.	Harrington and Bootle Co.'s Works	578,684	2	10
2.	Green Lane Works (Construction a/c.)..	71,055	13	11
3.	Rivington Works (ditto) ..	1,345,989	13	4
4.	Chorley Works.....	31,342	12	3
5.	Extension of Works, Wells, and Distributing Works (Home Works)	916,743	5	11
6.	Vyrnwy Works.....	2,254,795	19	3
		£5,198,611	7	6

PURITY OF THE WATERSHEDS.

The Act authorising the construction of the Rivington Works was passed in the year 1847. Earlier in the same year Parliament had passed the Water Works Clauses Act, which contained numerous enactments relating to the construction and management of water undertakings. In that Act the following provision was made under the head of "Fouling the Water":—

"LXI. Every person who shall commit any of the offences next hereinafter enumerated shall for every such offence forfeit to the Undertakers a sum not exceeding Five Pounds (that is to say)—

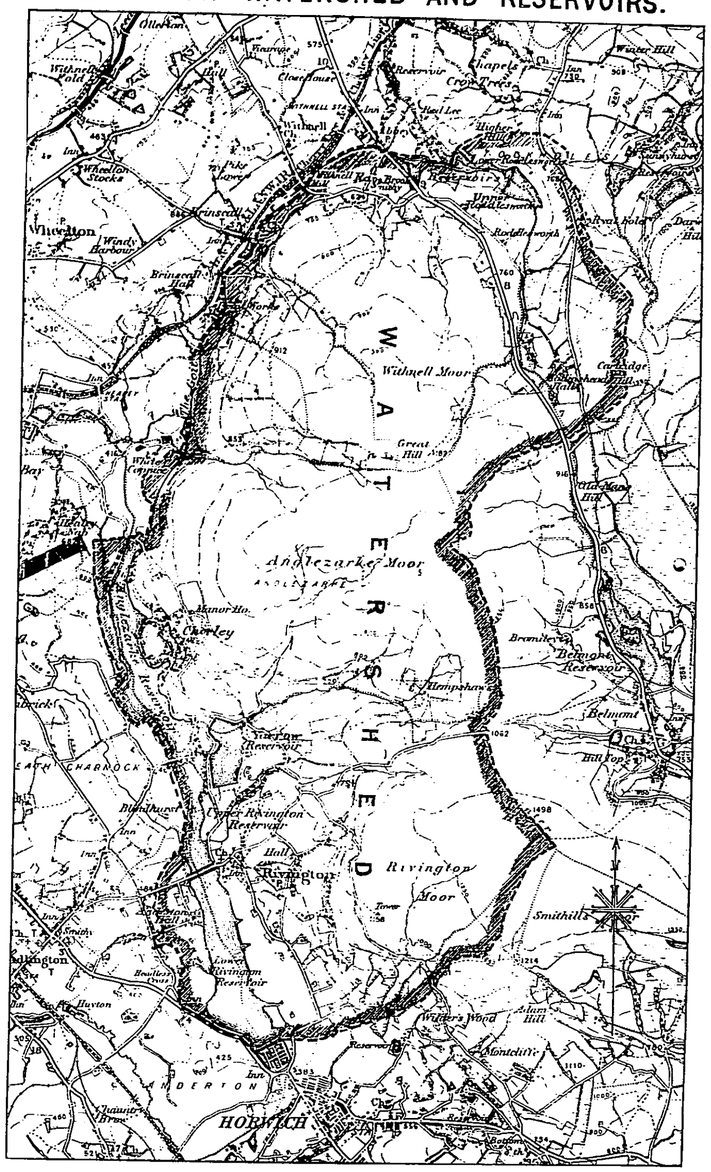
Every person who shall bathe in any stream, reservoir, aqueduct, or other waterworks belonging to the undertakers, or wash, throw, or cause to enter therein any dog or other animal;

Every person who shall throw any rubbish, dirt, filth, or other noisome thing into any such stream, reservoir, aqueduct, or other waterworks as aforesaid, or wash or cleanse therein any cloth, wool, leather, or skin of any animal, or any clothes or other thing.

Every person who shall cause the water of any Sink, Sewer, or Drain, Steam Engine, Boiler, or other filthy water belonging to him or under his control, to run or be brought into any Stream, Reservoir, Aqueduct, or other Waterworks belonging to the Undertakers, or shall do any other act whereby the water of the Undertakers shall be fouled:

And every such person shall forfeit a further sum of Twenty Shillings for each day (if more than One) that such last-mentioned Offence shall be continued."

PLAN OF RIVINGTON WATERSHED AND RESERVOIRS.


WATERSHED
Rivington Moor
Withnell Moor
Anglezarke Moor
Great Hill
Winter Hill
Chapels
Withnell
Wheelton
Brinscall
Brinscall Hall
Withnell Fold
Withnell Reservoir
Upper Rivington Reservoir
Lower Rivington Reservoir
Rivington
Hall
Smithills
Belmont
Belmont Reservoir
Bromilow
Hirnpshaw
Horwich
Chorley
Charnock
Heath Charnock
Adlington
Duxton
Whitters Wood
Adam Hill
Montcliffe
Bolton
Bolton Moor
Bolton Moor End
Bolton Moor Head
Bolton Moor Side
Manor Ho.
Barrick
Stanley Reservoir
Rivington Hall
Rivington Barn
Rivington Pike
Rivington Reservoir
Lower Rivington Reservoir
Upper Rivington Reservoir
Wind's Barbour
Brinscall Hall
Withnell Fold
Withnell Reservoir
Great Hill
Anglezarke Moor
Belmont Reservoir
Smithills
Adam Hill
Montcliffe
Whitters Wood
Bolton Moor End
Bolton Moor Head
Bolton Moor Side
Manor Ho.
Hirnpshaw

This pollution clause was incorporated with the Liverpool Bill of 1847 as it left the House of Commons, but was opposed in the House of Lords by a Rivington landowner, and the Lords' Committee struck it out, giving their reasons as follows:—"The Committee have turned their attention to the 61st clause of the General Act, and that they, being the first Committee who are dealing with a case under that clause or a case of any magnitude, it appears to them that the cases contemplated by that clause and for which the protection contained in it was intended were not such as that now before the Committee, and that the provisions of it are far more stringent than ought to be adopted. That under these circumstances the Committee are strongly of opinion that in a case like the present something ought to be introduced into the Bill to qualify these provisions."

The Corporation had therefore only such protection as their common law rights would give them as riparian owners at the junction of the streams and reservoirs, or such arrangements as they could make by agreement with the owners above.

Purchases under the Act were confined to the lands required for the construction of the works authorised. The Corporation doubtless relied very much on the remoteness and physical characteristics of the district for continued freedom from serious pollution. Nor did much change take place in the number of people resident upon the Watershed, but the surrounding population grew very rapidly.

In 1871 the Corporation promoted a Bill in which they inserted a clause making the exempted nuisance provisions of the Clauses Act, 1847, applicable to the Rivington Works. This passed without opposition.

Further powers for the prevention of pollution were obtained by a clause inserted in the Liverpool Waterworks and Improvement Act, 1887. The following is a copy of the clause:—

> "For the purpose of preventing the pollution of any stream or waters from which the Corporation derive any portion of their water supply, and in the event of the Sanitary Authority for the

district in which the pollution occurs refusing or neglecting for the space of one month after being requested by the Corporation by notice in writing signed by the Town Clerk so to do to enforce the provisions of the Rivers Pollution Prevention Act, 1876, with respect to any such stream or waters, the Corporation shall, in addition to any other powers possessed by them and have and exercise in respect of any act or default committed by any person beyond the limits of the City, all such powers and jurisdiction as they would have or might exercise under that Act if they were the Sanitary Authority of the sanitary district within which any such act or default is committed. Provided that nothing herein contained shall limit or affect the powers of any such Sanitary Authority within their own district, or shall authorise the Corporation to charge any expense incurred by them under this section on any such Sanitary Authority or on any district represented by any such Sanitary Authority.

"Provided also that nothing herein contained shall make the Justices of the Peace for the County of Montgomery liable for any unavoidable temporary pollution or obstruction caused by them in doing reasonable and proper repairs to the diversion bridges and roads constructed by the Corporation under the powers of the Waterworks Act, 1880, if at any time under Section 33 of that Act the said Justices are held liable to repair the same or any part thereof or to any bridge or roads which the said Justices of the Peace are now or may become liable to maintain or repair."

From time to time examinations were made of all houses and buildings on the Rivington Watershed, with a view to discover and deal with sources of pollution, and works were undertaken by the Corporation, at their own expense, wherever there appeared to be danger of direct contamination of the reservoirs or streams, or inadequate provision for treatment by land irrigation. The works thus carried out consisted chiefly of:—

1.—The diversion of water courses where (as frequently happened) they were allowed to flow through farm-yards and in proximity to manure pits.

2.—The removal of privies in the vicinity of water courses, and their re-construction at a safe distance.

3.—The construction of cesspools to receive the sewage where there was not sufficient or suitable land available for direct dispersion, or where occasional storage was required.

4.—The laying of earthenware or iron drain pipes with sound joints, and furnished with proper traps and fittings, in the place of defective rubble drains and open cesspits.

These sanitary operations extended over the whole area of the Watershed, and were carried out, at considerable expense to the Corporation, with the concurrence and co-operation of the landowners.

A systematic inspection by the Walksmen and Reservoir Keepers was instituted. They report daily particulars of their visits, and call attention to any nuisances or defects which they may find.

A sanitary survey of the Rivington gathering ground was made in the year 1898, with special reference to the working of existing methods of sewage disposal, and to the existence of probable and possible causes of pollution. The following are the principal total figures then obtained as to the buildings, population and cattle:—

Farmsteads.	Cottages and other Residences.	Horses, Cattle, Pigs and Poultry.	Water Closets.	Common Privies.	Closets with Pails.	Quarries.		Mills.		Other Works.		Schools.		Mines.
No.	No.	No.	No.	No.	No.	No.	Work-people.	No.	Work-people.	No.	Work-people.	No.	Schol-ars.	No.
113	84	1,345	16	129	26	5	220	1	200	1	30	2	120	1 out of use.

The survey proved that, on the whole, the arrangements made for the prevention of pollution were being satisfactorily carried out, and that, as a rule, the sewage was diffused over land at a reasonably safe distance from flowing water, and of sufficient area to ensure the absorption and nitrification of the organic constituents.

The most serious difficulties that have been encountered in preventing the fouling of the water have arisen from the neglect of tenants to empty cesspools provided for collecting the sewage. When the cesspools were first built the tenants excused themselves for their neglect by pleading that they had no facilities for carrying away the contents, and to meet this excuse liquid manure carts and pumps were provided by the Corporation, but notwithstanding this, several of the tenants have persistently neglected to keep the cesspools from overflowing.

A census of the population on the Watershed in the year 1898 compared as follows with a similar census taken in the year 1875:—

Census of 1875 .....1,182 inhabitants.
" " 1898 .....1,195 "

That the efforts constantly made to preserve the purity of the water have not been altogether unsuccessful is shown by the Chemical Reports which have been made periodically by Professor Campbell Brown, D.Sc., since the year 1872. For the purpose of comparison I subjoin the following copy of the first analysis made by him in June, 1872, with the analysis made for the June Quarter of 1902.

RESULTS OF ANALYSES IN PARTS PER 100,000.

Date.	Total Solid Matter in solution.	Organic Carbon.	Organic Nitrogen.	Ammonia	Nitrogen as Nitrites and Nitrates.	Total Combined Nitrogen.	Chlorine.	Total Hardness.
1872 June	10·6	·194	·055	·003	·027	·084	1·98	4°·30
1902 June	10·2	·137	·032	·003	·021	·056	1·6	3°·6

The Bacteriological Examinations of Professor Boyce show equally satisfactory results.

Notwithstanding these facts the difficulty of preventing pollution has been constantly becoming greater, and it has been found that to enforce rigorously the provisions of the law as to nuisances would involve much friction with the owners and occupiers, costly litigation, and troublesome supervision.

Influenced by these considerations and on the advice of their expert advisers, the Corporation first endeavoured to purchase lands on the Watershed by agreement. In this they were successful to the extent of 3,000 acres. They were then informed that there was no prospect of making more purchases by agreement, and were advised to seek compulsory powers. This they did successfully in the last Session of Parliament.

The Corporation are now proceeding to exercise the powers conferred upon them by the Act of 1902. When they complete the purchases the question will arise as to what use they are to make of the lands and buildings so as to ensure the desired degree of purity. The counsel of perfection would say sweep away every human habitation and every possible source of pollution. Already the Corporation have decided to demolish quite a number of farmsteads and insanitary, or otherwise objectionable, cottages. But a general scheme of procedure has yet to be adopted.

The experience of Liverpool at Rivington led the Corporation when considering the Vyrnwy Scheme to decide to ask Parliament for power to buy the Watershed instead of as formerly confining their purchases to the lands required for the construction of the Reservoir.

BATHS AND WASH-HOUSES.

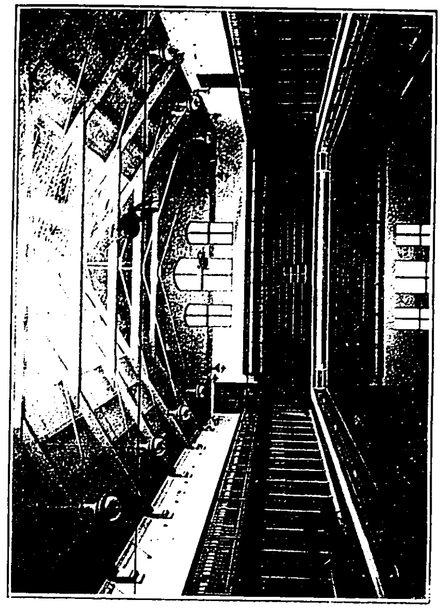
Prior to the year 1794 there were no public baths in Liverpool. People then availed themselves of the caravans on the North Shore, and such as could not afford the luxury of the caravan undressed on the sands. A private bathing establishment was situated at the end of the New Quay, and from this has been derived the name of Bath Street. In the year 1794 the Corporation purchased this establishment at the cost of about £4,000, and expended £1,000 additional in embellishing and making large alterations on the original plan.

By this expenditure the baths, says an anonymous local historian, were rendered "as commodious, safe, and elegant as any of the kind in England, and have all the advantages of the salubrity of the salt water without exposing the bather to view."

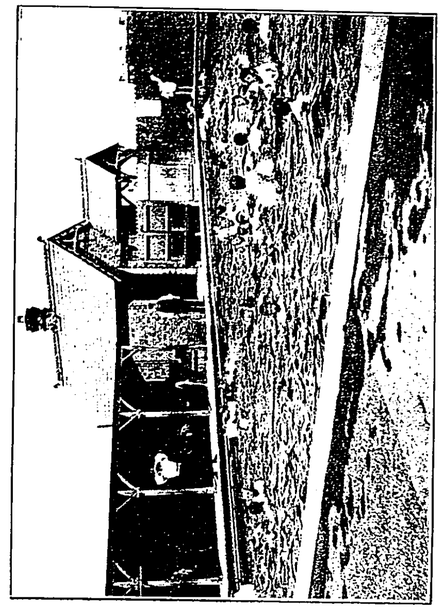
These baths were removed in 1820 to make way for the Prince's Dock, and the inhabitants remained without any public means of sheltered bathing in salt water other than that afforded by caravans on the shore, and the floating bath which had been launched in 1816.

In 1822 the Council prepared again to provide for the wants of the inhabitants by erecting the baths now called St. George's Baths, on the west side of the St. George's Dock; the baths were completed and opened in 1828. The structure, owing, among other things, to a treacherous foundation, cost £24,481, and has continued to cost a large expenditure annually, until it stands in the books to-day as costing £43,659 13s. 3d.

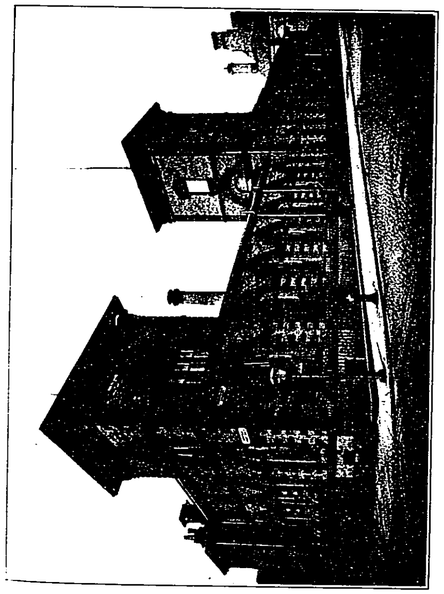
In 1832, when the cholera ravaged the town, a Mrs. Wilkinson allowed her poorer neighbours, destitute of the means of heating



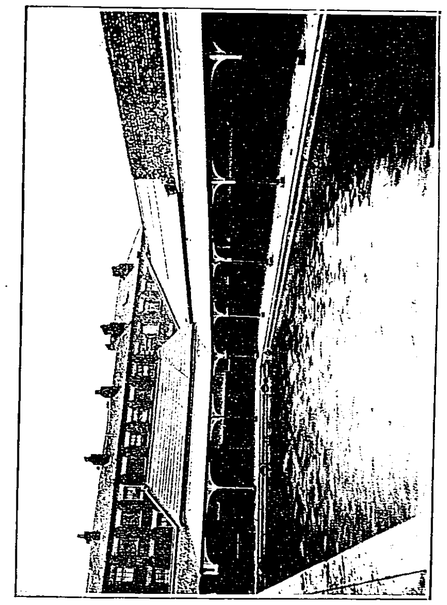
LODGE LANE FIRST-CLASS SWIMMING BATH.



GREEN LANE FREE OPEN AIR SWIMMING BATH.



CORNWALLIS STREET BATHS.



MANSFIELD STREET FREE OPEN AIR SWIMMING BATH.

water, to wash their clothes in the back kitchen of her own humble abode, and to dry them in the covered passage and yard belonging to it. Aided by the District Provident Society, and some benevolent ladies, this courageous woman contrived to provide for washing the clothing of, on an average, 85 families per week.

The great supporters of Mrs. Wilkinson in her praiseworthy efforts were Mr. and Mrs. William Rathbone, and encouraged by the eagerness of the poor to avail themselves of the accommodation provided, the Town Council, at the instance of Mr. Rathbone, determined to erect Wash-houses for the people in connection with baths. A site was obtained in Upper Frederick Street, and a building on a very humble scale was provided as an experiment—the first public establishment of Baths and Wash-houses in England. This was opened on the 28th May, 1842.

The annual cost of maintaining the establishment averaged during the first two years £287.

Baths and Wash-houses on a much larger scale than those in Frederick Street were erected in Paul Street in 1846, the cost of site and buildings amounting to £10,532.

Cornwallis Street Baths. — Cost of Site, £1,703 15s.; cost of Buildings and Furnishing, £21,777 11s. 2d. Opened 5th May, 1851. The building, as originally erected, contained both baths and wash-houses. The baths alone were opened on the above date, and proved so attractive that the Committee thought it undesirable to open the wash-houses, and converted them into additional baths.

On the 18th June, 1863, the Margaret Street Baths were opened. These had been erected by the Council owing to memorials from the West Derby Guardians and the inhabitants of the Everton District.

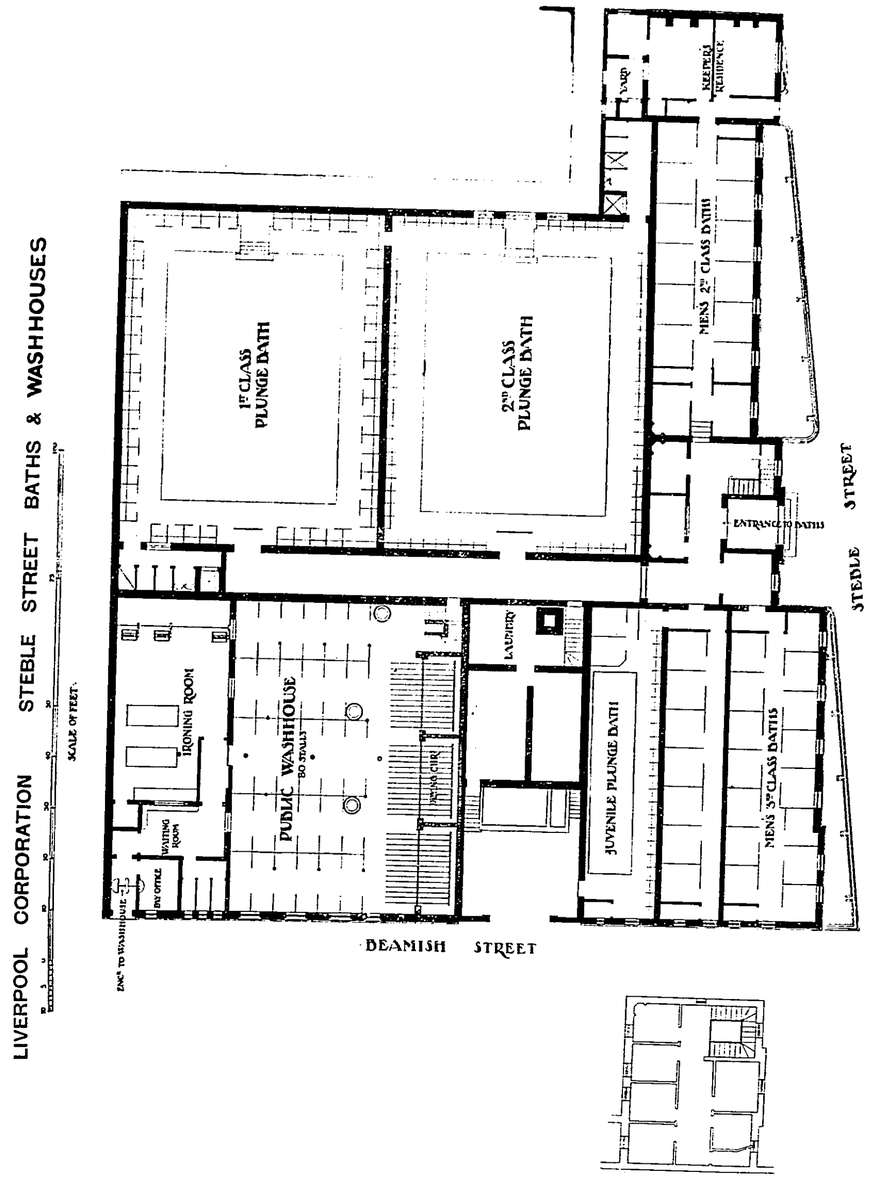
In 1872 the Steble Street Baths and Wash-Houses were commenced, and they were opened to the public in 1874.

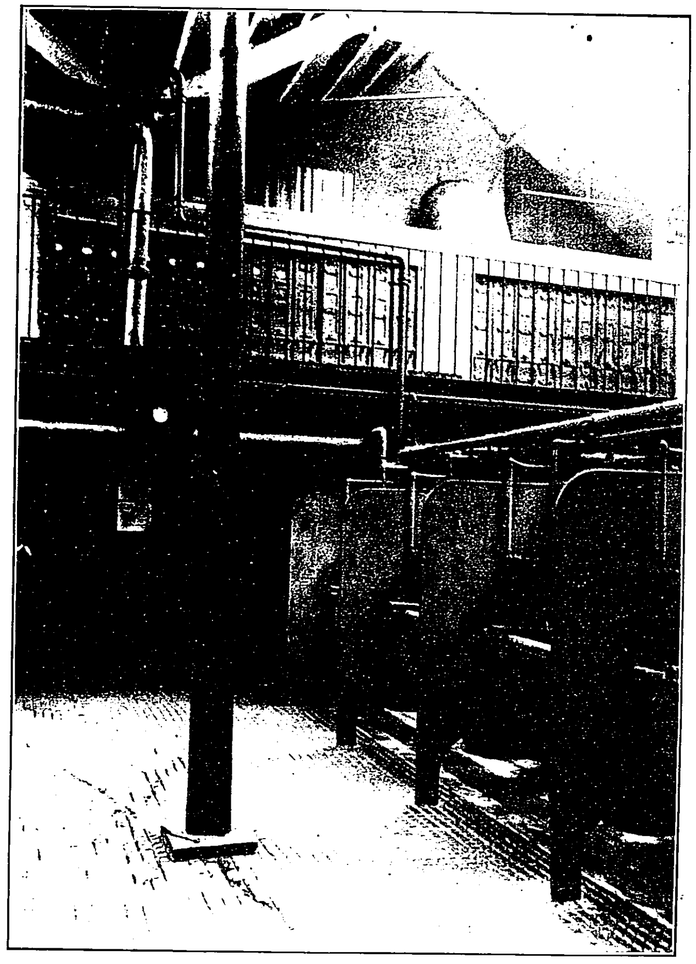
The year 1877 saw the opening of the Westminster Road Baths, which were followed in 1878 by the Lodge Lane Baths and Wash-houses, and in 1879 by the Baths and Wash-Houses in Burroughs Gardens.

On the completion of the last named establishment the town was well furnished with these institutions—better than any other town in the kingdom. Each of its districts had its bath. No matter in what part of the town you resided, there was a public bath within ten minutes walk of your residence. Under these conditions, it is not to be wondered at that a period of sixteen years should elapse before additional Baths were erected.

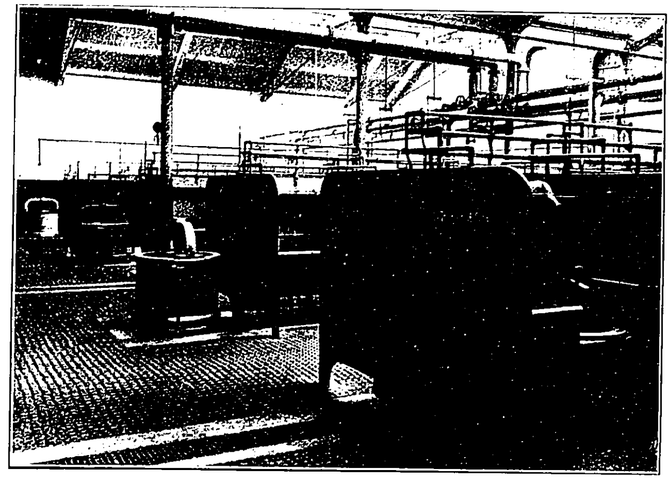
In 1894 the Baths Committee gave much time and consideration as to the advisability of providing open-air baths for the poorest children, their attention was frequently drawn to the children bathing in the filthy water in the canal, and also to the Coroner's inquests on the bodies of children drowned whilst bathing in the canal. In 1895 the first open-air bath (the Burlington Street Bath) was opened in Liverpool, in close proximity to the canal with which it has to compete; its success was immense. On opening, all ages were allowed the free use of the bath; it, was, however, found that the younger children would not use the bath when it was occupied by men, and consequently the Committee decided to fix an age limit of 15 years.

The success of the Open-air Bath was such as to induce the Council to construct three additional establishments—one in Gore Street, opened in August, 1898; one in Green Lane, opened in March, 1899; and one in Mansfield Street, opened in June, 1899. In each of these establishments there is provided a cleansing bath; two of the baths, Gore Street and Mansfield Street, are provided with a covered gymnasium, these are much enjoyed by the children after their bath.

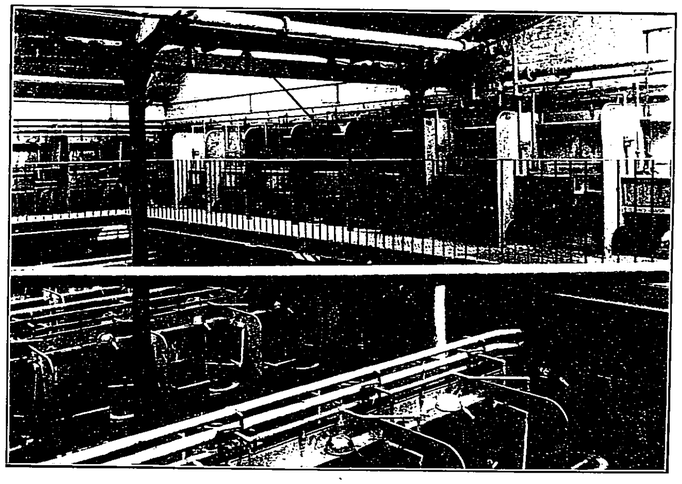




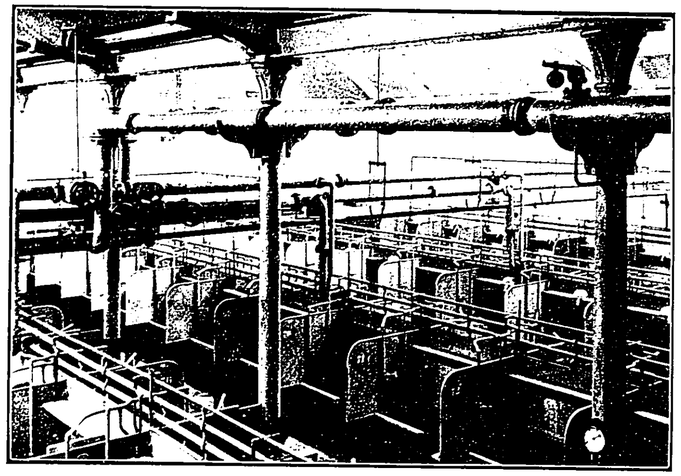
STEBLE STREET PUBLIC WASH-HOUSE.



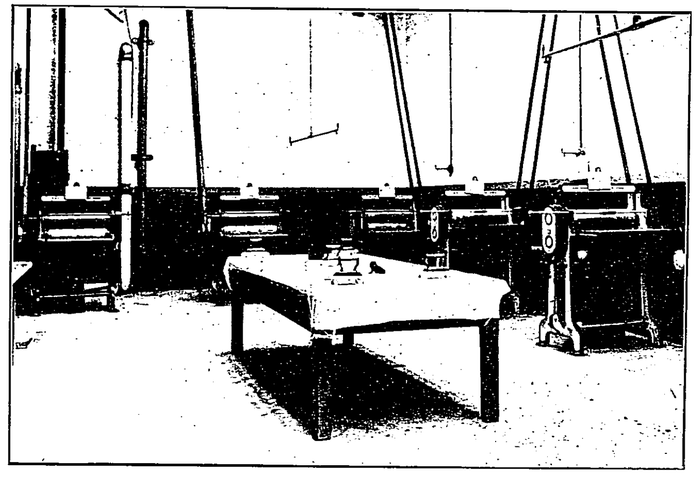
BURROUGHS GARDEN PUBLIC WASH-HOUSE.



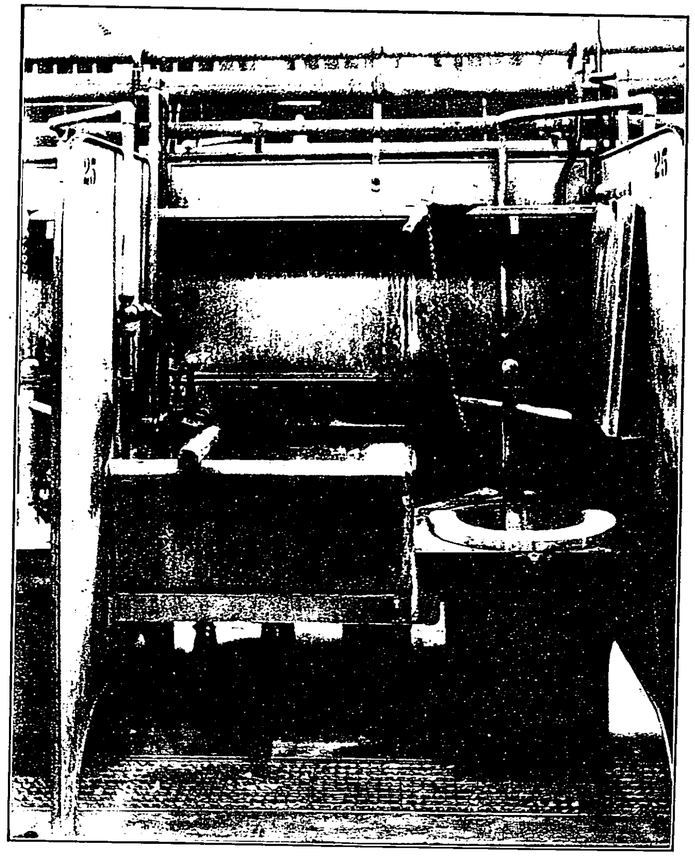
STEBLE STREET PUBLIC WASH-HOUSE.



BURROUGHS GARDEN PUBLIC WASH-HOUSE.



MANGLING AND IRONING ROOM. BURROUGHS GARDEN PUBLIC WASH-HOUSE.



WASH-STALL, BURROUGHS GARDEN AND STEBLE STREET.

Mansfield Street Bath is reserved one day each week during the best part of the season for girls; as many as 2,044 girls have used the bath in one day.

The following figures give the number of baths taken and the annual cost of up-keep, repayment of principal, and payment of interest since their institution:—

No. of Estab'ts	Year	Bathers	Working Expenses £ s d	Repayment of Capital & Interest £ s d	Total Expenses £ s d
1	1895	—	75 12 6	45 6 8	121 19 2
1	1896	199,061	177 14 6	47 0 0	224 14 6
1	1897	197,096	189 3 11	47 0 0	236 3 11
2	1898	308,540	273 15 0	47 0 0	320 15 0
4	1899	627,691	922 0 5	429 0 0	1351 0 5
4	1900	644,292	820 9 9	422 18 9	1243 8 6
4	1901	650,877	939 7 1	413 5 0	1352 12 1
4	1902	502,531	873 7 2	402 3 8	1275 10 10
		3,130,088			£6126 4 5

Cost to date equals ·45 of a penny for every bath taken.

PEOPLE'S BATHS.—In August, 1899, the Engineer and Chief Superintendent of the Baths and Wash-houses prepared and submitted to the Baths Committee a report on the provision of People's Baths, or Baths for the Poor. The term "People's Baths" is applied to bathing establishments used entirely for cleansing purposes, and in which the bath known as the spray and ring shower bath, the latter sometimes called the rain bath, predominates. No facilities are provided for swimming.

These baths consist of a number of dressing boxes, each 3½ feet square, and bath cabins of the same dimensions, grouped in halls, the arrangements for washing are such, that as the bather washes, the soiled water flows away leaving the bather perfectly clean, the tonic effects of the spray are then utilised. The advantages of this bath over the ordinary slipper bath are that it occupies one half the floor space, consumes one fifth the quantity of water, and bathes three times as many persons within a given time.

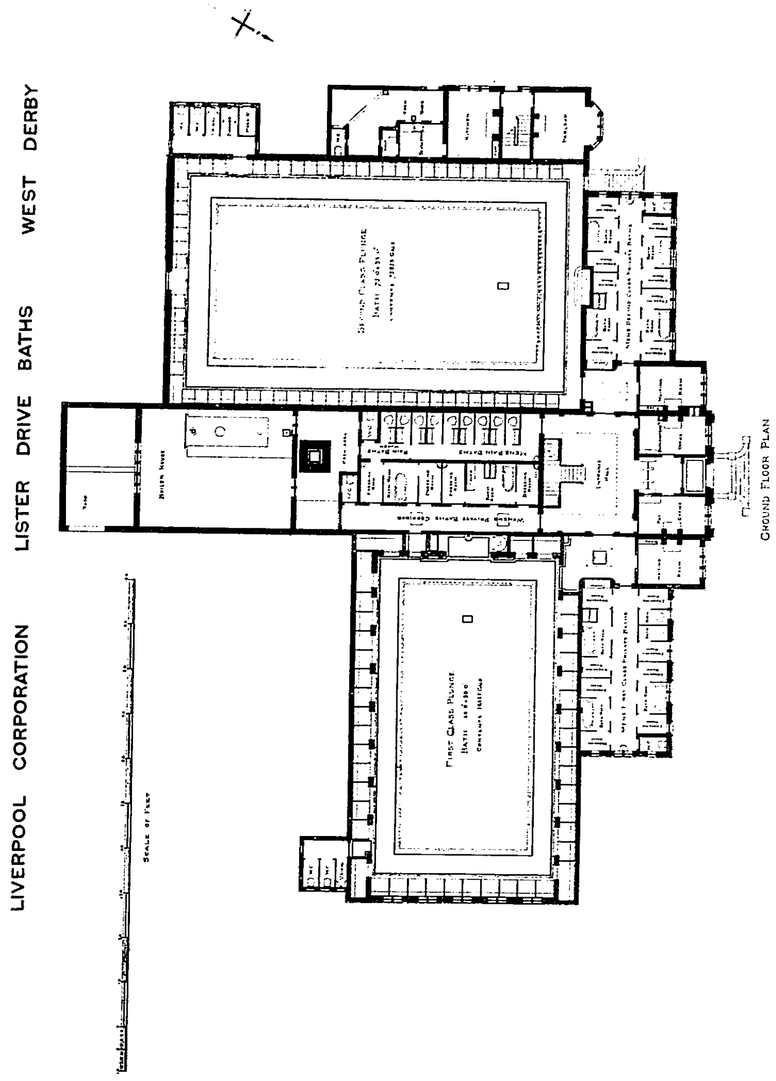
A site for People's Baths was secured in Beacon Street, the district being in every way a suitable one for an experimental bath. The buildings were erected, and the opening took place on the 7th July, 1902, the establishment being the first complete establishment of "People's Baths" in the kingdom.

On account of the extension of the boundaries of the city, the Council have erected for the district of West Derby, in Lister Drive, a fine suite of district baths at a cost of £24,000. They have also approved of a scheme for baths for Wavertree, to cost £26,000.

In laying out the site of the George's Dock the Council extended Brunswick Street and Water Street across the Dock, and in forming the latter extension, the portion crossing the dock has been made into a sea water reservoir with a capacity of $1\frac{3}{4}$ million gallons of water, sufficient to supply the whole of the existing and prospective baths with a daily fresh supply of sea water, a portion of the dock lying between Water Street and Brunswick Street is intended to provide for a complete central bathing establishment, tramway offices, &c.

The Public Baths and Washhouses are administered by the Baths Committee of the City Council on business lines, but the health of the community is considered of greater importance than financial gain. The Committee believe that, in order to obtain regular and systematic bathing among the poorer classes, they must educate the young to the benefits to be derived from bathing; and to this end, in addition to the open-air free baths, the whole of the children attending the Elementary Schools within the City have the free use during school hours of the swimming baths, where ordinarily a charge for admission is made. As many as 135,084 baths have been taken by these children during one season.

BATHING SCHOOL CHILDREN. — The utility of free bathing of children, not only in the open-air baths, but in the



establishment wherein a charge is made, is shown by the increase of paying bathers; in the year 1894, when there were no free bathers, there were 431,894, whilst in 1901, with four free open-air baths, and in addition the free bathing of school children, with the same accommodation for paying bathers as in 1894, there were 593,318 paying bathers, an increase of 161,424 bathers.

The first season, under the new rules, 135,084 school children made use of the baths

PUBLIC WASH-HOUSES.—There are four Public Wash-houses, situate in the poorest districts within the City. Three of these wash-houses are attached to public baths. Two (Steble Street and Burroughs Gardens) have recently been reconstructed, refitted, and brought up to date. In reconstruction it was impossible to arrange the plan as in designing a new building, consequently allowances must be made for this. With regard to the users, the majority are those for whom the wash-houses are erected; the minority (a very small one) consist of boarding and lodging house keepers, small shopkeepers and tradesmen, whose businesses are in close proximity to the wash-houses; the "professional" washer, *i.e.*, a person who washes for seafaring men and others who, if it were not for her, would seldom have the advantage of clean clothing. She, therefore, whilst earning a living, confers a benefit on the community. Approximately the work done in the four establishments in many cases, with the up-to-date appliances provided, represents that at least 5,000 families' washing per week is performed in the Public Wash-houses.

Summary of Bathers.

Establishment	1901 Plunge	1901 Private	1901 Total	1902 Plunge	1902 Private	1902 Total
Pier Head	39,019	3,101	42,120	34,430	2,986	37,416
Cornwallis Street	101,696	31,528	133,224	83,197	32,453	115,650
Margaret Street	95,358	16,198	111,556	69,905	16,294	86,199
Westminster Road	123,236	27,880	151,116	102,088	25,925	128,013
Steble Street	67,808	24,390	92,198	49,886	23,348	73,324
Lodge Lane	111,668	24,864	136,532	95,335	24,974	120,309
Burroughs Gardens	37,299	24,357	61,656	24,170	21,764	45,934
Burlington Street	216,560	—	216,560	145,587	—	145,587
Gore Street	161,893	—	161,893	99,835	—	99,835
Green Lane	60,158	—	60,158	34,376	—	34,376
Mansfield Street	212,266	—	212,266	222,733	—	222,733
Beacon Street	—	—	—	—	7,168	7,168
Totals	1,226,961	152,318	1,379,279	961,542	154,912	1,116,454

Note.—Decreases are the result of the cold Summer, 1902.

Summary of Washers and Wash-house Receipts.

Establishment	1901 Washers	1901 Receipts £ s. d.	1902 Washers	1902 Receipts £ s. d.
Steble Street	70,750	561 7 2	51,288	549 16 7
Lodge Lane	46,679	552 17 0	50,355	547 4 1
Burroughs Gardens	72,224	774 17 3	66,535	705 11 10
Frederick Street	17,556	323 15 4	16,924	303 3 10
Totals	188,209	£2,212 16 9	185,102	£2,105 16 4

Number of Bathers in the whole of the Establishments and Average Temperature Each Month.

The Temperature is taken at 9 a.m. daily, the Thermometer being situated in the open air in the shade.

Months	1901 Number of Bathers	1901 Temperature Deg Fahr	1902 Number of Bathers	1902 Temperature Deg Fahr
January	8,850	41°	13,896	43°
February	7,431	38°	7,955	34°
March	9,556	41°	12,978	44°
April	48,609	47°	66,718	48°
May	200,707	56°	103,597	52°
June	176,464	60°	155,246	57°
July	420,421	67°	330,640	63°
August	249,919	63°	173,540	59°
September	150,899	58°	153,888	58°
October	87,881	53°	73,682	52°
November	8,658	43°	13,982	46°
December	9,884	41°	10,332	45°
	1,379,279	Average for Year 50·66°	1,116,454	Average for Year 50·0°

Receipts and Expenditure.—Baths and Wash-houses.

Establishment	1901 Receipts £ s d	1901 Ordinary Expenditure £ s d	1902 Receipts £ s d	1902 Ordinary Expenditure £ s d
Pier Head	922 17 0	1,257 16 8	815 2 6	1,224 19 1
Cornwallis Street	1,769 3 9	1,835 5 1	1,514 18 5	1,789 11 1
Margaret Street	791 16 11	1,299 1 10	665 14 0	1,175 10 5
Westminster Road	1,091 13 0	1,539 11 3	930 13 2	1,566 16 4
Steble Street	1,190 18 8	1,697 18 1	1,047 7 11	1,484 17 0
Lodge Lane	1,541 18 9	1,692 2 5	1,421 17 6	1,576 14 1
Burroughs Gardens	1,292 6 8	1,891 8 10	1,123 14 11	1,956 3 5
Frederick Street	323 15 4	532 4 2	303 3 10	475 15 8
Burlington Street	—	298 9 1	—	258 14 1
Salt Water Supply to North End	—	85 17 6	—	61 1 2
Gore Street	—	228 5 9	—	221 14 10
Green Lane	—	156 17 11	—	168 0 8
Mansfield Street	—	255 14 4	—	224 17 7
Beacon Street	—	—	35 0 5	350 2 4
Lister Drive	—	—	—	119 3 10
Incidental	—	248 15 11	—	200 4 4
		£13,019 8 10		£12,854 5 11
Add Repayment of Principal & Interest		2,568 3 2		3,314 0 6
	£8,924 10 1	£15,587 12 0	£7,857 12 8	£16,168 6 5

SUMMARY of ESTABLISHMENTS, giving the Cost of each, and the Accommodation provided.

Establishment.	Cost of Site.	Total Cost.	Date of Opening.	Plunge Baths.	Private Slipper Baths.	Other Baths.	Where Wash-houses are provided No. of Stalls.	Remarks.
	£ s. d.	£ s. d.						
PIERHEAD	Not known.	43,659 13 3	1828	One 46ft 6in by 27ft 0in One 40ft 0in by 27ft 0in Two Small Private Plunges	Eleven.	Two Vapour. One Douche.	—	All the Baths are Salt Water with the exception of one Private Slipper Bath.
CORNWALLIS STREET	£ s. d. 1,703 15 0	27,945 3 4 This includes salt water supply.	5th May, 1851	One 56ft 9in by 40ft 0in One 42ft 4in by 26ft 10in One 39ft 6in by 26ft 9in	Fifty-six.	Two Vapour.	—	Both Salt and Fresh Water.
MARGARET STREET	700 0 0 This amount is for Leasehold only.	11,320 4 9	18th June, 1863	Two 67ft 6in by 34ft 0in	Twenty-four.	One Vapour.	—	Fresh Water.
WESTMINSTER ROAD	3,150 0 0	17,122 1 6	April, 1877	One 100ft 0in by 33ft 6in One 62ft 2in by 33ft 5in	Forty-one.	One Vapour.	—	Fresh Water. Plunge Baths, Salt Water.
STEBLE STREET	1,857 15 0	14,490 0 5	16th April, 1874	One 52ft 0in by 38ft 0in One 51ft 0in by 38ft 0in One 40ft 0in by 38ft 6in	Forty.	—	80	Fresh Water.
LODGE LANE	1,552 0 0	18,548 6 11	2nd Aug., 1878	One 75ft 0in by 30ft 11in One 63ft 8in by 32ft 11in	Thirty-five.	—	54	Fresh Water.
BURROUGHS GARDENS	3,970 14 0	21,784 0 5	22nd Jan., 1879	One 58ft 9in by 28ft 3in One 30ft 9in by 13ft 6in	Thirty-seven.	—	117	Plunge Baths, Salt Water. Private Baths, Fresh Water.
FREDERICK STREET	—	4,450 15 2	28th May, 1842	—	—	—	60	Wash-house only.
BURLINGTON STREET	Rented.	700 0 0	8th July, 1895	One 75ft 0in by 60ft 0in	—	—	—	Plunge Baths, open air, Fresh Water, and no Charge for Admittance.
GORE STREET	Rented.	2,000 0 0	26th Aug., 1898	One 75ft 0in by 50ft 0in	Covered Gymnasium.			Ditto.
GREEN LANE	—	1,096 2 9	28th Mar., 1899	One 73ft 0in by 45ft 6in	—	—	—	Ditto.
MANSFIELD STREET	Rented.	3,000 0 0	19th June, 1899	One 75ft 0in by 30ft 0in	Covered Gymnasium.			Ditto.
BEACON STREET	532 2 9	3,552 11 9	7th July, 1902	—	Seventeen Rain and Spray Baths. Two Slipper Baths.		—	

ELEMENTARY EDUCATION IN LIVERPOOL.

When the Elementary Education Act, 1870, came into operation, Liverpool was one of the few large towns in which the provision made by voluntary effort was fully equal to the estimated requirements. To meet needs which were estimated in round figures at 75,000, there were nearly 68,000 places in public elementary schools already in existence or in course of provision; while orphanages, industrial schools, poor law schools, and charitable institutions of one form or another, provided for nearly 4,000 children, and ragged and similar schools for over 3,500—showing an actual excess of some 500 places. Much of this accommodation was no doubt of a very rude character—some 4,500 school places being forthwith condemned by the Education Department—but in this respect it was fully equal to that then existing elsewhere; while in proportionate amount it greatly exceeded the provision made either in London or in any one of the other large towns, with the sole exception of the sister city of Manchester which rivalled Liverpool in this as in many other matters. The necessity then found for additional accommodation was due mainly to the fact that the migration of population from the central to the outlying parts of the town had rendered a considerable part of the provision unavailable for the actual needs.

The interest taken in elementary education in this district was further shown by the existence and operations of an "Education Aid Society," which among the more important of those operations paid the school fees of more than 4,000 poor children. Voluntary effort (for Liverpool has never had any other endowment for education), had also begun to bridge the gap between elementary and secondary education by the provision of free scholarships—some of them attached to individual

elementary schools—which assisted a few promising scholars to pass from the elementary to the secondary schools. Owing, however, to their not making any provision for the holders' maintenance these scholarships were not very successful, few being held for the whole time for which they were granted; and of the close ones only two now survive, both tenable at the Liverpool College, and attached respectively to the North Corporation and St. Augustine's (C.E.) Schools.

The existing provision dealing directly with elementary education in this City embraces:—

1. Public elementary schools; (*a*) ordinary; (*b*) attached to floating or land boarding institutions.
2. (*a*) Special schools, boarding institutions for blind or deaf children; (*b*) day schools for mentally or physically defective children.
3. Certified Day Industrial Schools.
4. A Certified Industrial School (boarding) for truant children.
5. Poor Law Schools (boarding).
6. Certified Boarding Industrial Schools.
7. Certified Industrial or Reformatory Training Ships.

The first two classes of schools have regard almost exclusively to education, the last two, mainly to preventive or reformatory work, while the other three occupy something of an intermediate character.

The Public Elementary Schools number 156, and comprise 417 separate departments, of which 135 are for infants alone and 21 for infants in common with elder scholars, while 261 are exclusively for elder scholars. Of the latter, 92 provide for boys alone, 92 for girls alone, and 77 for both sexes. The accommodation supplied by these schools is for a total of 132,216 school places, of which 38,706 are for infants

and 93,510 for elder scholars—31,164 for boys alone, 28,881 for girls alone, and 33,465 for either sex. With a population of the amount shown by the last census the accommodation required, according to the estimates of the Board of Education, is for 117,041—so that taking the city as a whole, the actual provision shows an excess of some 15,000 places, a not inconsiderable portion of which is, however, locally unavailable, whilst a good deal is in schools built to meet anticipated denominational requirements, or the needs of growing districts.

On the rolls of these schools there were in the month of February 128,044 children, viz., 37,780 infants and 90,264 elder scholars—29,086 of the latter being in departments for boys only, 28,676 for girls only, and 32,502 for either sex. The elder scholars made 88.2 per cent. and the infants 82.7 per cent. of the possible attendances—giving an average of 86.6 for the whole—while nearly 3,000 children were away from school the whole month, mainly through an epidemic of infectious disease.

The 156 schools comprise 43 Board and 113 Voluntary Schools, with 129 and 288 separate departments respectively. As regards religious or other denomination, the Voluntary Schools consist of 65 Church of England, 37 Roman Catholic, 1 Jewish and 7 Wesleyan Schools, while 3 are Undenominational. The Church of England Schools provide 43,180 places in 160 departments, the Roman Catholic 32,752 in 103 departments, the Jewish 744 in 3 departments, the Wesleyan 4,425 in 17 departments, and the Undenominational 1,350 in 5 departments. The Church Schools had 40,287 on the rolls, with an average attendance of 34,684; the Roman Catholic 31,615, with an average of 27,209; the Wesleyan 3,960 children, and 3,398 average attendance; the Jewish 777 and 725 respectively, and the Undenominational 974 children and 864 average attendance. The Board Schools provide accommodation for 49,765 children, and, in February, had 50,431 on the rolls, and an average attendance of 43,841. The school with the highest attendance,

as a whole, was a Church School, with an average of 92.9; but individual departments attained higher percentages, the premier place falling to a Roman Catholic mixed school, which succeeded in securing 96.8—the highest place among boys' schools falling to a Church School with 95.9, and among girls' schools to a Roman Catholic with 93.7. Among infants' schools the highest place was secured by a small Church School with 93.1 per cent. in a very poor part of the town.

In addition to the ordinary school buildings, the School Board has established 15 special centres for manual instruction, where practical woodwork (and, in some cases, metal work and clay modelling) are taught to the older boys from the Board Schools and from a number of the Voluntary Schools, a total of nearly 5,500 boys being at the present time under instruction in these subjects. All the boys in standard V. and higher standards in the Board Schools take manual instruction as part of their regular course, the scheme having been in operation since 1890. There are also 9 special centres for instruction in cookery and laundry work in addition to the cookery class-rooms which exist in a number of the schools. The School Board first introduced practical cookery into its schools in 1880, and at the beginning of the present year there were over 5,000 girls receiving practical instruction in these domestic subjects. Many of the Voluntary Schools have made provision for similar instruction.

During the winter session, 1902-3, there were held in connection with the Public Elementary Day Schools 30 Evening Schools, comprising 27 departments for boys, 19 for girls, and 1 mixed department, nearly all of these Evening Schools being under the control of the School Board, though a number of them were held on Voluntary School premises. The number of scholars on the rolls of the Evening Schools was about 8,000. At one of these schools—the Heyworth Street Board School—during the session 1901-2, the number of scholars enrolled was 1,045 males and 520 females. The Evening Schools under the



BRAE STREET SCHOOL. SENIORS' MAIN ROOM.



ADDISON STREET DAY INDUSTRIAL SCHOOL. DINING ROOM.

School Board are not absolutely free, the scholars having to pay a small deposit on admission which is returned in whole or in part for regular and continuous attendance.

There are also in the City five Day Industrial Schools, to which children of drunken or dissolute parents, or children whose home circumstances render them unfit to attend the ordinary elementary schools, are committed by a magistrate's order, and the children are fed and receive instruction (including some simple industrial training). Four of these schools have been established by the School Board, and one is under Voluntary management; and three of them (one Voluntary and two Board) were established in 1878, immediately after the passing of Lord Sandon's Act in 1876 giving power for the establishment of such institutions. At the beginning of the year there were about 1,000 children in attendance at day industrial schools in the city, of whom about one-third were girls. There are also 10 ordinary Certified Industrial Schools in Liverpool; five for Protestants with about 650 scholars, and five for Roman Catholics with about 800 scholars. A small proportion of the scholars in such schools come from districts outside the city; while on the other hand a number of Liverpool children are sent to industrial schools in other districts. The School Board has made arrangements with the managers of the industrial schools for the emigration of children from such schools and their settlement in Canada.

The School Board in 1878 established at Hightown, in the neighbourhood of Liverpool, a Truants' School to accommodate 160 boys, the number resident in the school at the beginning of the present year being about 100, some of them being admitted from other districts by arrangement with the school authorities of those districts. The school is in two distinct sections, one for Protestant and one for Roman Catholic children. The boys admitted to the school are detained for a

longer or shorter period, and then let out on license to attend ordinary public elementary or day industrial schools; about 200 being out on license to attend schools in Liverpool.

The Orphan Asylums consist of three institutions for boys, girls, and infants, respectively, founded at different dates, through the influence of an eminent local philanthropist, the late Mr. Harmood Banner. There is accommodation for 120 boys, 100 girls and 100 infants, and in February last there were 172 children on the rolls.

The boarding institutions of a special class comprise three schools for the blind and one for the dumb, all of which though intended primarily for Liverpool are available for children from Lancashire and Cheshire, and in some cases from the neighbouring portions of Wales. One of the schools for the blind is for Roman Catholics, the other three institutions are all for Protestants. The School for the Blind, until recently attached to the Asylum in Hardman Street but now transferred to separate and much superior premises in Wavertree, was founded as far back as 1791, and was one of the pioneers in this country in regard to the teaching of the blind. It has provision for 84 children of either sex, and 72 in residence—of whom 30 are from Liverpool.

The similar school for Roman Catholic children—recently removed from the parent institution in Brunswick Road, to premises of the most modern type specially erected for the purpose in Yew Tree Road, West Derby—has accommodation for 50 boys and 56 girls. In February it had an attendance of 51 boys and 48 girls—only 18 of the former and 8 of the latter being from Liverpool.

The other school for the blind is a small one in Devonshire Road, Prince's Park, which has provision for 20 boys under 12 years of age, and for the like number of girls. Of the 34 children in attendance, only 6 boys and 8 girls are from Liverpool.

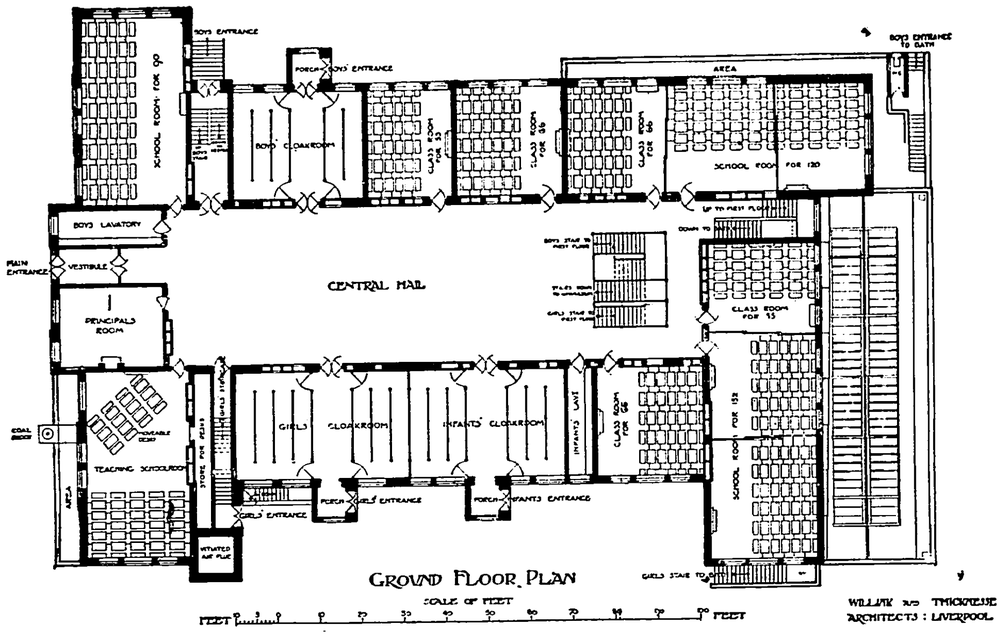
The School for the Deaf and Dumb in Oxford Street—like the School for the Blind, one of the earliest institutions of its kind in this country—was founded in 1825, in premises for which the site was conditionally granted by the Corporation. These are now somewhat behind modern requirements, and are about to be entirely re-modelled under arrangements with the School Board, by which, while the institution will continue to board the children, the School Board (or their successors, the City Council) will undertake their actual instruction in a school which is now being specially erected for the purpose on the other side of Olive Street. The present school provides accommodation for 67 boys and 38 girls as boarders, and for 45 children (of either sex) as day scholars, and has an attendance of 138 children, of whom only 61 are from Liverpool itself.

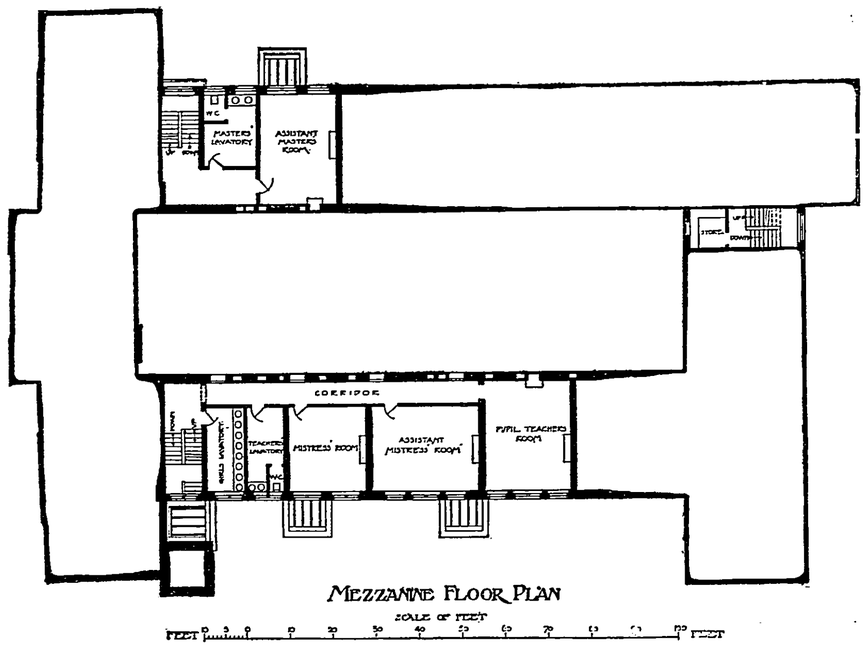
All these special schools are certified by the Board of Education, and are subsidized to a small extent by that authority, but much more largely by the School Board, under the terms of an Act passed in 1893, by which it is made the duty of the local Education Authority to secure the suitable education, up to 16 years of age, of all blind or dumb children resident in its district.

The day schools for mentally or physically defective children have been established by the School Board, under the provisions of a permissive Act passed in 1899. Those provided in Liverpool itself are four in number—two of which, carried on in houses adapted for the purpose, make provision (separately) for both classes of children, the other two, for which special premises (of an experimental character) have been erected, are limited to children mentally affected. In addition to these the Board have, in conjunction with the Seacombe School Board and the Committee of the Institution, established a day school, mainly for Liverpool children, on the premises of the Children's Convalescent Home at West Kirby. Children can be admitted to these schools only upon the certificate of a medical man approved by the Board of Education for the purpose.

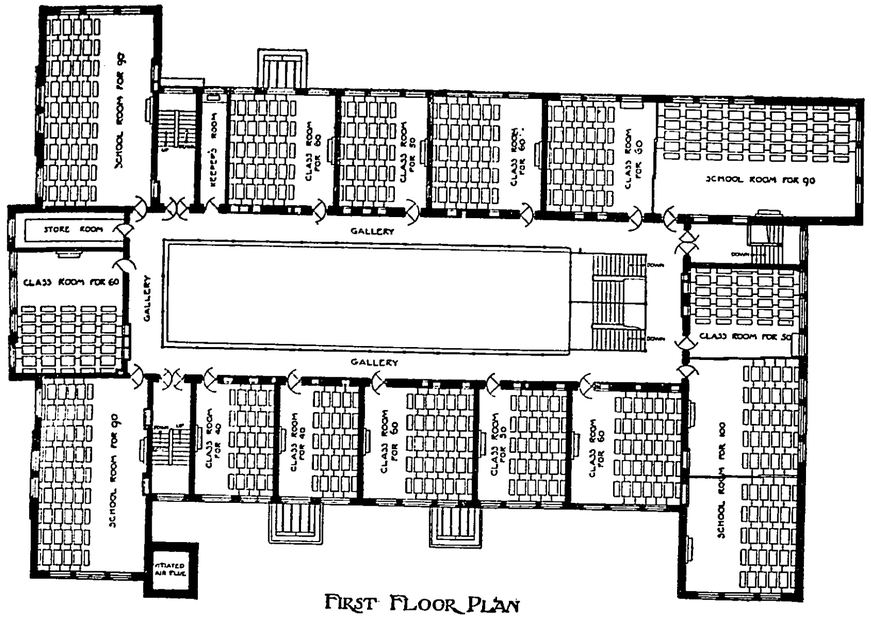
The work of the Liverpool School Board from its establishment in 1870 has been marked by a steady progressive enlargement of the field of elementary education, and by a consistent desire to enable the other public elementary schools of the city as far as possible to take advantage of the facilities which the Board provided for its own schools. In these and other respects elementary education in Liverpool owes much to the late Mr. Samuel G. Rathbone, who was Chairman of the School Board for 18 years. The Board has the credit of having either initiated or been one of the first to take action in several important developments of elementary education, *e.g.*, the provision of central classes for the instruction of pupil teachers, the introduction of systematic science teaching in their schools, the establishment of day industrial schools, the practical teaching of cookery, manual instruction, etc.

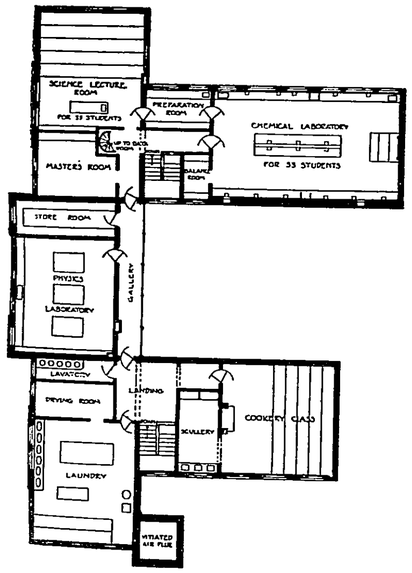
The hearty co-operation of the School Board with two Voluntary Educational Associations—the Liverpool Council of Education, and the Conference of School Managers—has served to promote the harmonious work and development of elementary education. The Council of Education, established in 1874, has not only co-operated with the Board in endeavouring to improve the regularity and punctuality of attendance of children at the elementary schools, but has also encouraged and financially assisted Voluntary Schools to make use of facilities provided for manual instruction, cookery, instruction of pupil teachers, etc., has established a system of scholarships for scholars from the elementary schools, and assisted in the establishment of School Penny Banks. The Conference of School Managers established in 1875 has secured a very large amount of uniformity of action among the managers of elementary schools in the matter of holidays, hours of attendance, and the prompt closing of the school doors at the beginning of morning and afternoon attendance. It has also done much to check the capricious removal of children from school to school by bringing about an agreement among the managers under which the

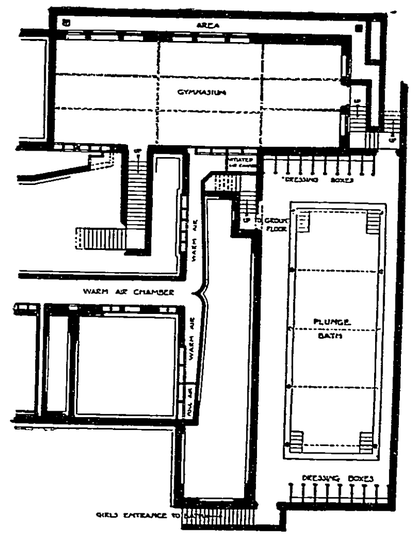


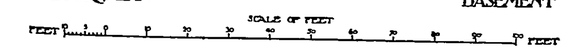


Plans, illustrating the General Arrangements for a large Board School.









Plans, illustrating the General Arrangements for a large Board School.

transfer of children from one school to another is permitted only at certain specified periods of the year, except under special conditions.

The School Board first established central classes for the instruction of Pupil Teachers in 1876, and was led to do this by observing the marked success which had attended the work of similar classes previously in existence in Liverpool under the Sisters of Notre Dame. The classes first established by the Board provided only for instruction in certain subjects on two evenings per week and on Saturday mornings; but the scheme has gradually extended until some three years ago arrangements were made by which the evening attendances of pupil teachers was altogether abolished, and provision made for them to attend at the classes from three to five half days per week. For the accommodation of these classes the Board built a special Pupil Teachers' College in Clarence Street, which was opened in 1898. A small number of pupil teachers from the Voluntary Schools attend the classes at the School Board Pupil Teachers' College, but there are several special centres for the teachers from the Denominational Schools.

Systematic experimental science teaching was introduced by the Board in all its schools for older scholars in the year 1877; a special staff of qualified science teachers being appointed for this purpose. This scheme has since been further developed in the schools by the introduction of elementary science object lessons in the lower standards, and by the provision of laboratories in some of the schools for the instruction of the older scholars in elementary physics and chemistry. In some cases the Voluntary Schools have availed themselves of the offer of the School Board to make use of the science apparatus and staff, and in other cases the schools have made separate provision for elementary science teaching.

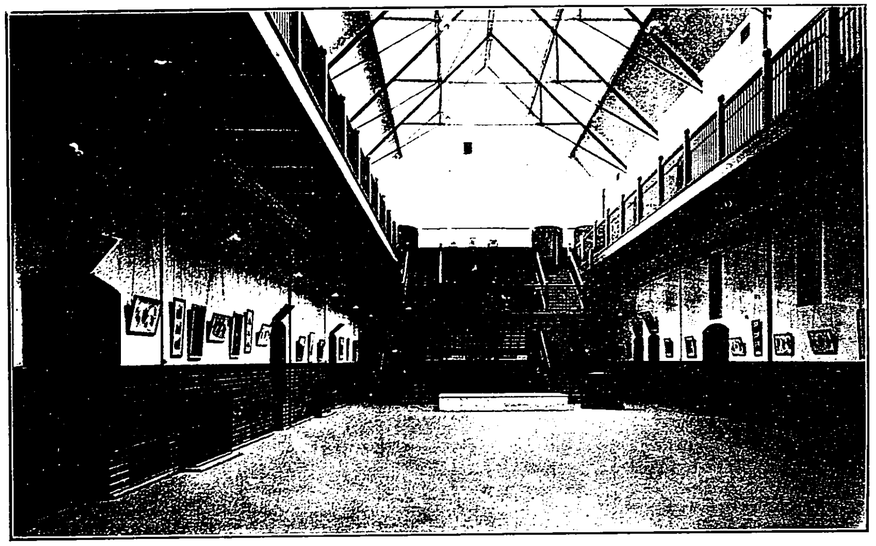
The penny savings banks which are in operation in many of the Public Elementary Schools in Liverpool are for the most part carried on in connection with the Liverpool Penny Savings

Bank Association. According to the last report of this Association these banks were in existence last year in 91 Public Elementary Schools in Liverpool and district, the number of open accounts being 47,224, and the total amount of deposits during the year, £19,866.

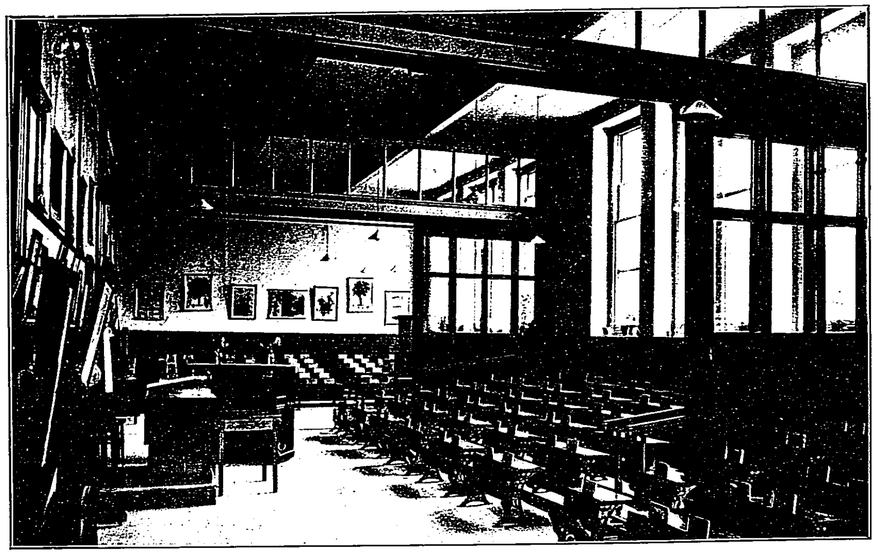
The total expenditure of the School Board during the last financial year was approximately £273,000, and the amount of the precept on the City Council in April 1902 was for £185,000, or equal to a rate of nearly one shilling in the pound.

The school buildings which have been put up by the School Board are of various kinds, some of the schools being organised in from three to five separate departments with a head teacher in charge of each; others are arranged as mixed schools under a principal. One of the schools recently opened (Birchfield Road) is arranged on the class room principle with a large central hall, and contains also special rooms fitted for cookery and laundry work, and an experimental science lecture room and laboratory, while in the basement a large plunge bath is provided. This school is warmed and ventilated on the plenum system, has accommodation for 1,690 children, and was built at a cost of £35,937.

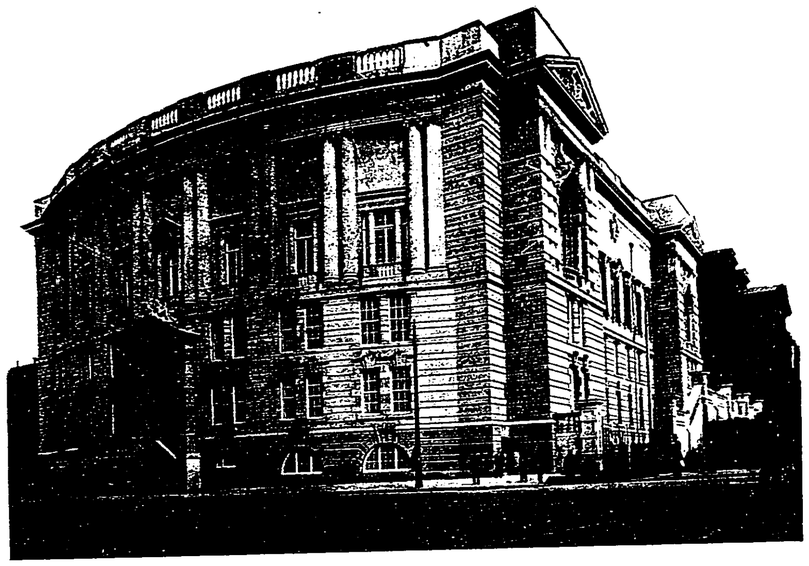
It may be mentioned here that the Corporation of Liverpool in their local Act of 1898 obtained special statutory powers for dealing with trading by children in the streets, the existing law being quite inadequate to deal properly with this matter. Under this local Act (as amended in 1902) the Corporation have made regulations as to the conditions on which children (that is to say boys or girls under the age of 16 years) shall be licensed to trade in the streets; and children trading when not so licensed, or children contravening the conditions of their licenses, may be taken before a magistrate, who may order the child to be given into the charge of some other person than the one in whose charge it then is, or (if under 14 years of age) may commit the child to an Industrial School.



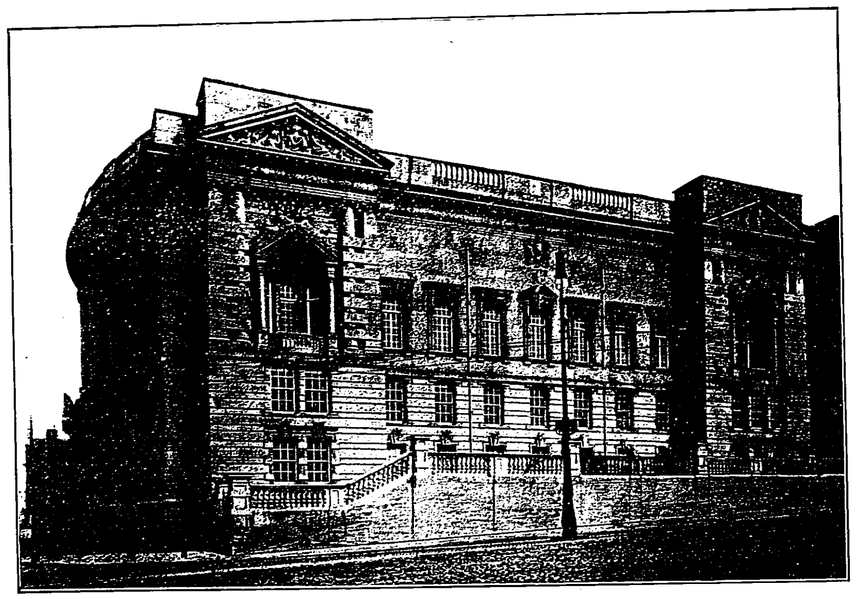
BIRCHFIELD ROAD SCHOOL. CENTRAL HALL.



BIRCHFIELD ROAD SCHOOL. INFANTS' MAIN ROOM.



CENTRAL MUNICIPAL TECHNICAL SCHOOL, BYROM STREET.



CENTRAL MUNICIPAL TECHNICAL SCHOOL (WILLIAM BROWN STREET ELEVATION).

SECONDARY AND TECHNICAL EDUCATION IN LIVERPOOL. -

The Corporation of Liverpool had for a long time shown its interest in Higher Education by the provision of excellent Public Reference and Lending Libraries, Public Museums, and a Municipal Art Gallery, before the passing of the Technical Instruction Act of 1889 led the municipalities of the country to undertake to provide for their citizens facilities for obtaining Technical Education. Under the power given by that Act, and with the funds provided by the Local Taxation (Customs and Excise) Act, 1890, the Corporation of Liverpool entered upon a definite scheme of educational work, which has been steadily developed, and which has made it the more readily possible for the City Council to assume the greatly increased powers conferred upon it by the Education Act, 1902.

The Council first entrusted the carrying out of its duties under the Technical Instruction Act to the Library, Museum, and Arts Committee, which Committee established a Special Sub-Committee—the Technical Instruction Sub-Committee—for the purpose. This arrangement continued until the work had developed to such an extent as to render it necessary for the Council in November 1897, to appoint a new Standing Committee—the Technical Instruction Committee—to take entire charge of the work. The Technical Instruction Committee (and the Technical Instruction Sub-Committee which preceded it) always contained, in addition to members of the Council, co-opted members representing various educational interests, *e.g.*, University College, Elementary and Secondary Schools, &c.; and in this way it succeeded in establishing relations with and between nearly all grades and sections of education in the city. In November, 1899,

the constitution of the Committee was revised to provide more definitely for the full representation of all grades of education, and to enable the Committee to act as a co-ordinating authority; thus anticipating to a large extent similar provisions in the new Education Act. The revised scheme provided for a Committee of 31 members—a majority (16) appointed by the Council, 10 members nominated by the School Board, 5 co-opted on the recommendation of University College and the Public Secondary Schools. The Chairman of the Committee at the present time is Councillor William Oulton, who, while Lord Mayor, convened a conference of representatives of educational bodies, which led to the revised scheme for the re-construction of the Committee. (Councillor W. E. Willink, M.A., acted as Chairman of the Technical Instruction Sub-Committee from 1891 until he resigned the post in 1897.)

The Technical Instruction Committee have entered into relations with nearly all the educational agencies in the city, from the Elementary Schools up to the University College. They have sought (so far as it came within their means and powers) to assist each of these institutions to develop those special branches of education which it was best fitted to undertake, and to co-ordinate the work of the various separate branches. They have taken advantage of the very wide powers conferred by the Technical Instruction Act to develop the education given in the public Secondary Schools, as well as to promote and assist the education of children in the Elementary Schools who had completed their course in the recognised standards.

Their first aim was to assist the development of existing institutions, and to ascertain how far they could be made to meet the needs of the city; and it was not until the inadequacy of the existing provision was clearly ascertained that the Committee proceeded to establish new institutions and to erect new buildings to supply what had thus been shown to be necessary. The Committee have in this way been the means of establishing

departments of Electrotechnics and Education at University College; a School of Architecture and Applied Art; a School of Hygiene and Sanitary Science; a School of Commerce; a Nautical College; a Central Municipal Technical School, and Branch Technical Schools and Centres. At the same time they have aided other technical departments (Chemistry, Engineering, Physics) of University College with payments for staff and apparatus; have assisted five public Secondary Schools with capitation grants for maintenance, and special grants for the equipment of laboratories and workshops; have given annual grants to develop the work of the School of Art, and of several Pupil Teachers' centres, in addition to making grants to other institutions carrying on evening classes in commercial and other subjects.

The grant from the Exchequer Funds which the Council has received, has, during the past four years, averaged £23,600, and the whole of this has been placed at the disposal of the Technical Instruction Committee for purposes of Technical Education.

TECHNICAL SCHOOLS AND CLASSES.

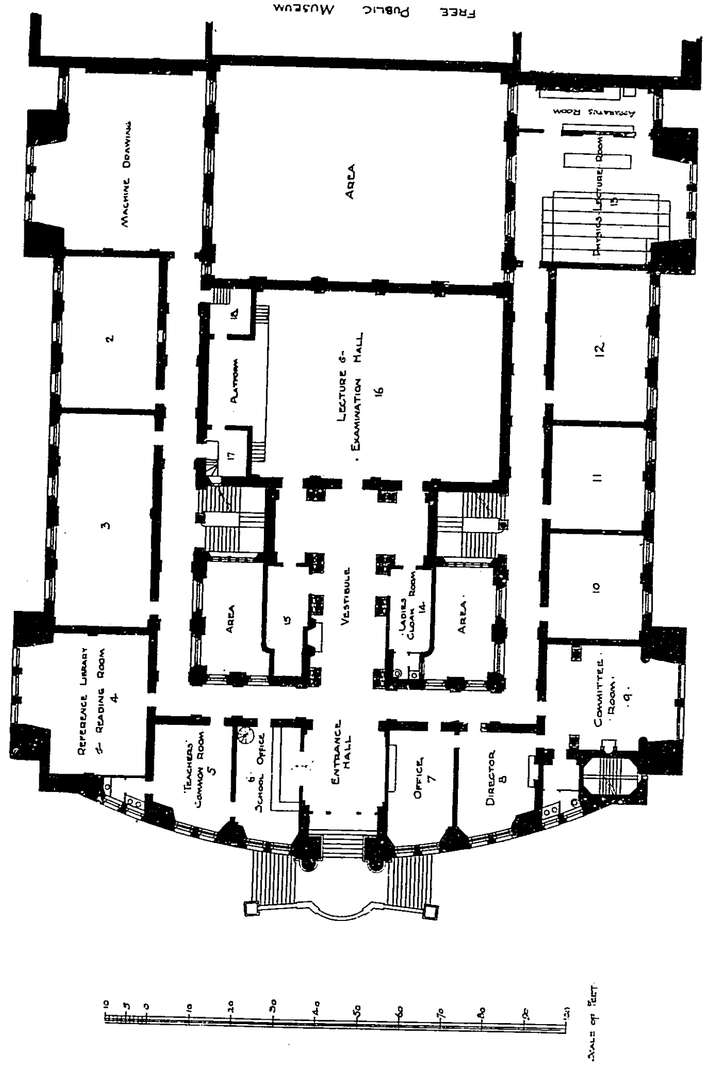
The instruction for which direct provision is made by the Technical Instruction Committee of the City Council is carried on at the Central Municipal Technical School and at several branch schools and classes in various parts of the City. At four of these branch centres special buildings have been erected, and the Committee have now under consideration the erection of two other special buildings for districts in which evening classes are meanwhile being carried on in premises (elementary day schools, &c.), rented for that purpose. The total number of class entries at these various centres for the session 1902-3 amounts to 7,750.

CENTRAL MUNICIPAL TECHNICAL SCHOOL.

The City Council on the advice of the Technical Instruction Sub-Committee decided in 1895 to erect a Central Technical School for the accommodation of classes in science and technological subjects of an advanced or specialised character. An excellent site (of about 2,900 square yards) in a central position at the corner of William Brown Street and Byrom Street, and adjoining the site of the existing Free Public Museum, was available and already in possession of the Corporation. As the accommodation provided in the existing Museum was far too limited for the display of all the important collections belonging to the city, it was decided to erect on this important site a large building, the two upper floors of which should be devoted to Museum Galleries, and the lower portion to the purposes of a Technical School. The position of a building erected on this site extending and completing the existing range of Municipal Public Buildings (comprising the Art Gallery, Free Library, and Museum) and the proximity of St. George's Hall, naturally fixed the general character and style of the new building. The improvement scheme for the widening of William Brown Street and the laying out of St. John's Churchyard, which was subsequently agreed upon, has still further increased the importance of the position.

The plans for the new building submitted for competition by Mr. E. W. Mountford, F.R.I.B.A., were selected, and at the meeting of the City Council in October, 1897, the Council accepted the tender of Messrs. Joshua Henshaw and Sons, of Liverpool, for the sum of £89,224 for its erection. The work was commenced in the same year, and although a portion was occupied by the Nautical College in November, 1900, it was not until September, 1901, that the whole of the school portion of the building was ready for occupation. The total cost of the building (including both the Technical School and Museum portions) was approximately £110,000; and the cost of the equipment of the Technical School portion, to date, about £13,000.

CENTRAL MUNICIPAL TECHNICAL SCHOOL.



GROUND-FLOOR PLAN

The building is in the classical style of architecture and externally is constructed of a hard cream coloured sandstone or fine grit obtained from the Darley Dale quarries in Derbyshire, and similar to that used in the construction of St. George's Hall and the adjoining Museum building. The elevation to William Brown Street and the entrance in Byrom Street is enriched by sculpture executed by Mr. F. W. Pomeroy, who also modelled a number of panels for the entrance hall, lecture room and other parts of the interior.

The general plan of the building is very simple, consisting mainly of two parallel wings connected at the western end by a building with a curved front to Byrom Street, in which the entrance to the Technical School is placed. A cross gallery of the full height connects the central portions of the two wings; and the courtyards on each side of this serve for the internal lighting of the structure.

The Technical School occupies three complete floors, together with an additional floor (the highest) in the cross gallery which is devoted to the Chemical Department; while in the highest part of the building is a small astronomical observatory, with a revolving dome, in which is housed an excellent equatorial telescope and a small transit instrument.

The basement floor contains the Electrical Engineering Laboratory, Mechanical Engineering Laboratory, Physics Laboratory, a workshop for Plumbers' work and Metal Plate work, rooms for practical work in Lithography, Bookbinding, Printing, House Painting and Decoration, Brickwork and Masonry, Plasterers' work, Carpentry and Joinery, Baking and Confectionery. The other floors contain various lecture rooms and class rooms, rooms specially lighted with inverted arc lamps for Machine Drawing and Building Construction, a room for elementary Art instruction, the rooms used by the classes of the Nautical College, the administrative offices, committee room, a students' library and reading room, teachers' room, &c.

There is also on the ground floor a large hall capable of seating nearly 500 people, used for examination purposes, meetings, and special lectures.

The building is heated and ventilated on the plenum system (Key's method), the air being taken in from one of the inner courtyards, filtered through wet fibre screens, warmed by means of a battery of steam pipes (supplied from large Lancashire boilers) and propelled by four fans driven by electric motors through the main channels in the sub-basement, making its way to the various rooms through flues provided in the walls. The air is delivered to most of the rooms at a height of six or seven feet, and makes its way out by openings at the floor level of the rooms into special flues opening to the external air by louvred openings protected by light valves.

With the exception of the Nautical Classes (referred to below) the instruction is at present given only in evening classes, and (in two or three instances) on Saturday morning; but the question of establishing day classes is under consideration. The subjects taught are:—Machine Construction and Drawing, Applied Mechanics, Steam, Pattern Making, Boiler Makers' Work, Metal Plate Work, Building Construction, Brickwork, Masonry, Plasterers' Work, Builders' Quantities, Plumbers' Work, House Painting and Decoration, Carpentry and Joinery, Carriage Building, Lithography and Process Work, Typography, Bookbinding, Chemistry (Organic and Inorganic), Physics, Magnetism and Electricity, Electrical Engineering, Flour Milling, Baking and Confectionery, Watch and Clock Making, Tailoring, Hygiene, Physiology, Biology, Botany, Geology, Mineralogy, Physiography, Mathematics, Theoretical Mechanics, Plane and Solid Geometry, Nautical Astronomy, Navigation, Naval Architecture, Elementary Art subjects.

The great majority of the students attending the classes are persons from 17 to 25 years of age, who are practically engaged during the day at their trades and professions. The

number of entries for the various classes held in the Central School during the session 1902-3 was 3,900. The session extends from the middle of September to May, and the fees charged to students for instruction during the session are fixed at a very low rate, the general fee being half-a-crown for a course of (about) 30 lessons in the theoretical classes, or 7s. 6d. for a course comprising both lecture and workshop or laboratory practice. The fees for Electrical Engineering and for Practical Chemistry range from 10s. 6d. to 40s. for the session.

Evening classes in science, art and technological subjects were held in Liverpool for many years before they were taken over by the Corporation and accommodated in the new building. Such classes were started in 1861, and were for many years held at centres in various parts of the city (in school-rooms and other buildings) under the management of two voluntary associations, the Liverpool School of Science and Technology and the Liverpool Science and Art classes. From the time when the Council began to make grants for purposes of technical instruction financial aid was given to these classes, which were previously entirely dependent on students' fees, Government grants and private subscriptions. The Technical Instruction Sub-Committee first succeeded in 1892 in bringing all these classes under one organisation, and in 1901, when the Central Technical School building was nearly ready for occupation, the City Council took over the classes and made itself definitely responsible for their maintenance. They are now managed by a special Sub-Committee of the Technical Instruction Committee of the Council.

The classes held in the central parts of the city were transferred to the new school buildings in September, 1901, but classes in science and art subjects (not workshop classes) are still continued in three other centres where the work is generally of a less advanced and specialised nature than that carried on in the central school.

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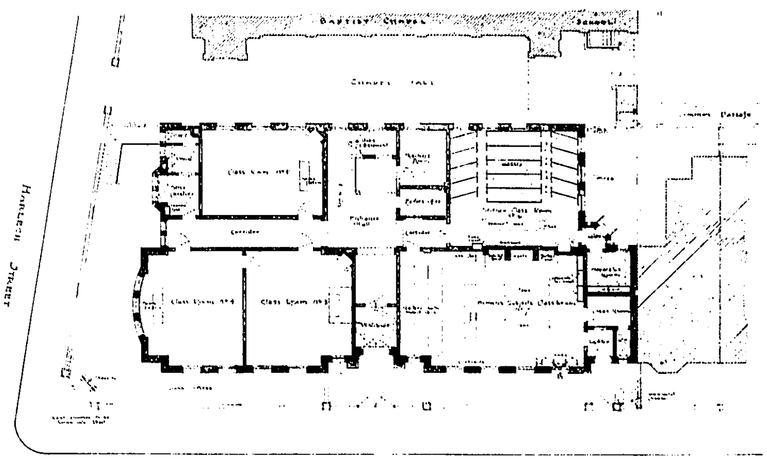
BRANCH TECHNICAL SCHOOLS.

The boundaries of the City were extended in 1895 to include the districts of Toxteth Park, Wavertree, Walton and West Derby, in each of which districts Technical Instruction Classes were being held under local district Committees. The Technical Instruction Committee of the Corporation, shortly after they assumed control of the classes in these outer districts, re-organised the work so as to bring it more on to the lines of that carried on in the old city; and they have since erected for these classes two new school buildings, and adapted existing buildings in two other cases. The two new buildings are as follows:—

1. WALTON AND KIRKDALE TECHNICAL INSTITUTE, built to the designs and under the supervision of the Corporation Surveyor. This was opened in September, 1901, to provide for the northern part of the extended city. The building is a substantial structure of red Ruabon brick with Grinshill stone courses, and is situated in Carisbrooke Road, Walton, on a site measuring 840 square yards. The cost of the building and equipment was approximately £9000. Unlike the Central Technical School this building is intended to provide for various sections of work, including Commercial, Domestic, and Manual, as well as Science and Art Classes, so as to serve as the principal centre for such work in that district. The building contains a Lecture Hall capable of seating 400 persons, a special room for Art; a room with range, gas stove, boiler, &c., adapted for Cookery and Laundry work; one room fitted with benches for Wood-work and Wood-carving, another room fitted with raised seats and a demonstration table for experimental Science lectures, and five ordinary class-rooms. The building is warmed by hot water pipes and radiators, and lighted by electricity.

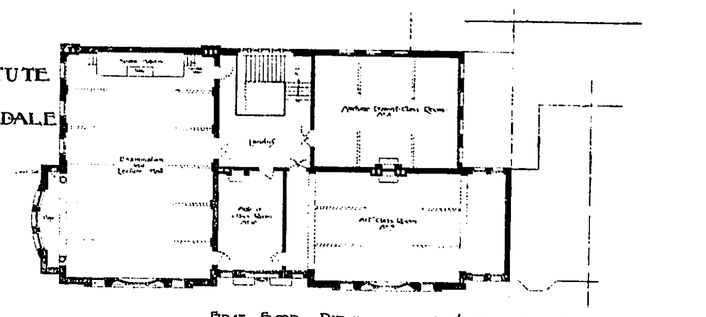
The subjects at present provided for are:—French, Shorthand, Book-keeping, German, Business Routine and Office Work, Commercial Arithmetic; Laundrywork, Needlework and

New Technical Institute for Walton & Kirkdale

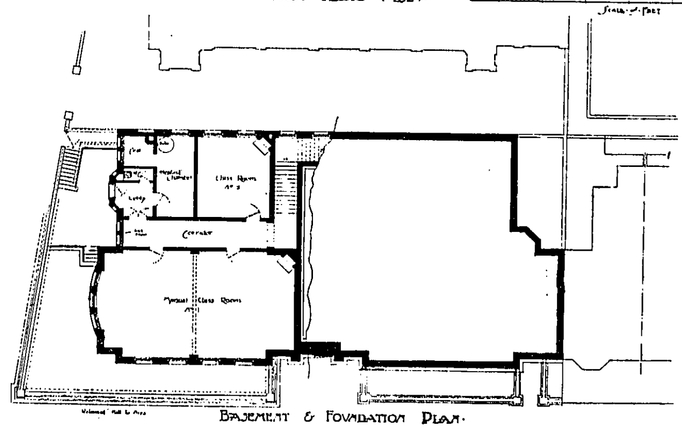


Ground Plan

New Technical Institute for Walton & Kirkdale



First Floor Plan



Basement & Foundation Plan

Millinery, Cookery, Sick Nursing and Hygiene, Dresscutting; Machine Drawing, Chemistry, Steam, Applied Mechanics, Building Construction, Mathematics; Freehand, Model, Geometrical, and other Drawing; Woodworking, Woodcarving, Workshop Arithmetic and Mensuration, Elementary Practical Drawing for Engineers and Builders.

The number of class entries for the session 1902-3 amounted to 1,041.

2. WAVERTREE TECHNICAL INSTITUTE.—This was the first building erected by the Committee and was opened in September, 1899. The area of the site is 546 square yards, and the cost of the building and equipment was approximately £5,800. The building was designed by the City Surveyor's Department, and contains a large lecture room, special art room, cookery and laundry room, science class-room, and four ordinary class rooms. The subjects taught are much the same as those at the Walton and Kirkdale Institute. The number of class entries is only 350, but the district is rapidly being built over.

THE NAUTICAL COLLEGE.

One of the first steps decided upon when the Corporation took up the question of Technical Instruction in 1891, was the establishment of a Nautical College, for giving instruction of a sound and practical character to the officers and men engaged in the Mercantile Marine. The college was first established on premises which had previously been occupied by the Royal Institution School, and was opened by Lord Brassey in December, 1892. In November, 1900, the classes were removed to rooms set aside for their use in the Central Technical School building.

The College, as at present organised, consists of three divisions, viz., (1) apprentices and men preparing for the two grades of mates' certificates granted by the Board of Trade;

(2) officers preparing for the two grades of masters' certificates; and (3) men who are taking special courses of instruction in certain subjects (Navigation and Nautical Astronomy, Nautical Surveying, Chart Instruction, Tides, Stability of Ships, Meteorology, Magnetism and Deviation), in preparation for the special diplomas given by the College. Up to September, 1902, there was also a division for boys preparing to go to sea; but the number of boys destined for such a career is very small, and the number of apprentices is steadily decreasing with the reduction in the number of sailing ships: it was therefore decided to discontinue the special Boys' Classes.

There is a staff of four teachers, including the Head Master, Mr. W. V. Merrifield, B.A., and the number of students in daily attendance varies from 40 to 60. The men come for courses of instruction in the intervals between their voyages, remaining on an average from three to four weeks at a time, and many of them return to the College after an interval to resume their studies in a higher grade. The classes are held daily throughout the year from 9-30 a.m. to 5 p.m. There is a room specially fitted with ship models, a deviascope, surveying instruments, and other apparatus for instruction in seamanship. The total number of individuals who have been entered on the books of the College up to the end of 1902 was 1,978, of whom 1,470 obtained Board of Trade certificates.

Cookery Class for Seamen.—The Technical Instruction Committee has since 1892 maintained a Special Cookery Class for Seamen, which is held in a room (provided by the Liverpool Shipowners' Association) in Manesty Lane, in a central position close to the Docks. The Committee of the Liverpool Training School of Cookery undertake the general management of the class. The instruction is arranged in three courses of twelve lessons each, followed by an examination, and the class is open throughout the year, morning and afternoon, five days a week.



LIVERPOOL SCHOOL OF ART, MOUNT STREET.



LIVERPOOL INSTITUTE (BLACKBURNE HOUSE, GIRLS' HIGH SCHOOL.

The teacher of the class was specially trained for the work at the Liverpool Training School of Cookery, after a long experience on board ship. The cooking is done at an ordinary galley stove; students are taught how to improvise substitutes in many cases where an ordinary ingredient runs short; how to economise water, or to utilise salt water; the proper way to treat salt and preserved provisions, &c. Since its establishment more than 900 individuals have passed through the School.

A large number of local shipowners have promised to give preference on their vessels to cooks holding the School certificate, and there has been frequent testimony to the improvement in the way in which the food on board a ship carrying a certificated cook is cooked and served. Similar classes have since been started in certain other ports.

THE LIVERPOOL INSTITUTE.

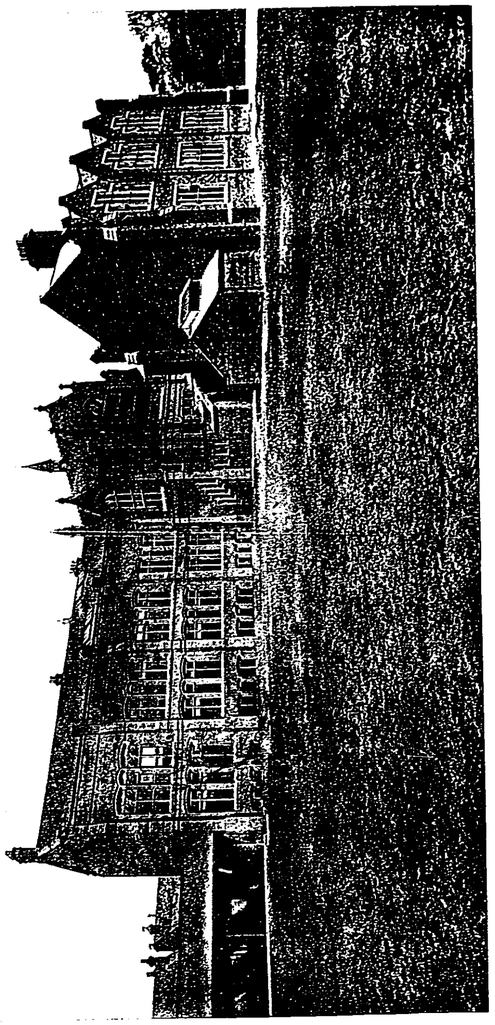
This Institution was founded as the outcome of a town's meeting in 1825 as a public trust—"The Mechanics' Institute"—"for the promotion of useful science and learning among the inhabitants." The present building in Mount Street, of which the foundation stone was laid by Lord Brougham, was erected by public subscription from designs by Mr. (afterwards Sir) James A. Picton and Mr. A. H. Holmes, and opened in 1837.

The Institute, as now constituted, comprises (1) a secondary day school for boys; (2) a high school for girls, and (3) a school of art. Its constitution is strictly undenominational, and the Governing Body is a Board of Directors, 36 in number, elected from among prominent citizens and supporters of education. The Liverpool Institute is greatly indebted to the Holt family for munificent gifts for the erection and alteration of buildings, for the purchase of land, and for other purposes.

1.—THE LIVERPOOL INSTITUTE BOYS' SCHOOL.—This School occupies the whole of the building erected in 1837, the

accommodation for school purposes having in recent years been considerably improved and extended. At the present time a scheme is on foot to acquire a considerable area at the back of the building to serve for an enlarged playground, and to admit of certain extension of buildings. New chemical and physical laboratories and lecture rooms, and a room fitted for manual instruction in woodwork, have recently been provided. The school consists of two departments—(*a*) the High School with fees of 12 guineas per annum, and comprising an advanced commercial department recently established, and (*b*) the Commercial School where the fees are now 6 guineas per annum. The present number of boys on the rolls is a little over 600, but the number was formerly much larger. There are several leaving Scholarships of £50 to £70 tenable at Oxford or Cambridge. The Senior Wrangler of 1900 (Mr. J. Wright) was an old scholar of the Institute, having come to that school from a public elementary school in the city with one of the scholarships given by the Liverpool Council of Education. The Senior Wrangler of 1877 and the second wrangler of 1895, were also scholars of the Liverpool Institute. The present Head Master is Mr. W. C. Fletcher, M.A., late Fellow of St. John's College, Cambridge.

2. THE LIVERPOOL INSTITUTE HIGH SCHOOL FOR GIRLS. This school, otherwise known as "Blackburne House Girls' School," was established as the result of a public meeting in 1844, and was therefore probably the first public girls' school to be established in the country. A large house previously belonging to the Blackburne family, standing in its own grounds in the immediate neighbourhood of the other buildings of the Institute, has been altered and greatly enlarged from time to time to serve the purposes of a school. The house, with the land surrounding it, was given to the Institute by the Holt family. The fees are from £4 16s. to 9 guineas per annum, and the present number of scholars on the rolls is 220. A small preparatory department for young boys and girls under 8 years of age is attached to the school. The head mistress is Miss L. Coombe.



LIVERPOOL COLLEGE UPPER SCHOOL, FROM THE PLAYGROUND.

3.—The School of Art, Mount Street.—The present substantial school building was erected in 1883, but for many years previously art work was carried on in special rooms in the upper part of the old building now used for the boys' school. The building contains modelling rooms, rooms for drawing and painting from the antique and the life, rooms for design, artistic lithography, etching, &c. The school has made very rapid progress during the last five or six years under the present head-master (Mr. F. V. Burridge, R.E.) and its present position among the other schools of art is shown by the fact that it was one of the five schools of art in Great Britain awarded a gold medal at the Paris Exhibition of 1900, for works comprised in the exhibit selected by the Board of Education as representative of the work of the Art Schools of the country. One of the gold medals given in the annual National Competition has been awarded to this School during each of the past four years. The School is open on five days and four evenings per week, and the number of individual students during the last completed session was 457. The course of work includes Drawing, Painting and Modelling from the figure and the antique; Pictorial and Decorative Figure Composition; Design for manufactures and decoration; Painting of still life; studies of Ornament from the Cast; Etching on copper and Mezzotint engraving, &c. A considerable number of the past students of the school have obtained the Board of Education's Certificates for Art Masters or Art Class Teachers.

LIVERPOOL COLLEGE.

The Liverpool College (or as it was originally called the Liverpool Collegiate Institution), was founded in 1840 as a Church of England Institution, and incorporated under the Companies' Acts in 1869 as "an Association to provide for the inhabitants of Liverpool an education suited to their wants upon the most moderate terms." The school was at first carried on wholly in the large and substantial buildings in Shaw Street.

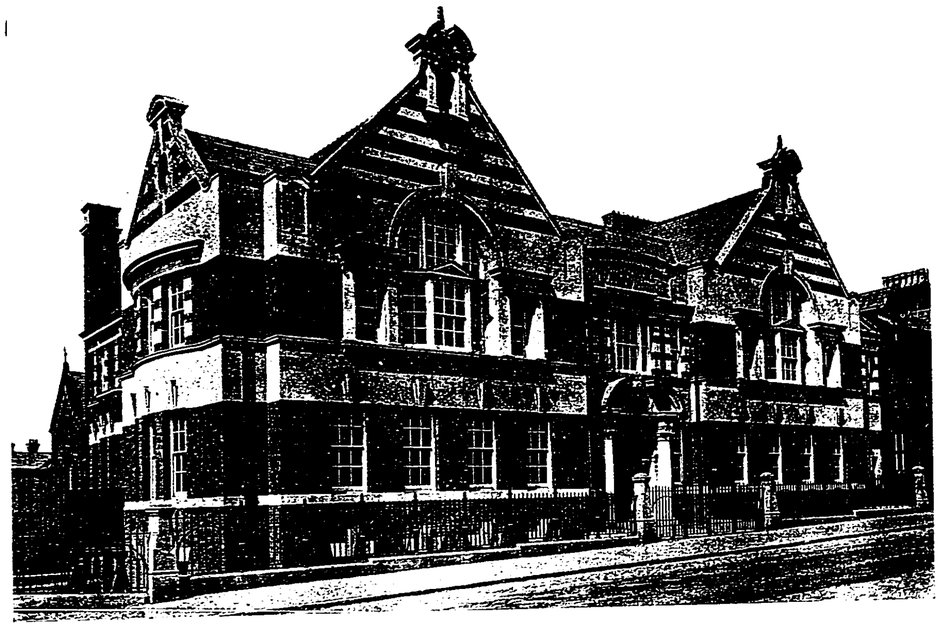
These were built at a cost of some £35,000 from designs by Mr. Harvey Lonsdale Elmes, the architect of St. George's Hall, and opened in January, 1843, by the Rt. Hon. W. E. Gladstone. The Upper School was in 1884 transferred to fine new buildings (erected at a cost of £24,000 to the designs of Mr. E. Banner) in Lodge Lane, one of the best residential portions of the City; and this department is now from a financial point of view the most successful portion of the whole. A College for Girls was established in 1856, and special buildings for the same in Grove Street were erected in 1878 at a cost of £11,000. More recently a Preparatory School for boys and girls has been established in Fairfield, and a Day and Boarding School for Girls at Huyton. All of these institutions are under the control of the Council of the College, which consists of 36 members.

LIVERPOOL COLLEGE BOYS' SCHOOL.—The present Principal is the Rev. J. B. Lancelot, M.A., formerly Scholar of Jesus College, Oxford, and the school numbers among its old scholars many men now occupying distinguished positions, including two Senior Wranglers and two second wranglers. As now organised the school comprises the following three departments:—

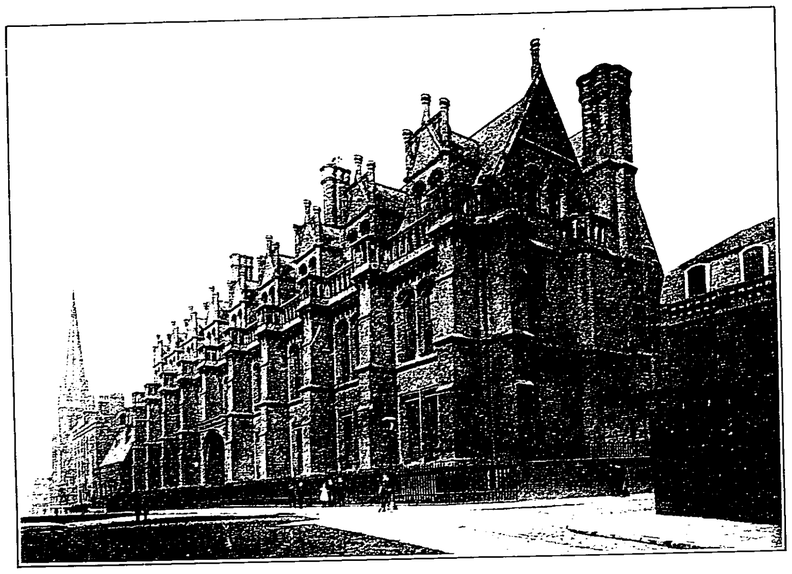
(*a*) Upper School, Lodge Lane, with 280 scholars on the roll, and fees from £13 to £25 per annum. This school contains, in addition to the usual school class-rooms, a library, chemical and physical laboratories, a large lecture hall fitted with an organ, a dining hall, fives courts, and two covered playgrounds. The College Council have recently purchased a cricket and football field of nearly seven acres in Mossley Hill Road. There are eight University leaving Exhibitions of values varying from £22 to £50 for three to four years, and a considerable number of the scholars proceed to the older Universities.

(*b*) Middle or Grammar School, Shaw Street, with 260 scholars on the roll and fees from £6 6s. to £12 per annum.

(*c*) Commercial School, Shaw Street, with 230 scholars on the roll and fees of £6 6s. per annum.



WALTON AND KIRKDALE TECHNICAL INSTITUTE.



ST. FRANCIS XAVIER'S COLLEGE, SALISBURY STREET.

The Middle and Commercial Schools are still held in the original building in Shaw Street, a large and commodious structure of four stories containing various class-rooms, a large library and Board room, a large assembly hall with an organ, chemical and physical laboratories, a special room for art instruction, a gymnasium and two large open playgrounds. A large field on the outskirts of the city is rented for use as a football and cricket ground.

LIVERPOOL COLLEGE FOR GIRLS, Grove Street, is a branch of the Liverpool College, and was founded in 1856, mainly through the exertions of the then Principal, the Rev. Dr. Howson, afterwards Dean of Chester. It was at first called the "Girls' Collegiate School," and was held for many years in Bedford Street. In 1878 the school was transferred to the new buildings in Grove Street, which were erected by public subscription from designs by Mr. J. Johnson, and opened by the Countess of Derby, in October, 1878. The building contains rooms fitted one as a science lecture room, another as a chemical laboratory, and one in the upper part of the building as an art room: in addition there are numerous class-rooms and a large assembly or dining room. There is a small kindergarten department for young boys and girls. There are now 180 scholars on the roll, and the fees vary from $6\frac{1}{2}$ to $10\frac{1}{2}$ guineas per annum. The present Head Mistress is Miss Clark, late Scholar of Girton College, Cambridge.

ST. FRANCIS XAVIER'S COLLEGE,

SALISBURY STREET.

This Roman Catholic Secondary School for boys, which is under the control of the Jesuit Fathers, was established in Soho Street in 1842. The present building in Salisbury Street was erected at a cost of £30,000, from designs by Mr. R. Clutton, and opened in 1878. It contains a very large lecture hall,

with a stage and an organ, chemical and physical laboratories, a room for woodwork, and a considerable number of classrooms. The school, as now organised, consists of two departments—

(*a*) The Classical School, in which the fees are £9 per annum, and the curriculum includes Greek, Latin, and French, Mathematics, Science, and English subjects, the number of scholars on the roll at the present time being 190. The staff in this school consists for the most part of members of the Society of Jesus.

(*b*) The Commercial School, where the curriculum includes French, experimental Science, Mathematics and English subjects, the fees being £4 16s. per annum, and the number of boys on the rolls 160.

The Rector is Father Hayes, S.J., and the Prefect of Studies, Father McHale, S.J.

OTHER PUBLIC SECONDARY SCHOOLS in the City are Greenbank School, Sefton Park, a public preparatory school for day scholars and boarders; St. Edward's College, St. Domingo Road, a Roman Catholic Boarding Institution; the High School for Girls, Belvidere Road, and the East Liverpool High School for Girls, Newsham Park, both of which are schools belonging to the Girls' Public Day School Company; the High Schools for Girls, attached to the Convents of Notre Dame, in Mount Pleasant and in Everton Valley; the High School attached to the Bellerive Convent, Prince's Park; the Catholic Institute, Hope Street, a secondary school for boys, which was temporarily closed in 1901, but was re-opened by the Christian Brothers in the autumn of 1902.

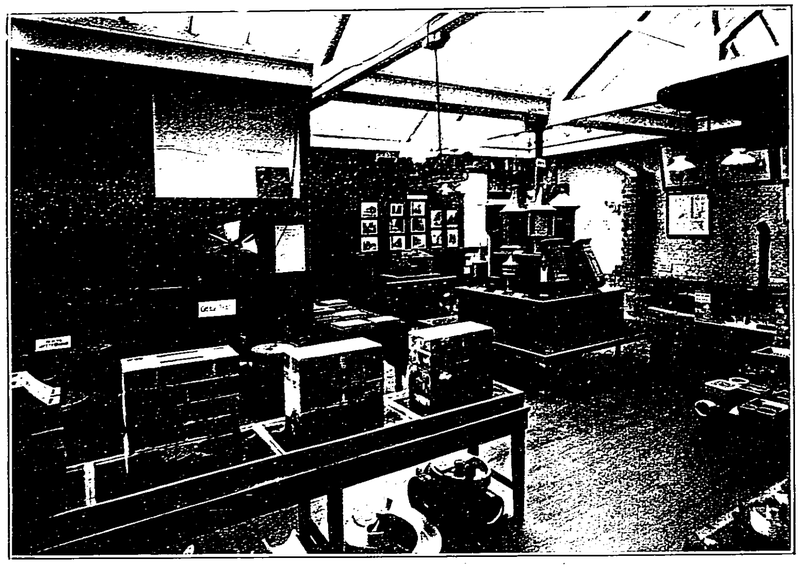
SCHOOL OF ARCHITECTURE AND APPLIED ART.

UNIVERSITY COLLEGE.

This Institution was established in 1894, mainly by the action of the Technical Instruction Sub-Committee of the City



SCHOOL OF ARCHITECTURE AND APPLIED ART. MODELLING (ORNAMENT) ROOM



SCHOOL AND MUSEUM OF HYGIENE.

Council in conjunction with the authorities of University College. It is maintained by annual grants from the Technical Instruction Committee, and is managed by a Board on which the City Council, the University College, the Architectural Society and other bodies are represented. The School was established with a view of providing facilities for instruction in various branches of Applied Art, especially those connected with Architecture; and is associated with the Chair of Architecture in University College, the Professor of Architecture (Professor F. M. Simpson) being the director of the School. The classes have been up to the present time housed in buildings of a somewhat temporary character in the grounds of University College, but as these are gradually being displaced by reason of the extension of the College buildings, plans are now under consideration for providing a building which will accommodate both the students of this School and those of the School of Art previously described.

The School provides classes in Architecture, Sculpture, Modelling, Decorative Design, Painting and Drawing, Brass and Copper work, Wrought Iron Work, Stained Glass Work, Enamelling, Woodcarving, and in Furniture and Fittings Design. The number of individual students in attendance during the last completed session was slightly over 200.

SCHOOL AND MUSEUM OF HYGIENE,

Ashton Street.

This Institution, which is closely associated with University College, was established in 1897 by means of a grant from the Technical Instruction Committee of the City Council, and is in receipt of an annual maintenance grant from that Committee. It is under the management of a joint Committee, on which are representatives of the City Council and University College. The main part of the instruction given in the School is in the

form of systematic courses of evening and Saturday afternoon lectures and classes for sanitary inspectors, builders, teachers and others interested in sanitation. The lectures are supplemented by practical demonstrations in the museum, and by visits to buildings in progress and other places.

The instruction comprises courses in Sanitary Engineering and Appliances, Food and Bacteriology, Methods of Inspection of Nuisances, Prevention of Infectious Diseases, Methods of Disinfection, Outlines of Meteorology and Vital Statistics, and Sanitary Law. The number of students attending the regular courses at the present time is 66. At the end of each session the Committee arrange for an examination, conducted by the Lecturers of the School and an external examiner; and to those students who are successful in the examination a special School Certificate of Sanitary Knowledge is given.

The Museum building was given by the family of the late George Holt, Esq., and the exhibits are of an extremely practical character. A useful illustrated handbook of the Museum has recently been published. The Museum is open free to the public, and is used for purposes of instruction not only by the students of the classes held at the School, but also by students of classes in hygiene, building construction, plumbing, &c., held in the various technical schools and centres.

SCHOOL OF COMMERCE.

Under a joint Committee, composed of representatives of the Technical Instruction Committee, University College and the Chamber of Commerce, arrangements have been made for special classes in Commercial subjects. These are supported for the most part by annual grants from the Technical Instruction Committee, together with a grant from the Lancashire County Council and subscriptions from members of the Chamber of

Commerce; whilst the University College provides accommodation for some of the classes in its buildings. The work is carried on in three departments, as follows :—

(*a*) Systematic Day Courses, established in 1899, and held at University College. A course of instruction extending over two years has been arranged embracing modern languages, mathematics, economics, commercial law, commercial practice. The composition fee for the full course is £25 per annum. So far, the largest number of students taking these courses at any one time has been six.

(*b*) Afternoon Classes in Modern Languages (French, German and Spanish), held in the centre of the business part of the town (K 28, Exchange Buildings) during business hours. The classes are held five days a week from noon to 4 p.m., each class lasting 45 minutes. The fees charged are 12/6 per term of three (or four) months. For the first term of the present session 109 individual students entered.

(*c*) Evening Classes. These classes are intended for such students as are closely engaged at business during the day. They are held in rooms at the University College during the winter months, from 7-15 to 9-30 p.m. The subjects taken comprise French, German, Spanish, Commercial Arithmetic, Commercial Geography, Commercial Law, Economics, Accountantcy, Commercial Theory and Practice. The fees charged to students are 10s. per session for modern language classes and 5s. per session for classes in other subjects. The number of entries to the classes for the present session is 210.

THE LIVERPOOL TRAINING SCHOOL OF COOKERY AND TECHNICAL COLLEGE OF DOMESTIC SCIENCE.

This Training School was one of the first Training Schools of Cookery in the country, having been established in 1876, one year after the establishment of the National Training School of

Cookery in London. It was the first school to provide systematic courses of training for teachers of cookery. Cookery classes for children attending Elementary Schools were undertaken by the Committee of the School before the subject was recognised by the Education Department; but that Department was at length persuaded to recognise such work, and in 1882 cookery was added to the subjects of the Education Code for which grants would be made. The School Committee in the same way subsequently took up the subjects of Laundry work and Housewifery, and after working out a satisfactory scheme of instruction for those subjects have also succeeded in getting them recognised by the Education Department as subjects which may be taken in Elementary Schools.

The Liverpool Training School of Cookery has supplied a considerable number of trained teachers of Cookery, Laundry-work, Dress-cutting, Needlework and other subjects for Technical Classes in various parts of the country. And it is not too much to say that no other school has exercised so important an influence in the promotion of systematic instruction in domestic subjects, and in securing official recognition of such subjects in national and local schemes.

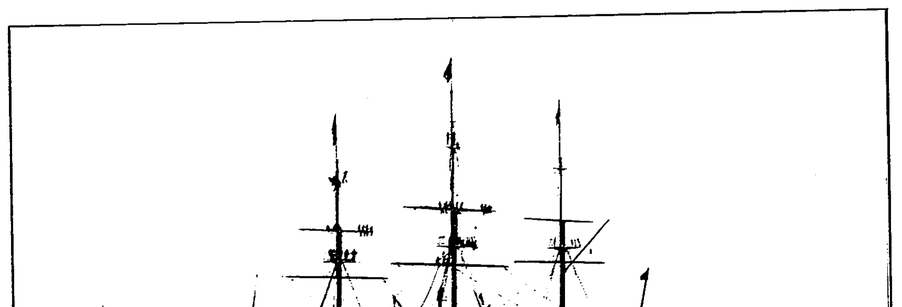
The School also provides for public demonstrations in high class and other cookery, dresscutting, millinery, &c.; for lessons in sick-room cookery at certain of the city hospitals, lessons in nursing at girls' clubs, training classes for char women, &c.

In September, 1901, the school was removed into its present premises, which have been partly built specially for the purpose, and partly consist of the old Royal Institution school buildings.

Domestic Science School, Prince's Road. — The Committee of the Liverpool Training School of Cookery in 1896 established in a large house in Prince's Road a School of



NAVIGATION ROOM, NAUTICAL COLLEGE, CENTRAL MUNICIPAL TECHNICAL SCHOOL.



SCHOOL SHIP H.M.S. "CONWAY."

Domestic Science, for girls just leaving public elementary and secondary day schools. A course of instruction is provided extending over six months, and embracing Cookery, Laundry-work, Household sewing, Home dress-cutting, Domestic Millinery, Hygiene and Housewifery.

From 70 to 75 girls are taken at one time and these are divided into five classes, each class in turn devoting a whole week at a time to one of the subjects above mentioned. In return for a grant of £100 a year from the Technical Instruction Committee of the City Council, about 30 girls are admitted each year free to the six months' course of instruction; nomination to these scholarships being placed at the disposal of the headmistresses of public elementary schools in the City. The ordinary fee for the course varies from £1 to £2 10s.

The School is largely supported by private subscriptions, the late Sir Henry Tate having been a liberal contributor.

TRAINING SHIPS.

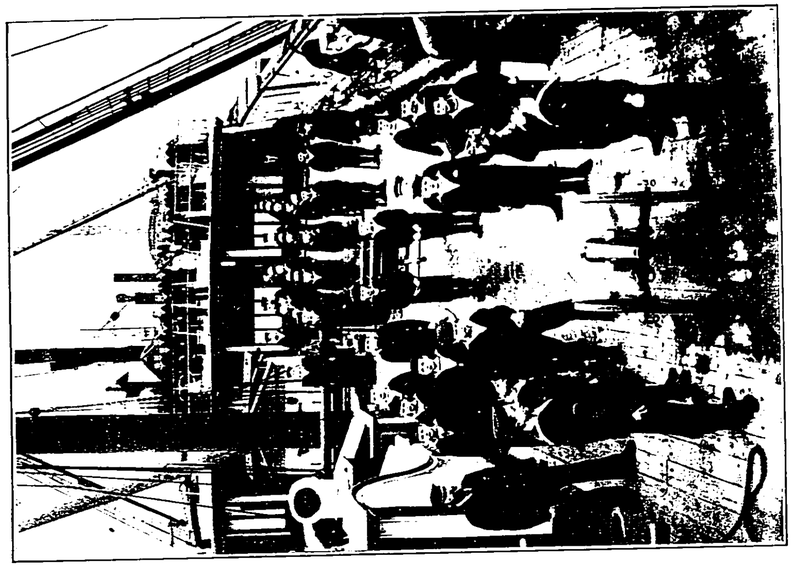
The three examples of the "wooden walls" of old England, which are moored in that part of the estuary of the Mersey known as the Sloyne, in the neighbourhood of Rock Ferry, constitute a feature in the educational scheme of the district, which is quite characteristic. These vessels (in order proceeding up the river) are (1) the Cadet ship "Conway," (2) the (Protestant) Reformatory ship "Akbar," under the management of the Liverpool Juvenile Reformatory Association, and (3) the "Indefatigable," a training ship for the sons and orphans of sailors and other poor and destitute boys. Until a few years ago there was a fourth training ship, the "Clarence," but this was burnt in 1896, and has not been replaced.

THE SCHOOL-SHIP "CONWAY."—This Institution is under the control of the Mercantile Marine Service Association, and was established in 1859, when a small 28-gun frigate (the "Conway") was placed by the Admiralty at the disposal of

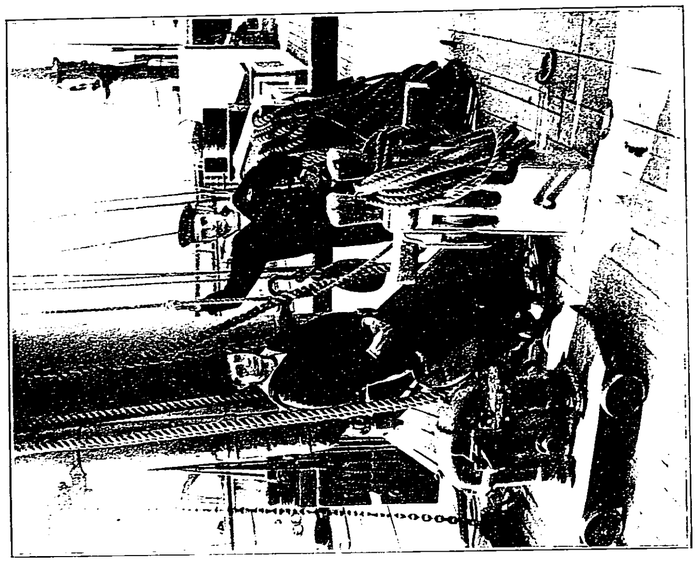
the Committee. The school, however, soon outgrew the accommodation provided by that vessel, as it afterwards did that of the larger vessel which took its place. The present ship (formerly H.M.S. "Nile") was provided by the Admiralty in 1876, and is a fine 90-gun line-of-battle screw steamship of 4,875 tons, 245 feet in length, with four decks. The machinery has been removed, and accommodation provided for the Commander (Lieut. A. T. Miller, R.N., F.R.G.S., &c.) and his staff of 30 officers, and for 230 boys, with the necessary schoolrooms, living and sleeping rooms, work rooms, lecture hall, gymnasium, bathrooms, hospital, &c., while the upper deck forms a splendid fine weather playground for the boys. Three iron masts have been placed in the ship, and the topmasts and topgallant masts, yards, rigging, &c., are all arranged for the instruction of the pupils in manning yards, making and shortening sail, and other matters of nautical training.

The object of the ship is stated to be "to train and educate young gentlemen with a view to their becoming captains and officers in the Merchant Service." The terms of admission are 60 guineas per annum, which includes education, board, and uniform. There is a head master, and a special staff of highly qualified assistant masters for the school work, which includes English, Mathematics, French, Drawing, Navigation, and Nautical Astronomy, Physics, Chart Drawing, Gun Exercise, Small Arm Drill, Cutlass Drill, &c. Another staff of instructors takes charge of the pupils for their seamanship work, and instructs them in all the duties of a first-class ship, and knotting, splicing, reefing, furling, sending up masts and derricks, heaving the lead, management of boats, &c. The number of pupils now in attendance is about 180.

Her late Majesty Queen Victoria in 1866 established a prize in the form of a gold medal to be given annually "to encourage the boys to acquire and maintain the qualities which will make the finest sailor. These consist of cheerful submission



GUN DRILL ON THE TRAINING SHIP "INDEFATIGABLE."



BOYS OF THE TRAINING SHIP "INDEFATIGABLE."

to superiors, self-respect and independence of character, kindness and protection to the weak, readiness to forgive offence, desire to conciliate the differences of others, and, above all, fearless devotion to duty and unflinching truthfulness." The award of this medal is being continued by His Majesty King Edward VII., who has established in addition another valuable prize. The Admiralty have placed at the disposal of the ship several cadetships in the Royal Navy, and a considerable number of old "Conway" boys are now holding important positions in that service. The Admiralty also grant a number of appointments as Midshipmen in the Royal Naval Reserve. Over 3,000 boys have been trained on the "Conway" since the date it was first established.

THE TRAINING SHIP "INDEFATIGABLE" was established by the action of a Committee of Liverpool gentlemen in 1865, who obtained from the Admiralty the loan of a three-masted ship for the purpose of providing a school and institution for the education and training of orphans of Liverpool seamen. The scope of the work has since been extended to provide for the admission of poor and destitute boys of all kinds and belonging to any religious denomination. The institution has been carried on almost exclusively by means of voluntary subscriptions, though for several years past grants have been received from the Education Department in respect of a portion of the school work.

Boys are received from 12 to 15 years of age and are expected to pass through a course of training lasting at least three years. Every alternate day except Saturday and Sunday is spent in ordinary school work, the remaining time being devoted to instruction in practical seamanship. The training in seamanship is carried on under the Captain Superintendent (Captain A. W. Bremner) and Seamen Instructors; and includes instruction in the compass, rule of the road at sea, use of the lead and line, heaving the log, management

of boats, knotting and splicing, setting, reefing and furling sails, sending up and down masts and yards, &c. The boys are also taught to sling and lash their hammocks; to do all the cleaning on board, and to make, wash and mend their own clothes. Every boy is taught to swim. There is a division into messes of about fourteen boys, each under the charge of a petty officer who is selected from among the boys for his general good conduct and trustworthiness, certain privileges being allotted to this office, which make it an object of emulation among the well disposed boys. The boys are divided into two watches, Port and Starboard, one division at a time being in school and the other engaged in practical work.

The number of boys on board at the time of the last annual report was 241, and during the previous year 93 boys had left the ship to go to sea, 14 of them going into the Royal Navy and one into the Royal Marines. Since its foundation 3,500 thoroughly trained boys have been passed through the ship; and out of these 3,200 have gone to sea, 150 entering the Royal Navy, and 500 the Royal Naval Reserve.

The late Mr. T. H. Isnay was Chairman of the Committee for 27 years, and took a great interest in the ship. He took the boys (in the S.S. "Teutonic") to witness the Naval Review in 1889, and the Diamond Jubilee Naval Review in 1897. At his death he left a sum of money to provide annually five valuable prizes to be given to the five boys chosen by their shipmates as most worthy of esteem, admiration, and imitation.

In 1902 by means of a generous donation from Mr. Frank Bibby, supplemented by other voluntary subscriptions, the Committee of the Ship were able to arrange for a sailing Brigantine—the "James J. Bibby"—to be built, for use by the boys of the "Indefatigible," and during last summer parties of from 50 to 60 boys were taken on training cruises of six weeks at a time.

PUPIL TEACHERS' CENTRES.

There are several special centres in the City for the training of Pupil Teachers engaged in Public Elementary Schools. At these centres the pupil teachers attend for the most part for instruction during half of each day, the other half being spent in teaching in their respective schools. The centres are:—

(1) The School Board Pupil Teachers' College in Clarence Street, a special building, opened in 1899, with accommodation for some 900 students, male and female.

(2) The Church School Managers' Pupil Teachers' College in Colquitt Street, for male and female pupil teachers engaged in Church of England Schools, a partly new and partly adapted building, opened in 1902, and accommodating about 300 students, male and female.

(3) Central Classes for female pupil teachers engaged in Roman Catholic Schools, held in the Convents of Notre Dame, Mount Pleasant and Everton Valley, and in the Bellerive Convent, Prince's Park.

(4) Catholic Male Pupil Teachers' Centre, held under the Christian Brothers in connection with the Catholic Institute in Hope Street.

TRAINING COLLEGES.

There are three Training Colleges for Elementary Teachers in the City—the Liverpool Training College, the Edge Hill Training College, and the University Day Training College. (The last named is described in connection with University College.)

THE LIVERPOOL TRAINING COLLEGE.—This is a Roman Catholic College for Mistresses, situate in Mount Pleasant, and carried on under the Sisters of Notre Dame. The number of students in residence is about 120, and there are practising schools in connection with the College.

EDGE HILL TRAINING COLLEGE.—This undenominational College for Mistresses was founded in 1885 by a committee of leading educationalists. A large house, standing in its own grounds in Durning Road, was obtained, and considerable additions have been made to it, from time to time, to provide for an increase in the number of students, &c. There is accommodation for about 110 students, and a considerable number of the students in residence attend classes at University College and read for degrees. There are no special practising schools attached to the College, but arrangements are made for the students to obtain practice in teaching in several of the Board Schools and other elementary schools.

OTHER INSTITUTIONS.

Evening Educational Classes in commercial subjects, and in woodwork, music, ambulance, drill, &c., are carried on in several institutions, which were primarily established to provide social or recreative advantages for young people. Among such institutions are :—

(*a*) CENTRAL YOUNG MEN'S CHRISTIAN ASSOCIATION, Mount Pleasant, established in 1846, first in Slater Street, but removed to the present building, specially erected at a cost of £23,300, in 1880. With this is also associated the Liverpool Gymnasium in Myrtle Street, one of the finest buildings for this purpose in the country, which was built at a cost of £14,000, on a site containing 1,450 yards, and opened by Lord Stanley in 1865. It was bought in 1880 by means of a public subscription and transferred to the Y.M.C.A.

(*b*) NORTH LIVERPOOL Y.M.C.A., Foley Street, established in 1888, as a branch from the first named institution.

(*c*) BALFOUR INSTITUTE, Smithdown Road, an educational and recreative institute for young men, established in 1884 as the Earle Road Boys' Club, but moved into its present special building (erected at a cost of £8,700), in 1890.

(*d*) GORDON WORKING LADS' INSTITUTE, Stanley Road, established in 1885, the building being erected as a memorial institution "for the benefit of the Working Lads of Liverpool," by Mr. William Cliff, a Liverpool merchant.

(*e*) FLORENCE INSTITUTE FOR BOYS, Mill Street, founded in 1889, by the late Mr. Bernard Hall, in memory of his daughter, and to "promote the welfare of poor and working boys, more especially during the critical period between the time they leave school up to the age of 21."

THE LIVERPOOL COUNCIL OF EDUCATION.

The Liverpool Council of Education is a voluntary association of gentlemen interested in education, which has exercised a very great and far reaching influence in promoting the general progress of, and harmonious relations between, various sections of educational effort in the City. It was established in 1874 by the efforts of several well-known men, among whom may be mentioned the late Christopher Bushell (first Chairman of the Liverpool School Board), the late William Rathbone, the late Alexander Balfour, the late Samuel G. Rathbone (Chairman of the Liverpool School Board from 1873 to 1891), and others. It comprises representatives of all grades of education, and of all parties and sects. Its object is :—"To promote and encourage education by every available means, including a system of scholarships, prizes, and rewards; and, by general co-operation with the managers and teachers of all public elementary schools, and others interested in the practical work of education in Liverpool, but without interference with the internal economy or management of any individual school."

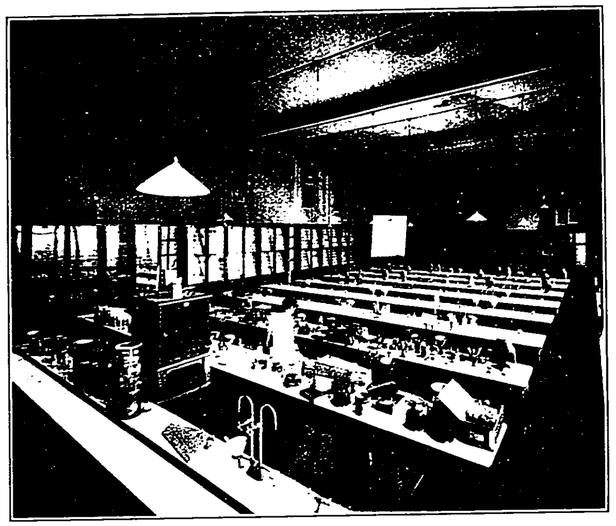
Established shortly after the Elementary Education Act of 1870 had come into operation, and after the great and almost insuperable difficulties of securing regular and punctual attendance at school had begun to be felt, the Council of Education set itself to endeavour to attract children to school;

and it established a system of certificates and rewards for good attendance, which has done much to raise the general level of attendance at the elementary schools in Liverpool well above that in the country generally.

The Council also established a system of scholarships to enable children to proceed from Elementary to Secondary Schools. Such scholarships (which have since been increased in number by the Technical Instruction Committee of the City Council) not only give the holders the privilege of free admission to the Secondary School, but also carry with them a grant to the parents at the rate of £12 per annum for the term of the Scholarship (three years), to enable them to maintain the scholar during the period of his school attendance. By this means a considerable number of boys and girls of ability have been kept at school until 16 or 17 years of age (and in many cases have afterwards distinguished themselves at the Universities), who would otherwise have been obliged to leave school at a much earlier age. The Council can reckon among those who have been thus helped men now holding distinguished positions, Senior Wranglers, University Professors, &c., as well as a considerable number of successful school teachers.

SCHOLARSHIP SCHEMES.

In addition to the Scholarships established by the Liverpool Council of Education, and to a small number of other Scholarships attached to certain of the public secondary schools, the Technical Instruction Committee have established a scheme of Scholarships, comprising (1) Scholarships from Elementary to Secondary Schools (to supplement the number of similar Scholarships provided by the Council of Education); (2) Technical Science Scholarships, tenable in the science departments of University College; (3) Art Scholarships, tenable in the Schools of Art, or in special cases, as travelling scholarships; art studentships; exhibitions in instrumental music, &c.



STUDENTS' PATHOLOGICAL LABORATORY.



PHYSIOLOGICAL CHEMISTRY LABORATORY.

THOMPSON YATES AND JOHNSTON LABORATORIES of Physiology, Pathology, Bio-Chemistry, Tropical Medicine, Experimental Medicine, Comparative Pathology, and Municipal Bacteriology.

To increase the accessibility of university education to this modern centre of population, and to implant that education in the great communities our century has gathered in maritime Lancashire and Cheshire and their "hinterland"—this object is the birthright of the University of Liverpool, allotted to it even before its actual creation. Here where the mother country teems with a rich and active people, and faces the successes of her race in sister cities over sea, earnest minds have at our end of the century yearned for a loftier local education for the citizen. History has reared her recent growths of labour and capital remote from the old thrones where mediævalism and the Renaissance crowned all the higher education for the realm. And more than that, the desire for fuller local opportunity for the complete training and thinking of citizenship, has been whetted on the hard self-knowledge of shortcomings in and apathy towards the nation's effort for its children. Facts are eloquent; the people are becoming aware that the renown and the prosperity of the country have, in spite of the boon of a long reign of peace, waned under comparative supineness of our governments—supineness in the matter of the higher education now requisite for enterprises both of industry and commerce. The day is passed when we can speak of the "learned" professions and mean three, in contradistinction to other vocations by antithetic inference

"unlearned." The engineer, the manufacturer, the agriculturist, the shipowner, the raiser of stock, the importer of food, the exporter of goods, all these require as much, in many cases more, "learning," than do the members of the old professions. But we have in our conservatism been late to recognise this truth. A rival nation, despite the scourge of continental war and the up-keep of armaments far heavier than our own, has by her lavish and buoyant university system, supported on the large-handed sympathy of the State, outstripped us of late years in progress and invention, especially in the vast industries based on Chemistry. She leads the world in medical discovery. That astute other island race in the Eastern Hemisphere, that began a quarter of a century ago to send her sons for medical training to ourselves, has *changè tout cela* and sends them to Berlin. Even our own Colonies invoke, when pestilence comes on them, the wisdom not of London or of Cambridge, but Berlin. Happily for suffering man and beast, and for our own renown, we have in the domain of Surgery the great work of Lister to place beside the triumph of Virchow and of Koch, of Pasteur and of Roux. And in regard to this it was a sinister sign of our condition that the benefits of Listerism had their wide recognition earlier in Germany and France than in England itself. The reason was that the Schools of Medicine in Germany were University schools. Their teaching and their studies were bound up with all the width of educational view that a university confers, and were linked closely with the far-reaching activities of Faculties of Science. In England nine-tenths of the study of Medicine was prosecuted at schools unconnected with any university; isolated from broad and generous learning, these remained narrowly technical. They knew little and neglected to know more of Chemistry, of Physics, and of Biology. Physiology, the hopeful basis of progress for them, divorced from her sister sciences, languished low within them. The English physiologist gave himself only to those branches of his study which could be prosecuted with least leisure and with least equipment. Hence it comes that to this day in England, with Physiology there is

confounded Histology, the study of the cell-structure of the human body. One installation, one laboratory, and one professor have to satisfy both of the two studies, of which in other countries each receives an ample and an independent recognition. Nor, to say truth, has the more intimate fusion of the two been without some happy results, traceable although it is to causes blameworthy in the schools.

The Pathological Laboratory is the paradise of the "keen" student of medicine. To sow the germ, the *causa causans*, and watch its harmless growth on the clear jelly, and analyse—or attempt to—the harmlessness that, planted on flesh and blood, can blossom to disease and death is, even apart from sentiment, a piquant occupation. And then, to extract from the emprisoned germ the antidote for itself, its antitoxin! Pathology is the physiology of disease settling down before getting to quantitative work.

The Laboratories now erected are devoted to Physiology, Pathology, Bio-Chemistry, Tropical Medicine, Experimental Medicine, and Comparative Pathology. They are fitted out in such a way as to embrace their subjects in full range, not merely to meet a single technical application. These Laboratories form an integral part of the College's Faculty of Natural Science, and they will simultaneously contribute to the teaching of students of Science, Medicine, and of Arts alike. On Physiology lean a number of other studies beside that of medicine. The study of mind, Psychology, fast gaining recognition as essential for the equipment of those entrusted with teaching, especially with teaching of the young, depends on Physiology, and in the opinion of some of its votaries entirely is Physiology.

Next, perhaps, to Psychology, the study called Hygiene, or the science of the laws of healthy living, draws daily closer to Physiology. It is in fact Physiology applied to the daily mode of life of the community. The breathing space, the warmth and change of air requisite for healthy dwellings and workrooms, the

choice of foods as a struggle between nutrition and cost, the dietary for different ages of life and different kinds of labour, the question of healthy clothing, the proper distribution of light so as to strain neither the sight nor mind, and to avoid fatigue of vision, especially for the growing eye, the appointment of labour so as to exclude excessive fatigue of either nerve or muscle—all these are practical subjects upon which the science of Physiology alone can adequately pass decision.

For society to draw due benefit from wells of natural knowledge three classes of workers must co-operate. First the *investigator*, who, pursuing truth, extends discovery for knowledge's own sake, with little or no reference to practical ends. He constitutes the fountain-head of the knowledge that is for distribution. The largeness and nearness of the material results that indirectly flow from his inquiries, cause to be habitually forgotten by the general community the, in their eyes insignificant, small spiritual beginnings that were his labour and reward. The seed is his, for he not only reared but set it. To do the rest is "easy when all have got the seed." The nation that starves the sower, or elsewise destroys him, nay even fails to secure to him free scope and encouragement, loses not only the germ, the motive power of this kind of intellectual progress, but infallibly severs itself from *the real springs of industrial life.* After the investigator there comes, in the second place, the *teacher*. To him it belongs to diffuse the knowledge won by the discoverer. Thirdly, there is the *applier* of natural knowledge, whose vocation is to make scientific knowledge serve the bodily needs, the comforts, luxuries of mankind. It is this work which commonly to the popular idea represents the whole of science, or all of it that is "useful" to the world. The practical monuments of this work are often so astounding to those ignorant of the steps by which they have been reached, that they distract the public attention from the less obvious and profounder business of original research. Our nation often called "practical" is rightly proud of the epithet. But it is a title given not free from the suspicion that we at the same time

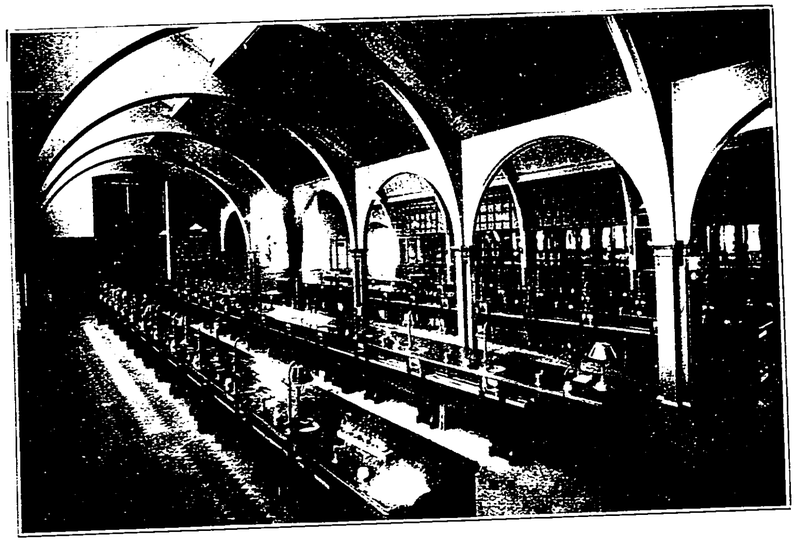
fail in the theoretical, and not infrequently contemn it. We do so foolishly. We do so at our peril. Behind all practical applications there is a region of intellectual action to which, though our practical men have contributed little, they owe the whole of their supplies. "Other men have laboured, but ye are entered into their labours." Theory may be a goose, but she lays the golden eggs. To speak of theoretic knowledge slightingly is for the lips of the fool. To do so harms studies whence not only intellectual gain, but the industrial arts have sprung, though from them the rising genius of this country is frequently so flippantly advised away. The great Pasteur, speaking of the overthrow of his country by its rival, spoke like a statesman when he said, "Few persons comprehend the real origin of the marvels of industry and of the wealth of nations. I need no further proof of this than the employment, more and more frequent in official language and in writing of all sorts, of the erroneous expression *applied science.* The abandonment of scientific careers by men capable of pursuing them was recently deplored in the presence of one of our Cabinet Ministers of great talent. This statesman endeavoured to show that we ought not to be surprised at or to lament this result, because in our day the reign of theoretic science yields place to that of applied science. Nothing can be more erroneous than this opinion; nothing, I venture to say, more dangerous even to practical life than the consequences which might flow from these words. They bide with me as proof of the imperious necessity for our reform in higher education. There exists no category of the sciences in which the name 'applied science' can rightly find a place. We have *science* and *the applications of science*, which are one growth, united together even as the tree is with its fruit."

Finally, what is the grand use of these Laboratories to the community? They will assist in training men for various honourable callings, especially for that most ancient one of Medicine. They will assist no doubt also to render our life, by the technical applications of science, superficially still more different

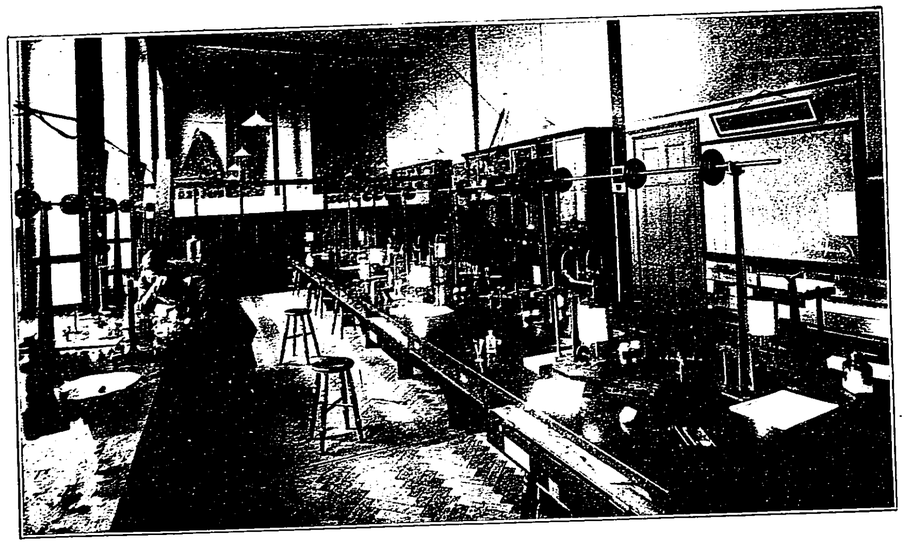
from what it was no more than a generation ago. Their highest office, however, is not these, but a more difficult. Genius cannot, by any community, however wealthy and powerful, be made to order: in Biblical language it is the gift of God. All our city can do toward obtaining it, be our richness and willingness a thousand-fold what they are, is to ensure the rare and glorious plant a meed of freedom, light and warmth, for blossoming upon our soil. Few of us are such pessimists as to doubt that in so vast a population as ours here genius exists—not sown, it is true, broadcast, for nowhere is it thus—yet existent, scattered up and down. It is for this community to foster, to discover. By help of the good gifts that Mr. Thompson Yates and Mr. William Johnston have given in these finely-built and finished Laboratories this much in one direction can be done. The problem to which they turn is the discovery less of *things* than of *men*. By these Laboratories our community can create opportunity for the exercise of powers which come from sources within itself, but are utterly beyond its power to produce at will. Their loftiest function is creation of this opportunity. For that aim the studies in them must be followed with no one single technical purpose, but must be wide of scope and full of access to all kinds of students, man and woman alike, and suited to a score of technical ends. Within the walls of the Thompson Yates and William Johnston Laboratories must be fostered and grow up no single-faculty school, but a University school. So shall they prove a cornerstone for the up-building of many crafts, and a touchstone for the best ore of intellect within this city's bounds. *Hæc otia studia fovent.*

THE THOMPSON YATES LABORATORIES.

These Laboratories were founded in 1898 by the Rev. S. A. Thompson Yates, and were opened by Lord Lister, in the presence of the late Professor Virchow and a very large and distinguished gathering.



HISTOLOGY LABORATORY



A ROOM IN THE PHYSIOLOGICAL LABORATORY.

THE LABORATORY OF PHYSIOLOGY.

In the new Thompson Yates Laboratories the School of Physiology occupies the first and second floors of the building. As the visitor ascends by the main staircase he reaches, on arriving at the first floor, an open landing. From this and from the short corridor, continuous with it toward the east, open a number of rooms, which may be described in the following order. On the visitor's left hand, as he steps from the staircase upon the landing, the glazed door opens into the room for Chemical Physiology. This room serves at once as a class-room and a research room. It can accommodate a class of more than fifty students, allowing to each one of them a separate table space for the carrying out of the exercises required of candidates taking Physiology for the degrees of B.Sc. or M.B. of the University. At each student's place there are provided gas, water, vacuum-pipe, filter and filter-stand, shelves containing chemical reagents in bottles, and a cupboard fitted with the necessary apparatus allotted for his individual use. Too often the lighting of the Chemistry class-room suffers from the screening of the windows or bench-tops by ranks of shelves for the reagent bottles. Here this defect has been avoided. Eight large windows magnificently light it, and the shelves have been arranged in such a way as to leave the access of daylight perfectly free. In addition to the ordinary benches, three smaller are elaborately fitted, to serve advanced students or research-workers to the number of six. Three fume-chambers on glazed brick piers are provided. The room is fitted with a main water supply, a hot water supply, a steam supply especially connected with a set of drying ovens, a distilling apparatus, and a number of taps supplied by a pipe bringing water from the high-pressure cistern in the Tower of the Victoria Building. The lighting for evening work is by ceiling pendants, carrying incandescent electric lamps. There is also a cable and switch for the electric arc. Against the long east wall are filter-pumps, glass-blower's table, and incubators for fermentation work. The

chemical side of Physiology is one of rapidly increasing economic importance. It embraces the whole subject of food and dietaries, and problems of cheapening and of manufacturing food-stuffs. It has manifold applications in the industries connected with the dairy, and with brewing and tanning, and the preparation of animal oils, gelatine and albumen for cotton-printing, photography and paper-making, also for the valuation of the nutrient worth of different kinds of sugars.

Next to the Large Chemical Room is the Small Chemical Room, in which are placed the balances and the polarimeters. Also adjoining the Large Chemical Room is the Small Theatre, for demonstration of experiments that cannot be rendered intelligibly visible to as numerous an audience as that accommodated by the Large Theatre. It is fitted with every convenience for various kinds of experimental work. Stepping from this room across the corridor the Large Theatre is entered through a folding door. The auditorium is made to seat 150.

The Large Theatre is the largest room in the whole building, and in some ways the most important. In this room the student is taught the use of an instrument that should in after life be to him a trusty assistant, his *microscope*. The School of Physiology in the Thompson Yates Laboratories is therefore in reality a double one, including both Histology, the study of the intimate visible structure of the machinery of the body, and Physiology, the study of the active working of that machinery in health. Of the two studies the latter is of course the more difficult, and requires more previous training, but it forms also much the finer intellectual training, as it is actuated by the strict and well-ascertained "laws" which form the basis of the exact sciences of Physics and Chemistry. But it is noteworthy that by studies in Histology were each of two great leaders of medicine led earliest along their courses of beneficent discovery; Lord Lister, by his investigation of the

phenomena visible with the microscope in the inflamed frog's membrane; Professor Virchow, by the comparison of the microscopical structure of the body in health, and of the changes wrought in the cellular elements of organs by interfering with the channels bringing them fresh blood for nutriment.

The Class-room for Histology is made to accommodate eighty students. Each student is allotted ample table space, and supplied with water, gas, electric light, and a set of chemical reagents, and a drawer and cupboard in which to keep under lock and key his sketch-book, specimens, microscope and instruments for fine dissection. A small aquarium for preservation of fresh-water plants and beetles, snails, etc., is placed in the west end of the room. A microtome table and a bath for "imbedding" preparations in wax, in order to facilitate sectioning, is provided for the use of the students. By sectioning is meant the cutting of the pieces of tissue into sufficiently thin slices for proper examination by the microscope. The slices have to be very thin, and with the apparatus provided the student should be able to cut slices much less than a thousandth of an inch in thickness.

THE LABORATORY OF PATHOLOGY.

The department occupies the ground floor and basement of the Thompson Yates block, and is built into the old existing Pathological Museum. The Museum thus becomes part of the Laboratory. The *Museum* is a very large, handsome room, with a gallery, exceedingly well lit by a large top light, and in the evening by electricity, and is also thoroughly well heated. It is now nearly full of specimens, and museum expansion will soon have to be thought of; the present collection is fast approaching the large figure of 3,000. A special feature of the Museum is a large number of photographs by Mr. Thelwall Thomas, and a series of beautiful paintings by Dr. Glynn.

The Museum opens into the *Morbid Histology Class-room*—a very large room capable of seating 60 students for practical work: each student has abundant bench and locker accommodation, an electric lamp, gas, and water supply. The bench tops are covered with slabs of opaline, and therefore are impervious to dirt. The room is furnished with an electric projection lamp, hot-water and steam supply.

Opening out of the previous room is the *Holt Fellows Room*, where the specimens for the class are kept, and sections of all tissues made.

On the other side of the corridor another series of rooms are placed. There is a very large *Private Experimental Room* fitted with shafting and other apparatus driven by an electric motor. Adjacent are the Developing and Microphotographic rooms. The *Bacteriological Laboratory* is a very large room. The benches are covered with opaline; each student has an electric light, gas and water, and there is a plentiful supply of steam at high pressure to conduct the various boiling operations necessary in such a laboratory. It is fitted with the apparatus necessary for bacteriological research, including suction and force-pumps for filtering purposes, and a bacterial mill for pulverizing bacteria. Opening out of the previous room is a small incubator chamber, which can be kept at a constant temperature.

The *Chemical Pathology Room* is the laboratory of the Senior Assistant, and is fitted for conducting researches in Chemical Pathology. Immediately adjacent to it is a private research room, and further on the private room and library of the Professor. By two especially constructed staircases, two rooms are reached on the first mezzanine, one room entirely set apart for the *Museum Preparator*, and the other an *Incubator Room*, where all the incubators and ovens are placed which require a constant temperature.

THE MUNICIPAL BACTERIOLOGICAL DEPARTMENT.

Owing to the growing importance to the community of bacteriological analyses it has been necessary to find increased accommodation and equipment.

The Laboratories consist of a receiving room and office, of a bacteriological water analysis room, milk and food analysis room, and preparation room.

Two farms are in connection with the department, one at West Derby and the other at Walton; and at these stations animals are kept under observation. The work of the department consists in routine bacteriological analyses of the water supplied to Liverpool, of the milk supply of the city, and of shell fish and preserved foods and meats. The Department is also used by the City Fever Hospitals and the General Practitioners of the city and neighbourhood for the diagnosis of cases of diphtheria, typhoid and tubercle. All suspected cases of rabies and anthrax are investigated. Investigations are continually in progress bearing upon disease problems in the community, such as the distribution and cause of outbreaks of diarrhœa, typhoid, etc. Owing to the immense foreign trade of Liverpool, a continual watch has to be maintained for cases of plague and cholera, and with a view to forestalling a possible outbreak of the former, the rats of the city are systematically kept under observation, and samples of them, taken from ships, markets, warehouses and sewers, are sent to the laboratories for investigation.

THE MACHINE ROOM.—This room in the basement of the Thompson Yates Laboratories illustrates the immense progress which has been made in medical research, and the necessity of powerful machinery in connection with biological investigations. The chief pieces of apparatus include an hydraulic press capable of exerting a pressure of 200 tons to the square inch, a large air pump for filtering under very high pressure, centrifugal machinery, grinding and evaporating apparatus.

THE JOHNSTON LABORATORIES.

These laboratories were founded in 1902 by Mr. William Johnston, shipowner of Liverpool, for the advancement of medicine by research. They were formally opened in May, 1903, by Mr. Walter Long. They have been designed especially with reference to facilitating research, and comprise four principal departments, viz.: the laboratories of bio-chemistry, experimental medicine (including the cancer research), tropical medicine and comparative pathology, with which is affiliated the Serum Institute.

THE LABORATORY OF BIO-CHEMISTRY.

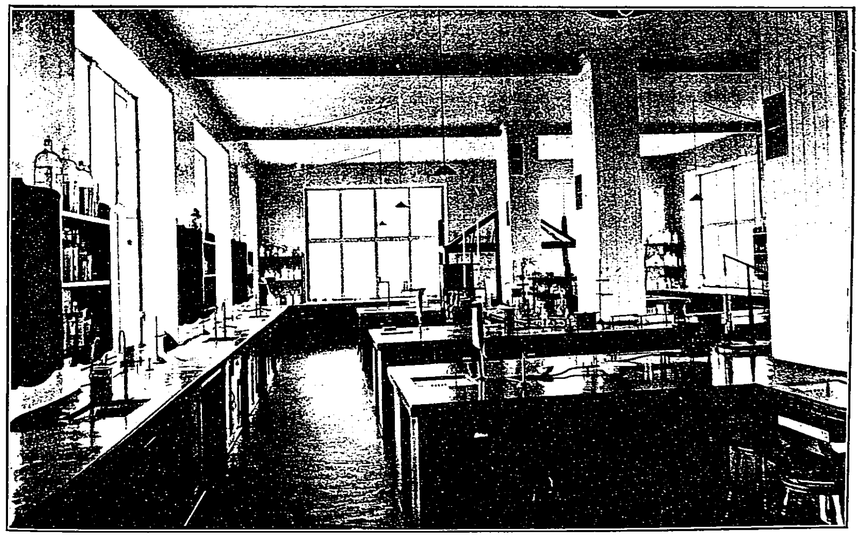
The laboratory of Bio-Chemistry was founded in 1902 by the generosity of Mr. William Johnston, who endowed a chair in the subject and erected and equipped a laboratory, which is situated on the top floor of the Johnston buildings.

The Laboratory is capable of accommodating ten research workers in the large research room, and contains in addition, a balance room, private research room and library.

The importance of a knowledge of the chemical processes taking place in the body both in health and under the abnormal conditions produced by disease, is daily becoming more evident to all workers upon biological, medical, and hygienic problems. Chemical modifications lie at the very basis of all the changes occurring in disease, no matter what may be the agent evoking these changes, and hence true and radical progress can only be achieved by acquiring accurate knowledge of the chemical changes going on in the body during health; of the nature of the chemical products formed by the various tissues of the body and their mutual interaction upon one another; of the nature and properties of the substances produced by the various pathogenic bacteria and other parasites, and of the action



LABORATORY OF TROPICAL MEDICINE.



LABORATORY OF BIO-CHEMISTRY.

of these on the normal cells of the body, and of the bio-chemical methods by which these products may be rendered innocuous or neutralised in the body.

The new Laboratory of Bio-Chemistry has hence been equipped to foster the study of these subjects, and take a share in the rapid development of this important aspect of biological and hygienic research.

THE CANCER RESEARCH AND EXPERIMENTAL MEDICINE LABORATORIES.

Mr. T. Sutton Timmis has given a sum of £10,000 to be expended in Cancer investigation. Dr. A. S. Grünbaum is the Director of the Research, the objects of which are as follows:—

(*a*) To investigate the biology and chemistry of the disease.

(*b*) To attempt the production of curative remedies.

(*c*) To discover, if possible, means for the prevention of the occurrence and spread of the disease.

(*d*) To investigate, experimentally and otherwise, the questions of etiology relating to heredity, locality and occupation, &c.

The chief laboratory is placed with experimental medicine upon the first floor, and accommodates a group of workers, all engaged upon research bearing upon disease.

Electrical Research Department.—Mr. John Hughes has fitted up a room with complete installation of electrical appliances in order to investigate the biological effect of various forms of electric currents.

LABORATORY OF TROPICAL MEDICINE AND PARASITOLOGY.

The Liverpool School of Tropical Medicine was founded in 1899, under the Chairmanship of Sir Alfred Jones, K.C.M.G.

It was affiliated to University College and the Royal Southern Hospital, and has been foremost amongst the schools of tropical medicine in advancing the knowledge of the diseases of tropical countries. Since its foundation as many as ten research expeditions have been sent to tropical countries, very numerous important investigations have been published, and classes for the teaching of medical and also lay men have been established. The school has proved of wide practical utility, and this is shown not only in the very generous support accorded to it by the citizens of Liverpool, but by the fact that practical assistance is given by other cities in England and by many foreign countries. The holder of the Sir Alfred Jones' Chair of Tropical Medicine is Professor Major Ross, who obtained the Nobel Prize of 1902—the Walter Myers Lectureship is held by Dr. Stephens. The laboratories are fitted for teaching, research and museum purposes.

LABORATORY OF COMPARATIVE PATHOLOGY.

These Laboratories occupy the basement of the Johnston block. The department was founded in August, 1902, to promote the study of the science of Comparative Pathology, and particularly to encourage and advance our knowledge of the pathology and means of prevention of human disease, by the study of diseases of lower animals in their relation to those of man—especially the prevention, diagnosis and treatment of disease by means of curative and prophylactic vaccines and sera.

Recent researches in the study of the bacteriology of disease have indicated the enormous importance and benefits derivable from the method of the treatment and prevention of certain infective diseases of both man and animals by the use of preventive and curative vaccines and sera: the preparation of these therapeutic products on scientific lines, research into their mode of action, and means of improvement and extension in their utility will form a most important branch of the work of the department.

In addition, the study of the diseases of lower animals which are of economic importance in the agricultural pursuits of this country will be encouraged.

Associated with the Laboratory is a large farm, where the horses, calves, and other animals are kept. The farm has been provided with laboratories, fitted up with modern scientific appliances and apparatus, for the production on a large scale of vaccines and sera. A general bacteriological laboratory, an incubating room, mixing, distributing, and sterilising rooms—and a separate room specially set apart for the preparation of calf-lymph vaccine, and another room for plague prophylactic and serum, make up the laboratory accommodation.

The farm buildings, sufficient to accommodate a large number of animals, are favourably situated in a most suitable and accessible agricultural district in North Cheshire.

THE FISHERIES RESEARCH LABORATORY AND LOCAL SEA FISHERIES - - - INVESTIGATION. - - -

Since 1890 when, as the result of public inquiries held at Liverpool and elsewhere, the Lancashire Sea Fisheries Committee was constituted, there has been a close connection between the work of that Committee and the Zoological Department of University College. The Professor of Zoology was appointed Honorary Director of the scientific work, a small laboratory was erected in 1892 at the College to be devoted to Sea Fisheries investigation, and eleven Annual Reports have since been published, dealing with the work carried out both in the Liverpool Laboratory and also elsewhere in the district.

A few years later a branch laboratory and sea fish hatchery was established at Piel near Barrow in the northern part of the county; and the Marine Biological Station at Port Erin in the Isle of Man, founded and carried on by a Liverpool Committee, also contributes to the elucidation of the fishery problems of our district, and to the advance of Marine Biology in general.

All these establishments for research work centre in the Zoological Department of University College, where a "Fisheries Museum" and a collection illustrating the local fauna, has recently been formed. In the new laboratories, which are planned and will shortly be erected for this department, a considerable amount of space has been allotted to sea fisheries work—both for the prosecution of research, and also for the exhibition of the collections to the public.

Evidence based upon the work done at these laboratories by the Professor and his Assistants has been given before several Royal Commissions and Committees, and at various public inquiries; and questions connected with the Sea Fisheries District are constantly being referred to the Director of the Laboratory for investigation and report. Special pieces of work have also been undertaken for the Board of Trade Inspectors of Sea Fisheries.

The following are amongst the more important matters which have been dealt with, so far, in the Annual Reports to the Committee:—

1. The food of fishes—both adult and young.
2. The relation between the sole and the solenette.
3. The distribution of immature fishes.
4. The food, habits, &c., of the shrimp.
5. The maturity-sizes of fishes.
6. The determination of spawning grounds.
7. Experiments on the vitality of fishes in trawl nets.
8. Distribution of young and adult fish.
9. Reproduction of the mussel.
10. Reproduction of the cockle.
11. Experiments on currents by means of drift bottles.
12. Investigation of shell-fish and disease.
13. Investigation of the green colours of some oysters.
14. Lectures and demonstrations to fishermen.
15. Experiments in fish-hatching.
16. Circulating Fisheries Exhibition.
17. Plankton investigations.
18. Investigation of iron and copper in oysters.
19. Anatomy and life history of the cockle.
20. Fish parasites.
21. Practical classes for fishermen.
22. Classes in "Nature-study" for school teachers.

In addition to the Annual Reports, certain larger Memoirs, illustrated by plates, have been published, viz:—

No. I. "On Oysters and Disease," and
No. II. "On Fishes and Fisheries of the Irish Sea;" also a Series of "L.M.B.C. Memoirs" on Common Marine Animals, amongst which may be mentioned as being of industrial importance:—

No. 2. On the Cockle, by Mr. J. Johnstone.
No. 6. On Fish Parasites, by Mr. Andrew Scott, and
No. 8. On the Plaice, by Mr. Cole and Mr. Johnstone.

The Circulating Fisheries Exhibition was fitted up in 1897, and was opened at a public meeting, held in the Natural History Museum at University College, by Mr. John Fell, J.P., D.L., Chairman of the Lancashire and Western Sea Fisheries Committee. Since then it has been exhibited twice in Liverpool, and has been on view in public institutions at the following towns in the county:—Salford, Preston, Bolton, St. Helens, Piel and Barrow. It has apparently been much appreciated, and has excited much interest. While at Salford it was visited by over 120,000 people. The object of this exhibition is to show some easily understood examples of the application of science to fisheries and aquiculture generally, and to demonstrate the work of the Local Sea Fisheries Committee.

The practical classes for fishermen have been given both in the Liverpool Laboratory and also at the Piel Hatchery, and are considered locally to be very successful. Ten men, chosen by their fellows out of the large numbers who apply, are taken at a time, and these work practically in the laboratory every day for a fortnight, both forenoon and afternoon. The Technical Instruction Committee of the county allows £5 to each man to pay his travelling and living expenses while attending the class.

A recent further development of the work, on the educational side, has been the organisation of courses in "Nature-study"

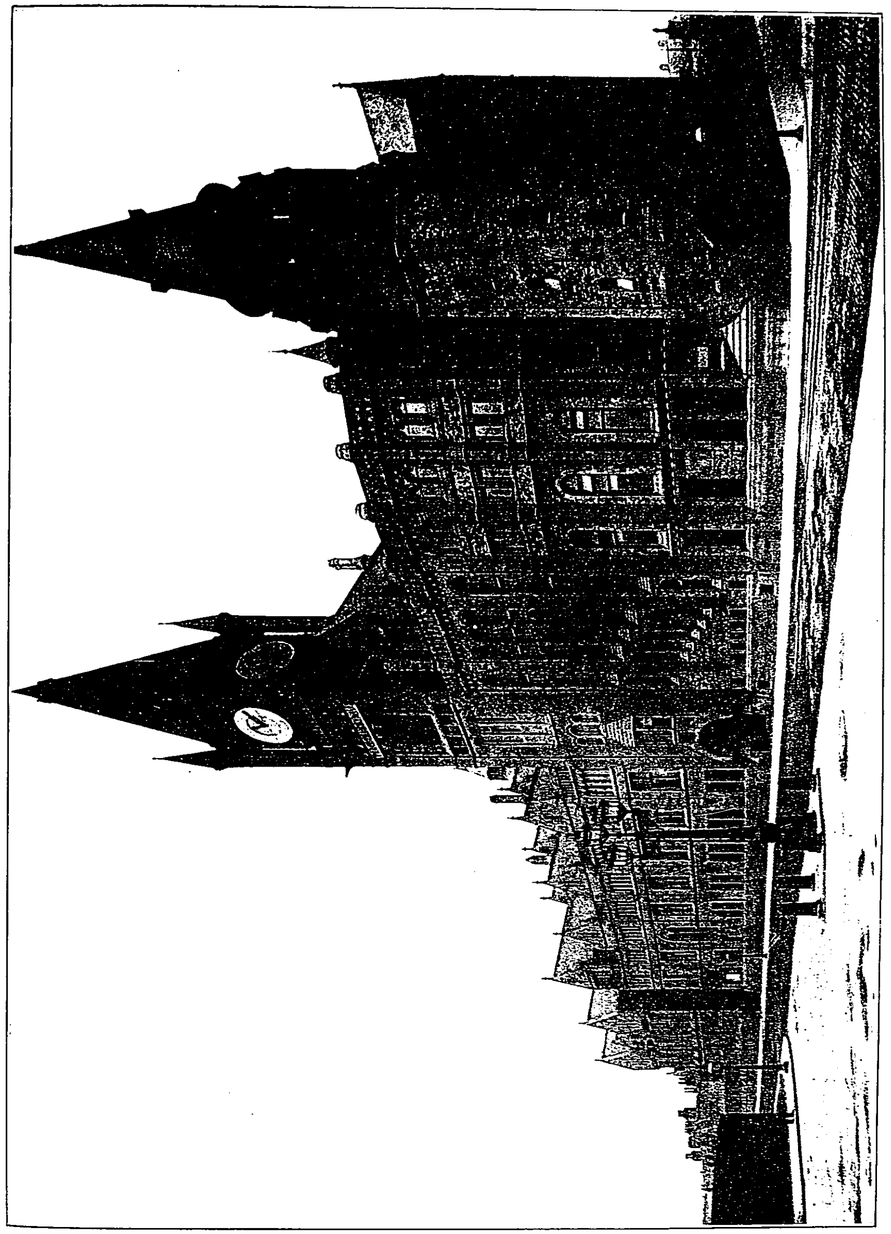
for school teachers. These classes have been held both at University College—during the winter—and also at the Piel and Port Erin Marine Laboratories in vacations. They have been received with enthusiasm by the school teachers, and will probably increase in scope and usefulness.

The recently issued report of the Committee on Ichthyological Research, which sat at the Board of Trade last year, contains a recommendation that the Liverpool Laboratory should be made the centre for sea fisheries investigations on the west coast. If that and the other recommendations of the Report are carried out, additions will be made to the local scientific staff, and a special steamer will be provided for fisheries research in the Irish Sea. The new Natural History Laboratories, now planned, come at an appropriate time to afford the necessary accommodation for the additional workers, and for the increased collections that will be gathered together under the new scheme of Ichthyological Research.

Biology is now taking its place as a science having many applications to industries and to affairs of every-day life, as well as one of great educational importance; and Liverpool has recognised this, and is acting as a pioneer in several of these directions. The connection between the Liverpool School of Marine Biology and the Lancashire Sea Fisheries is a notable case.

UNIVERSITY COLLEGE.

Among the institutions of the city none, it may safely be said, holds a higher place than University College. Not on account of age, for it is one of the youngest in time; nor on account of wealth, although the citizens of Liverpool have enriched it with a magnificent generosity; but because it crowns and completes the educational system which is both the pride and the strength of every enlightened community. The College was established and received its Charter of Incorporation in October, 1881, but it did not begin work until the January following. Its origin was due, not to the munificence of an individual, but to the public spirit of many. The City of Liverpool had a part in its foundation, for the site and the original buildings were provided by the Corporation at a cost of £30,000. Large grants, now amounting to £1,800 a year, have been made continuously to advance technical instruction and the science of education; and power has been obtained under a recent Act to levy a rate not exceeding a penny in the pound whenever the College may be raised to university rank. The original purpose of the College, as expressed by its promoters, was "to provide such instruction in all branches of a liberal education as would enable residents in the town and neighbourhood to qualify for degrees in arts, science, and other subjects, at any of the universities granting degrees to non-resident students, and at the same time to give such technical instruction as would be of immediate service in professional and commercial life." The objects that the founders set before themselves have been carefully kept in sight. While the value of a broad and sympathetic culture has been consistently asserted, the College has never forgoten



UNIVERSITY COLLEGE.

that its function is to train its students, both men and women, for the practical work of life in the community which it was established to serve. But with the growth of its resources and of its strength, it has raised the level of its aims. For the first four years of its existence, those of its students who sought a degree graduated at London University; then, in the autumn of 1884, the College was admitted into Victoria University, established a few years earlier, side by side with the Owens College, Manchester, to be followed two years later by the Yorkshire College, Leeds. But this arrangement also proved to be only another stage in development. The federal system was helpful in its time, but federalism has now been outgrown. A year ago the College asserted its claim to recognition as an independent University, the Corporation of Liverpool gave official support to the proposal, and a special fund, now amounting to about £176,000, was raised to extend and perfect its equipment. The validity of the claim has been admitted by the Privy Council, though the conditions on which the Charter will be granted have not yet been finally determined.

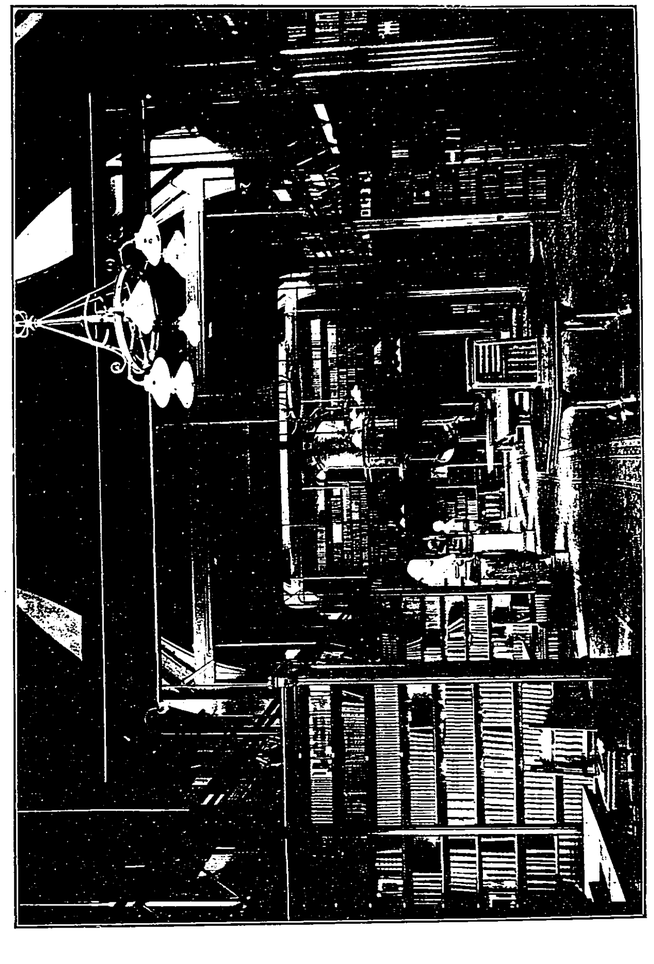
The College, therefore, it will be understood, is passing through a period of rapid expansion: change is written on its face. The old buildings, in which all its departments were once housed, are now surrounded — almost submerged — by new buildings, some of them already complete, some in the course of construction, whilst others are yet only planned. The original site—an irregular parallelogram containing about four acres—is bounded by the Royal Infirmary on the north, by Brownlow Hill on the south, and by Ashton Street and Brownlow Street to the east and to the west. On the south side stands the Victoria Building, which contains the lecture-rooms and professors' rooms of the Faculty of Arts; the Tate Library, the students' common rooms, the senate-room, and the business offices of the College. A passage and an archway separate it from the Walker Engineering Laboratory, built by the late Sir A. B. Walker, Bart., at a cost of £23,000. On the western side, in Brownlow Street, is the

Chemical Laboratory; and on the northern side, parallel to the Royal Infirmary, are the buildings of the Medical School.

The intervening block is still unfinished, as is the new Physics Laboratory, which continues the line of buildings eastwards to Ashton Street. Ultimately the Victoria Building will be extended along Ashton Street by a wing at right angles to its main block, so completing the quadrangle. The old buildings in the centre of the grounds, now containing the departments of Physics, Zoology, and Education, with Electrotechnics in a temporary annexe, will be pulled down, leaving the space in the centre clear, with almost unbroken lines of laboratories and lecture rooms on the four sides. The departments thus dispossessed will be removed to a new site on the further side of Brownlow Street. A part of the ground is already occupied by the Botanical Laboratory, recently given to the College by Mr. W. P. Hartley, of Aintree; but there is ample room left for Zoology and Electrotechnics. For the department of Education new quarters must be found elsewhere. It should be added that the College already has an offshoot on the further side of Ashton Street in the Museum of Public Health.

With this expansion of buildings there has been a corresponding growth in the teaching staff. In 1882 the College began its work with seven Endowed Professorships and three Lectureships. It has now (1) in the *Faculty of Arts*, nine Endowed Chairs, one Assistant Professor, five Lecturers, five Assistant Lecturers, a Tutor in education and four Readers; (2) in the *Faculty of Law*, two Endowed Chairs, four Lecturers, and one Tutor; (3) in the *Faculty of Science*, six Endowed Chairs, two Lecturers, eight Assistant Lecturers and Demonstrators, one Research Fellow, and two Honorary Research Assistants; (4) in the *Faculty of Engineering*, two Endowed Chairs, four Associate Professors and two Lecturers: (5) in the *Faculty of Medicine:* four Endowed Chairs; six Unendowed Chairs; fourteen Lecturers; six Assistant Lecturers; ten Demonstrators; eight Research Fellows, and one Research Assistant.* In quality the teaching

* When a Professor or Lecturer is a member of two Faculties he is counted only in one.



LIBRARY, UNIVERSITY COLLEGE.

staff is as strong as it is in numbers. From the first the College has been able to secure the services of men of high distinction in Science and in Arts. Ten of its Professors, past or present, are, or have been, Fellows of their Colleges at Oxford and Cambridge. Nine of its members, past or present, are Fellows of the Royal Society. One of its present members, Professor Major Ronald Ross, C.B., has recently won European distinction in the award of the Nobel Prize for Medical Research.

The number of students in the last complete session, 1901-2, was as follows :—Day Students in Arts, Science, Law, and Medicine, 698; Evening Students in Arts and Science, 275. To this total should be added the Students in the Affiliated Schools, who are not included in the total given above :—(1) Tropical Medicine, 19; (2) Sanitary Science, 59; (3) School of Commerce, 326; (4) School of Architecture and Applied Art, 217; total, 621.

The financial position of the College is one of great strength. The total amount of its capital, including the University Fund raised for its extension, amounts to nearly £680,000. This comprises the value of endowed chairs and lectureships; the cost of sites acquired, and of buildings erected or in course of erection; fellowships, scholarships, and prizes; endowments for the maintenance of laboratories and the library; and the value of the Day Training College, its hostel and its endowment. The cost of the more important buildings is shown in the following table :—

1886	Chemical Laboratory ..... Given by the late Mr. T. Cope, Mr. M. Guthrie, and other Citizens.	£21,000
1886	Walker Engineering Laboratory..... Given by the late Sir A. B. Walker, Bart.	£23,000

1892 The Victoria Buildings £54,000
Including the Tate Library, which the late Sir H. Tate built at a cost of £20,000, and the Jubilee Memorial Tower, erected by Citizens of Liverpool. The rest was contributed by Citizens of Liverpool. Sir H. Tate gave an additional £10,000 for books and maintenance; and Mr. W. P. Hartley gave the Clock and Chimes.

1895 Museums of Natural History and of Sanitary Science (Ashton Hall) and Outbuildings of the Anatomical School £7,300
Given by the late Mr. George Holt.

1896 Gossage Chemical Laboratory £7,000
Built by Mr. Gossage and Mr. Timmis in memory of the late Mr. William Gossage.

1898 Thompson Yates Laboratories of Physiology and Pathology £32,000
Given by the Rev. S. A. Thompson Yates in memory of his parents.

1902 Hartley Botanical Laboratory £13,000
Built and equipped by Mr. W. P. Hartley.

1903 Johnston Laboratory £9,000
Built and equipped by Mr. William Johnston.

1902-3 Buildings of the Medical School £30,000

1903 Physics Laboratory £24,000

The chief function of the College is to teach; failing in that duty, it would be false to the purpose for which it was founded. But it has done its part with ever increasing activity and success in advancing knowledge. In the Thompson Yates Laboratories, of which a separate account will be given, research is energetically carried on by a band of workers, the results of which appear in the series of Laboratory Reports. In the Engineering Department work of the same kind has been undertaken for the Royal Society, and for other bodies, both public and private. The department of Natural History, in

connection with the Lancashire Sea Fisheries, has devoted special attention to scientific research in its application to marine industries. Other departments, including the Faculty of Arts, in their respective provinces, have shown similar enterprise. As the University that is to be takes shape, it will be able to render important service both to science in general and to the industries of the district in particular; for by association and co-ordination it will act as a centre to which problems arising from day to day in connection with commerce and manufactures may be referred. Such problems are not simple, but complex; and for solution they require the efforts of experts in different branches of science, accustomed to act together and to apply the resources of their common knowledge to the point at issue. And in these days the progress of scientific knowledge is most effectually secured, not by the enterprise of solitary workers, but by the efforts of a brotherhood of students bound together by common sympathy and by common purpose.

THE MEDICAL SCHOOL. - -

The origin of the Liverpool Medical School goes back to the last years of the eighteenth century, of which time there are authentic records in the archives of the Royal Infirmary, of instruction given, and certificates and diplomas granted to "Surgeons," who became the doctors on the vessels engaged in the slave trade.

In 1834 the School was properly organised as The Royal Infirmary School of Medicine, and instruction was given in the necessary subjects of the medical curriculum for the diplomas of the College of Surgeons, and, after its institution, for the degrees of the University of London.

At this period the Anatomy Act had been passed (1830), and adequate arrangements became possible for a complete medical curriculum.

The School was established on land belonging to the Infirmary, intermediate between the Hospital and the Lunatic Asylum. The numbers of students were at first small, and the teachers were all local practitioners. Among them are names of distinction—Formby, Long, J. Dickinson, Fletcher, Bickersteth, and F. T. Roberts.

The gradual development of the scientific side of medical education, the competition with other medical schools, and the rapid growth and extension of Owens College, Manchester, helped to bring about the next stage in the history of the School, resulting, in 1881, in the conversion of the Royal Infirmary School of Medicine into the Medical Faculty of University College. The College was indeed an outgrowth of the School

of Medicine. With its foundation the scientific training of the student was adequately provided for by the establishment and endowment of chairs of Chemistry, Physics, Natural History, and (later) Botany. These chairs were first held by Professors Campbell-Brown, O. J. Lodge, Herdman, and Harvey Gibson. In 1900 Professor Lodge, on becoming principal of the Birmingham University, was succeeded by Professor Wilberforce.

During the years immediately before and after the establishment of the College, the progress of the Medical School was sure and rapid; and the systematic and clinical teaching was secure in the hands of men like Banks, Bickersteth, Caton, Cameron, Carter, Harrison and Waters.

The numbers of students increased with the foundation of the College, attracted by improvements in teaching and equipment, and by the establishment of fellowships, scholarships and prizes.

In 1884, one year after the foundation of the University, and three years after the foundation of University College, the union with the Victoria University, Manchester, took place, which has been of such inestimable value to the Liverpool School for the past nineteen years. The students of the school were at once provided with a medical degree at their own doors; the College participated in the advantages of corporate university life, and its growth and advancement have been enormously stimulated by the union.

Laboratories have been established for chemistry, physiology, pathology, botany, and anatomy; the resources of the school in equipment, scholarships, etc., have been greatly enriched; and new endowments have been provided by Mr. George Holt and the Earl of Derby for Chairs in physiology, pathology and anatomy.

The following fellowships, scholarships and prizes are now at the disposal of the medical faculty, amounting altogether in annual value to over £1,000.

Four Robert Gee Entrance, £25 each; two (junior and senior) Lyon Jones' Scholarships, £42 each; University Scholarship in Medicine, £25; University Fellowship in Medicine, £100; Derby Exhibition, £15; two Holt Fellowships (Physiology and Pathology), £100 each; one Robert Gee Fellowship in Anatomy, £100; one Ethel Boyce Fellowship in Gynaecology, £100; Alexander Fellowship in Pathology, £100; Johnston Colonial Fellowship, £100; and John W. Garrett Fellowship in Physiology and Pathology, £100.

The operations of the Medical Faculty have been greatly extended during the last ten years by the establishment of associated schools, of Tropical Medicine, and Sanitary Science, and by the development of the affiliated School of Dental Surgery. The erection of suitable Laboratories and buildings has made it possible to pursue investigations and foster the study of Medical Science in various directions, one of which may be mentioned —the establishment of a cancer investigation in conjunction with the Royal Infirmary through the generous endowment of £10,000 by Mr. Sutton Timmis. The progress of scientific investigation in other subjects has been hastened by the valuable researches in the various laboratories of the College, while the resources of the institution have been much enhanced by the establishment and development of museums and libraries in the several departments.

The chief avenues by which the students proceed to a qualification at the present time are—in medicine, the degrees of the Victoria or London Universities, and the diplomas of the conjoint Board of the Royal Colleges in London; in Dentistry, the License in Dental Surgery of the Royal College of Surgeons; and in Public Health, the Diploma in Public Health of the Victoria or some other University, or of the College of Surgeons of England.

Clinical Work.—The wealth of clinical material available for the instruction of students is enormous, and the School is

fortunate in having at its doors the Royal Infirmary (295 beds), re-built in 1890, and equipped with every modern appliance. In addition, the practice of the David Lewis Northern Hospital (155 beds), and of the Royal Southern Hospital (200 beds), is open to students. The practice of special hospitals—the Hospital for Women, Shaw Street, the Ladies' Charity and Lying-in Hospital, the Children's Infirmary, the Skin Hospital, the Eye and Ear Infirmary, and the Dental Hospital, all within a few minutes' walk of the College—is also open to students of the School. Ample anatomical material is available for the study of practical anatomy and for operative surgery, and adequate arrangements are made for the necessary instruction of students in outdoor midwifery, which is now conducted as a part of the midwifery course in conjunction with the Maternity Hospital. The sanitary resources of the city are placed at the disposal of students preparing for diplomas in public health, who, under the direction and supervision of the Medical Officer of Health, possess unequalled facilities for obtaining the requisite knowledge of sanitary conditions in a well ordered city and seaport. In the College is an admirable Museum of Hygiene, which serves to supplement the work which is carried out practically in the city.

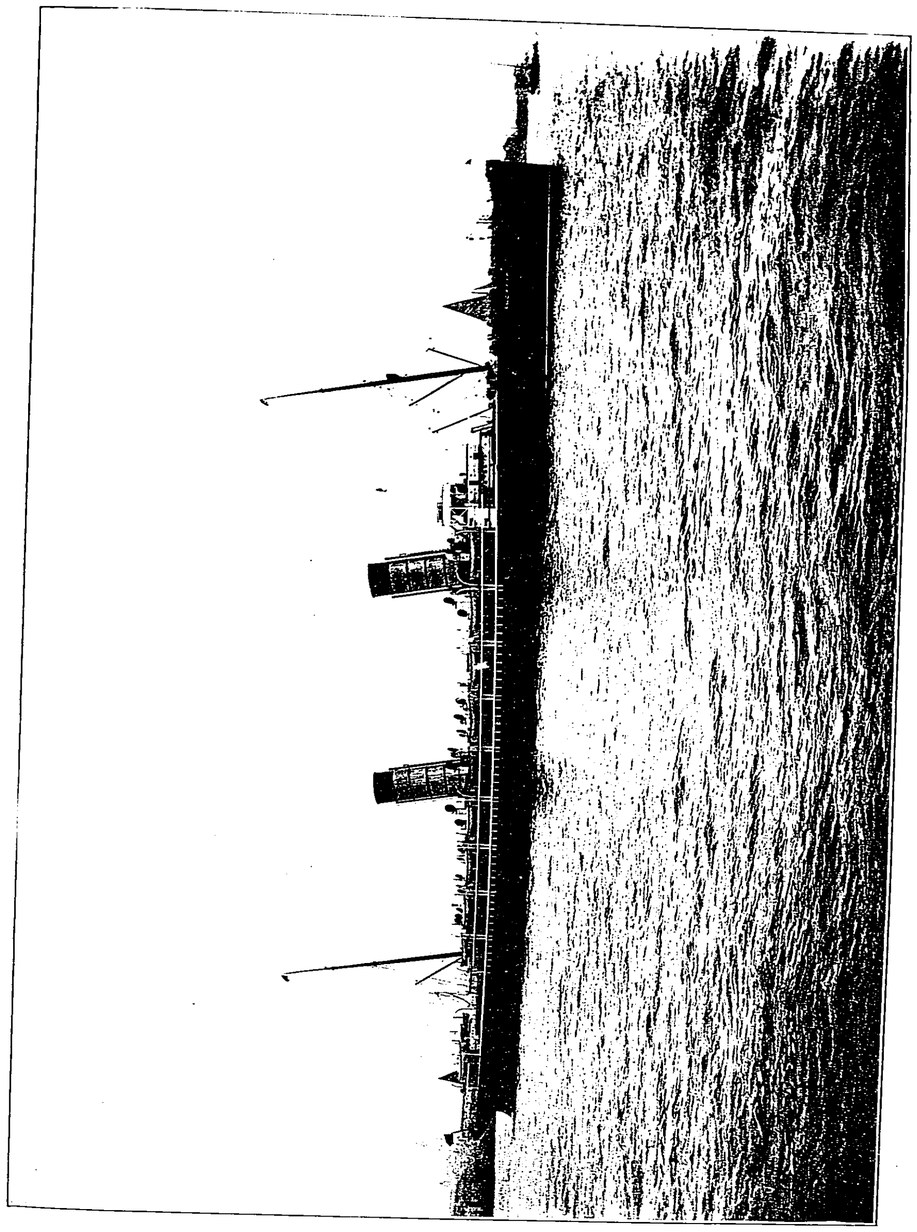
Separate prospectuses are published annually, dealing with the Medical Faculty, School of Dental Surgery, and D.P.H. Curriculum, and from these and the College Calendar all details may be obtained of the courses of study, fees, scholarships, and prizes.

THE CUNARD STEAMSHIP COMPANY, LIMITED. - -

It was from Liverpool that the first ocean steamship line began to track the pathless Atlantic, as long ago as 1840, and it is to the Cunard Steamship Company that this honour belongs.

No American firm or owner believed in the possibility of carrying out such a contract, except Samuel Cunard, who hailed it as a fortunate opportunity. It was true that a few steamers had crossed the Atlantic, and conveyed passengers, but the general idea was that sail was safer for a constant dependence. Cunard thought differently, and he travelled to England in order to find some one in agreement with him. He obtained introductions to Mr. Burns and Mr. MacIver. The latter two, who up to this time had been running rival coasting lines, agreed to join forces, and, with Mr. Cunard, to submit a tender to the Admiralty. The necessary capital being obtained, this was done. A Company under the title of "The British and North American Royal Mail Steam Packet Company" was started, and three vessels were commenced, shortly afterwards increased to four, to ensure a fortnightly service.

It is hardly possible for travellers of the present day to realise the enthusiasm and excitement aroused by the first trip of the "Britannia," the pioneer of the service, and the first steamship on any sea to deserve the title of "liner." In the present age of voyaging, when Atlantic records are captured by minutes and fractions of knots, every newspaper notes the feat, and all the steamship world is excited. But in 1840, when the little paddle steamer of eleven hundred and fifty-four tons



CUNARD ROYAL MAIL STEAMER "LUCANIA."

made her first trip from Liverpool to Boston in fourteen days eight hours, she knocked something like a month off the usual time occupied by the ten-gun brigs that had preceded her in the mail service.

The size of the "Britannia" may best be gauged by comparing her measurements with those of the later vessels. This will be seen by the diagram.

It is not at all generally known that the employment of merchant steamers as transports for troops dates so far back as the building of the first Cunarder. Yet this is a fact. The pioneer vessels were all so constructed as to permit of their being used for army transport purposes at very short notice, as also were the succeeding "Hibernia," and "Cambria." In 1847, when the Government contract was renewed, under the conditions that mails should, in future, be carried weekly, four new steamers, of 2,000 horse power, and capable of carrying guns of the largest calibre, were laid down, and shortly added to the fleet. From that time to the present day, the Cunard Steamship Company and the Admiralty have always been closely connected. The Cunard ships have very frequently been used for transport duty, and four of the present fleet are capable of being rapidly transformed into armed cruisers of great strength and speed, in time of war. Their decks are specially strengthened to bear the weight of the ponderous guns used in present day warfare, and the engines are placed below the water line. A large proportion of Cunard officers are on the Naval Reserve, having undergone training in the Royal Navy. They take a certain period of naval duty every year, so that, in case the Government called on the Cunard Steamship Company to furnish an additional armed cruiser or two, such ships could be officered by the company's own men.

From 1840 to 1903, the long stretch of sixty-three years—including almost the whole Victorian era, and going well into the dawn of the Edwardian—shows an endless perspective of famous Cunard ships—"Swift shuttles of an Empire's loom"—

weaving across the broad Atlantic the gradual history of ocean steamship construction, and of the British Mercantile Marine.

The "Umbria" and "Etruria," fastest liners of the later eighties, and still among the most prominent favourites of the Atlantic Ferry—the "Campania" and "Lucania," modern flyers, which still hold the Liverpool-New York record; the "Saxonia" and "Ivernia," large, luxurious ships of recent design, which have become famous on the "Ferry" for their phenomenal steadiness at sea—all these, and many others hardly less remarkable, have kept the name of the Cunard Steamship Company prominently before the world for more than sixty years. At the present moment much public interest has been aroused by the recent contract with the Government, which binds the Cunard Steamship Company to remain a purely British undertaking for at least twenty years to come, and to build two ships which, outclassing all others in size and speed, will be invaluable auxiliaries to the navy in case of war—in these days when both the race and the battle are assuredly to the swift.

The "Campania" and "Lucania," twin-screw sister ships, were built by the Fairfield Shipbuilding and Engineering Company, Limited, of Glasgow, and are among the leading ships of the world in point of speed and popularity. They are graceful and yacht-like in design, in spite of their great size—12,952 tons gross.

The "Lucania" and "Campania" are the fastest merchant vessels owned by Great Britain.

The "Umbria" and "Etruria" are still in their prime, and keep to their time-table with the punctuality of railway trains. Their dimensions are—length, 519 feet; beam, 57 feet 3 inches; moulded depth, 40 feet; gross tonnage, 8,127; horse power, 14,500; and average speed, 19 knots—highest, 20. At the time when they were launched they were the speediest liners in the world, and they are still among the fastest and best.

PORT OF LIVERPOOL.

It was not until the last century had well begun that the geographical position of Liverpool, as a door through which western communication had to be chiefly sustained, began steadily to raise her from little more than a harbour of refuge to her present position of one of the greatest Ports the world has yet seen.

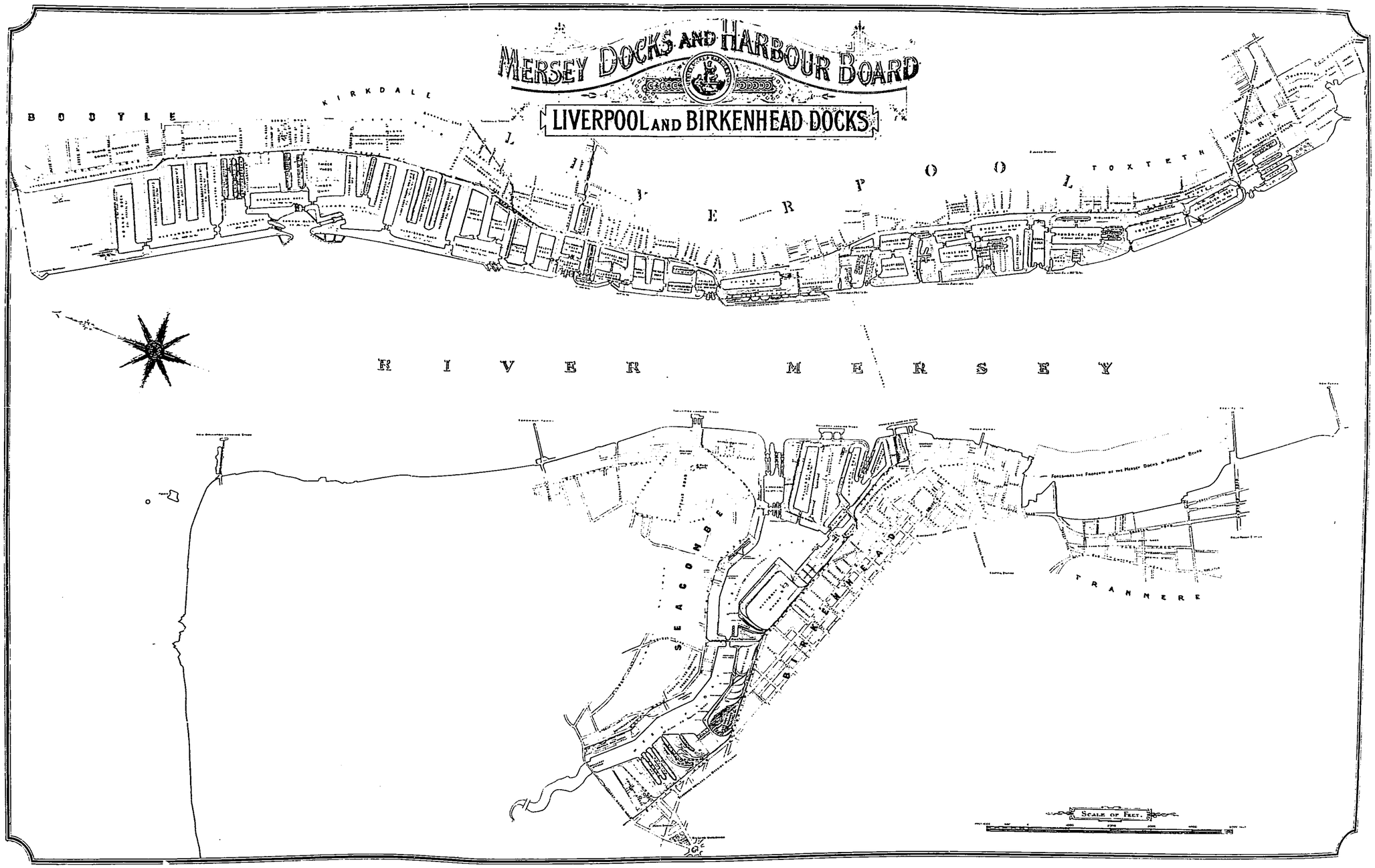
From the Herculaneum Dock at the south-end to the Hornby Dock at the north, the river is unbrokenly fronted for a length of about 7¼ miles by a system of docks and basins (having a water area of 558 acres and a lineal quayage of over 35 miles) of every imaginable type and variety, from the gigantic accommodation necessary for the ever-increasing size of the Atlantic liners to the lesser requirements of the small coaster. On the opposite side of the river the Birkenhead Docks (forming a part of the whole Mersey system) present the same features of progressive modernism.

Of a grand total of 63 wet docks, the most notable are, of course, those constructed for the use of huge steamers of the Atlantic type, such as the "Oceanic" and "Campania."

Following the construction of the Langton-Hornby group of Docks at the north-end, and the Herculaneum-Toxteth group at the south-end of the Liverpool Docks, the Mersey Docks and Harbour Board have for the past ten years been engaged in extensive works of alteration and addition to the older docks. These chiefly affect (*a*) the Canada-Huskisson system to the northward, and (*b*) the Brunswick-Wapping system

MERSEY DOCKS AND HARBOUR BOARD

LIVERPOOL AND BIRKENHEAD DOCKS



to the southward, and their object may be stated generally to be the provision of deep water quayage in long lengths furnished with sheds of great floor area, chiefly in two stories.

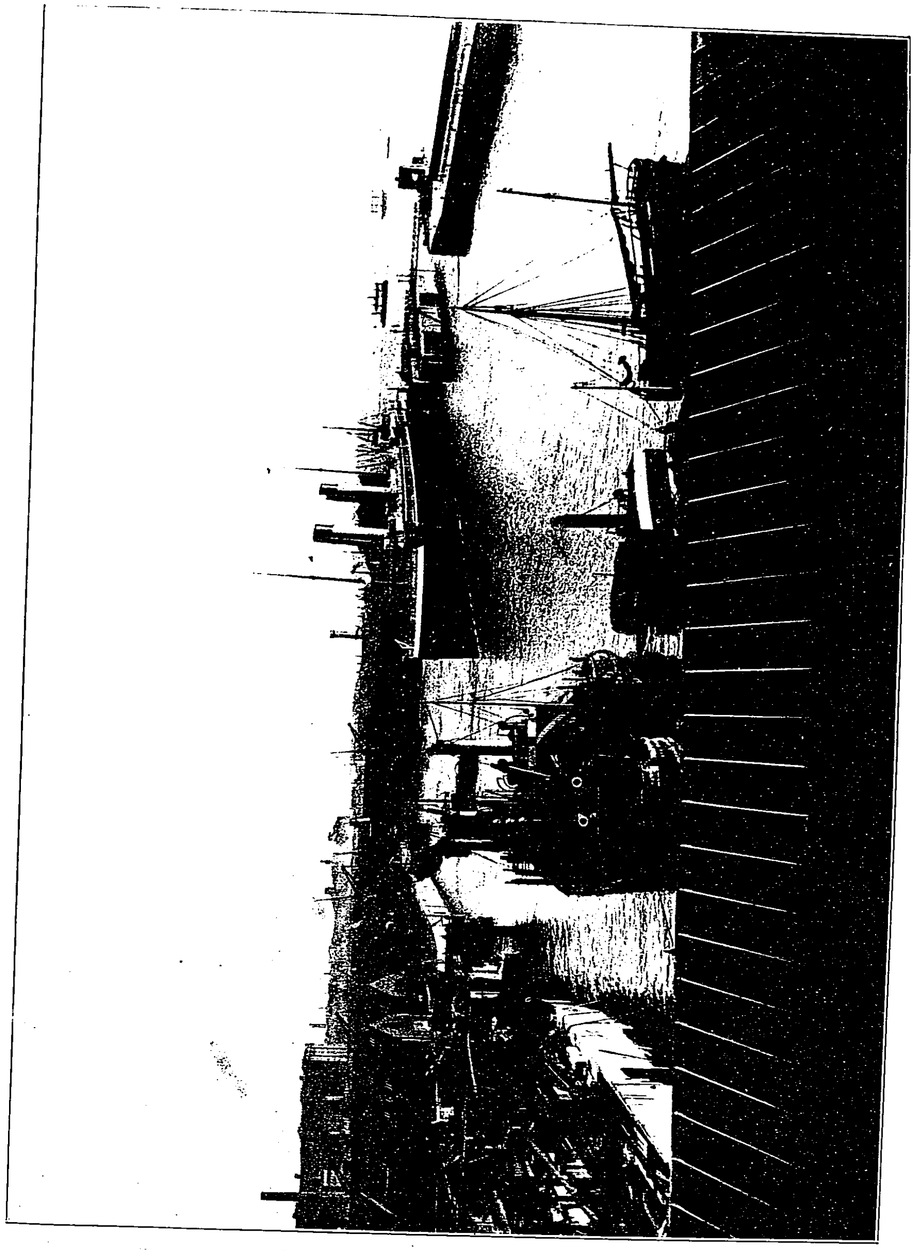
(A) CANADA-HUSKISSON SYSTEM.

From time to time during the period named, as certain parts of the scheme were completed they were brought into use, and thus very great additions to the deep water quayage have been provided in the Canada Dock and Huskisson Dock, including the Canada Branch Dock No. 1. The Canada Graving Dock, 925½ feet long and 94 feet in width (which is the largest dock of its kind in the world), was one of the most recent works to be brought into use and is used for the largest vessels afloat, such as the "Campania," "Oceanic," "Celtic," &c.

The Board have now commenced the work of converting the South Carriers' Dock into a graving dock, which will be 800 feet in length, also capable of taking vessels of the type of the "Oceanic" and "Celtic."

The works that have recently been in hand more particularly are the completion of the Sandon Half-tide Dock, which is now the principal entrance to the important system of deep water docks to the north, including the Canada-Huskisson system of docks and others adjoining them.

On neap tides this dock will be used as a lock for vessels passing between the river and the docks. The main entrances from the river to the dock are 100 feet and 80 feet wide, and have their sills laid at a low level so as to allow vessels of the largest class to enter the docks on all tides. The inside area of the dock will give about 40 feet depth of water on spring tides. In this dock the longest vessels hitherto constructed, viz., the "Oceanic," "Celtic," "Cedric," manœuvre with the greatest ease, and this and the adjoining



ENTRANCE TO THE SANDON HALF-TIDE DOCK.

docks, as well as the newer docks at the south end of the estate, are capable of receiving and dealing with a large number of such vessels at one time, or of those of even greater length which the new century is bound to see if shipping develops on the lines recently in favour.

As part of the Canada-Huskisson system, a new Branch Dock (the Huskisson Branch Dock No. 1) 1,300 feet long and 300 feet wide, 9¼ acres area, at the south end of the Huskisson Dock, and on the site of the old Sandon Graving Docks, having double story sheds on its north and south sides (except that for a length of 600 feet the south shed is treble storied), has just been completed and brought into use. This Dock has the same depth as the Sandon Half-Tide Dock.

A Branch Dock (Canada Branch Dock No. 2), 930 feet long, 300 feet wide, and 6½ acres area, is also being constructed out of the Canada Dock. The Sheds on its quays are to be wide single story sheds. This Dock will be ready for use by April, 1903. The Board are also about to construct a similar Branch Dock immediately to the north of the Canada Branch Dock No. 2.

The Dock Engineer is at present engaged on the work of deepening the Sandon Dock, and the re-construction of its north and south walls, and the erection of first-class sheds on the north and east quays of the dock.

In the Canada-Huskisson system the accommodation is the best in Liverpool at the present time. It gives deeper water than any other system, and the shed accommodation is of the most modern type. Here, the finest vessels frequenting the port are accommodated. The "Lucania," "Campania," and "Oceanic," take in and discharge cargo there, and the arrangements are such that these may be handled with the utmost despatch. Here, too, the enormous cargo vessels such as the "Saxonia," "Cymric," "Cevic," "Runic," and the "Celtic," are docked to receive and discharge their immense cargoes.

(B) THE BRUNSWICK-WAPPING SYSTEM.

A new Branch Dock out of the Queen's Dock, 860 feet long, 250 feet wide, and 5 acres area, with double story sheds, has recently been completed. A contract has also recently been entered into by the Board for the construction of a new second Branch Dock out of the Queen's Dock, similar to that above referred to, with first-class double story sheds on the quays thereof, and of a deep water Graving Dock, 630 feet long and 80 feet wide, alongside it.

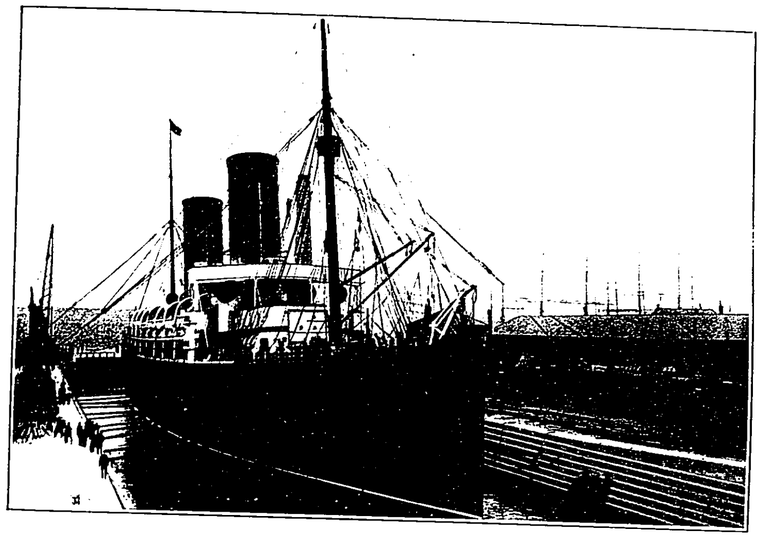
An additional Graving Dock (Herculaneum Graving Dock No. 4), is also being constructed, by contract, to the eastward of the existing Herculaneum Graving Docks. The length of the new dock will be 745 feet, and its width 80 feet.

New deep-water river entrances, 100 feet and 80 feet wide, are being constructed at the south end of the Brunswick Dock, as part of the scheme of re-construction of the Brunswick-Wapping system which they will serve.

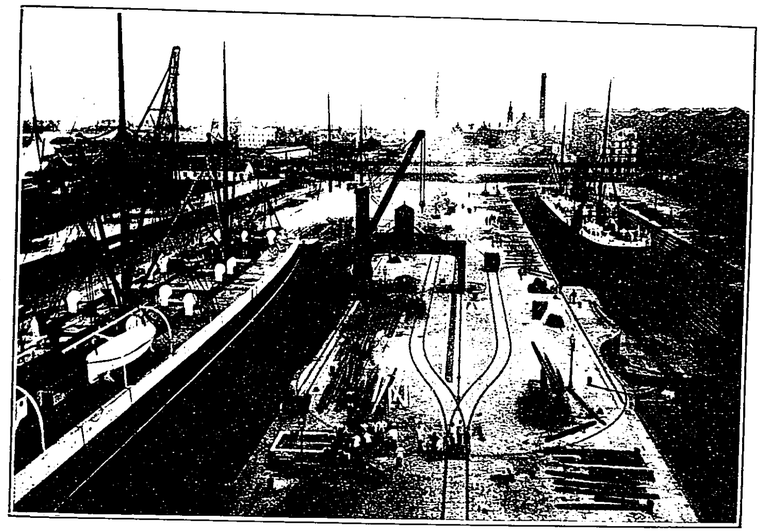
To enable these docks to be fully utilized by the largest class of vessels, the passages between the several docks of the system are being widened to 100 feet from their former width of 60 feet, and the north and south passages of the Coburg Dock so widened have been brought into use.

It may be interesting to state that the Dock Engineer's wages bill averages £10,000 to £11,000 sterling per week, and the number of men employed has been upwards of 8,000 at a time. (These figures are exclusive of payments to contractors also engaged on dock works, and do not include the men employed by them). The total expenditure in this Department for the year ending July 1st, 1902, has been £1,315,853 sterling.

The Board have also Parliamentary powers to make two new Branch Docks out of the Wapping Dock. This work has, however, not yet been put in hand.



CANADA GRAVING DOCK.



LANGTON GRAVING DOCKS.

BIRKENHEAD DOCKS.

These docks are constructed on the site of a tidal creek known as the Wallasey Pool, which extended inland for about two miles from the left or west bank of the Mersey. The main features of the scheme were two large docks called the East and West Floats, of 120 acres in area, and occupying a large portion of the Pool, the connection between these and the other adjoining docks and the river being by means of four locks, the most important of which is the Alfred Lock. This lock is now being lengthened and deepened, and powerful pumps to raise the level of the water in the Birkenhead dock system so as to give an equivalent increase of depth there have also been provided. The Alfred Dock into which the Alfred Lock leads is at present also being deepened.

These improvements will enable vessels drawing 28 feet of water to enter and use the system on the lowest tides. The quays are equipped with sheds of modern type, and there are also provided in the system three graving docks, one being 930 feet in length, and the remaining two 750 feet in length.

The docks at Birkenhead are frequented by prominent lines of steamships, such as the "Pacific," "Harrison," "Anchor," "Hall," and others.

The Board, some years ago, acquired a considerable area of foreshore abutting on the River Mersey, a short distance to the south of the entrances to the Birkenhead Docks, and a large portion of this foreshore has been leased by the Board for a number of years to a newly-formed Shipbuilding Company, who propose to construct two large graving docks and a wet dock with an area of about 64 acres thereon, in connection with the construction of vessels of the largest type.

The docks at Birkenhead are served by an extensive system of railway lines connected with practically all the

quays, and several of the principal Railway Companies have large goods depôts adjoining the docks.

The Port is well equipped with cranes, there being at the present time 148 hydraulic cranes, ranging from 10 cwt. to 100 tons, in addition to which there are a number of hand and steam cranes. Jiggers, both hand and hydraulic power, are provided for loading goods out of the ships on to the first or second floors of the sheds, and from the sheds on to the carts, &c., or railway trucks. At the Langton Graving Docks and the Canada Graving Dock, moveable hydraulic cranes of 30 and 40 tons power, respectively, are provided.

In addition to the foregoing, the Board have provided the following floating cranes, which are used for conveying lifts from quay to quay or vessel, or from vessel to vessel or quay, viz:—

A Barge Crane (the "Hercules") capable of dealing with loads up to 50 tons.

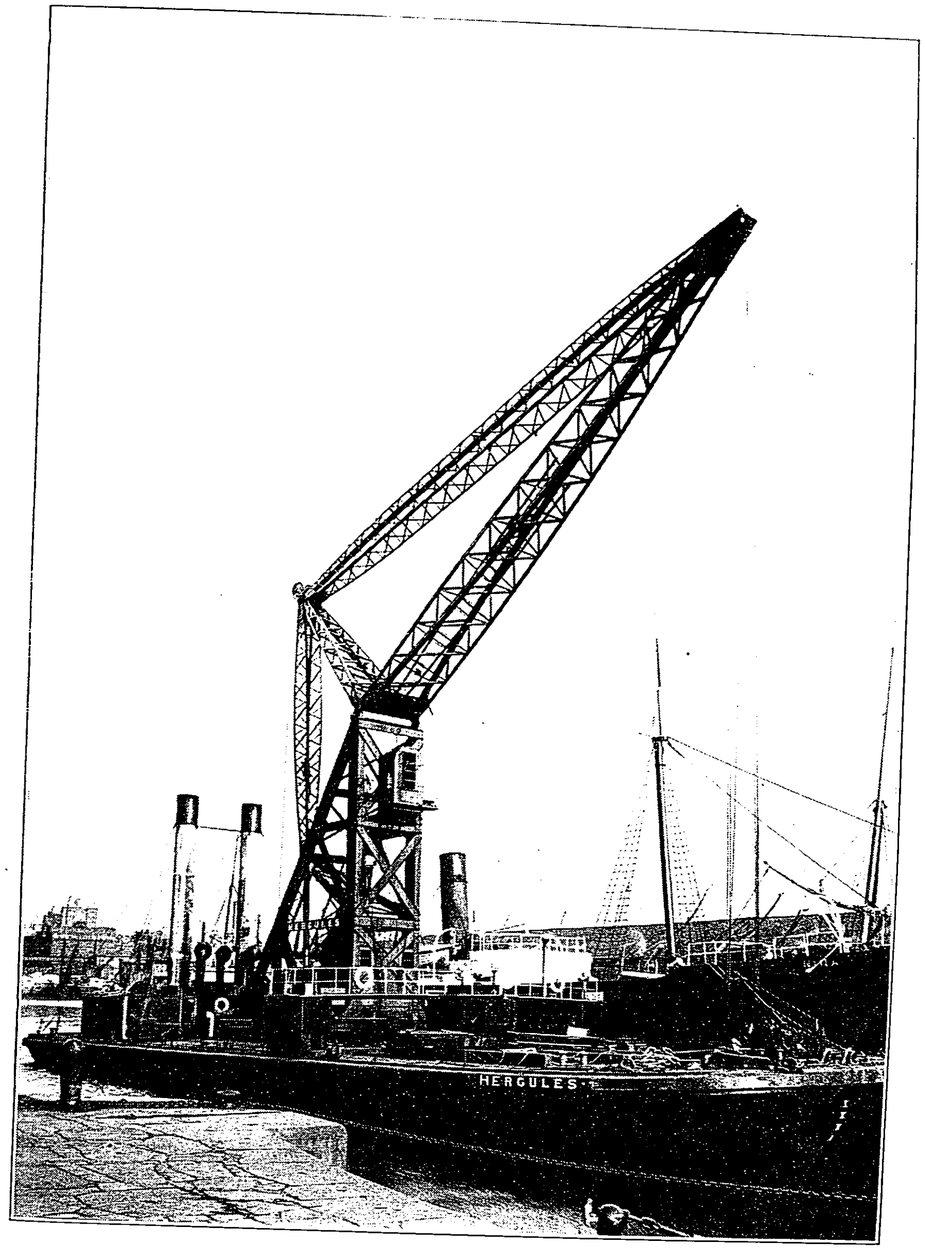
A Barge Crane (the "Atlas") capable of dealing freely with loads up to 30 tons weight, and, under certain restrictions, with loads up to 100 tons.

A Barge Crane (the "Titan") capable of dealing with loads up to 25 tons.

The floating cranes are in very great demand, and have proved most useful appliances.

There are three separate positions at this Port for the shipment of Coal, viz:—

1. At the Wellington and Bramley-Moore Docks.—Coal is brought from the Lancashire and Yorkshire Railway, and is shipped at the east side of the Wellington Dock, and north and east sides of the Bramley-Moore Dock from an elevated or



FLOATING CRANE "HERCULES."

high-level railway. There are nine fixed hydraulic cranes on the railway of the following capacities, viz:—

7, about 300 tons per hour each.
2, „ 150 „ „ „

2. AT THE HERCULANEUM DOCK.—

On the East Quay of this Dock, there are two 25-ton moveable hydraulic cranes, which are used for shipping Coal. The cranes have each a capacity of about 300 tons per hour.

3. AT THE EAST AND WEST FLOATS, BIRKENHEAD.—The following is the number and the capacity of the Coaling appliances at the Birkenhead Docks, viz:—

For shipping coal into large vessels.—One moveable hydraulic hoist, West Float, capacity about 300 tons per hour. Two hydraulic hoists (fixed), West Float, capacity about 300 tons per hour each.

For shipping coal into small vessels.—One hydraulic hoist (fixed), East Float, capacity about 100 tons per hour.

For shipping coal into flats.—Six hydraulic tips (fixed), East Float, capacity about 100 tons per hour each.

It may not, perhaps, be out of place to draw attention to the despatch given the "Lake Champlain" some time ago. The vessel arrived in Liverpool on a certain Sunday, and in 48 hours had discharged 12,000 tons measurement of cargo, and sailed again the following Wednesday morning with 2,000 tons of coal and cargo, and a large contingent of troops.

NOTE.—In the East Float a jetty has been constructed by the Board for the shipment into flats of coal from coasting steamers. There are four 30-cwt. moveable hydraulic cranes, with weighing machines combined, on the jetty.

The case of the "Lake Champlain" must not be taken as an exceptional one, as it is a common thing for 1,000 tons and upwards to be discharged per working day of nine hours.

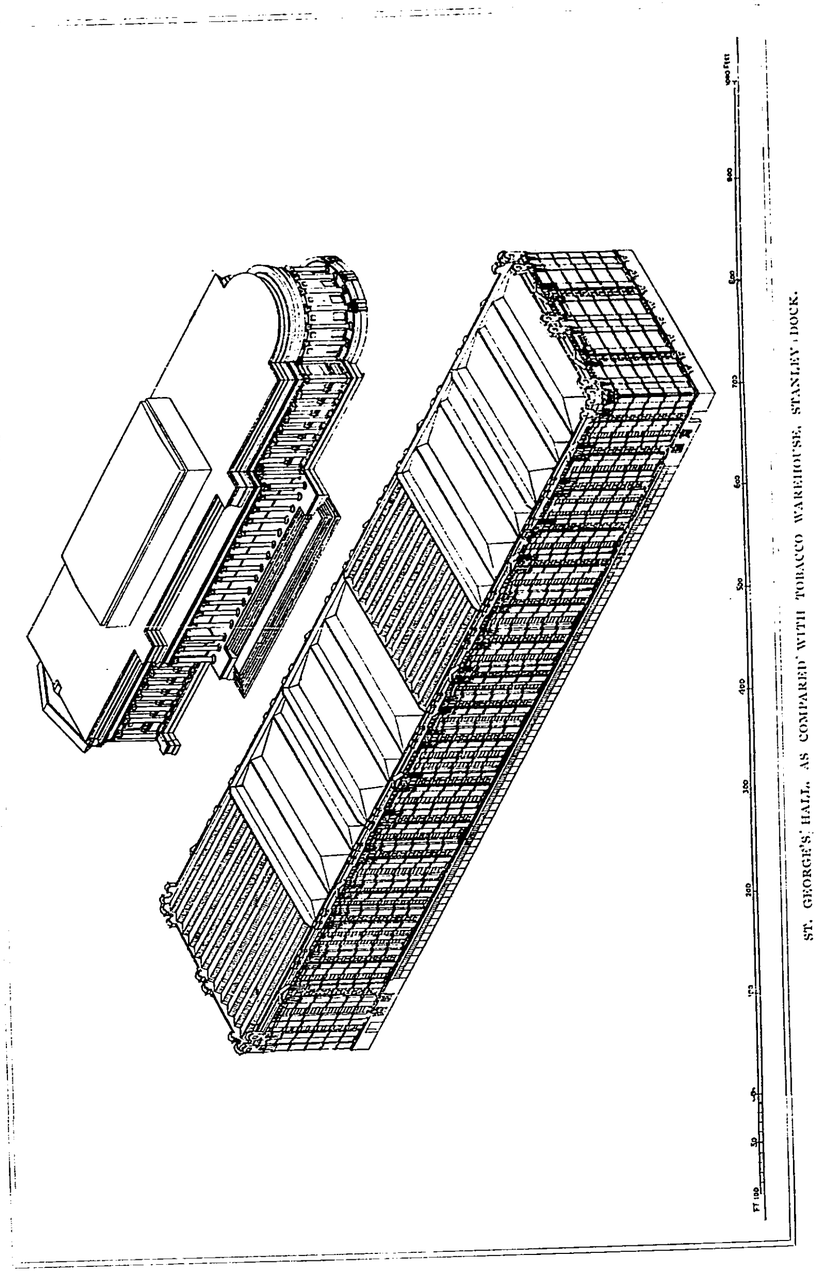
The following may also be taken as an instance of the rapid discharge of a cargo of cotton at this port, and the clearing of the quays.

The s.s. "Irada," from Galveston, with 30,026 bales of cotton, 640 tons of wheat, and 2,800 bags of flour, commenced to discharge at 1 p.m. on the 5th of November, 1900, and finished at 10 p.m. on the 9th of that month, the working time being 60 hours. The steamer took in about 2,500 tons of bunker coal, and sailed again at noon on the 10th of November, 1900. Nearly the whole of the cotton was weighed as landed, and removed by the consignees within three days.

The Warehouses of the Board present features at once striking and unique.

Sailing up the River Mersey, the most important building to be seen on the Dock Estate is the recently erected Tobacco Warehouse at the Stanley Dock, which is probably the largest Warehouse in the world, being 125 feet high, with a total floor area of about 36 acres.

The building consists of a vault, quay and twelve fire-proof upper floors, the latter specially constructed for the storage of Tobacco, of which they are capable of storing about 60,000 casks, in single tier, i.e. without any piling. The quay floor of the Warehouse is, of course, used for the landing of cargoes from vessels in the Stanley Dock, and the basement is used for the storage of general goods. Some idea of the magnitude of this Warehouse may be gathered from the fact that 27,000,000 bricks and about 6,000 tons of iron were used in its construction. The Warehouse is fitted with hydraulic lifts, hoists, &c., and is lighted by electricity. There are also two smaller blocks of Warehouses at the Stanley Dock with a total capacity of about 38,000 casks of Tobacco.



At the present time there are over 120,000 casks of Tobacco stored at the Dock Warehouses at Liverpool, which is more than at all the other Ports in the United Kingdom put together.

To those who know Liverpool it may be mentioned that if St. George's Hall in Lime Street could be lifted bodily and dropped in through the roof of the Tobacco Warehouse, it would disappear from view.

Special Warehouse accommodation has also been provided by the Board for the storage of Grain, both at Liverpool and Birkenhead. The Warehouses at the East Waterloo Dock on the Liverpool side of the river have a capacity for about 35,000 tons of Grain, in addition to a large quay for the landing, &c., of goods.

The Grain Warehouses at Birkenhead are situated on the north side of the East Float and have a storage capacity for about 39,000 tons of Grain.

Each of these Warehouses is fitted with hydraulic machinery, lifts, bands, elevators, &c., for the proper and expeditious handling of Grain, which can be stored either on floors or in silos.

There are also other large blocks of Warehouses on the Dock Estate for the storage of Wool and General Produce.

The Wool Warehouse which is specially set apart for the storage of that article is situate a little to the eastward of the Tobacco Warehouse and has an actual storage capacity for 88,000 bales of Wool, but as it is the practice for the Wool to be placed "on show" at this Warehouse for public auction, the actual working capacity is reduced to about 35,000 bales at the approach of the periodical auctions.

The top floor is provided with a "weaving shed" roof specially constructed to give a good north light for the convenience of Wool buyers.

The Warehouses for the storage of General Goods are erected over the quays of the Albert and Wapping Docks.

Special mention may be made of the several large Cold Storage Depôts in the Port, including one belonging to the Riverside Cold Storage Company, Limited, situated about the centre of the Dock Estate, capable of storing in the insulated portion of the premises about 180,000 sheep or 56,000 quarters of beef, while if the buildings were fully insulated, there would be storage capacity for 260,000 sheep or 87,000 quarters of beef.

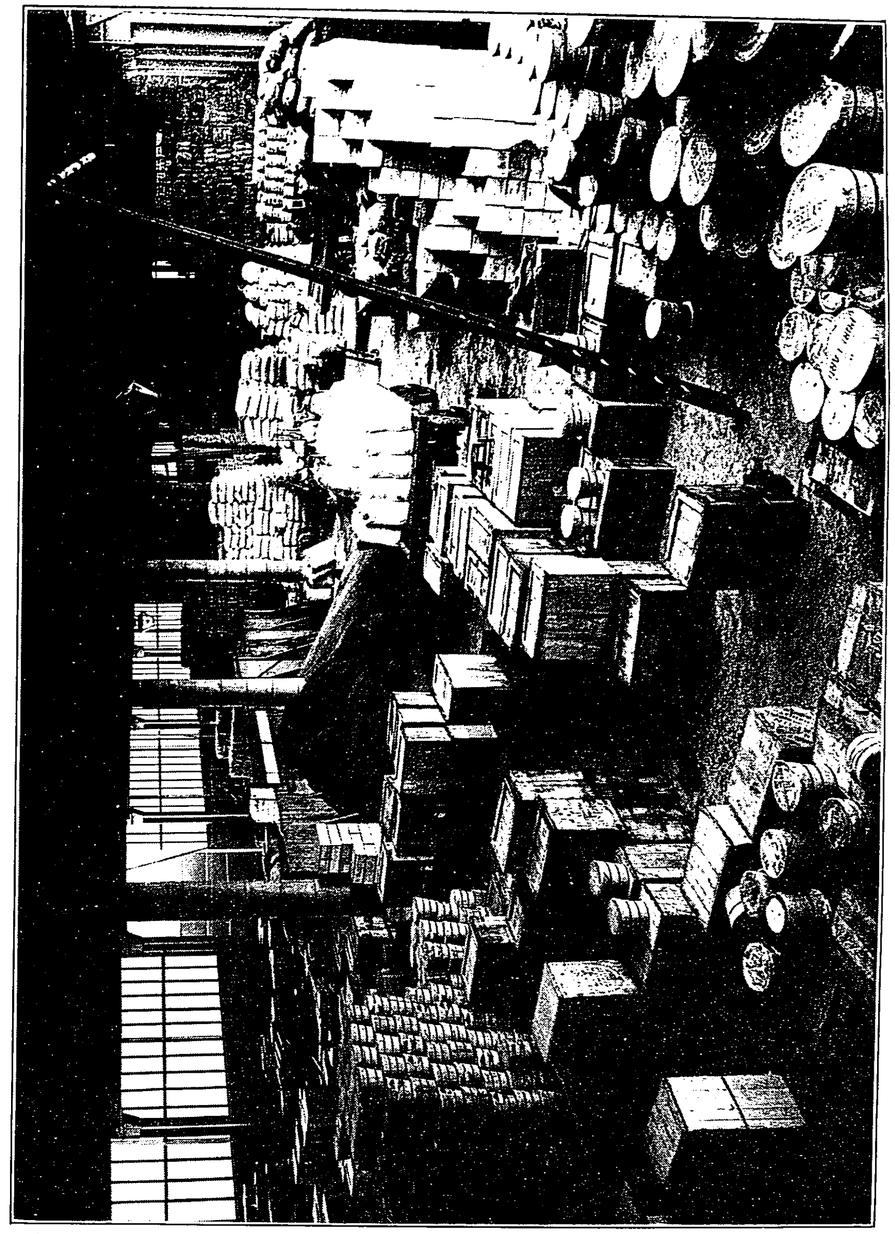
There is also a new Cold Storage Depôt in the course of erection by a public company in close proximity to one of the docks at the north end of the Dock Estate. In all the depôts throughout the Port *all* classes of goods requiring cold storage can be accommodated.

The Foreign Cattle Trade at Liverpool is dealt with at the Birkenhead Foreign Animals' Wharf on the Cheshire side of the River Mersey, and the Cattle are landed at two stages (Woodside and Wallasey) from the large Atlantic boats engaged in the trade.

At this Wharf, accommodation is provided for about 6,000 head of cattle and 16,000 sheep, with extensive chill rooms capable of accommodating 2,800 carcases per day; also slaughter house accommodation for 3,400 head of cattle and 3,000 sheep per day.

All the recent improvements in connection with this extensive trade have been introduced, and it is generally acknowledged that the Wharf is perhaps the most complete and best in the Kingdom.

During the year 1901, 482 vessels discharged at those stages 243,984 oxen and 250,067 sheep.



GROUND FLOOR OF A DOUBLE STORY SHED, SHOWING INWARD CARGO.

The carcases of animals slaughtered at the Birkenhead Foreign Animals' Wharf are distributed all over the United Kingdom.

Tank accommodation for the Petroleum Trade has been provided by the Board at the south end of their estate at Liverpool, having a total storage capacity for 12,500 tons of oil.

These tanks are all let on annual tenancies, and are worked by the tenants themselves.

At Birkenhead on land belonging to the Board there are also large depôts for the storage of Petroleum in bulk close to the docks. They belong to the Anglo-American Oil Company, Limited, and have a total capacity of about 18,000 tons. Railway lines are laid in connection with each installation.

Perhaps one of the first objects of the Port which attracts the attention of the traveller, is the famous Landing Stage.

In the Mersey, where the rise of the tide is so considerable, the total range between high and low water being as much as 33 feet on extreme spring tides, and about 11 feet on neap tides, some device by which vessels could discharge and receive passengers and goods at varying levels of the tide, early became necessary, and the inclined slipways, which served the purpose in the first instance, were superseded for the first time in 1847, by the construction of the George's Landing Stage. Since that time the Landing Stage in that position has been greatly increased in dimensions, and other Landing Stages have been erected at different parts of the river.

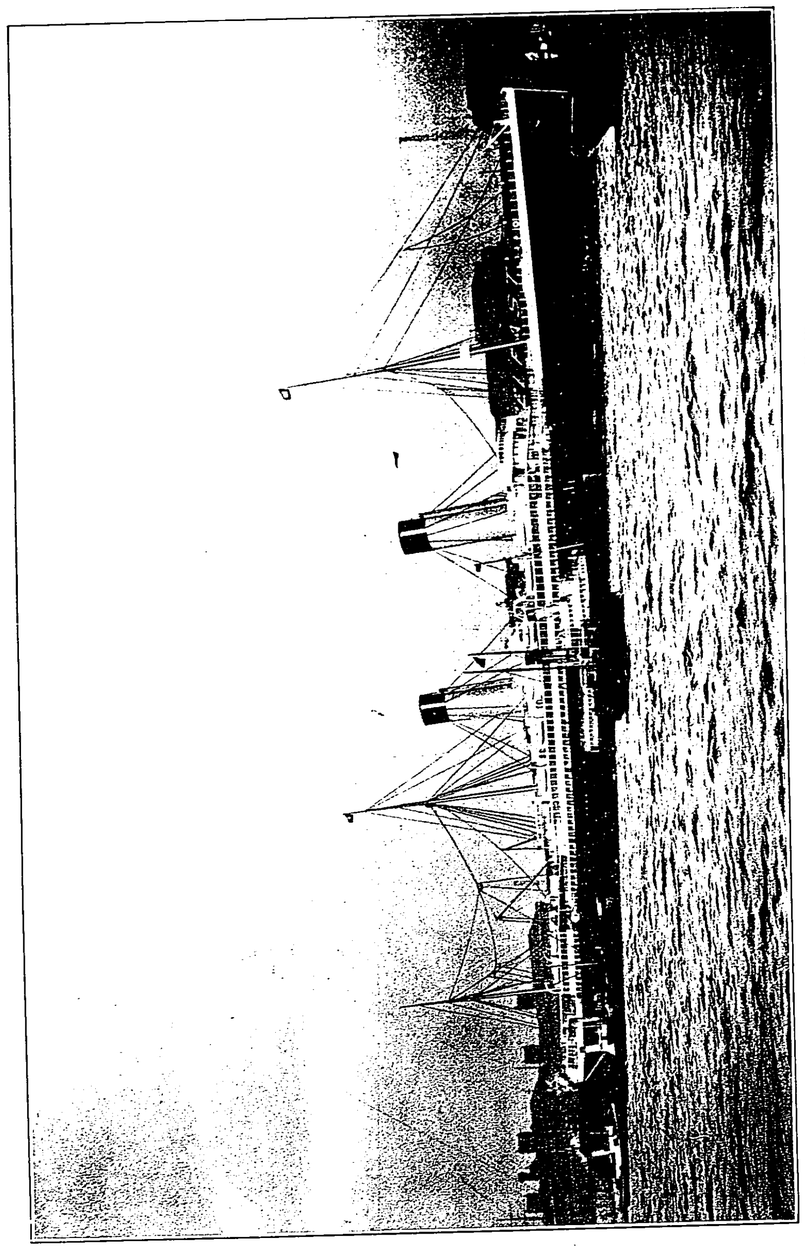
The greatest of such stages is the Landing Stage at Liverpool, which runs along the river front by the Prince's Dock for a total length of 2,478 feet.

Its general width is about 80 feet. It is a floating structure carried by iron pontoons, about 200 in number, their normal dimensions being about 80 feet long, 10 feet wide, and

6 feet deep. The pontoons are arranged at right angles to the length of the stage, and on them are placed five longitudinal iron box girders or keelsons 4 to 5 feet deep. Above these are placed deck beams of iron running across them about 4 feet centre to centre, and, on these, planking of two thicknesses is bolted, forming a continuous deck. The stage is held in position by a number of bridges connected with the shore and stage by swivel joints, and by mooring chains, the shore ends of which are in the river wall. The level of the deck of the stage is about 6 to 8 feet above the water, and, for the Ferry passengers, lowering gangways are arranged in fixed positions on the deck of the stage so as to lower on to the deck of the Ferry Steamers. For the higher transatlantic and other vessels, moveable gangways are used, and for specially high vessels an upper deck has been provided at one part of the back portion of the stage, and a bridge at the same level is provided, extending to near the front of the stage, where moveable gangways can be placed to reach the vessel on the level, or at an easy slope.

The main bridges are about 110 feet long and their incline to the shore is practicable for foot passengers at all states of the tide, but at low water the ordinary bridges would not be practicable for goods traffic, and to meet this case a bridge of special construction is provided near the centre of the stage. It is a floating bridge 550 feet long and 35 feet wide, formed of sections, alternately a section and platform carried by a number of small pontoons, and a section formed of a trussed platform, the whole forming a continuous bridge having two cart tracks and three foot passenger tracks. At dead low water it has a continuous incline of 1 in 20 and at other times, when the tide is higher, it is either partially inclined or wholly level.

Buildings and Offices are provided on different parts of the Stage for Shelter Sheds, Refreshment Rooms, Customs' Examining Rooms, Shipping Offices, &c. The largest transatlantic liners come alongside the Stage on their arrival at



WHITE STAR LINER "OCEANIC" ALONGSIDE LIVERPOOL LANDING STAGE.

and departure from the Port at all states of the tide, and embark and disembark their passengers with their luggage, mails, specie, &c. This is done at the northern part of the Stage. The southern part of the Stage, for about 805 feet, is appropriated for the passenger ferries, and a certain portion, close to the floating bridge, is used for Goods traffic to Birkenhead and Wallasey in Cheshire, for which special boats are provided by the authorities of those districts—the owners of the ferries plying thereto.

The Transatlantic Passengers for and from London depart from and arrive at the Riverside Railway Station. The Station occupies a position between the Landing Stage and the west side of the Prince's Dock at its south end. It is erected upon the site of a number of Dock Sheds and other Buildings which formerly were in use for ordinary dock purposes. The work was commenced at the end of December, 1894, and the Station was opened in the June following.

The Station is a commodious building covered by a roof, in wrought iron work, of one large span about 85 feet wide. From its design and the tasteful colours which have been adopted for the roof and side walls of the Station, the whole has a light and pleasing appearance. The total length of the Station is 790 feet. There are three platforms of great length, each being capable of accommodating one of the longest passenger trains.

The west platform which, from its facing the Landing Stage, is that most used, is 770 feet long.

Mechanical conveyors are provided for the transfer of luggage from steamers to railway carriages or other vehicles, and *vice versa*.

The Prince's Jetty, a fixed pile structure, extending from the north end of the Liverpool Landing Stage to the south side of the Prince's Half-tide entrances, is specially arranged for the landing of coastwise cattle and goods at all

states of the tide. It is provided with moveable cranes capable of lifting up to five tons. Adjoining it, a commodious wharf, with pens for coastwise cattle, has been erected and is largely used, as shown by the following figures, which give the number of animals placed in the pens during last year, viz. :—

Cattle	140,339.
Sheep	321,601.
Pigs	115,887.
Horses	1,399.

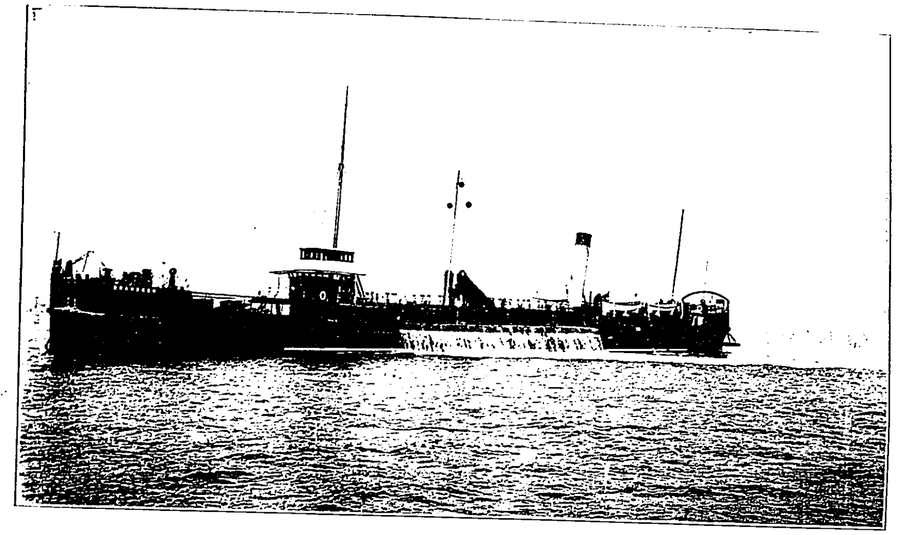
For the whole distance between the Liverpool docks and the sea there was generally ample depth of water in the main channel on all conditions of tide, except at the bar at the entrance to that channel.

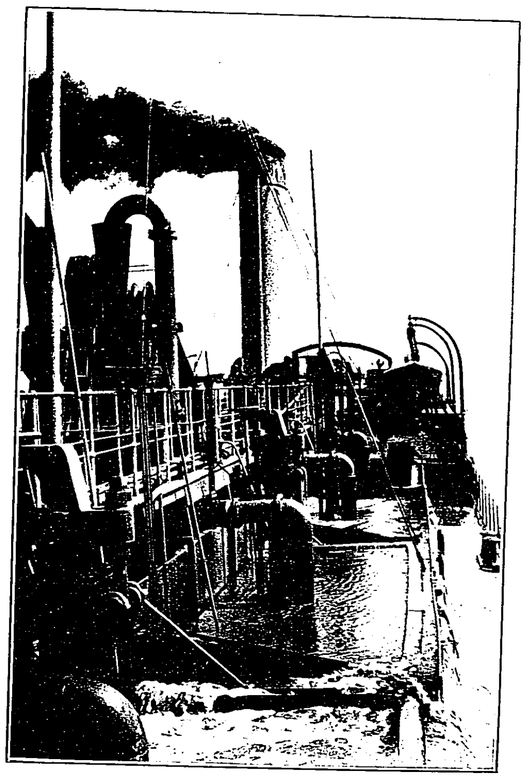
To increase the depth of water on this bar, dredging was commenced as an experiment in September, 1890, two of the Board's ordinary hopper barges, "No. 5" and "No. 7," of 500 tons capacity each, and until then in use for carrying dock dredgings to sea, having been fitted up with centrifugal sand pumps, the suction tube of "No. 5" being 18 inches in diameter, and that of "No. 7" 22 inches. These vessels were capable of filling their own hoppers with sand at the bar in about half-an-hour.

The result of their work was favourable, and in 1892 the Board decided to order a new hopper dredger larger than any hitherto built.

This vessel, named the "Brancker" (which cost about £60,000), was set to work in July, 1893. It is 320 feet long, 46 feet 10 inches moulded breadth; the hopper capacity is 3,000 tons of sand; it is propelled by twin screws, and can steam when loaded 10 knots per hour.

This Dredger has two pumps driven by direct acting compound engines, the suction orifice of each pump being 36 inches in diameter and the suction tube arranged in a central





STEAM DREDGER "BRANCKER."

well and supplying both pumps, is 45 inches in diameter. These pumps are capable together of filling the vessel's hoppers in three-quarters-of-an-hour with sand of average quality. It fills itself in varying times, according to the quality of the material, the minimum time being about 25 minutes. It has dredged as much as 39,000 tons of sand within twenty-four hours, and 183,000 tons in one week of 5½ days.

In November, 1895, a duplicate of the "Brancker" named the "G. B. Crow" was put to work on the Bar.

Up to the end of the year 1902, there had been removed from the Bar a total of about 28,800,000 tons of sand. Before dredging was commenced the depth of water at dead low water of spring tides was only 11 feet, whilst now there is under the same conditions about 26 feet.

The space over which dredging has been carried on at the Bar measures about 6,000 feet by 1,500 feet wide, the latter being the average width of the buoyed cut or channel through the Bar. The quality of the material dredged from the Bar varies from fine sand mixed with mud on the outer slope of the Bar to a coarse sand on the inner slope. The "Brancker" and the "G. B. Crow" are also capable of dredging successfully in gravel. Dredging has also taken place on shoals and projections of sandbanks in the main sea channels and from these the sand pump dredgers have removed over 37,000,000 tons.

The total expenditure in connection with these dredging operations up to the end of the year 1902, not including capital cost of plant, interest or depreciation on that capital, was about £288,000.

The expenditure in like terms for the year ending the 1st of July, 1902, was about £37,000.

It may be added that a new Sand Pump Dredger, larger than those mentioned, is in course of construction, and will shortly be brought into commission. The vessel will be named the "Coronation," and will be a twin screw self-propelling Sand Pump Dredger, having a hopper capacity of 70,000 cubic feet,

capable of filling itself with 3,500 tons of Mersey River sand in 50 minutes from a maximum depth of 65 feet, and of propelling itself in its normal steaming trim with a full load, and with coal bunkers and water tanks full, at the rate of 10 knots per hour.

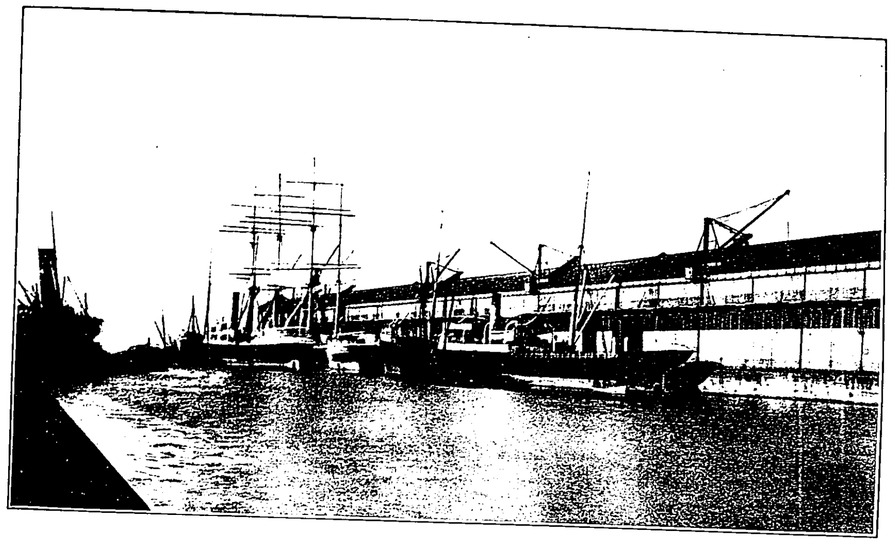
The draft of the vessel when fully loaded will not be greater than 15 feet. Its cost when completed will be about £75,000 sterling.

The interchange of traffic between the docks and the city is carried on by means of a wide street traversing the whole length of the Dock Estate from north to south, upon which side streets abut.

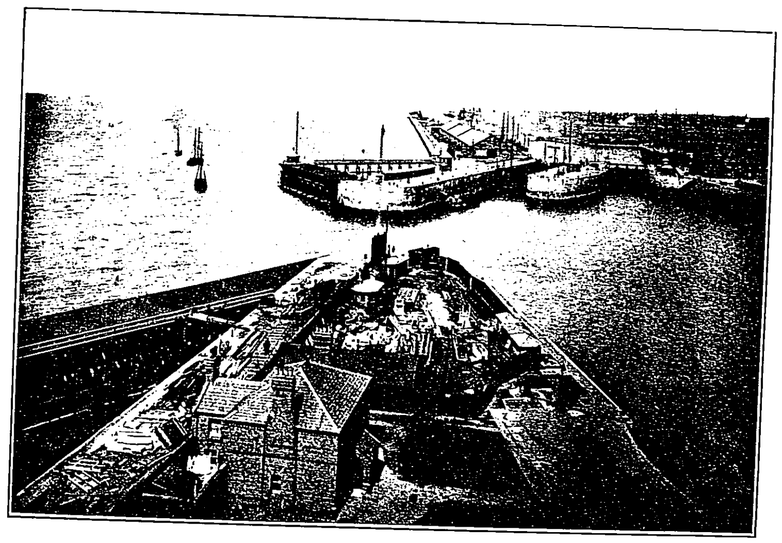
This thoroughfare is of sufficient width to allow of a double line of railway being laid along its margin throughout, communicating, where necessary, with lines along the dock quays, and also with several Railway systems which have their goods termini adjoining. There are in all about 16 stations along this six-mile length, divided among the London and North Western, Lancashire and Yorkshire, Cheshire Lines, Midland, Great Northern, Great Central, and Great Western Railways, some of which, however, have no direct rail access to Liverpool, but have depôts for the interchange of traffic with their fully developed system at Birkenhead.

An Overhead Railway worked by electricity, and at a level of about 16 feet above the double line of railway referred to in the preceding paragraph, has been erected for passenger traffic, and has proved to be a valuable public convenience, and is daily becoming of greater importance.

The Mersey Tunnel Railway, an important work which has added very materially to the facilities of the passenger cross-river traffic, as well as in effect linking up for passenger purposes the railway systems of the Lancashire and Cheshire sides of the river, was carried out from the designs of Sir James Brunlees and Sir Douglas Fox, and, until this year, was worked by steam locomotion, which has now been superseded by electricity.



DOUBLE STORY SHED, QUEEN'S BRANCH DOCK.



LANGTON AND ALEXANDRA DOCKS, FROM CANADA TOWER.

Several canal systems from up the river work in connection with the Dock Estate, and are important adjuncts to the trade of the port. The only one, however, which has a direct communication with the docks is the Leeds and Liverpool Canal, which traverses the country to the north of Liverpool, and is in direct communication with the manufacturing and mineral centres of Lancashire and Yorkshire.

During the last financial year of the Dock Estate, ending on the 1st July, 1902, the aggregate tonnage, entering and clearing at Liverpool was about 26,600,000 tons, the largest in the World, excepting London.

As regards her export trade, Liverpool stands without a rival in the kingdom, as the following comparison of the values of exports at the ports named, during the year 1901, will show :—

Liverpool	£105,808,166
London	92,600,191
Glasgow	16,935,318
Southampton.....	13,695,657
Cardiff	12,077,148
Swansea.....	5,727,925
Bristol	1,491,510

In the matter of her import trade, Liverpool stands second to London alone, and vastly overtops each of the other ports enumerated.

The Mersey Docks and Harbour Board, constituted by Act of Parliament to take over the entire control of the Port accommodation, is a body of 28 gentlemen. Twenty-four are elected by the Dock Ratepayers, *i.e.*, persons paying rates and dues on ships and goods only, and the remaining four are appointed by the Mersey Conservancy Commissioners, who consist of the First Lord of the Admiralty, the Chancellor of the Duchy of Lancaster, and the President of the Board of Trade.

The Members of the Board are all business men of the highest standing and reputation, and receive no remuneration

whatever for their services—a position on the Board being regarded as an honour to be attained only by the best men representing the various branches of trade.

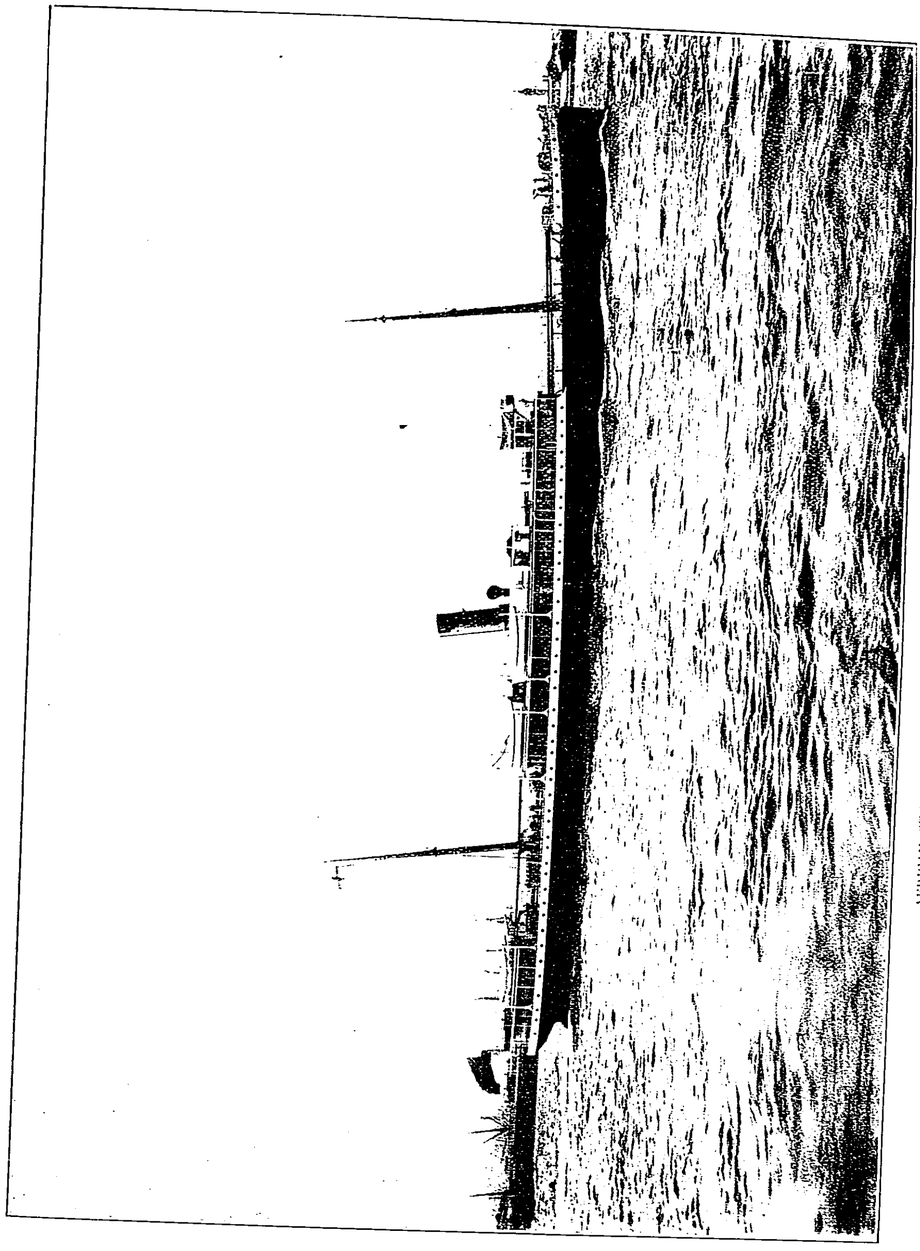
No interest, political or otherwise, is allowed the slightest footing in the councils of the Board and it would be difficult if not impossible to find another instance of so impersonal yet highly expert and laborious services being given without any inducement save public spirit and honourable distinction.

The revenue of the Board to maintain and improve this enormous area, is derived from the vessels which pay tonnage rates, and goods carried in them which pay dues. This revenue which amounts to about £1,500,000 per annum is, to a large extent, absorbed in payment of the interest on the Bond Debt and in repairs, maintenance and management. When, as has happened, the Board are in such a position, owing to the growth of trade, that their revenue greatly exceeds their expenditure, they make reductions in their charges where these charges seem to press most heavily, and thus bring down, at any rate for a time, the revenue to the normal level of expenditure.

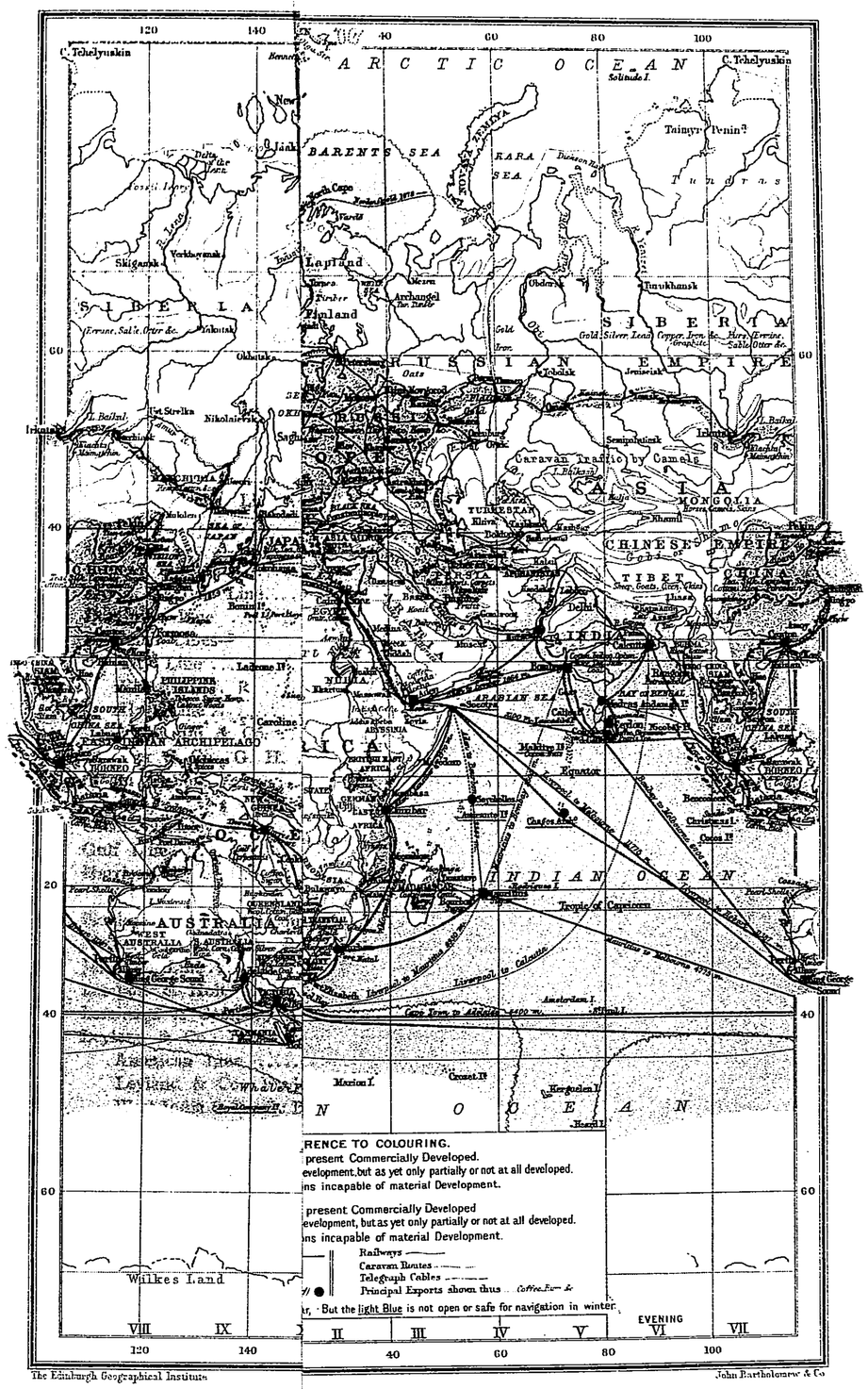
The Board's Offices are at present situate in the Revenue Buildings, Canning Place, but have for many years past ceased to be adequate for the requirements of the staff, which is consequently scattered in about half-a-dozen different buildings in the immediate neighbourhood.

The Board have arranged for a new building to be erected in which to concentrate the whole of their extensive staff. The position selected for the Building is on the Southern half of the site of the old George's Dock, the Northern portion of which the Board have sold to the Corporation of Liverpool to enable the latter to extend and develop the City Electric Tramway System. The cost of the Building is estimated at about £300,000 sterling.

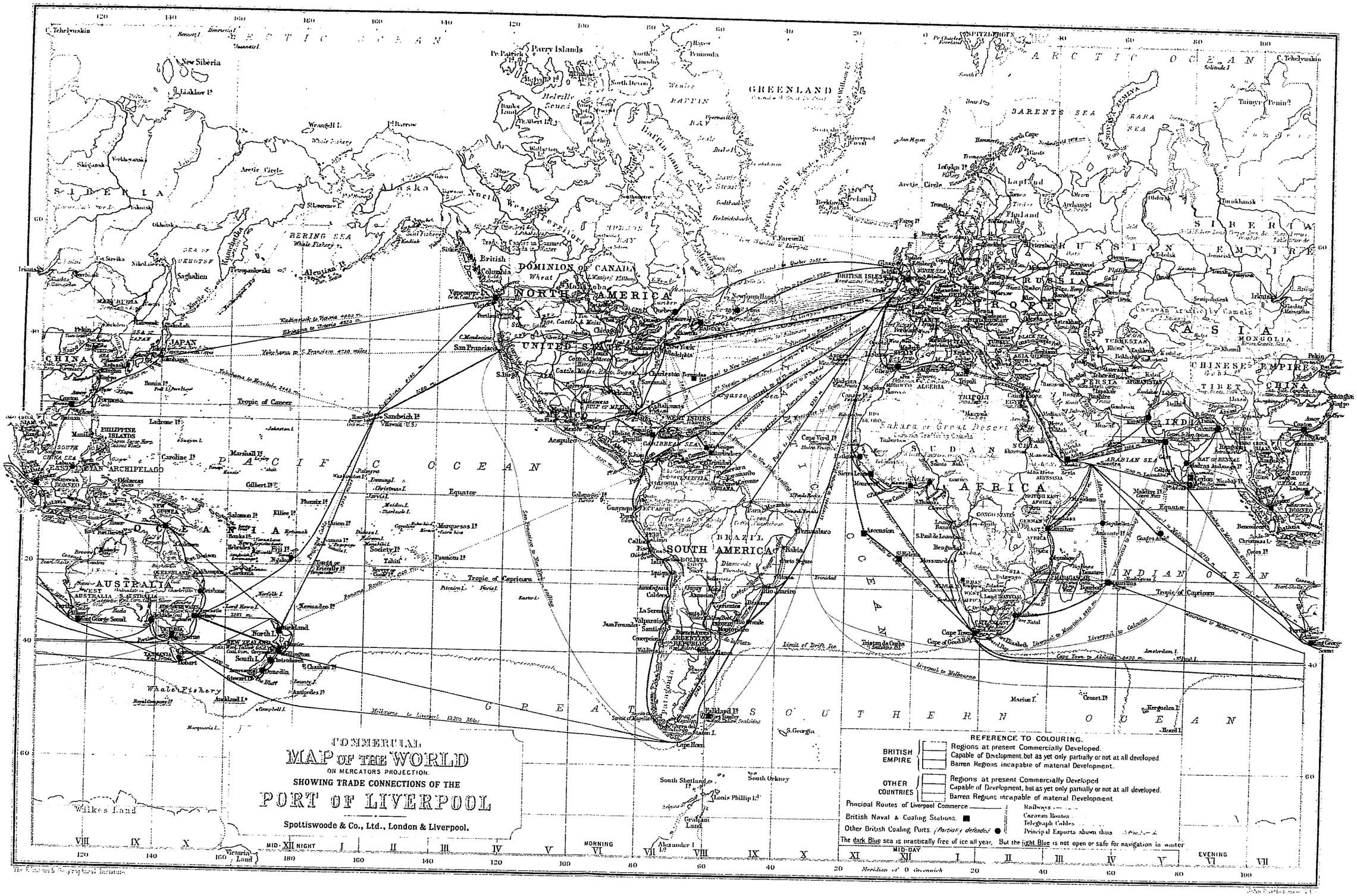
The Corporation also propose to construct handsome buildings on their adjoining property, which will harmonize with the new Dock Offices.



AFRICAN STEAMSHIP COMPANY'S ROYAL MAIL STEAMER "NIGERIA."



The Edinburgh Geographical Institute
John Bartholomew & Co


COMMERCIAL
MAP OF THE WORLD
ON MERCATORS PROJECTION.
SHOWING TRADE CONNECTIONS OF THE
PORT OF LIVERPOOL
Spottiswoode & Co., Ltd., London & Liverpool.
REFERENCE TO COLOURING.
BRITISH EMPIRE
Regions at present Commercially Developed.
Capable of Development but as yet only partially or not at all developed.
Barren Regions incapable of material Development.
OTHER COUNTRIES
Regions at present Commercially Developed
Capable of Development, but as yet only partially or not at all developed.
Barren Regions incapable of material Development
Principal Routes of Liverpool Commerce
British Naval & Coaling Stations.
Other British Coaling Ports. (Partially defended)
Railways
Caravan Routes
Telegraph Cables
Principal Exports shown thus
The dark Blue sea is practically free of ice all year. But the light Blue is not open or safe for navigation in winter
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
SOUTHERN OCEAN
NORTH AMERICA
SOUTH AMERICA
EUROPE
ASIA
AFRICA
AUSTRALIA
GREENLAND
SIBERIA
RUSSIA
RUSSIAN EMPIRE
DOMINION OF CANADA
UNITED STATES
BRAZIL
CHINA
JAPAN
INDIA
PERSIA
TURKESTAN
MONGOLIA
CHINESE EMPIRE
TIBET
SUDAN
ALGERIA
TRIPOLI
EGYPT
ARABIA
Liverpool
London
Glasgow
Dublin
Belfast
Edinburgh
Manchester
Birmingham
Bristol
Hull
Leith
Aberdeen
Dundee
Cardiff
Plymouth
Portsmouth
Southampton
Queenstown
Limerick
Galway
Sligo
Londonderry
Cork
Waterford
Wexford
Drogheda
Dublin
Belfast
Newry
Armagh
Enniskillen
Omagh
Derry
Coleraine
Ballymena
Antrim
Lisburn
Downpatrick
Newtownards
Bangor
Carrickfergus
Larne
Ballycastle
Portrush
Portstewart
Limavady
Strabane
Dungannon
Cookstown
Magherafelt
Ballymoney
Ballycastle
Portrush
Portstewart
Limavady
Strabane
Dungannon
Cookstown
Magherafelt
Ballymoney

The following indicates the principal shipping firms in Liverpool trading to all parts of the world:—

African Steamship Company....West and South-west Africa.
Allan Line.....Canada and River Plate.
American Line .....Philadelphia.
Bates & Son, E. .....Galveston.
Bibby Line .....India and Burmah.
Booth Steamship Company.....Para, Manaos, and Maranham.
British and African Steam Navigation Company .....West and South-west Africa.
Brocklebank Line .....Calcutta.
Canadian Pacific Line .....Quebec and Montreal.
Clan Line .....India and South Africa.
Coker & Co., A. .....Baltic.
Cunard Line.....New York, Boston and Mediterranean.
David MacIver Line.....River Plate.
Dominion Line .....Boston, Montreal and Quebec.
Ellerman Lines—
City Line .....Bombay and Karachi.
Ellerman, J. R. .....Portugal and Mediterranean.
Hall Line .....Bombay and Karachi.
Papayanni & Co. .....Mediterranean.
Fletcher & Co., G. H. .....West Indies.
Glynn & Son, J. .....Newport News and Mediterranean Ports.
Gracie, Beazley & Co.....Australia, &c.
Gulf Line .....Chili, Peru, &c.
Harrison, T. & J... .....India, Brazil, West Indies, and South Africa.
Houlder Brothers & Company..Australia, South America, &c.
Houston & Company, R. P.....River Plate and South Africa.
Johnston Line .....Baltimore and Mediterranean.
Lamport & Holt .....Brazil, Valparaiso, &c.
Larrinaga & Company.....Manila, Singapore, and West Indies.
Leyland & Co., Ltd., Frederick—
American Line .....Philadelphia.
Leyland & Co., Frederick ..West Indies.
West India & Pacific Branch..West Indies and Gulf Ports.

SHIPPING FIRMS.—*(Continued.)*

MacAndrews & Co.	Spain and Mediterranean.
Moss Steamship Company	Mediterranean and Black Sea Ports.
Nelson Line	River Plate.
Ocean Steamship Company	China and Japan.
Pacific Steam Navigation Co.	Brazil, Chili, and Peru.
Serra & Tintore Line	West Indies.
Stott & Company, W. H.	Baltic and Mediterranean.
Warren Line	Boston.
Welsford & Company, J. H.	Galveston.
White Star Line	New York, Australia, and South Africa.
Yeoward Brothers	Canary Islands.

LEE & NIGHTINGALE, PRINTERS, LIVERPOOL.

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