

Joshua Tetley & Son, Leeds

Extracted from the Noted Breweries of Great Britain and Ireland

Alfred Bernard

*"Nor does the home-spun juice of malt,
Like foreign wines, alone exalt
The fancy, but if drank in season
Strengthens and modulates our reason;
The fragrant hop at the same time
Does with the malt itself sublime, ..."*

Chapter I

It was night by the time we reached Leeds, and the great clock over the Town Hall had just rung out eleven when we entered the hotel. We were up betimes the next morning, to make a survey of the town before commencing our duties at the Leeds brewery. Few manufacturing towns have finer buildings or prettier suburbs than Leeds. Handsome villas and mansions are built on the different roads and around the margins of the park-like moors, and picturesque suburbs rise in beautiful undulations northwards.

Leeds, the most opulent and populous town in Yorkshire, is the seat of the woollen manufacture in England, and contains some fine streets. Among them is Briggate, one of the broadest, handsomest, and busiest thoroughfares in the north of England. The Old Bridge at its

foot was, within the last seventy-five years, the only communication between the northern and southern parts of Leeds; but many others have since been erected. Leeds, by the union of the canal with the river Aire, has the important advantage of an inland navigation, which extends from the eastern to the western seas.

Few towns in England have risen so rapidly as this, for we find, on looking at the statistics of the period, that in the year 1080 the population numbered 300 persons, and in 1831 it had reached 123,393; whilst at the present time it exceeds 309,000.

For centuries Leeds has been the centre of a great brewing trade, and at one time the breweries were so numerous that they had the benefit of special legislation.

In 1393, an ordinance for the price of victuals and drink was proclaimed in a full court at York; "By the advice and consent of our lord the King's justices in manner following: Good wheaten bread, four loaves for one penny; strong beer, per gallon, one penny.; and claret wine, eight pence per gallon." Previous to this date "beere," as it was then called, was

extensively brewed by private persons; but this was not the beverage known in the present day, although it was fermented.

Whether or not we assent to the dictum of Autolytus, in the *Winter's Tale*, that "a quart of ale is a dish for a king," it is certain that a malt liquor, more or less resembling the ale of modern times, was much in vogue among our forefathers centuries ago. In the days of St. Augustine, ale and mead were the chief drinks of the Saxons, the former being made from wheat, barley and oats, with the addition of herbs to flavour it.

It is stated in Knight's *Cyclopaedia* that, in the early periods of the history of England, "ale and bread were considered as equally victuals, or absolute necessities of life."

This appears from the various assizes or ordinances of bread and ale, which were passed from time to time for the purpose of regulating the price and quality of these articles. In the fifty-first year of the reign of Henry III (1266) a statute was passed, the preamble of which alludes to earlier statutes on the same subject, by which a graduated scale was established for the price of ale throughout England. It declared that "when a quarter of wheat was sold for three shillings, or three shillings and fourpence, and a quarter barley for twenty pence, or twenty-four pence, and a quarter of oats for fifteen pence, brewers in cities could afford to sell two gallons of ale for a penny, and out of cities three gallons for a penny, and

when in a town (in burgo) three gallons are sold for a penny, out of a town they may and ought to sell four."

In process of time this uniform scale of price became extremely inconvenient and oppressive; and by the Statute 23, Henry VIII, c. 4, it was enacted that ale-brewers should charge for their ale such prices as might appear convenient and sufficient in the discretion of the justices of the peace within whose jurisdiction such ale-brewers should dwell.

The price of ale was regulated by provisions like those above stated, and the quality was ascertained by officers of great antiquity, called "*gustatores cervisiae*" - ale-tasters, or ale-conners. These officers were regularly chosen every year in the court-leet of each manor, and were sworn "to examine and assay the beer and ale, and to take care that they were good and wholesome, and sold at proper prices according to the assize; and also to present all defaults of brewers to the next court-leet." Similar officers were also appointed in boroughs and towns corporate; and in many places, in compliance with charters or ancient custom, ale-tasters are, at the present day, annually chosen and sworn, though the duties of the office have fallen into disuse. These ancient regulations appear to have been dictated by a regard to public health; but in modern times, since ale and beer have become excisable commodities, the numerous restrictions and provisions which have been introduced are directed principally to the

security of the revenue and the convenient collection of duties, although they undoubtedly secure the consumer, to a certain extent, from any adulteration of the article by the admixture of improper ingredients.

As the time had now come when we were due at the brewery, we turned our faces southward and continued our walk to Briggate.

Those dwellers in, and visitors to the great manufacturing town of Leeds who have crossed the old bridge from Briggate, can scarcely fail to have observed the array of tall chimneys which meets the eye on the left side of its eastern extremity, each one serving as a kind of beacon to the great buildings beneath, and all of which belong to Tetley's Brewery. Indeed, this mammoth establishment is as distinguishable on this side of the river, for its tall chimneys and numerous piles of buildings, as the other side is for its great woollen and other manufactories.

There is not the slightest doubt that this brewery was in existence at the end of the last century, for among the books and papers stowed away in one of the strong rooms, we came across an old-fashioned debit note, dated Leeds, July 28, 1796, addressed to Mr. Is. Harrison, as follows:-

"Bought of WILLIAM SYKES,
"Common Brewer. Opposite the Coal
Staith."

which, by permission, we here reproduce. The old brewery, before it was pulled down, faced the river Aire, on which the Coal Staith stood, as at that time there were no houses intervening.

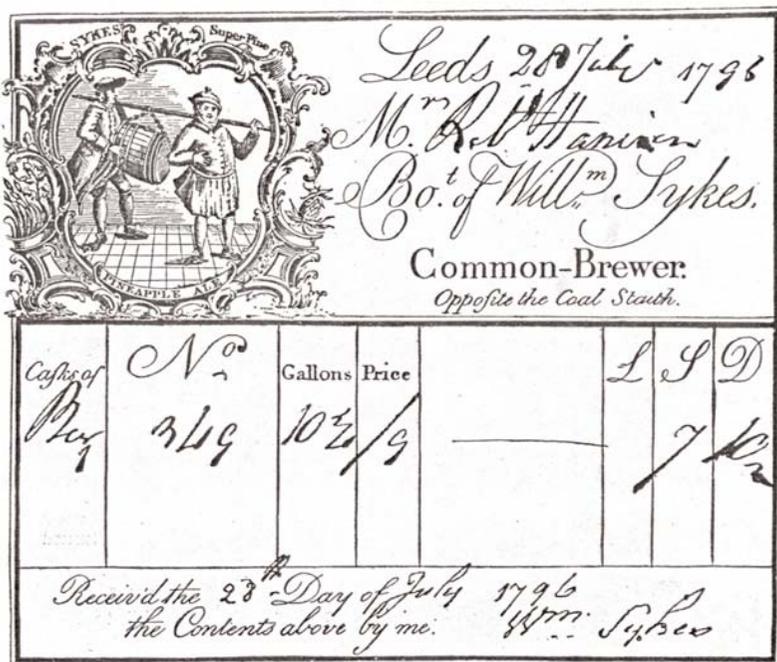
Some of the ancient buildings, notably the old maltings connected with the brewery, are still extant, and stand as evidences of the substantial style of construction in vogue during the eighteenth century.

In the annals of Leeds it is recorded, "that in the year 1756, a public brewhouse was built in Meadow Lane, wherein was brewed about fifty quarters of malt weekly."

Although the brewery has disappeared, the maltings are still standing in Meadow Lane, and are the property of Joshua Tetley & Son. A description of them will be found in a later chapter.

Tetley's is a vast brewery, whether we regard the extent of the premises comprised in it, the amount of capital invested and by which it is maintained, or the systematic arrangements by which the daily operations are conducted. It is situated on the south side of the river Aire, and is about half-a-mile from the Town Hall and railway stations.

Our frontispiece, copied from a series of photographs taken from steeples and towers in the immediate vicinity, represents a bird's-eye view of this mammoth establishment, and includes the notable Crown Point Maltings, etc.



The Sykes debit note

At the side of the noble main entrance-gate there is a range of buildings appropriated to enquiry and weigh offices, and to the office of the foreman of the yard, in front of which is a wide corridor, paved with Minton tiles, leading to the general offices. Nearly in the middle of the premises are the brewhouse and fermenting rooms, where the principal processes connected with the brewing are conducted. Towards the east are malt stores, a great loading-out stage, with offices over, and numerous cask-washing sheds; and beyond, an open court, containing at various points in its circuit an engine house, with all the steam-engine

apparatus, an ice-machine house, cooperages, and a pumping house; westward, range upon range of stables, dray sheds, malt kilns, and quite a village of industrial shops.

Such are the extensive ranges of buildings visible from the elevated roof of the great Crown Point Maltings, the whole covering a space of ground six acres in area. We propose, in the following pages, to describe the purposes to which these several buildings are applied, and the numerous vessels and extensive plant contained therein.

Having already briefly referred to the antiquity of Tetley's brewery, we now proceed to give our readers a full description of the interior of this notable place as it appears to-day, together with a few particulars of the enterprising firm by whom it has been elevated from a small business to be the most important brewing concern in Leeds and district.

In the middle of the year 1822, Mr. Joshua Tetley took the Leeds Brewery, then, as now, the largest in the town. Thirty years after, when the business had outgrown both plant and buildings, the new brewery was built by his son, Mr. Francis William Tetley, the present stone room being erected on the exact site of the old fermenting house.

Mr. Joshua Tetley died in 1859, the business then being carried on by Mr. Francis William Tetley and Mr. Charles Ryder (the present senior partner).

Mr. Francis William Tetley died in January, 1883; his son Mr. Charles Francis Tetley had previously joined the concern. Mr. Charles Foster Ryder was afterwards admitted a partner.

Since 1853, the business has increased very largely, necessitating, from time to time, additional buildings and improvements. In every department new and costly appliances have been fixed, together with hydraulic machinery of great power, supplied by Sir W.G. Armstrong, so that the brewery, now vies with the most modern in engines, plant and machinery.

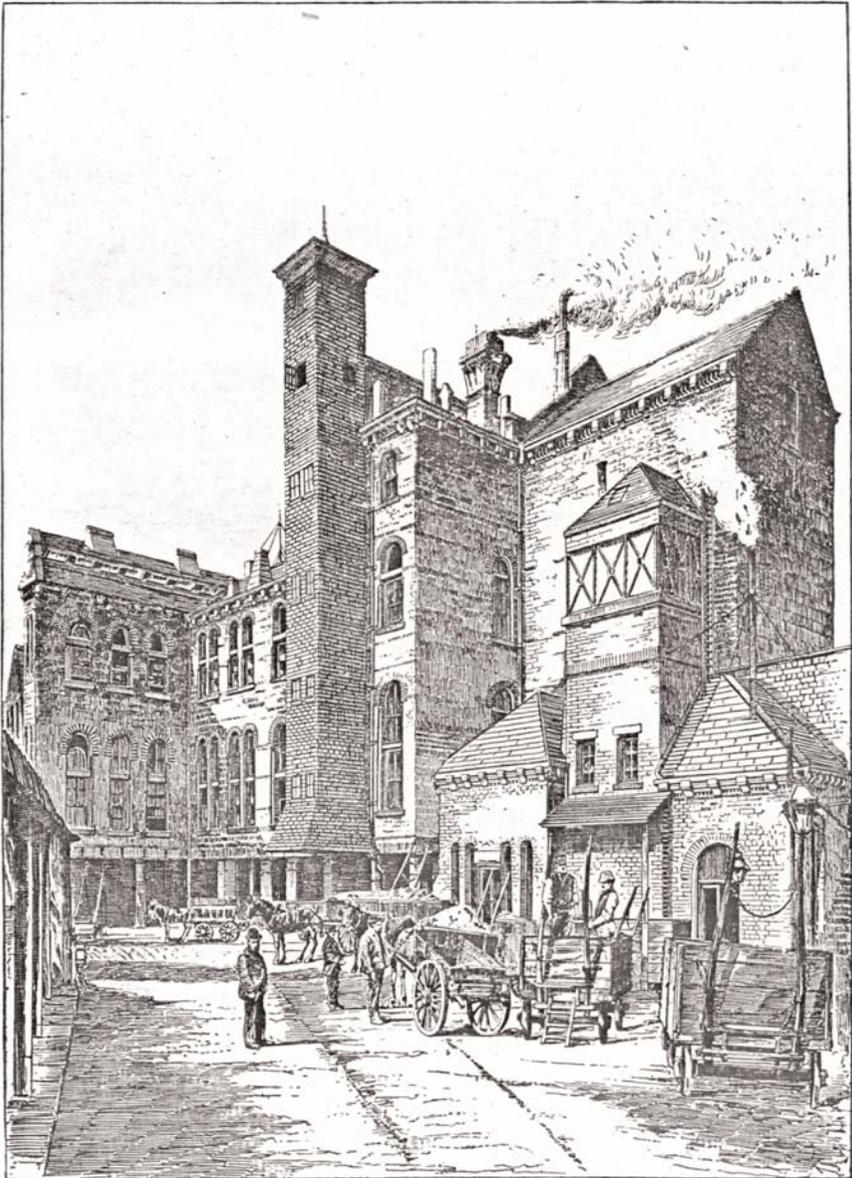
The most notable among all the buildings, is the New Crown Point Malthouse, erected in 1866, the loftiest of its kind in Leeds, and of handsome elevation. It is only when one makes a tour of an establishment of this magnitude, that an idea can be formed of the fabulous amount of money employed in the brewing trade.

As we entered the brewery precincts, a number of loaded wagons were just passing through the gates, and we could not resist stopping awhile to admire the noble horses and their stalwart drivers, the latter proceeding merrily along and looking the picture of health and happiness.

Our first duty, was to present our credentials to the firm, and obtain permission to spend a few days in their great brewery. We had no difficulty in seeing them, and, after a most courteous reception, were taken to the head brewer's office, in the centre of the brew-house and situated on the first floor. Here we were introduced to Mr. Cross, who provided us with a guide, and arranged the order of our four days' tour through the premises.

Our first visit was to the malt storehouse, a large structure, five storeys high, adjoining the east side of the brewhouse. The maltings, where the malt is manufactured, were inspected a few days later.

At the back of the building, in the south yard, there is an enclosed chain hoist, passing through trap-doors, inserted in each floor, worked by an engine in the yard.



Grains courtyard and brewhouse

The malt is lifted by the hoist from the wagons to the required floor, and is either shot into a hopper, connected with screening machines, and measured by an automatic weigher before being binned, or is wheeled into malt chambers, occupying four floors of the adjoining block.

In the east building there are eight bins, each 44 feet deep, and together holding 5,000 quarters of malt.

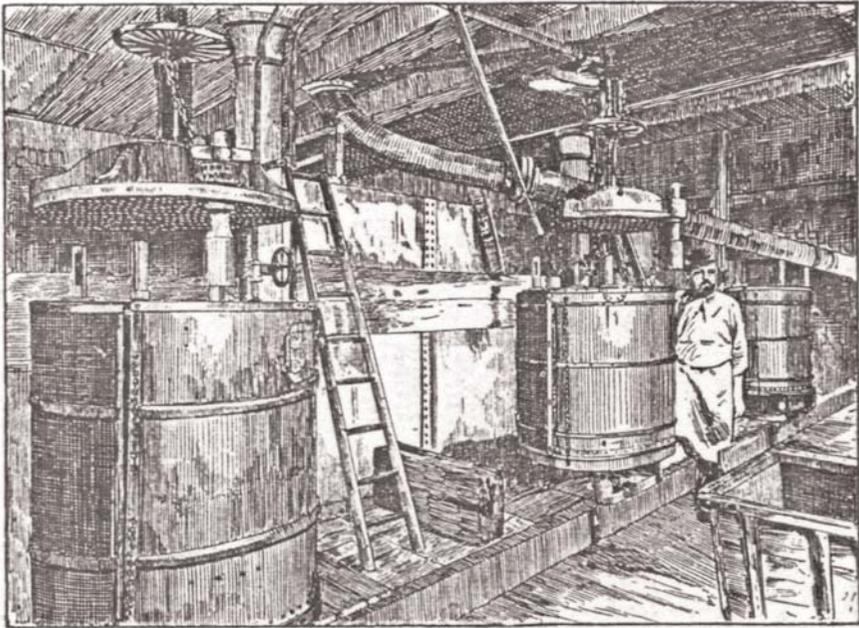
By pulling out a slide at the bottom of these bins, the malt falls on an elevator, by which it is lifted to two Archimedean screws running along inside the roof of the

building. These screws convey the malt to various screening machines placed on the top floor, from whence it again falls into four of Penney's dividing machines (for sizing the grain) as it drops into one of Reuther & Reiser's automatic weighers placed on the floor below, the index or register being fixed in the Penney's machine above, for the convenience of the attendant, who works on that floor. There are other screens besides those mentioned, and two automatic measures for measuring malt en route to the mill.

Passing through the second floor, we came to the maltster's mess room, fitted-up with benches, tables, etc.; with lockers



Mashing room



Hopback stage, showing circular hop presses

for their clothes; whence, passing through a doorway, we reached the grist-case room at the top of the brewhouse. This contains an experimental plant, or five-quarter model brewery, complete in every particular. On this floor are the tops of the grist cases, and here are erected two of the five malt mills, each of which grinds at the rate of twenty quarters per hour. One is placed on the floor beneath, the others are on the ground floor. The patent, or black malt, is stored in one of the lower chambers of the maltstores. where it is crushed in a mill erected in the black malt room for that purpose. From the mills, the crushed malt is conveyed by belts to the numerous grist cases over

the tuns. The water used in the brewhouse comes partly from a deep well in the east yard and partly from the town supply. There are also on the premises two boreholes, each 600 feet deep, which furnish an unlimited quantity of water for cooling purposes.

Following our guide, we climbed a flight of steps leading to the top stage of the brewhouse, where we were shown three metal heating tanks, holding each 250 barrels. Over them is placed a bonnet-hood, or wooden shaft, a necessary appendage, for taking away the steam; and on each is an indicator, giving the temperature and contents. Descending

another staircase, we reached the great mashing room, measuring 100 feet by 60 feet. Here are displayed numerous vessels of great size and capacity; and, in the centre of the concreted floor, an array of eight mash tuns, two rising from the floor to a height of 8 feet, and capable of mashing each seventy quarters. They are constructed of iron, with gun-metal draining-plates and mashing rakes; some are commanded by mashing machines, and all have wooden covers. Along the ceiling overhead are to be seen ponderous shafting, wheels, great pipes and machinery, in such bewildering numbers, that they somewhat obstruct the light from the many windows pierced in the walls. Connected with the mash tuns, and beneath them, are three underbacks ; and at the bottom of all the vessels are valve-traps, for conveying the grains therefrom to the farmers' carts in the court below.

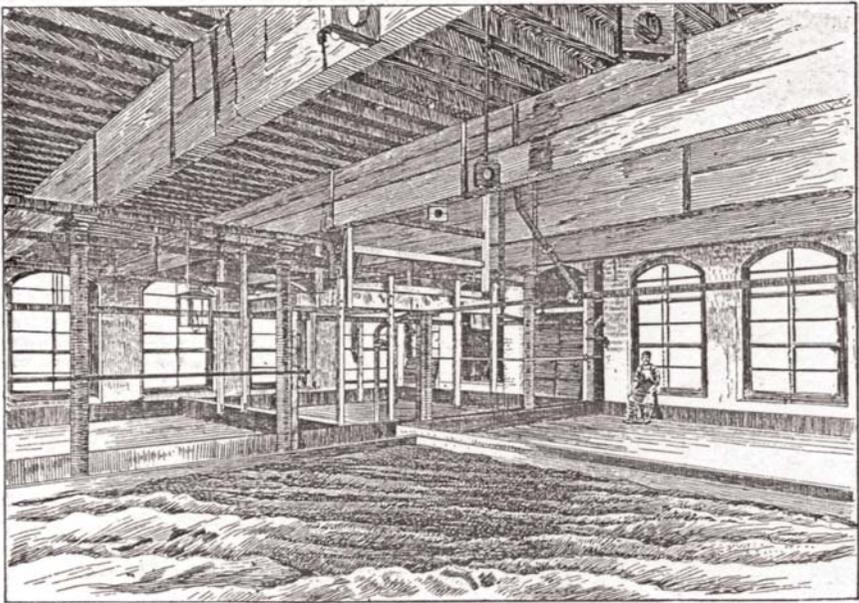
The grist hoppers over the tuns are somewhat noticeable, being balloon-shaped and painted light drab, which gives them a striking appearance. Along the walls are numerous pumps for wort and water, which will be described in their proper places.

From the first landing of the staircase we took a good look at this room, where we could see the mashmen flitting about in their long white coats, and, at the same time, hear the hum and roar of the machinery in motion. We were much impressed with the animated appearance of the place, which made up a scene full of life and business.

Once more ascending the main staircase, we reached the first section of the copper-stage, where there are to be seen two steam-jacketed coppers, each of 260 barrels content. Our guide pointed out two intermediate receivers placed over them, constructed of copper, to which the wort is first pumped before reaching the coppers. Passing beneath an archway, we came to another section of the building, which has an open roof and a solidly constructed concrete floor. Here we saw four more coppers, heated by fire, and having a capacity of from 100 to 200 barrels. On the east side of the building are placed three large converters; and beyond them another little experimental brewery plant like that already referred to.

The hopbacks, three in number, and 9 feet deep, are on the same level as the mashing room, and are constructed of copper. In front of each vessel (as shown in our illustration) is placed a circular hop press, of ingenious construction. On leaving these presses the spent hops fall into movable wagons, by which they are conveyed to the shoots leading out into the east yard.

Proceeding southward, we passed beneath a broad archway into the hot-liquor room, containing four hot-liquor tanks, constructed of iron and heated by steam. Three hold 100 barrels each, the other holds forty barrels, and the tops are reached by a gallery in front. Above these hot-liquor tanks we noticed two large iron tanks, containing a supply of cold Water for these heating vessels. Besides those



No. 1 cooling room

mentioned, there is another large hot-water tank on the opposite side of the room, for cleansing the various vessels and utensils in the brewery.

Passing through the washing-up room - a distinctive feature of this brewery, where every utensil is washed after each operation - we came to a long staircase leading up to the numerous floors of this solidly-constructed building. Ascending to the first landing, we entered the No. 1 cooling loft, 70 feet square, a magnificently lighted place, having two sides of its walls louvered on the most approved style. It contains four open coolers, covering the entire surface of the floor. Above it is another cooling room, almost as impor-

tant, containing one open copper cooler, 40 feet in length, under which are placed two receivers, constructed of copper, for receiving the partially-cooled wort on its way to the No. 2 refrigerator.

Moving downwards, and afterwards turning to the right, we came to the No. 1 refrigerator room, containing a peculiar circular horizontal block tin refrigerator, 15 feet in circumference, cooling wort at the rate of 140 barrels per hour. In this room there is an auxiliary tank, containing a further supply of water, in case any deficiency should arise in the larger tank. In another room there is a vertical refrigerator, and near it is the Excise office, beyond which is a store capable of con-



No. 2 fermenting stone room

taining 2,000 pockets of selected hops.

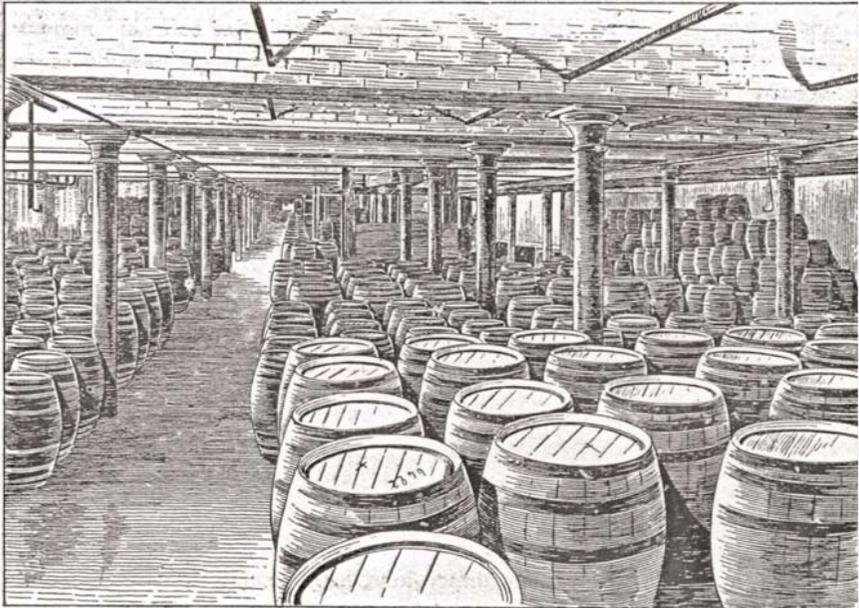
As we returned to the staircase, our guide pointed out the "air propeller," or blower, driven by steam-power, for blowing cold air into every fermenting room in this fine building, also, ranged along the wall, a battery of wort pumps. Over this is an extensive floor, running the whole length of the building, which comprises a large general store house, and a room containing two cold wort receivers-intermediate vessels for receiving the liquor on its way from the refrigerators to the fermenting squares.

After this, we returned to the washing-up room, where we ascended a platform,

erected in the centre, containing another circular refrigerator, cooling 140 barrels an hour, after which we made our way to the brewer's room and offices, to rest a short time before exploring the fermenting department.

These offices are unusually important. They comprise, first, a neatly-fitted up and well-furnished room for Mr. Cross, the head brewer, next to which is a large office for the under brewers; secondly, a laboratory, fitted up with the usual paraphernalia; and beyond a clerk's office, accommodating half-a-dozen gentlemen, whose duties are to work out the brewings, and check the receipts of raw material.

In the lobby there is a small room, which contains a cooling tank for sampling wort; and near the doorway are placed extinguishers and fire apparatus.

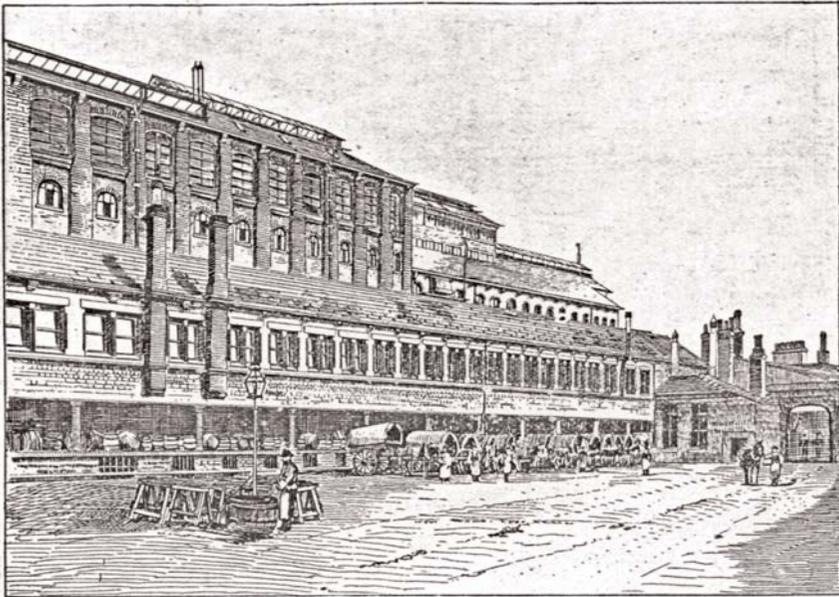


Gyle room

*"- As if the Nine, so fam'd of old,
In musty tales by poets told,
Their Heliconian streams had slighted,
And in good nappy ale delighted,
Esteeming cellars better fountains
Than any in Parnassus mountains ... "*

Chapter II

Walking a few steps from the brewer's offices, we came to the stone fermenting house as it is called, containing a number of floors of various dimensions, kept beautifully clean. We took a peep in at the No. 1 room, on the second floor,



Loading-out stage and offices over

which, like the others, rests on brick arches turned on to iron beams, and contains thirty-seven slate squares. But the most noticeable of all is the No. 2 fermenting room, the most important on the premises, which consists of a collection of slate vessels well worthy of admiration.

Here all is clean, regular and orderly; and this is not the only proof which such an establishment affords, that the large extent of the operations is the very circumstance which leads to cleanly and orderly arrangement, from the absolute necessity of economising space and time.

It would be impossible for any descrip-

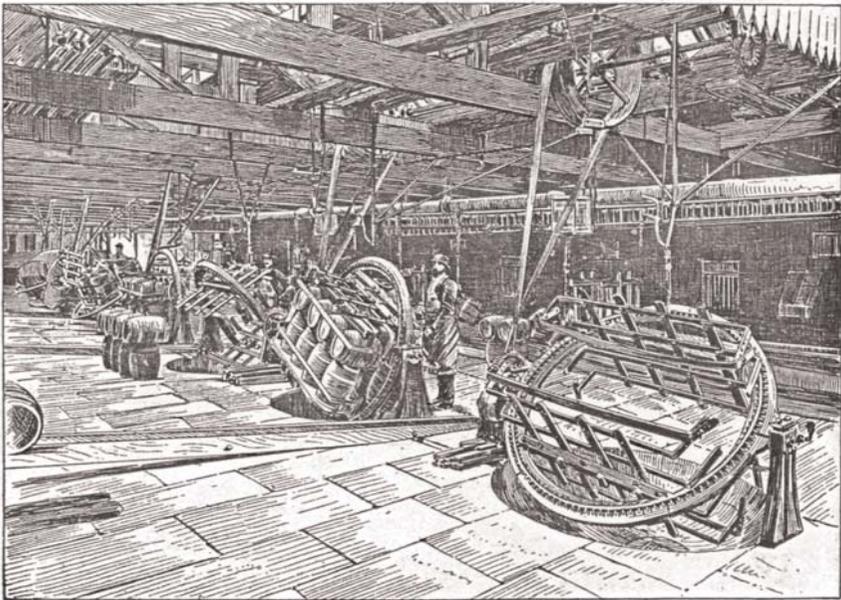
tion to do justice to this splendid room, we must therefore refer our readers to the foregoing illustration, which gives some idea of its magnitude. We may, however, mention that it is nearly 150 feet in length, is lighted by no less than thirty-six windows, and that the ventilation is as nearly perfect as possible. Ranged on either side, with a 10 feet gangway down the centre, are eighty slate fermenting squares of great capacity. The supply mains, four in number, extend over the whole length of the room, and are detachable for cleaning purposes. On this level there is a large yeast room, containing nine copper tanks, for receiving pitching yeast; each vessel has an outside casing, where

cold water is continually passing, to keep the yeast cool in summer. The third fermenting room contains thirty slate squares, besides other vessels, and is similarly ventilated with shutter windows.

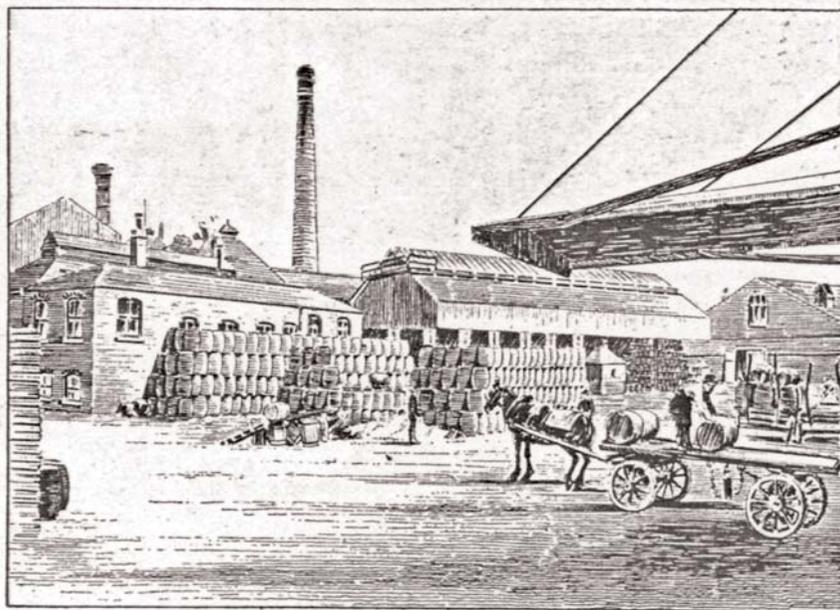
The main hoist runs through the various floors of the building, and by this we descended to the racking room, situated on the ground floor, in front of which is the loading-out stage. This latter, which opens into the north yard, and is 160 feet long and 30 feet broad, is one of the most extensive loading-out places we have seen. As many as twenty-five drays can be loaded at one time. At one end of the loading-out stage is the wagoners' office, and at the other a

mess room for the draymen. On the outside wall of the building we noticed a small lift or elevator, communicating with the invoice office above, for conveying delivery dockets, order sheets, etc.

In the racking room are nine slate racking vessels, the largest holding 160 barrels, and on the floor we noticed nearly a thousand casks, that had just been filled with Yorkshire stingo, ready either for delivery to customers or for storing in the cellars. When the ale has been filled into the casks from the slate squares, it is allowed to settle for awhile, after which a small quantity of hops is put in; the cask is then bunged and hoisted from the cellar by one of the lifts. At the western end



Cask-washing shed



Empty barrel shed and number office

of the room is a storekeeper's office, capable of accommodating eight clerks, and another room for the head cellarman.

By one of the lifts, we descended to the brewery cellars - vast subterranean caverns, that branch out right and left, and cover half-an-acre of ground. In the first cellar - where a forest of eighty ponderous iron columns, supporting the floor above, greets the eye-hundreds of casks, placed on stillions, were being filled with "running ale" from main-pipes, and "hopped down," or "topped up." Others were filled with stock beers of various kinds, or with stouts or porters. The most important ale stores, however,

are situated beneath the New Crown Point Maltings, at the east side of the brewery yard, Which occupy a large sub-floor and basement, and have two lifts capable of delivering six casks per minute. These cellars will hold 5,000 casks, and are chiefly used for storing bitter and strong ales. The firm have other large beer cellars, beneath the Midland and North Eastern Railway Stations, capable of storing over 20,000 barrels. Next, in the order of our visit we inspected the cask-washing operations, for it is well known that it is impossible to have sound beer without clean casks.

The cask-yard is superintended by a foreman and his assistant, with an office in

the machine shed, whose duties are the supervision of work done, and the keeping account of all casks received; also the preparing of time sheets for the counting-house. The empty casks are received in a large, high, and commodious shed, adjoining the machine house. This latter is a large building, 200 feet square, flagged with stories, containing seven machines or cradles of enormous size. These machines, improved by the firm's engineer, are capable of cleaning 2,800 casks per day of ten hours. The method of cleaning adopted in this brewery is, first, to cut out the bung of the cask; next, to fill it with hot water and place in it one of Thornton's patent chains for barrel cleaning, with a plug attached. The casks

are then placed in a revolving machine (driven by steam power), of special construction, so as to insure their being cleaned in every part. After this they are taken to a large trough, thoroughly washed out, and then passed on to an inspector, who ascertains the sweetness, of each cask, at the same time inserting a small gas-jet or light inside. Finally, the casks are passed on to another part of the shed to have the outsides washed and cleansed, after which, they are carried on a "traverse" through a subway to the clean cask shed, an enormous building, capable of holding 5,000 or 6,000 casks of various sizes. We should here state that the sacks, when received from the "traverse," are placed, bung down-



One of the coopers' shops

wards, in rows of twenty-five, on a hot water pipe specially designed with nozzles, comprising five holes or jets, that throw the water into every corner, thus cleaning the cask from any small hops or sediment which may have been left. They are then transferred to a hot air pipe, the air being propelled by a large fan, whose pipe passes over a furnace specially constructed, which heats the air to about 160 degrees. After this they are placed on a cold air pipe, the air being propelled from another large fan. The casks are then stored in separate sizes, ready for filling, previous to which each cask is inspected a second time, so as to insure its being perfectly clean and sweet. As many as 2,418 casks have been passed through the washing sheds in one day. An entry of 2,000 casks is a frequent occurrence.

After quitting this busy scene, directed by the foreman cooper, we passed on to the cooperage, which immediately adjoins this department.

When casks are found to be imperfect or damaged, they are sent at once to the coopers' shops to be repaired, hence, we first bent our steps to the No. 1 shop, a busy and noisy place, where the repairs are carried on. As we entered the manager "rung an axe" on one of the benches, to proclaim silence for a few minutes, whilst we walked through the place. As we passed along we noticed that damaged casks were taken to pieces and built up again, in the same manner as if newly manufactured. We next passed the

Nos. 2 and 3 shops, taking a peep in at the windows, and as we walked along, our conductor pointed out a number of finished casks, piled in separate groups on the pavement, that were marked approved, ready to be checked by the foreman cooper, showing the result of each man's labour; coopers' work being paid for by the piece.

The process of measuring empty barrels is carried on in three small and separate buildings, each containing two registering tanks-for both new and repaired casks are thus tested before being filled with beer. After this operation, they are taken to the branding room-a hot place in summer-where there are six furnaces, presided over by the same number of branders, who number and stamp on every cask the name of the firm. Finally they are rolled down an incline to the racking cellars.

On the south side of the coopers' yard is the cask manufactory, carried on in an extensive building, where 500 casks can be manufactured weekly. The steam cooperage next claimed our attention; a great detached brick building in the centre of the cask yard, containing a saw-mill, and some very ingenious machinery for cutting staves and manipulating the timber used in this great workshop. We should here state that all the timber used in the cooperage is shipped from Memel or Bosnia; also that, before being used, it is stacked in the east yard to be seasoned.

When required for use, a load of this oak timber is delivered to the sawmill of the steam cooperage, where it is sawn into two sizes-long strips for staves, and wide planks for "heads." Entering the main building; we commenced our observations at a machine called a jigger, containing in a steel frame a number of very sharp saws, for cutting Memel oak staves, used for building up the sides of the casks, as well as for repairing them. A few yards further on we came to a "cross-cut saw," were staves as well as heads are cut to the required length; and immediately adjacent we saw two peculiar machines, called jointers, where the pieces of timber are ingeniously shaped. Further on is a steam lathe, for turning the heads, which is rapidly accomplished by a revolution of the machine. In the rooms beyond, under the same roof, there are placed two band-saws, and a "smuggling" machine, the latter for leveling the top of the head-boards; also shive and peg-cutting machines.

On the north side of this busy place is an "instrument-sharpening room," where all the saws, cutters, etc., used on the premises, are sharpened; and next to it is an engine room connected with the great cask factory, containing a steam engine on the Hammer principle, which not only drives all the machinery in this building, but works the well-pumps.

The ground floor of this structure contains a large wood-turning lathe, a saw-grinding lathe, a powerful grindstone (worked by steam power), and the shafting, pul-

leys, etc., for driving the ponderous machinery above. Next door, and beneath the sharpening room, there is a store room containing some tons of iron hoops, and other material connected with the great cooperage. Bidding adieu to our intelligent guide, we commenced our inspection of the engineering and machinery department, under the direction of the engineer.

This gentleman first took us to see the main engine house, adjoining the malt-crushing house, a noble, lofty room, and lighted at each end. It contains a splendid horizontal engine of thirty-six horse-power, erected by Kitson & Co., for driving the motive power in the brew-house. The fly-wheel, which is 18 feet in diameter, and weighs ten tons, is a magnificent piece of casting. There is also at one end of the building another engine of ten horse-power, for driving the dynamo of the electric light.

These engines are remarkably well kept - as, indeed, were all the others afterwards seen. The engineer showed us with pride the beautiful movements and splendid fittings attached to them, and explained their purposes and uses. To the uninitiated, the wheels, cranks and levers, appear inseparable or indispensable portions of the steam-engine, and the principals complicated. Such, however, is not the case; the essential power, by which it becomes a moving force, is beautifully simple, and the complexity arises only in the means of applying that force to any particular



Steam boiler shed

purpose. Without entering upon so extensive a subject as the application of the steam-engine, we may be permitted to state that the circular motion given to the large "fly-wheel" may be considered as occupying the point of connection between the production and the consumption of steam-power, and we may regard the fly-wheel as a mighty workman, whose labours are so directed that small things cease to be small, and great things cease to be great.

To some persons, the inspection of a collection of wheels, axles, levers and

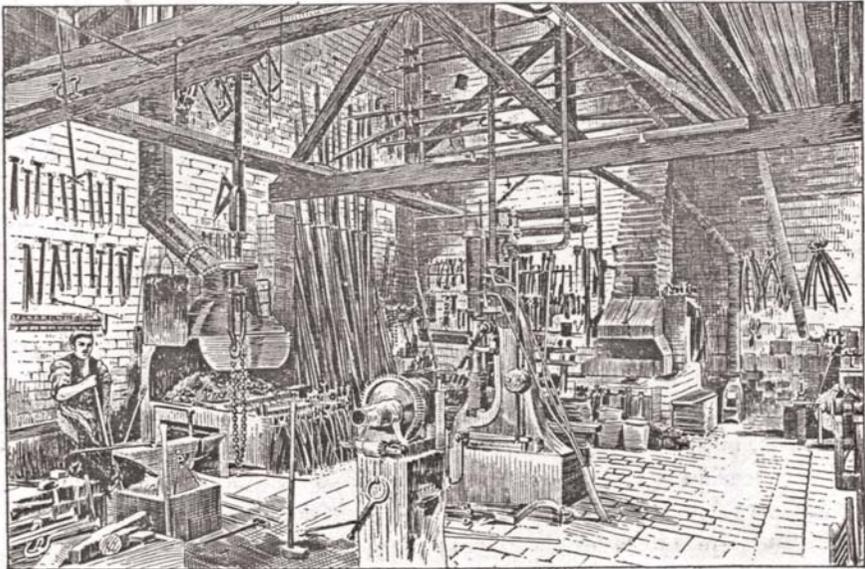
pinions, is most irksome; but to those who, like ourselves, regard them as evidences of commercial advancement and engines of national wealth, they rise to very considerable importance, and become profoundly interesting.

Immediately adjoining the main engine room is the ice machine house, a large brick building with glass doors, containing two engines, each of fifteen horse-power, and so arranged that, in case of a breakdown, they can be coupled together, and take the place of a large engine previously mentioned. Here are to be seen the

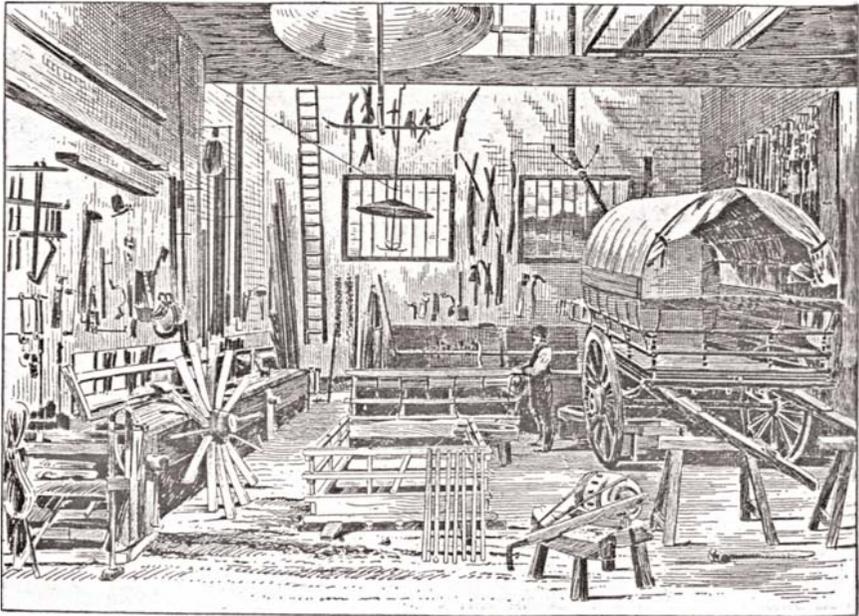
cooling cylinders, freezing machines, etc., which, in the hottest weather in summer, are capable of covering the pipes with a perpetual hoar-frost.

Continuing our walk, we next reached the hydraulic engine house, 30 feet long, which contains a double accumulator, and a cylinder engine of twenty horse-power, for working all the passenger and other lifts throughout the premises. There are other engines about the place; notably, one of fourteen horse-power in the Crown Point Maltings, for working the elevators, screws, and screening machinery; another of eight horse-power, for cutting chop and grinding corn for the horses; one in the malt-kiln engine room

of eight horse-power, and four others in the yards; altogether, there are eleven engines scattered about the works. After this we were taken to see a formidable battery of eight Lancashire boilers, planted on the north side of the scalding shed. Each is 27 feet long and 7 feet in diameter, sunk in an open chamber some 4 feet below the level of the floor, with capacious coal bunks opposite. Some are steel boilers, and nearly all are supplied with self-feeding grates worked by steam-power. The boilers are filled by means of four donkey pumps, and supplied with hot water from a large tank in close proximity, which is heated by exhaust steam from the great engine. Besides these, there are two more



Smiths' shop



Wheelwrights' shop

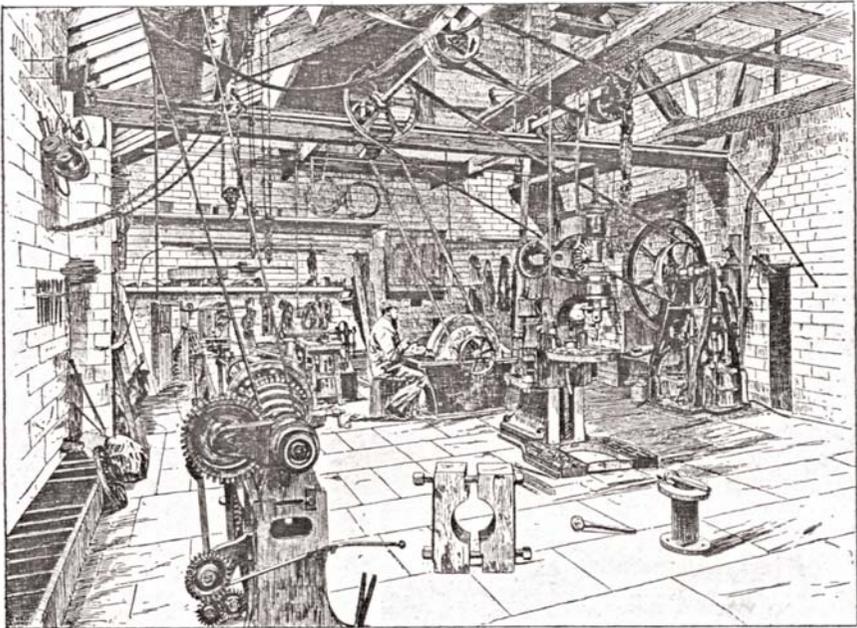
Lancashire boilers of equal power, adjoining the dynamo house, and several smaller ones, too numerous to mention.

The village of industries, as they have been aptly designated, next occupied our attention. These artisans' shops are mostly situated in a range of brick buildings, with paved floors, and are covered by a double roof, of lofty elevation. We commenced our observations at the smiths' shop, the first in the row, measuring about 56 feet square. It contains two massive steam forges, a steam hammer, a screwing machine, a steam engine and blower combined, a working bench, two smiths' anvils, a Swedge block for round steel and iron,

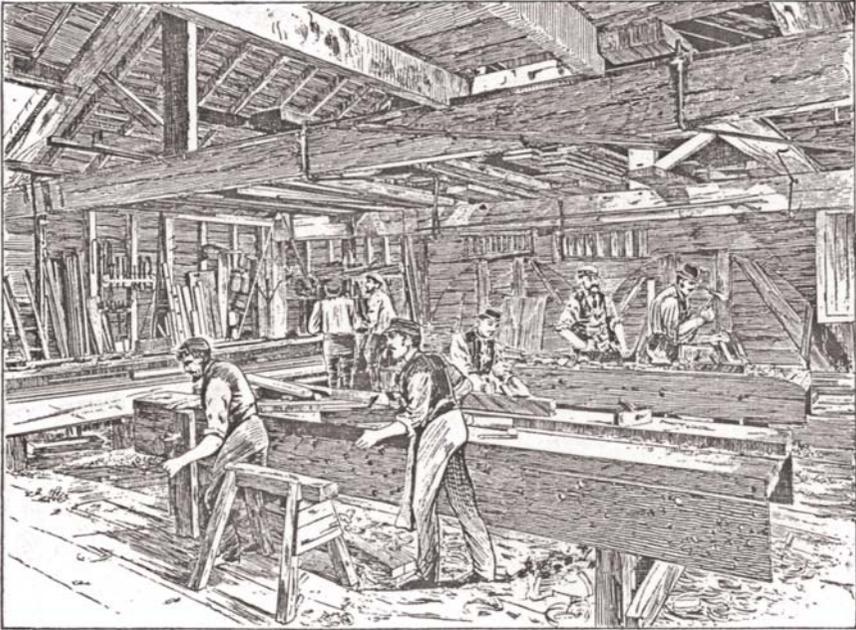
screwing-plates, and many appliances for lessening manual toil and elevating industrial labour. All the machinery here, as elsewhere, is the best of its kind, and evidently capital has been invested with no miser's reserve. Next we came to the wheelwright's shop, another important branch of industry, where all the drays, wagons, carts, and vehicles of every kind used in the business are made and repaired. Only timber that has been well-seasoned, and of the best quality, is used. New or fresh wood soon gets warped; hence the firm store their own timber many years before it is required. Eight skilled workmen are daily employed in this shop, which, like all the others, is airy and well ventilated.

Immediately adjoining is the mechanics' shop, containing a ponderous slide screw and turning lathe, 24 feet long, worked by a five horse-power engine; also a huge drilling machine in the centre of the floor, and other powerful machinery. Over every department there is a responsible foreman; and here, as in the other shops visited, we spoke to several of the leading hands, skilled workers, who seemed to be most efficient in their business. The adjoining shop, which is two storeys high, and the largest of the group, is used both as a joiners' shop and a timber store, and contains machinery for sawing and preparing timber, etc.

We next visited the slate-workers' shop, a great room 60 feet long, and of necessity a noisy place. Here all the great fermenting slate squares, vats and other vessels, are repaired by the firm's own skilled workmen. In one part of the room we observed a number of men sawing into slices huge blocks of slate, of such proportions that we wondered how they were conveyed from the quarries. In another, many more were adjusting the slabs on benches, and measuring them off carefully, whilst others were grooving and fitting them into each other to a nicety. This is a most interesting process, and, like all branches of skilled labour, requires care and attention; everything



Mechanics' shop



Carpenters' and joiners shops

has to be done according to a plan, and there is nothing of a random character attempted in this shop. The slabs must be cut most accurately, and every one fits into the groove of another with great precision.

In the south yard, near to the cooperage, are the painters', sign writers', and other shops; also stores and buildings for warehousing raw material used by the mechanics, and a special store-house for iron and brass fittings.

Before taking leave of our courteous guide, we persuaded him to take us a run round to see the numerous pumps placed

about the works. We stopped first at the great pump room, near the loftiest of the chimney stacks, which by-the-bye, is 150 feet high. This room contains a Tangye combined engine and pump, of great power, for throwing water, in case of fire; over the highest building and most distant point of the premises; also a powerful pump for supplying the mains in the fermenting and racking departments, and for cleansing the vessels and floors.

In front of this house is an engine and blower, enclosed in a glass partition, for blowing cold air in summer, and hot air in winter, through all the offices and counting-houses. On the wall adjoining, in a

glass case, are seen enormous lengths of fire-hose, we forget how many hundred feet, and other apparatus connected with the fire-engine. Here we came to the two bore-holes, each 600 feet deep, lined to the depth of 300 feet with copper pipes, 8 inches in diameter. The water, which is only used for cooling purposes, is drawn up by a twelve horse-power engine and pump, erected on massive iron girders and pillars in the courtyard. This engine-pump is capable of delivering the liquor to a height of 20 feet above the highest cooling liquor reservoir. Near to the engine is a winch, driven by another engine, for drawing the pump-rods and pipes in case of an accident; and, next to it, a fan and hot air furnace, for forcing hot air through the empty casks, to dry them, and another for driving cold air through afterwards.

There are six passenger and goods lifts in the brewery, one of which rises from the cellar floor to the top floor of the fermenting house. The lifts are worked by hydraulic machinery, erected by Sir William Armstrong & Co., and are also used for delivering beer from the racking cellars. Ascending by the No. 2 lift, we reached the level of the mashing floor, where our guide showed us a beam wort-pump, of considerable power and peculiar construction, for pumping wort from the underbacks to the coppers, and two single pumps used for the same purpose; also two four-throw and one three-throw pumps for delivering the wort to the open coolers. Here we notice, as we walk along, that the experimental

plant, or model brewery, has an engine to itself; there is also a small engine, of eight horse-power, on the same level, for working the rousing pumps in the fermenting rooms.

On our way back we noticed, on the north-west side of the brewhouse, two capacious hot water tanks, for receiving the contents of all the copper-coils to be pumped therefrom into the boilers. Near to them is the second mill room, where there are two pairs of malt rollers, and two sets of hydraulic pumps, for use in case of a breakdown.

At the bottom of the premises there is a stone or builders' yard, of considerable extent, containing builders' material of every kind, huge blocks of slate, and many tons of stone, etc.

Before concluding our observations for the day, we paid a visit to the new barley screening and cleaning room, attached to the middle malting, which has lately been fitted up at great expense and in the newest style.

During the last few years great improvements have been made in the preparation of barley for malt, and malt for grinding. The rough-and-ready system has been abandoned, and brewers, now-a-days, supply themselves with the best screening and cleaning machinery obtainable, to ensure perfect purity of both barley and malt.

The screening plant in this room is very



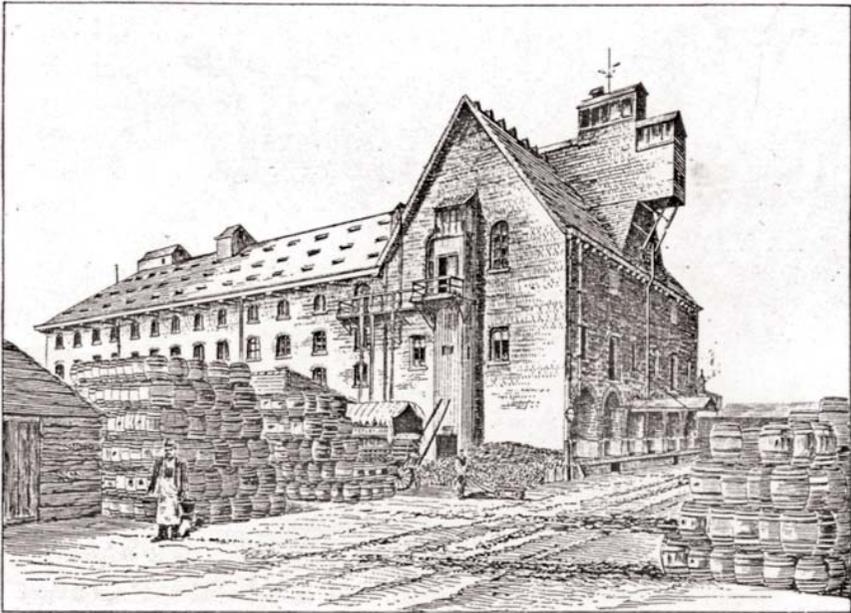
Painters' shop

elaborate, and was erected by Mr. R. Boby, of Bury St. Edmund's. It comprises a "half-corn and round seed separator, suspended in a timber frame, consisting of two cellular cylinders of most improved construction, the cells being of a pocket shape," and not simply round indents. Also a patent self-cleaning corn screen, with blower and removable wire, and wood spring suspenders for separating grain, attached to which is a patent large-substance separator, capable of cleaning the very dirtiest grain. This machinery is driven by a vertical engine of great power, placed in the adjoining room, and called the malt-kiln engine-house.

Chapter III

Taking our way to the buying department, situated in a wing of the office building, we were introduced to Mr. Hindle, the buyer and manager of the malting department. Following his lead, we entered one of two purchasing rooms, with a north light, where barley is sampled, weighed and tested, and were shown the various testing processes. After this we were handed over to the guidance of the foreman maltster, who, for the rest of the day, directed us in our wanderings through the numerous malthouses owned by the firm.

Accompanied by the foreman, we com-



Exterior of the Crown Points Maltings

menced our tour at the New Crown Point Maltings, situated at the bottom of the yard.

We have seen few maltings to equal these in point of appearance, structural arrangements, and utility. They are built of red brick, roofed with slates, and are seven storeys high. Each floor is reached by a passenger hydraulic lift, enclosed in a tower-like structure outside the building. After taking a peep at the foreman's office, near the great cask shed, we ascended to the topmost storey of the lofty edifice, used as a barley store, and capable of holding 6,000 quarters. In the principals of the roof is erected a chamber, where the barley is either landed from a cage hoist, depending over the

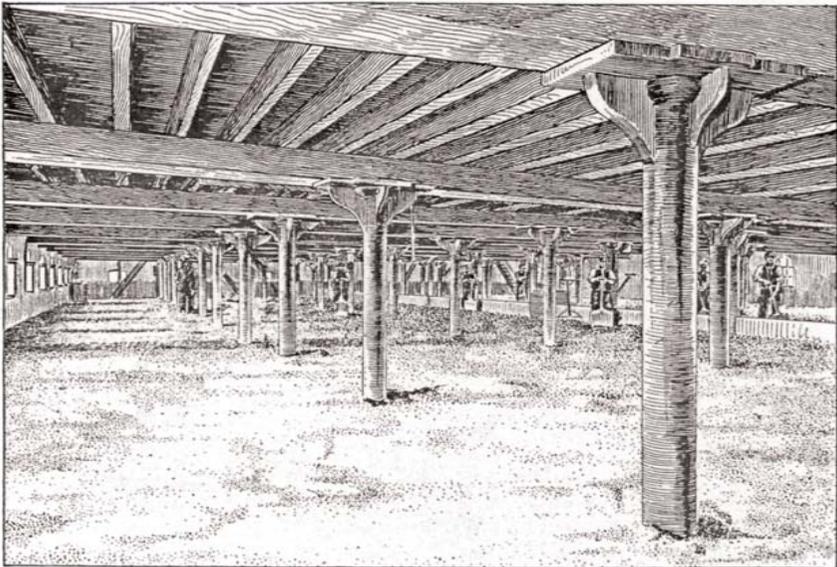
public street, and then wheeled to various hoppers communicating with the screening machines, or is delivered thereto by an endless belt running along the centre of the roof. This belt is fed by a powerful elevator; communicating with a hopper fixed in the yard loading-stage, the barley being delivered at the rate of seventy quarters per hour. There are three cleaning and screening machines (two manufactured by Boby), and all driven by shafting from the engine. The dust is drawn from the barley during this process by a "cyclone" - a machine manufactured by Simon, of Manchester, which most effectually accomplishes its purpose. On leaving the screens, the barley is lowered to stores, situated on the

two floors beneath, both of which are divided in the centre - one side for barley, the other side for malt in air-tight bins - each store holding 3,000 quarters.

We next reached the first of three working floors, laid with buff quarries, and lighted by thirty patent ventilating windows. The floor of the first storey is formed by brick arches on iron beams, and each floor is supported by sixty iron pillars. On two floors there are a couple of steeps, each 120 quarters, constructed of timber and lined with lead, filled by shoots direct from the barley stores. When the green malt is ready for the kiln it is put into circular baskets, fitted on iron wheels, covered with india-rubber, which roll along the floor to the hatchway, where it is drawn up to the

kiln. Six men can then put the 120 quarters on to the drying floor in two and half hours. The kiln, which extends the whole width of the building, is covered by three louvred roofs; the floor is laid with Nuneaton tiles. We descended to the kiln logic, situated on the level of the first floor of the malt-house, to see the six furnace fires, or choffers, where only anthracite coal is used. Three of them, each enclosed in a brick chamber, are placed on either side of an arched passage, with a window at each end. These brick chambers can be closed by iron doors, and each possesses three draught flues.

In close proximity there is a mess room for the maltmen, heated by steam-pipes, and comfortably seated.



An interior, Crown Point Maltings

At the suggestion of our guide, we next visited the ancient malt kiln, built in 1790, at the bottom of the yard. It is a little low building, grey with age, containing two withering floors, a small store, and a kiln with an old-fashioned fireplace.

The central maltings, divided by a roadway, and communicating with the first floor by a bridge, were next visited. They are eighty-quarter houses, and contain, on either side, two growing floors laid with concrete; a barley and malt store, holding 1,400 quarters; and two drying kilns, one floored with wire cloth, the other with tiles.

A few steps further on, and opposite the general offices, there is a fourth malt-house, almost as old as the "lower kiln," containing one growing floor and a fifteen-quarter stone steep. The top storey is divided off into general stores, each store being reached by an outside staircase.

The Meadow Maltings, situated about a quarter of a mile from the brewery, next claimed our attention.

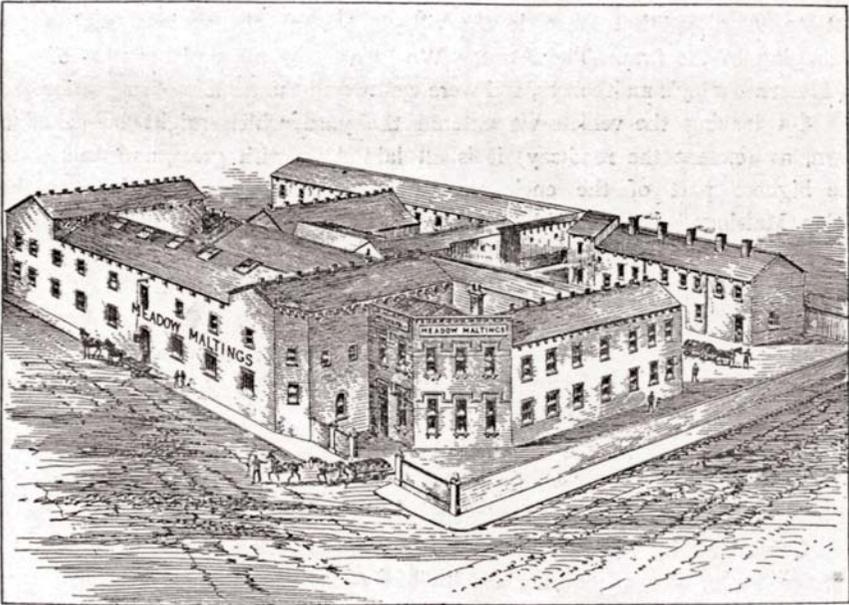
We entered the enclosure through a pair of gates leading to a long, narrow yard, which encircles the premises. These comprise, among others, an important block of brick and stone buildings, 230 feet long and 150 feet broad, fronted by a two-storeyed office of neat elevation. In the former are contained, on the basement level, eight enormous malting floors, and four above, the latter covering

the whole area of the structure. There is a steep on every growing floor, the whole capable of wetting 200 quarters at one time, and all the floors are laid with concrete. The topmost storeys are divided off into barley and malt stores, the former holding 3,420 quarters, and the latter 5,500 quarters. In one part of the building there are screening rooms, where the machinery is worked by a gas-engine of considerable power.

Attached to these maltings are no less than seven kilns. Along the bottom of the yard is a foreman's house, a row of workmen's cottages, a barley-drying kiln, and spacious stores, these latter being connected with the maltings by a bridge over the yard. The maltster's offices in front are exceedingly well arranged, and contain, on the ground floor, a counting-house; above these, private offices, store rooms, etc.

Leaving the Meadow Maltings, we hailed a passing cab, and drove out to Armley, that once lovely village, to see the various malthouses belonging to the firm. The Armley Works are the most picturesque of any of Messrs. Tetley's malthouses, and were well worth the trouble of inspection.

On leaving the vehicle we entered the yard, which might be called a lawn, as (except the roadway) it is all laid down with grass, and walked to the highest part of the enclosure, to commence our observations at the "Top Maltings." We should here observe that the maltings are



Meadow Maltings

planted in three groups or ranges, on a plot of land two acres in extent, and that the property, which faces the Bradford Road, is half-a-mile from the Midland Railway, and three miles from the brewery. All these malthouses are built of red brick; some are roofed with paving stones and others with slate. Two of them, built in the year 1781, are most interesting, and contain very curious rooms and furnaces.

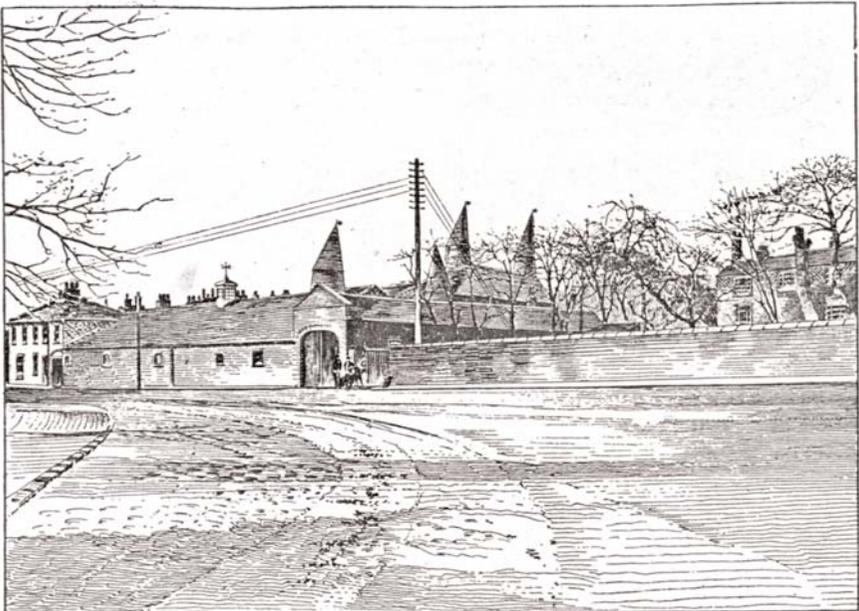
We were met at the entrance by the manager, "a veteran maltster," who has been with the firm forty-nine years, and, although esteemed clever at his business, is a very unsophisticated and modest gentleman.

Conducted by him, we made a tour of the "Top Maltings," a fifteen-quarter house, and one of the old buildings referred to. It contains three growing floors, of so low a pitch that a tall man cannot walk across them in an upright position. They are laid with paving stones, and the rooms are lighted by a number of very small ventilating windows. Here we were shown an old-fashioned square stone cistern, supplied with steeping water from a pipe in the wall, serving the three floors. The storey above contains a malt store with a capacity of 200 quarters, and a barley store holding 300 quarters. We next took a peep at the kiln floor, which had just been newly laid with Newmarket tiles, as also had all the rest, and then made our

way to the middle or new malting, a large building erected some forty years since. It is a fifty-quarter house of three storeys, and, as compared with the other two, is modern in its style. We entered the building, through one of the kiln logies, where the furnaces are enclosed, and the heat is conveyed into hot-air chambers, over which are heat distributors. From this place we passed through a tunnelled passage dividing the two kilns, which leads to the No. 1 growing floor, 90 feet long and 30 feet wide, over which is the No. 2, a similar floor. These also contain stone cisterns supplied with water. On the third floor there are two malt stores, holding respectively 1,200 quarters and 300

quarters, and a barley store holding 400 quarters.

On leaving this structure by the west door, we found ourselves in close proximity to the office - an odd-looking detached brick building, containing two rooms. Our guide invited us to enter, that we might see a curiosity in the way of mahogany desks, which is said to be more than a hundred years old. It is 8 feet square, double-flapped, accommodating four clerks, and most solidly constructed. Besides curious lockers, etc., it contains a number of secret drawers, so ingeniously arranged that, without the clue, a stranger could not open them. On the



Armley Maltings

outside there is a coin-tester, or slot, made of brass, and let into the solid wood.

Proceeding to the bottom of the hill, we came to the "Old Malting," as it is designated - a forty-quarter one, and the most ancient of the group. Along the whole front, the ground is paved to about 6 feet wide, and entrance is obtained to the structure through an archway, closed with an oaken door 4 inches thick, the door-jambs being constructed of narrow slabs of stone. A long strip of the front part of the building, into which this doorway leads, is used for storing barley in small chambers holding together 250 quarters.

This malting contains four kilns, three in front and one at the back, all having box louvres, surmounted by a cowl, and tiled drying floors.

The principal growing floor, 120 feet long, is in the basement of the edifice, divided by three rows of stone arches, of immense span, which support the storey above, and is lighted by six Norman windows. In quaint arched recesses are placed the most antique stone cisterns we have ever seen, which are filled simply by a main-pipe from above. Over this chamber, on the ground level, are two more floors, and a malt store holding 1,200 quarters.

Near the east kiln there is a loading-out stage, opening on to the road, for loading malt for the brewery.

Two hundred yards from these maltings are others, called the Simpson Maltings - storing 1,000 quarters each, of barley and malt - and equally interesting. Close to the Armley premises is a foreman maltster's house, and workmen's cottages; and, opposite the property, standing in a beautifully wooded park, is the mansion, formerly belonging to and inhabited by Mr. William Tetley the owner of the maltings.

At the conclusion of our visit to Armley, we drove back to the brewery, to complete our interesting visit by an inspection of the offices and stabling premises. Before doing so, we were taken to the sampling room, to taste a few specimens of the firm's brew. The manager of the cellars was, fortunately, present, and first handed us a specimen of the "running beers" as supplied to public-houses, which we found to be a good wholesome beverage for the labouring classes; next a specimen of Yorkshire stingo, which we found very luscious, full of body, and well flavoured without being heady.

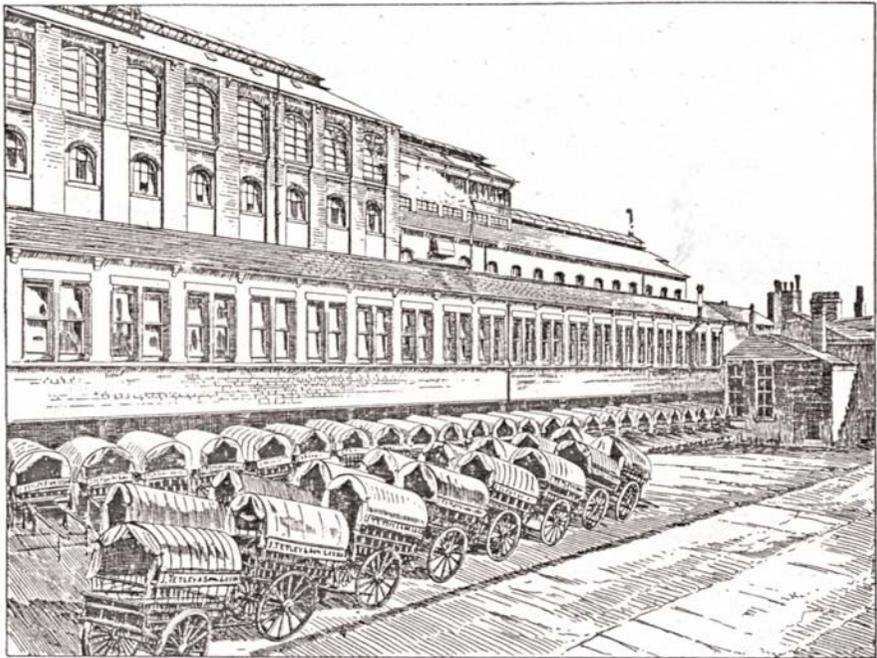
The light bitter ale, which is in great demand among the gentry and leading families of the district, suited us better. It has a distinct flavour of its own, and is a suitable beverage for those who enjoy a sparkling tonic and wholesome drink. Finally, we tasted the East India pale ale, for which the firm have such a high reputation in London and elsewhere.

Our conductor informed us that the firm have more than a dozen agencies in

different towns and cities, and a branch house and stores at St. Pancras, London. On leaving the sample room, we made our way to a row of offices, leading up to the main entrance gates, where we were handed over to the care of a gentleman who, besides superintending the horse and dray department adds to his duties that of yard manager. We found this gentleman most intelligent, and gained from him much useful and interesting information. His office is excellently fitted and furnished, and contains quite a museum of objects connected with his occupation, arranged in glass cases as classified. They comprise a collection of

horses' leg-bones, fetlock-joints, vertebrae, skulls, etc.; in fact, everything connected with the frame of a horse, all taken from the remains of animals that have been used in the brewery, and have died accidentally or otherwise. Among them, in a separate case, is a collection of horses' teeth, in sets, ranging from six to thirty years old; and many other veterinary curiosities.

Conducted by the master of the horse, we paid a visit to the stables situated in three separate ranges of buildings in the brewery yard. And here we should observe that the firm own a magnificent



Yard, showing loading stage and drays



Interior of general offices

stud of eighty dray horses, mostly shire-bred, some of which have taken prizes.

Our steps were directed, in the first place, to the west yard, covering upwards of a quarter of an acre, and containing, besides a series of stables for carriage-horses, and a range of dray-sheds, a blacksmith's shop, smithy, and a timber stores ground; also coalsheds, and a coal bank nearly 100 feet long, in which is stored a reserve stock of coal. Here, also we were shown a room 140 feet long, called the drying floor for wagon covers, a convalescent home for sick horses, and

a fold-yard of considerable extent, laid with tan for "cripples." This yard is quite enclosed, and entrance is obtained through an archway, at the side of which is a watchman's cabin.

On the same side of the premises there is a second range, containing twenty-three stalls and two sick boxes; and a third, just beyond, with seventeen stalls. Over all the stables are capacious hay and straw lofts, and attached to them are harness rooms, etc. In close proximity to the third range are the new model stables, occupying the extensive ground floor of a

lofty building, comprising fifteen stalls and seven loose boxes. The walls of these stables are 18 feet high, the floor is paved with Stafford bricks, and the ventilation and drainage are most perfect and effective.

Ascending by the hydraulic lift, we visited other parts of this well-planned building, which included the corn warehouse, where 2,000 quarters of oats are barned; a beans, maize, hay and straw store, and a machinery and engine room. This latter contains a steam engine, a corn-grinding apparatus, steam machinery for cutting hay and chop, and two improved "dick-eyes" for taking the dust from the crushed food and horse-chop. There also is a steam-hoist for delivering the provender to these floors, and a bridge over the yard leading to the top floor of the No. 3 stables opposite. Besides these, there are other stables in the south yard, and at the maltings, of less importance, which we had not time to visit. In the centre yards and sheds as many as seventy drays are drawn up every night; the firm have 125 carts and wagons in daily use.

To reach the great block of buildings devoted to the offices we passed through a doorway at the side of the draymen's lobby, and by a short cut reached the grand staircase, cruciform in shape, leading to a range of splendid offices over the loading stage. The stone steps, 10 feet wide, rise to a paved vestibule, broken midway by a spacious landing, whence, to the right and left, other stairs lead to various suites of rooms and stationery

store chambers. It would be impossible for any description to do justice to this handsome suite of offices; we must, therefore, refer our readers to the following illustration, engraved from a photograph.

They comprise the following:- A letter office, invoice department, ledger posting and check offices, agency department, cask office, strong room, and lavatories. A paved corridor, 7 feet wide, runs along the front of these six offices, all of which communicate, and are divided from each other by glass partitions. At night they are lighted by the electric light; they are ventilated by the hot and cold air-shafts already described, and are heated throughout by hot water. The principal office is in communication by speaking tubes with the brewery, as well as with the maltster's offices.

Along the whole length of the walls of the corridor are erected wardrobe cupboards (one for each clerk), and over them a series of closed lockers for storing ledgers and account books. Near the box lift, which brings up documents and books from the loading-stage, we were shown a neat little wagon for wheeling the ledgers, cash-books, etc., to the strong room, a stone-built chamber, 16 feet square, at the far end of the corridor, with double iron doors.

On leaving these offices we made a hasty survey of the rooms on the other side of the staircase, which consist of wages-paying, rooms, stationery stores, muni-

ment rooms, and private offices; and then descended to the ground floor, beneath the last-mentioned rooms.

At the foot of the staircase is the head cashier's room, and his clerks' office; beyond which, opening out into the west yard, is the order office and sampling room, the former containing a paying lobby, where all the weekly wages are paid, and where orders are received and attended to. Bearing round to the left, we entered a long corridor leading through a second building, on the right of which are several offices devoted to correspondence clerks, and where a number of responsible gentlemen attend to the principal and confidential correspondence of the firm, etc.; also the statistical and forwarding offices. Here, also, is the telephone room, through which we walked to waiting and other rooms, too numerous to be described.

The partners' rooms are very extensive, and occupy the whole of the left side of the building.

All counted, there are eighty-five clerks daily employed in the offices, and 400 persons in the brewery; and if we add travellers and collectors, there is a total of 500 persons employed in the establishment.

Among the noticeable features of this brewery is the provision made for the recreation and comfort of the workmen.

Following our indefatigable guide up a long staircase from the yard we reached

the general mess room, a wooden building upwards of 70 feet long, and capable of seating nearly 300 persons. It is light, lofty, and well ventilated, and attached to it is a kitchen, lavatories, etc. There is another hall and mess room, almost as important, adjoining the loading-up stage, which is specially set apart for draymen.

In the immediate neighbourhood of the premises is a small wooden mission church, for the use of the parish, built and supported by members of the firm. A children's school room and mission rooms have likewise been provided.

The firm subscribe liberally to the local charities. Their own employees are not forgotten.

In bringing our notice of this vast undertaking to a close, we cannot omit to mention some things that seemed to us of obvious importance. Everything in the brewery is so systematically arranged that mind, rather than muscle, is called into action, and everywhere, in our progress through the various departments, we saw, among the industrious workmen, signs of content and happiness. Indeed, in office, brewery and workshop alike, everything indicated the business habits for which those concerned in the management of this great undertaking have so long been celebrated.