An Object Lesson in Cleanliness and Brewery Design.

By

FRED M. MAYNARD.

Mr. FRANCIS WINTLE

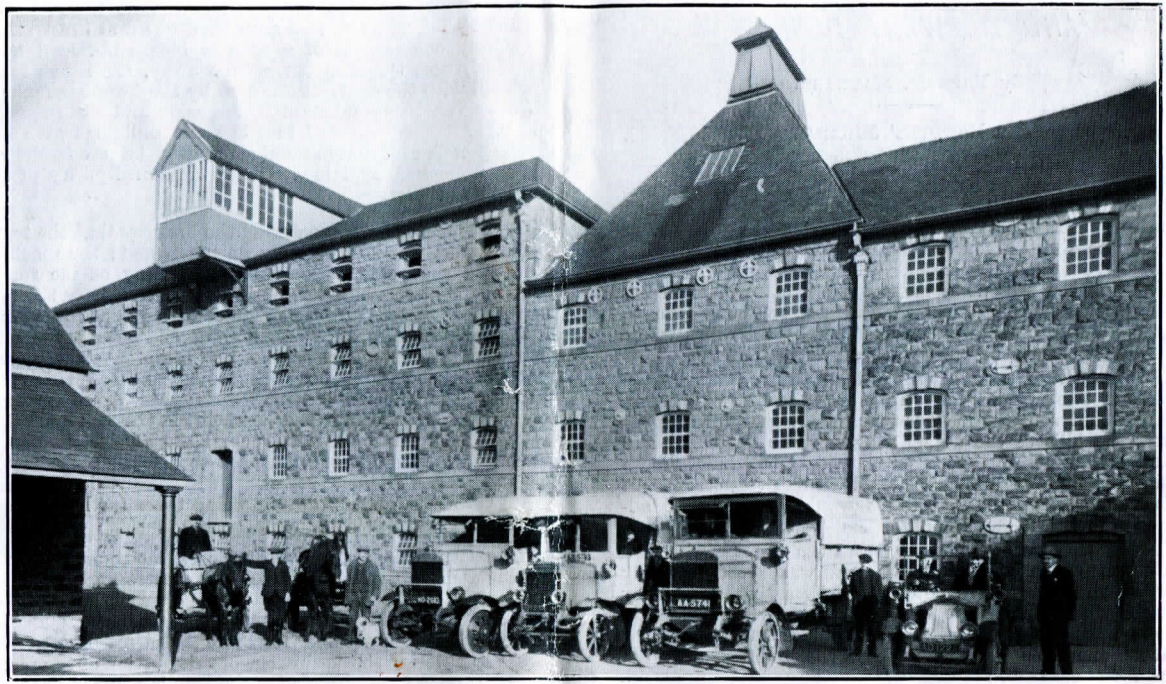
Proprietor of the Forest Steam Brewery, Mitcheldean.

Pitcher.] THE STAFF. [*Gloucester.*

Forest Steam Brewery, Mitcheldean.

Pitcher.] INTERIOR OF OFFICES. [*Gloucester.*

Forest Steam Brewery, Mitcheldean.



Pitcher.] THE MALTINGS AND TRANSPORT. [*Gloucester.*

Forest Steam Brewery, Mitcheldean.

AN OBJECT LESSON IN CLEANLINESS AND BREWERY DESIGN.

By Fred M. Maynard.

Reprinted from "The Brewers' Journal," Feb. 15, 1923.

Many a member of the "Bung" fraternity, when he gets away for a spell from his own mash tun, takes a curious delight in exploring the conditions under which his more or less fortunate brother is working—for the "busman's holiday" is not confined to the Jehus who steer their cumbersome vehicles so smartly through London's seething traffic—and the present scribe, to whom his profession has always been something more than a mere source of income, must confess to this "wanderlust" among breweries where the brotherhood of the craft will gain him admission.

Therefore, when spending a short holiday recently on the borders of two of our Western counties, and having heard, during a chat with the local brewer, of a wonderful brewery among the hills of the adjacent county, he determined to investigate what, if report were true, must indeed be a shining example of what we should all like to possess, but which under mundane conditions would generally be adjudged a practical impossibility.

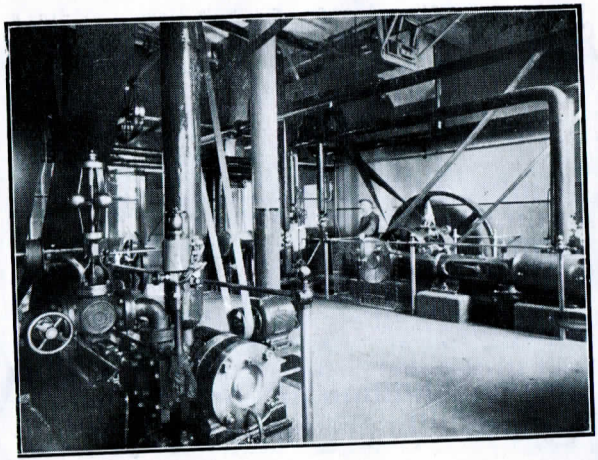
Having been warned, however, that the secret of the high reputation which the beers enjoyed was most jealously guarded, and as the writer did not desire a six-mile journey to prove abortive, he wrote to the proprietor who courteously gave him permission to visit, what turned out to be, nothing less than one of the show breweries of the country.

He therefore made his way to the quaint old-world village of Mitcheldean where, on taking a sharp turning out of the main street, he found himself confronted by the handsome pile of buildings known as the Forest Steam Brewery and Maltings. These, as will be seen from our first illustration, are solidly constructed of sandstone blocks obtained from the Wilderness Quarries but a mile away, the rough faces of which, with the contrast afforded by the freestone facings, make a remarkably substantial, imposing and clean-looking edifice. Although erected in 1868, the buildings give one the impression of having only recently been completed; this is, doubtless, explained by the wonderful purity of the air in this district.

It was, however, upon entering the brewery that the truth of the report was so strikingly demonstrated; the machine hall faced the entrance and although many engine rooms will, if kept in anything like clean condition, satisfy the eye, it can safely be said of the one under review that for cleanliness, smartness and orderliness it compared quite favourably with what one associates with a battleship. As the second photograph shows, it contains, among other machinery, a 16 h.p. Marshall engine; a Worthington air compressor, supplying compressed air for the air-lift in the well and other purposes; a dynamo providing current for an electric rousing pump and for driving the fan used to dry the casks in the washing shed. The exhaust steam from the various engines passes through a Paul's heater, being there further utilised for heating the brewing liquor.

The pump room opens out of the engine room. Here is the dug well fed by a bore hole in the bottom. The water overflows from the bore hole into the dug well, but the flow can be increased when necessary by means of an air-lift, the compressed air receiver for same and a set of deep well pumps completing the equipment of this portion of the plant. A further concrete reservoir for the brewing liquor has been constructed in a disused malting close by. The water is of

Pitcher.] Forest Steam Brewery and Maltings, Mitcheldean. [*Gloucester.*

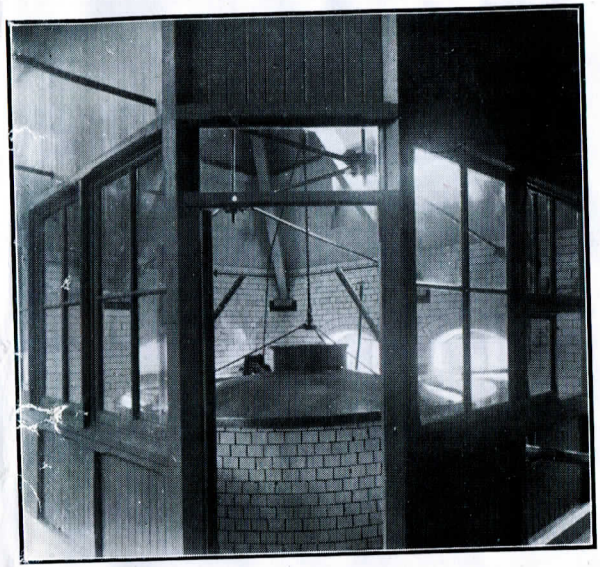


Pitcher.] Engine Room. [*Gloucester.*

excellent brewing quality, and is obtained from springs rising in the hills but a short distance away.

Steam is generated in two 28 ft. by 7 ft. 6 in. Lancashire boilers, the feed water being softened in a Lassen & Hjort plant and stored in a 40-barrel cast-iron tank prior to passing to the boilers. A feature of the boiler house are the coal bunkers which, together with the walls, are of white enamelled bricks, whilst their condition is so spotlessly clean as to lead one to suppose that the builders had only just finished them, whereas they have actually been in use for 25 years.

Alongside the boiler is the 100-barrel fire copper, fitted with boiling dome and powerful auxiliary steam coil, from which the exhaust steam passes direct back to the boiler through a Pratt return steam trap. In view of the firm's friendly welcome, any attempt to pry into their particular system of brewing would have been most ungracious, but



Pitcher.] Copper House. [*Gloucester.*

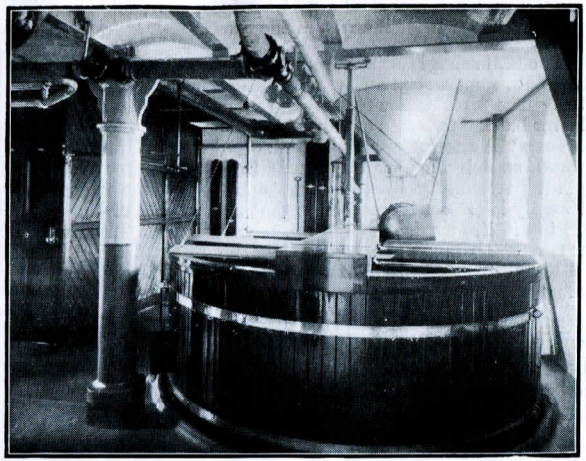
one factor which partly explained the remarkable brilliancy and fining capacity, for which the beers are justly famous, was at once revealed by the intensity of the tumultuous boil proceeding in the copper, and the obvious fact that the beer is boiled in one length.

Further evidence in the same direction was afforded in the hop back room, for there the deep 90-barrel cast-iron circular hop back, fitted with gun metal, slotted false bottom and sparger, is further equipped with a powerful circulator, which, by drawing off all sludge and matters in suspension—that had passed through the false bottom with the first rush of wort when casting the copper—and returning them to the surface, effected a thorough filtration of the wort and that through a bed of hops, which was of really adequate thickness, owing to the hop back being of correct dimensions; at the same time a thorough hot aëration was brought about, this taking place at just that stage of the brewing operations when its value is greatest. A massive set of three-throw gun-metal pumps raises the wort from the hop back to the cooler.

Upstairs, on the copper house floor, are a 12-barrel cast-iron under-back, fitted with a silent heater, and a large copper wort-safe, the latter receiving the wort from the four mash tun spend taps. To this wort-safe is attached a wort circulator, this being employed to return the first runnings back to the top of the goods until absolute brilliancy is secured.

In the mash room (see accompanying view) is an 18-quarter cast-iron mash tun with rakes and gun-metal slotted false bottom, Morton sparger and a simple flat wooden cover, in two halves, with counter-balance weights; a Steele's mashing machine and circular steel grist case complete, an eminently practical and straightforward mashing plant.

Although in view of the otherwise perfect and up-to-date equipment of this section of the brewery, the boiling in one length, and when the unsatisfactory quality of this season's



Pitcher. **Mash Room.** [*Gloucester.*

barley is considered, it is somewhat surprising that the value of the mash-filter, as a wort refiner, and time and malt saver, has not been recognised: for here its employment would appear to be specially indicated.

On the next floor above is the tank room, accommodating two hot liquor backs of 60 and 40 barrels capacity, respectively, for the mashing liquor. Both are lagged and fitted with silent heaters. There is also a 40-barrel cold liquor tank for adjusting temperatures. The upper portion of the steel grist

case, to which is attached a maize mixer, is on this floor, but partitioned off from the rest of the room.

The mill room is situated on the topmost floor and contains a Nalder malt screen and grader, connected to a dust destructor. The malt passes from the grader into the malt mill, the latter having two sets of rolls side by side (not one above the other), the one for crushing the large malt and the other the small, as delivered by the grader into each respectively. A point particularly worthy of note here, yet one which confessedly is almost incredible, is that not a speck of dust could be found in any part of the room, nor on the mill or screen, this extraordinary absence of "matter in the wrong place," although characteristic of the whole brewery, was naturally more surprising here than elsewhere.

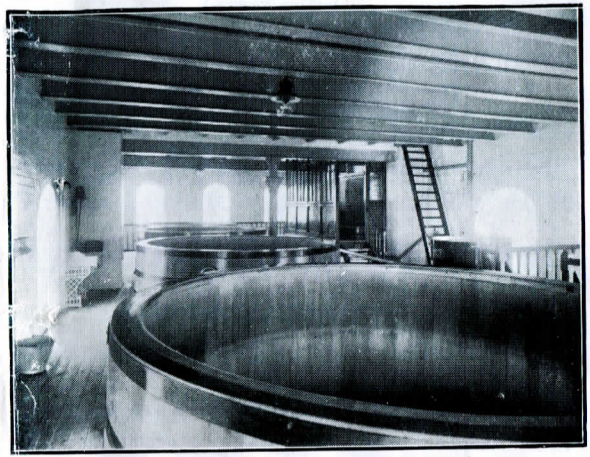
This floor further accommodates another hot liquor tank (12-barrel) with silent heater and a 40-barrel cold water cistern, both these receiving waste water which is used for washing down and other purposes.

Here also are the two sugar dissolving vessels, one of cast iron with a capacity of 25 barrels, fitted with silent heater, for the copper sugar, and the other of copper with steam jacket, holding 4 barrels, for the primings. The sack hoist which serves all floors is carried on brackets close to the roof.

The remarks respecting the mill room apply with equal force to the rest of the brewhouse, for no dust or dirt could be found in even the most out-of-the-way corners; every bit of metal, including the shafting, was kept polished; the woodwork, stairs, hand rails, partitioning, ceilings, and so forth, were all stained and varnished and showed not the slightest sign of deterioration, any more than did the floors, for everywhere is scrubbed and wiped down every day; even at the sugar dissolving vessels there was not the least evidence to denote that sugar had been handled there. All the stairs are fitted with Ferodo treads. Throughout the brewhouse the walls, if not lined with white glazed bricks, are coated with glossy white enamel, which, together with all the paint and varnish, is maintained in perfect condition.

The Fermenting Wing.

Passing to the fermenting side of the brewery and starting at the top, the main cold liquor tank, of cast iron, with a capacity of about 200 barrels, is in a room by itself. Below



Pitcher.] **Round Room.** [*Gloucester.*

this is the cooling room, the 90-barrel cast-iron cooler occupying the centre, a closely-boarded floor surrounding it, this, as well as the cooler, being scrubbed every day. The wort main from the pumps delivers into a sieve on high legs, which acts as a strainer and aërator combined. The cooled wort is drawn off by means of a float syphon. The louvres, on all three sides of the room, are enamelled white, both inside and out.

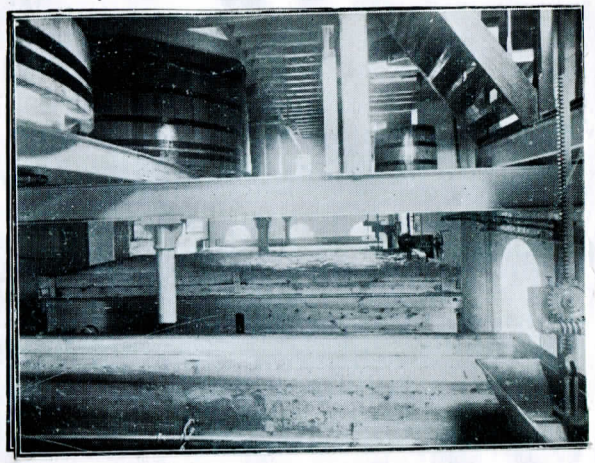
Below the cooling room is the round room with the refrigerator in a separate glass-partitioned chamber, at such a height as to command the fermenting rounds. If scrupulous cleanliness was manifest in all other parts of the brewery, here it was at its optimum, the writer being invited to rub his clean white handkerchief over any part of the room and into all the corners. The refrigerator, which is kept bright all over, is of the vertical type and of 35 barrels per hour capacity; this, in turn, was carefully examined, particularly between the tubes, by means of a penknife, the latter being wiped each time on the clean handkerchief, with the result that not the faintest mark was visible!

The round room, as will be seen from the photograph, contains four 100-barrel Kauri pine fermenting rounds, fitted with attemperators; these are in perfect condition and kept varnished outside. The small copper-lined round is the collecting vessel for the primings.

In order to maintain equable temperatures in the cold weather a steam-heating coil is suspended under each of the large rounds some distance below the bottoms.

From the rounds the beers are dropped to the four 100-brl. skimming squares, which are fitted with attemperators, copper parachutes and skimming gear. Heating grids are also provided under these vessels.

The waste water from the attemperators is collected in a 60-brl. cast-iron tank outside the square room.



Pitcher.] Square Room. [*Gloucester.*

On the ground floor are the yeast room, racking room with Morton's three-cock racker, finings room, beer cellar and vat rooms, the latter containing eight vats, of capacities ranging from 28 up to 165 barrels.

The cask washing area is slightly raised above the rest of the yard; it is equipped with a MacCardle six-nozzle washing plant and a cask drying installation for twenty-four casks, with fan situated in engine room and driven off main shaft.

To any brewer possessing the ability to appreciate it, the whole design and equipment of the brewery affords evidence of the most careful forethought and technical knowledge. As will be apparent from what has been said, it provides not only for the maintenance of the most extreme cleanliness, but equally for the greatest economy in working, as demonstrated, for example, by the general use of silent steam heaters in all the hot liquor tanks whereby every heat unit present in the steam passes into the water and is thus completely utilised, and where a coil is employed, as in the copper, the direct return of the condense to the boiler reduces the loss of heat units to the minimum. Another feature of note is that all waste water, such as from the refrigerator and attemperators, is saved for further use.

The provisions against infection as exemplified in the careful partitioning off of the malt screen and mill and likewise the refrigerator, may well serve as lessons to even larger concerns and in places where such safeguards are even more necessary than at Mitcheldean, where the pure air of the hills almost precludes the possibility of infection, as compared with the germ-laden atmosphere of our towns.

Further powerful protection to the beers is afforded by the use of a racking machine, whereby the beer is filled into the casks direct from the skimming squares, without coming in contact with the air or losing any of its protective carbonic acid gas, and incidentally without the inevitable waste attaching to the use of settling and racking backs; the latter having always appeared to the writer a direct invitation to the infection of the beers at their most susceptible stage, such vessels, therefore, greatly nullifying the value of a pure air plant in connection with the refrigerator.

But ease of supervision is of equal importance as efficient equipment, and this is provided for in the straightforward and compact lay-out of the whole brewery ; the brewer's office being centrally placed on the mash tun floor facilitates quick access to any department.

The Maltings.

These, erected in 1872, are in no respect behind the brewery in the perfection of their arrangement and equipment. On the ground floor is a working floor with overhead runway and baskets for distributing the grain from the steeps; the kiln furnace is fitted with King's heat regulator, in addition to which the entrance doors to the stokehole are constructed in the form of venetian shutters, in order to afford further control of the draught ; and as they are of a somewhat novel design the accompanying photograph of them was secured in the belief that it will interest the readers of this Journal.

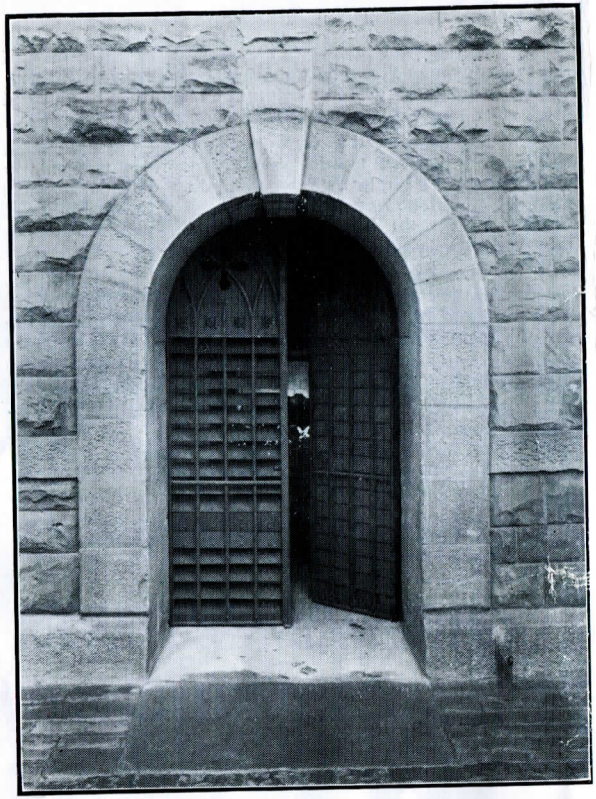
From the working floors access is gained to the furnace of the barley sweating plant.

On the first floor, which provides ample storage for barley, is a Nalder rotary barley screen, with half corn separator and fan, an elevator delivering the cleaned barley into the cisterns.

The two 25 quarter circular steeps are of cast iron and are self-emptying. Power for the whole of the maltings is provided by an 8 h.p. steam engine supplied with steam from the brewery boilers.

A special feature is the Topf continuous barley sweating plant, of which the accompanying illustration gives a good idea. This installation is capable of dealing with 4 to 5 quarters per hour and may be heated by means of fire or steam. It is fed from a barley bin holding about 50 quarters, the dried barley falling into a collecting hopper of about 25 quarters capacity, which feeds the elevator raising the grain to the barley floors above.

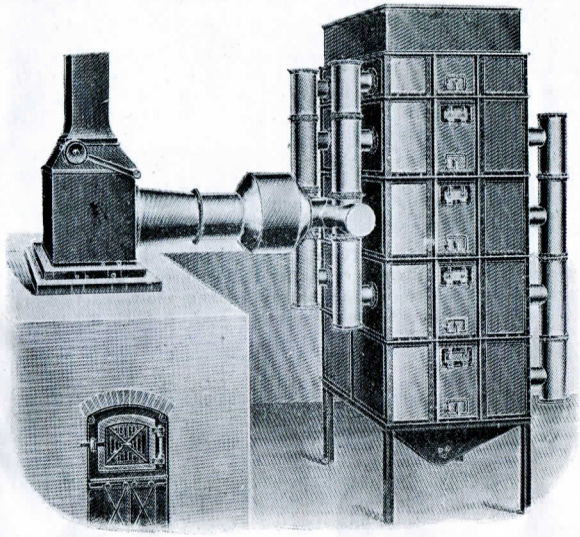
An enclosed bridge connects this floor with the brewery.



Pitcher.] Entrance to Kiln Stokehole. [*Gloucester.*

The system of transferring the growing grain from one floor to another being practised here, the second malting floor is found on the second floor of the building, and like the one on the ground floor is provided with runway and baskets for the elevation of the malt from the lower growing floor.

On the same level is the curing floor of the kiln (which possesses two floors), fitted with mechanical turner. The malt bins of a total capacity of about 2,000 quarters are on



Topf's Continuous Automatic Barley Sweating Plant.

either side of the kiln, so that the chance of its becoming slack is reduced to a minimum.

Obviously, the third working floor is found on the third floor, and this is similarly provided with runway and baskets for lifting the green malt from the second floor and finally loading it on to the drying floor of the kiln, access to which is gained from this floor.

On the fourth floor are the barley stores and bins together with the sack hoist for unloading wagons in the yard.

From the foregoing description it will be apparent that the same careful thought and sound technical knowledge has been applied to the arrangements in the malting as it was in the case of the brewery. The three special features to be noted are :—

1. The three working floors, one above the other, whereby the growing grain is aërated and mixed by the two-fold elevating, in a manner far more thorough than is possible when merely worked on one floor.

2. The employment of a double floor kiln, which not only contributes to economy but ensures a more gradual and even drying and curing of the malt, particularly as mechanical turners are employed on both floors.

3. The inconvenience and expense of utilising the kiln for barley sweating is dispensed with by the use of the continuous and automatic Topf drying apparatus, which operates with a minimum expenditure of fuel and labour—in fact, the latter is virtually dispensed with.

If one may be allowed to venture a suggestion in connection with such a perfect malting plant—but it is particularly prompted by the unsatisfactory quality of this season's grain—it would be to provide the steeps with washing and aërating appliances which would greatly conduce to an improved vitality and growth on the floor.

Critics may suggest that such cleanliness is not difficult to attain in the country, where labour is plentiful. This would imply that the staff is a large one, but this is not so ; on the contrary, comparatively few hands are employed ; it is simply an example of what well-paid, honest country labour, under competent supervision, is capable, and affords a striking contrast to the slovenly service rendered by town-bred hands.

In conclusion, the writer would express his great appreciation of the privilege accorded him in having been allowed to view what will ever be to him a real object lesson, not only in cleanliness, but in how a brewery and maltings should be designed and equipped.

Printed by McCorquodale & Co. Ltd., London.