steam, water or brine can be made to circulate, and has at its bottom an outlet pipe with valve and cap for the yeast.

The apparatus, having been tested for tightness by means of water or steam, is sterilized in the same manner as the Hansen apparatus, the steam entering through D into A, and through N into B, which is sterilized first. When sterilization is over *a* is opened, and the wort conduit thoroughly sterilized with steam before the wort is allowed to enter it. The boiling hot wort now runs into the cylinder, and when the latter is three-fourths filled, *a, b* and *e* are closed, and the air allowed to enter the cylinder through *d*. After a few minutes the water (or brine) is sent through the coil, and the wort cooled, care being taken that air is passing through it all the time.

Part of the cooled wort is forced under air-pressure up into B, the pure culture added through S and thoroughly mixed by forcing the air in through *l*. According to the temperature of the wort and the room, B will start to ferment in a day or two, whereupon it is filled up with wort from A. A few days later, when B is in full fermentation again, it is stirred up (with air through *l*), and while air still is entering through *l*, and R is closed, is run down into A and mixed carefully with the wort remaining in that vessel. Part of this mixture is forced back into B and now both are allowed to ferment.

When the fermentation is over the beer in A is removed through E—the air entering through *e*—and, *c* having been closed, the yeast is stirred up by the stirrer K and air that passes through *d*. Now the total yeast is taken out through the bottom opening, the wort conduit C is again sterilized, and the hot wort run into the cylinder to be cooled. This accomplished, the yeast in B is stirred up, air being admitted through *l*, and let down into A, mixed with the sterilized wort, part of which is then forced back into B, and both left to ferment as above. In this manner the apparatus may be kept in continuous operation.

The principal advantages of this apparatus are: It occupies little space, is not very expensive, and yields comparatively a larger amount of pure yeast.

MALTHOUSE OUTFIT.

TRANSFER OF GRAIN.

The machinery used in transferring or conveying the different grains in the storage elevators or barley and malt in the malthouse and brewery is practically the same in construction and operation.

The grain, etc., is unloaded from the wagon or railroad car by gravity, that is, it is dumped or shoveled into a chute delivering to the "boot" of the elevator or to the conveyor.

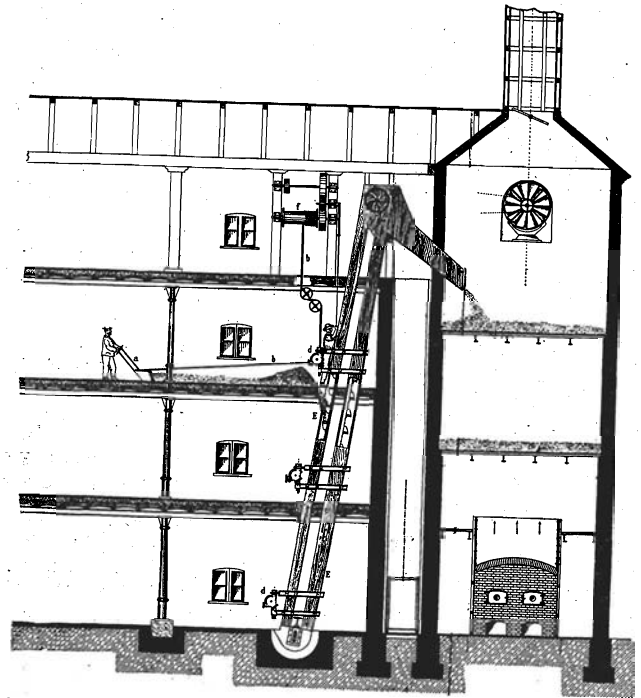
A power shovel is often used when unloading cars. This consists of a wide shovel or scoop, propelled or drawn forward by means of a rope attached to, or running over, a power windlass or shaft. This windlass is supplied with a friction wheel, or clutch, to allow the alternate winding and unwinding of the rope, whereby the shovel is drawn forward or the rope unwound so as to allow the shovel to be moved backward for the next operation. Corners and angles between the windlass and shovel are overcome by having the rope pass over swivel pulleys or blocks and tackles, enabling the shovel to be operated at various points surrounding the windlass.

These power shovels are now in general use in floor malthouses to transfer the barley or green malt from any part of the floors to the openings through which the malt falls into the elevator for further transfer.

This shovel has the advantage over the old method of loading the malt upon a truck or wheelbarrow, wherein the malt is carted to the opening, that the shovel is much more rapid in operation, and crushing of the malt berries by the wheels of the truck is practically avoided. (For illustration of power shovel see next page.)

ELEVATORS AND CONVEYORS.

The ordinary appliance for elevating grain, barley, malt, etc., in the brewery, is the bucket elevator. This consists of a number of steel, iron or wooden buckets, attached at equal distances on an endless chain or belt. The buckets, while turning around a pulley or sprocket wheel placed at the lowest point of travel, dip into the



Floor Malt House with Power Shovel and Bucket Elevator for Green Malt.

grain receiver or "boot," scooping up a certain amount according to their capacity, and pass upward to and around the top pulley or wheel, where they are inverted and their contents drop out, discharging into a bin or hopper, or being conveyed further, as may be desired.

The conveyor is an appliance used to move and deliver grain

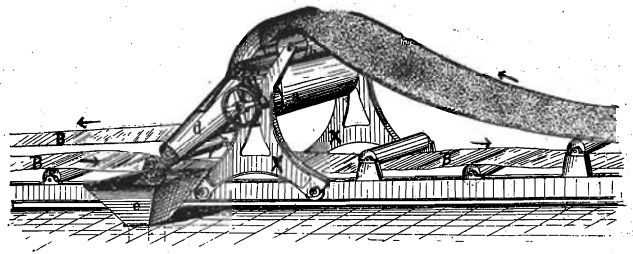
in a horizontal direction. It consists of a wooden trough or box sometimes lined with iron or made entirely of iron in which is placed a closely-fitting spiral iron propeller screw. This screw, in revolving around its axis, pushes the grain with its blades in the direction of the spiral movement.

SIZES AND CAPACITIES OF CONVEYORS.

The following data are furnished by a leading maker, and represent average dimensions:

Outside diameter in inches.	Standard lengths.	Maximum capacity per hour—bushels.	Revolutions per minute.
3 in.	8 ft.	100	100
4 in.	8 ft.	150	100
6 in.	10 ft.	400	150
8 in.	10 ft.	800	150
9 in.	10 ft.	1,000	150
10 in.	10 ft.	1,400	180
12 in.	12 ft.	2,500	180
14 in	12 ft.	3,500	180
16 in.	12 ft.	5,500	180
18 in.	12 ft.	6,000	180

Another conveyor for transferring grain in a horizontal direction is the belt conveyor, which has the advantage over the



Belt Conveyor.

spiral conveyor that grain can be conveyed for long distances, and that during transit the berries cannot be broken, as may happen in a loosely-fitting spiral conveyor. This device also requires less power since the friction of the grain against the blades of the spiral conveyor or conveyor trough is eliminated.

This belt conveyor consists of and is operated as follows

(see illustration): An endless belt *B* runs over two pulleys at either side (not shown in drawing), one of which is the driver, and is supported along its route by a series of pulleys or rollers. The grain falls upon the belt at one side, and is conveyed along until the belt runs over pulley *b*, when the belt suddenly descends while the grain continues in the same direction and falls into spout *c d*, delivering into hopper *e*. The carriage *X* is movable forward and backward by means of rollers running upon rails extending the whole length of the conveyor, so that the grain can be delivered to any number of hoppers *e* placed along the conveyor, which hoppers deliver to bins underneath. The grain can again be divided so as to deliver into two bins by means of the double spouts shown on page 581. Here the grain, falling into *a*, can be delivered through *d* or *e* by pulling on the cords connecting the lever at the top, whereby the one spout is closed and the other simultaneously opened by means of the slides *l* and *c*.

GRAIN AERATORS OR COOLERS.

Should grain become heated while stored in a bin, many grain storage elevators are so arranged that the grain can be aërated or cooled. This is done in a very simple manner by running the grain out of the bottom of the bin into a bucket elevator and discharging it back into the bin at the top.

GRAIN AND BARLEY DRYERS.

Should grain contain too much moisture a device is sometimes installed for drying it. This consists of a series of inclined endless belts, running in boxes placed in a zigzag position above each other, each receiving warm air from a heating device and fan. The moist grain is elevated or delivered to the top belt, and in turn falls on each succeeding lower one. If not dry when delivered at the bottom the grain is again run through, after which it passes through a cooling device to be cooled to storage temperatures.

This device can also be used to dry skimmed or float barley from the steep tanks in the malthouse.

GRAIN MEASURES.

All grain, malt, etc., is bought and sold by the bushel, and the number of bushels in a lot is calculated by weight. When grain is shipped or received in cars or wagons these are weighed with

and without the load, the difference being the total weight of the grain. This is then divided by the bushel weight, determined by a special balance for that purpose, which gives the number of bushels in the load of grain. Most grain storage elevators are supplied with a large scale hopper or bin wherein the grain can be again weighed while in the elevator, either after receipt, or before delivery.

AUTOMATIC MALT WEIGHING SCALES.

Automatic scales are sometimes used and consist of a box arranged in such a manner upon a scale that a certain weight of malt entering at the top forces it down, shutting off the supply and opening the bottom discharge valve. As soon as the box is empty it rises by its decreased weight to its original position, closing the bottom and again opening the top. This operation is continuous. The box is generally arranged to operate with a charge of one or more bushels of 34 pounds each. The amount discharged by each operation is registered on a dial. No attention is required except to start the machine and to stop it when the dial indicates the amount wanted.

This apparatus is not strictly accurate, as the moving parts are numerous and often stick together.

GRAIN AND MALT CLEANERS.

As grain, barley, malt, etc., contain substances that are undesirable, such as chips of wood, foreign seeds, small stones, malt sprouts, etc., it is necessary to clean them before they can be used. Malt is now almost universally cleaned by the maltster before delivery to the brewer.

BARLEY CLEANERS.

Grain is cleaned by the following methods:

1. Forced draught;
2. Sifting or screening;
3. Gravity cleaners.

Forced Draught. A current of air is forced through the grain while it is being fed in an even, thin sheet. The lighter particles such as dust, rootlets, etc., are carried away and the heavier berry falls into a receptacle below.

Sifting or Screening. The grain is passed through and over a series of screens of different size of mesh by an oscillating motion of the screens. In the first series of screens the meshes are

larger than the size of the berry, allowing the berry to fall through and retaining the larger particles. In the second series the meshes are somewhat smaller, retaining the berry and dropping the smaller particles, such as seeds, broken corns, etc. Some constructions have a revolving cylinder instead of oscillating flat sieves. The advantage claimed for the cylinder is that a small berry becoming wedged into the sieve will fall out when it reaches the top position and not clog the sieve.

In some styles of grain cleaners the arrangement is a combination of the draught and sifting methods.

These are now extensively used for both grain and malt. For the latter a somewhat different construction of sieve mesh is used on account of the malt sprouts.

In the grain cleaner the grain first undergoes the action of a fan where light substances are blown away by the air, then over a scalping screen, that is, a screen with meshes larger than the berry, where the larger, heavy substances are retained. It then passes over a screen with meshes smaller than the grain where the smaller particles drop through, and is finally again subjected to the action of the fan to remove particles not at first removed, or that may have become separated by friction while running over the screens.

Another style of barley cleaner consists of a machine having at the top a perforated circular conveyor bottom which contains a spiral conveyor with brushes attached, which distributes the grain over the whole width of the machine, and discharges at the end all substances larger than the perforation. The grain falls into a hopper with automatic valve the whole width of the machine, which regulates the grain when it falls on a division board dividing the grain into two parts. Each part passes the suction chambers separately, whereby all the light substances are removed. The grain then falls on the shoe of the shakers and grader screens, where the grain is spread very thin so that every berry has access to the surface of the shaker screens, of which there are two sizes, fine and coarse, in order to grade the barley.

Through the fine screens all small barley, also broken kernels, cockle, peas, seeds, etc., pass into the cockle reels or cylinders, which separate the small barley from all broken kernels, seeds, etc. Over the fine screens passes the large barley to the second or coarse screens, which will only allow clean, large barley to

pass through into the discharge spouts, while the larger substances like oats, corn, etc., are cast off into the screenings pile.

In another style of combined cleaner the barley first drops on a screen, where sticks, straws and stones, or other foreign substances are taken out. The screen is very wide, so as to allow the barley to spread out into a thin sheet, and to give the berries an opportunity to pass through the perforations and allow none to tail over. After passing through the screen the barley falls into hoppers, which conduct it into the case. The grain then falls upon a rapidly revolving cylinder head, from which it is distributed evenly around in the space between the beaters and the case. The beaters throw the barley into oblong depressions in the case, whence they rebound to the beaters, and in being thrown back and forth between the beaters and the case, the barley is thoroughly scoured and clipped. All the impurities that are loosened are immediately drawn through the slotted openings to the fan, thus not allowing any of the dirt to be rubbed into the crease of the kernel, from which it cannot be removed. After the grain leaves the case it falls into a suction spout and meets a strong current of air which divests it of remaining impurities before it leaves the machine.

MALT CLEANERS.

One style of malt cleaner operates as follows:

The malt is drawn from a garner into a hopper to an automatic feed, which is constructed with a regulating valve, and with an oscillating valve operated by two levers or arms connected with each side of the shoe, in order to secure a perfect and positive feed at all times. In the hopper is also placed a polisher, which is so constructed that it will remove the sprouts, and, while brightening it up, will not break or injure the malt. As most malt contains more or less metal, such as iron, wire and nails, there is placed in the hopper a heavy bank of magnets to remove them. The malt is fed in a thin, even sheet into the first suction leg, where the dust and light impurities are carried by a perfectly controlled air current to a dust room. The greater part of the sprouts are at the same time deposited in the first separating tip. Both separating tips are provided with a conveyor that carries the sprouts out of, and discharges them on either side of, the machine, as may be most convenient for their

removal. From here the malt drops and is spread evenly over the whole width of the upper or scalping screen, which throws off any coarse foreign matter, such as straws, sticks, headings, etc. The malt next passes over a malt screen the entire length of the shoe. Under this is a fine screen, which removes cockle, sand, small seeds, etc. From here it passes into the last suction leg, in which a final separation is made of any impurities that may remain, the malt dropping out of the bottom of the leg in a cleaned condition, while the impurities are drawn into the second tip and removed by the conveyor. The sieves of this machine are all adjustable in the shoe, so as to be changed to finer or coarser ones, while the machine is running. In order to keep the bottom screen from clogging, this machine is supplied with an automatic brush, which travels underneath the bottom screens to keep them clean. The fan-shaft is extended, so that it can be driven from either side of the machine. The two suction legs are the full width of the sieves in order to secure perfect separation. There are two fans in this machine, one on each side of the air trunk for securing a free passage of air at any point and also avoiding sharp currents. This air trunk is so arranged with valves that any desired air current can be obtained at any point of the suction legs where it may be desired.

Gravity Cleaners. These consist of a tall, upright spout or box inside of which are placed a series of steel pins or wires having different distances between them and the whole arranged in rows with one end of the wires free, similar in construction to an ordinary hair comb. These wire combs are placed in the box in an alternate or zigzag position, at right angles to each other, the end of one almost touching the other; in fact, they occupy the position that the steps of a staircase would occupy if they stood on end upright. The grain is fed at the top and falls on the first "comb," thence rebounds to the second and so on to the last. All particles smaller than the berry fall or pass through the wires or "teeth" and are discharged into separate receptacles at either side, while the grain or malt berries fall into another. An advantage possessed by this system of wire teeth is that the grain in striking them causes them to vibrate and dislodge any berry that might have a tendency to clog. These gravity cleaners require no power and can therefore be placed wherever convenient.

In some malthouses the grain is passed through a gravity cleaner, after being cleaned with one of the above mechanical devices, as an extra safeguard.

MALT STORAGE.

The proper storage of barley and malt is a matter of considerable importance, and is usually done in square bins like those described for malt in the brewhouse (which see). Of late, however, a new form of storage receptacle has come into use which possesses features that will gradually enforce its universal installation. This is the steel tank bin.

These bins are constructed to hold many carloads of grain or malt. They possess advantages in the fact that malt or grain can be stored in them without absorbing much moisture; that it is easy to banish the objectionable weevils and other insects which cannot find their way through the steel plates of the tank; or if present are easily removed when the tank is empty and cannot infect subsequent contents; that the risk from fire is lessened to a minimum and consequently a great saving in insurance rates is effected.

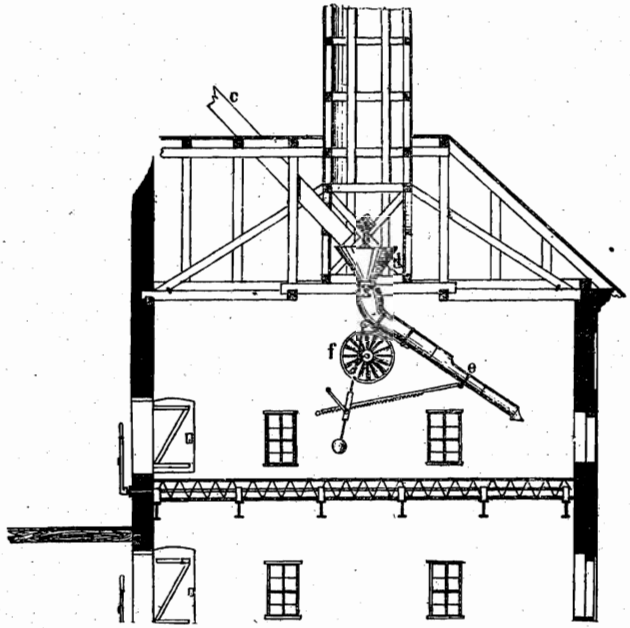
BARLEY WASHING MACHINES.

The washing of the barley previous to entering the steep tank is usually accomplished in one of three manners. One method employs an injector-shaped vessel, where the grain and water are simultaneously allowed to enter, being there thoroughly mixed and the grain washed, whereupon both pass over a sieve, where the grain is intercepted and transferred to the steep tank. The second method proceeds in a closed vessel having an agitator, wherein the grain and water are stirred together and the barley thus washed. The third way is to pass water through the conveyor while the barley is being moved.

STEEP TANKS.

The steep tanks, in which the barley is soaked or steeped, consist now almost universally of cylindrical iron hoppers, with conical bottoms. Attached to the point of the cone is a steep tank valve, which is usually supplied with two opening devices, one for draining off the water, and another for discharging the barley. Some steep tanks are supplied with an aerating device for injecting air into the steeping grain.

Other steep tanks consist of two tanks placed one over the other, the grain being partly steeped in the upper one before dropping into the lower. When there is more than one steep tank they are placed in rows or tiers, and above them runs a spiral conveyor having an opening over each tank, so that in order to drop the grain into any tank all that is necessary is to open the corresponding slide in the conveyor. The tanks are



Revolving Funnel Green Malt Distributor.

also supplied with overflow water pipes for carrying off the float barley and chaff (skimmings).

When the barley or grain is properly steeped it passes either to the growing floors, or into pneumatic drums, etc.

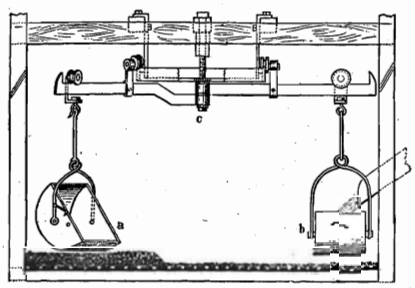
Several devices for turning the malt on the growing floors by machinery have been invented and tried, but did not meet with any general introduction, since they were complicated in detail and often got out of order, causing frequent delays.

FLOOR MALT HOUSE.

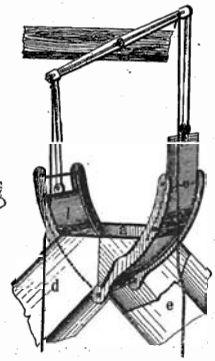
Floor malting is very simple, as far as mechanical equipment is concerned, and requires practically no machinery except the power shovel described above.

The malthouse has different numbers of floors, consisting of different body construction, but nearly all finished with a top coating of cement. The floors have a slight pitch to the sewer pipe to ensure drainage when washed.

The barley is elevated into the steep tanks which are placed on the top floor of the malthouse, from which it falls upon the growing floors below.



Green Malt Distributing Shovel.



Grain Spouts.

The green malt is usually elevated by a bucket elevator to the kiln, and is there distributed by one of three appliances. The one now most commonly in use is a revolving or movable spout (shown in illustration). The malt is dropped by the elevator into the hopper top, and by moving the spout the malt falls to different parts of the kiln, where it is spread out by hand. To the spout are attached two rods in such a manner that they form a triangle with the spout. To the lower or horizontal rod a sliding weight is attached, by moving of which the slant of the spout can be changed. Another style is the movable buckets (see illustration). The green malt falls into one bucket which is then pushed to where wanted and dumped. Another style is the ordinary spiral conveyor, which runs across the kiln lengthwise and has openings at different distances apart at its bottom. By open-

ing the different slides the green malt can be dropped where wanted in heaps and likewise spread by hand.

The construction of the kilns is practically the same as those used for drum malt described below.

MECHANICAL MALTING DEVICES.

Of late years quite a number of mechanical devices for replacing the old-style growing floors have been coming into use and are rapidly supplanting them. The advantages are principally as follows: Smaller buildings and less space to produce a certain output; continuous operation both summer and winter; more regularity in the growing process, etc.; reduced capital invested; less exposure of the growing grain to outside atmospheric influences and consequent lessening of danger of mould, etc.; malt is not crushed by the workmen or shovel in turning; and, last, not least, reduced cost of labor.

PNEUMATIC FLOOR OR BOX MALTING.

This system of malting employs a box-shaped receptacle for holding the steeped barley during the growing period. Traveling across this receptacle lengthwise is a carriage supporting a number of revolving spiral propellers for the purpose of aerating the growing barley by lifting or turning. This carriage travels from end to end automatically, being propelled by wire rope transmission.

The floor consists of perforated or slotted metal, through which the properly attemperated air passes. This air first passes through the attemperators, consisting of perforated zinc plates, over which water is continuously trickling, effecting a moistening of the air to the saturation point, and, at the same time, purifying it and equalizing the temperature. In cold weather the air first passes through a system of steam coils to be warmed, while in warm weather the air is cooled by the evaporation taking place in the moisteners. This air can thus be kept at a uniform temperature all the year round.

The moistening of the growing barley can be accomplished by passing water through the shafts of the screw propellers, which are provided with sprinklers, so that as they travel through the grain the same is equally moistened. The growing boxes are also made double, one above the other, so that the process can be carried out in a more economical manner as to ventilation, etc.

Another system of pneumatic box malting is very much similar in general details to the one above described, the main difference being in the shape of the receptacle containing the growing barley. Here this box or receptacle is round, having at its edge and near the top a circular cogwheel or ring attached, with the cogs pointing inward. The stirring and turning device is attached to an horizontal shaft revolving on an upright central shaft as an axle by means of a cogwheel at its end fitting into this circular cog ring, in fact, similar in construction to a one-armed mash tun stirrer. The advantage claimed in this circular device is that each portion of the growing barley is turned at regular intervals at every revolution of the shovels, while in the first system where the turners travel from end to end and back again the middle portion is the only one turned at regular intervals, while those at the ends are turned twice in quick succession and then left undisturbed for some time.

This round system, however, has found only limited installation, while the square system is in extensive use and has, by long experience given good results.

DRUM MALTING.

The cooled or heated and moistened air used in pneumatic floor systems circulates through the whole space in the rooms, as well as through the barley receptacles, consequently a very large volume of this treated air must be furnished. This quantity of air is considerably lessened by the employment of drum-shaped receptacles for containing the growing barley.

Drum systems differ from each other mainly in the construction of details and methods of using the prepared air. They are all, however, similar in the following points, namely: At every revolution of the drum every portion of barley contained undergoes the same change that it did in previous revolutions, hence, there is uniformity in turning; the circulation of the prepared air passing through the growing barley can be well regulated; there is little barley exposed to the air in the unfilled portion of the drum, consequently the grain does not dry out much; and there are no shovels or stirrers to injure the barley berries.

In the construction of the drums there is also this similarity in all systems: That they consist of two concentric perforated iron cylinders, a smaller one placed inside a larger one, the barley being placed in the space between the two cylinders, but both having

the same heads and revolving on the same central shaft, the whole being supported by four friction wheels or pulleys and revolved by means of a worm gear. The drums are also supplied with sliding doors so as to allow examination of the contents during the process, and also for filling and emptying.

One construction of malting drum now in use has two inlets for air, one at one end of the central cylinder for injection of moistened air, and one at the other end for dry air. The moist air in this system is injected upon the growing barley with considerable force, thereby loosening the barley and causing better turning while the drum revolves. Two thermometers and two wheel throttles are inserted, one at each end of the inner cylinder, in order to allow the observation of the temperature of the injected air and to regulate its pressure.

Another system of malting drum in extensive use passes the air through the growing barley in practically the opposite manner described in the foregoing. The air passes from around the outside larger perforated cylinder inward, and finds its exit through the inner perforated cylinder, both being encased by a third not perforated cylinder. Furthermore, the air here is not forced in by compression, but is sucked or drawn through by an exhaust fan. The air for purification and attemperation is drawn through a tower or cylinder filled with coke, at the top of which water is sprayed under pressure, being cold in summer and warm in winter, in order to preserve an equal temperature of the air. This drum also has a thermometer and valve for observing the temperature and regulating the draft.

Another form of drum has the inner cylinder tapering or cone-shaped, with the small end near the suction end of the drum. The advantage claimed here is that at the smaller end of the inner cone, which is surrounded with more grain, the suction is greater, and this greater suction, passing through this larger body of grain, is proportionally reduced, consequently the air passes with equal force through every part of the drum, causing a more even growth.

In still another system the drum consists of two concentric cylinders, but allows the inner one to revolve independently of the outer or larger one, so that the two cylinders can be given different speed. By these two different speeds it is claimed that the growing barley is more thoroughly turned.

MALT KILNS.

After the growing barley, now called green malt, has reached the desired stage of growth, the next operation necessary is quickly to check this growth. This is done by drying the moist malt upon the kiln. Here it is not only deprived of its moisture, but also receives certain new characteristics, the latter depending upon the amount of moisture contained at certain temperatures. The temperatures in the kiln therefore must be easily regulated. The green malt, in discharging from the drums, falls into a horizontal conveyor, which discharges it by means of a bucket elevator to the kilns where it is distributed as above described.

Kiln Floors. The kiln consists of perforated floors below which are furnaces supplying the heat for drying.

In order to save fuel, building space and labor, the kiln floors are placed one over the other, usually two in number, although occasionally, especially in large plants, there are three such floors. The dryer malt is placed upon the lower and the more moist upon the top floor and the heat applied from below, so that the greater amount of moisture is nearest the exhaust and does not pass through the dryer malt.

Dumping Floors. The kiln floors are constructed of perforated or slotted metal and in order to allow the malt to drop upon the floor beneath are made to open partly and are then called "dumping" floors. These consist of a number of strips of perforated metal which, when all laid horizontally, form an even floor, but, each being centrally pivoted at the smaller end, can be tilted or given a quarter turn so that each strip assumes a vertical position and any malt resting on it is dropped or "dumped" on the floor below. The pivot or bearing on one end of these strips usually extends through the wall and is supplied at the outside with a lever handle for the purpose of turning and closing from the outside.

A mechanical *device for turning the malt* upon the same kiln has lately been installed. This consists of a series of short conveyor screws each attached to a vertical shaft, and these shafts in turn supported by and revolving in an overhead beam or traveling crane running from end to end of the kiln. As the revolving screws travel through the malt they lift the lower layers and allow the upper to fall in their place, thus turning the malt evenly.

The furnaces for furnishing the heat to the kilns are usually open at both ends and are supplied with draft regulating air shafts. The fuel is usually anthracite pea coal or coke, and special care should be taken to add little fuel often in order to reduce the smoke production to a minimum.

COMBINED DRUM AND KILN.

As the handling of the green malt from the drum to and upon the kiln necessitates considerable labor, and the installation of the kilns considerable capital, one system of malting now in use does away with the extra kilns by also using the drums as kilns.

The manipulation of these drums differs little during the growing period from those used for germination only. But at the time growth is completed, the green malt, instead of being taken out, remains in the drum and the cool, moist air used in the growing period is replaced by dry, hot air and the drum is used as a kiln. In this system the drum is in uninterrupted operation from the time it is filled with steeped barley until the latter is taken out as finished malt.

MALTING OPERATIONS.

GENERAL OUTLINE.

Malting is the process of preparing the grain—commonly barley—for use in the production of beer wort. Broadly, it embraces every manipulation from the moment the crude grain leaves the elevator or storehouse up to the time the finished malt is conveyed to the storage bin or to the hopper to be measured into the crusher mill. In a more confined sense, the term is sometimes applied only to the three operations of steeping, germination and kiln-drying.

IMPORTANCE OF MALT.

Among all the materials, undoubtedly the greatest importance attaches to the malt. It is only in malted grain that we find not only the materials necessary to give substance to the beer, in fact to supply the greater part of the extract, and all the essential ingredients which make up the character of the beer except those which are derived from the hops and the water, but also the enzymes—diastase and peptase—that prepare those ingredients by the inversion of the starch and peptonization of albumen. Unmalted grain may supply starch; malt alone supplies the important albuminoids and the enzymes.

It follows that while it is possible to make beer, using as the starch-yielding basis only barley malt, it is impossible to prepare a beer wort from unmalted cereals only. A certain amount of malt is indispensable to supply the enzymes in sufficient force to invert the starch both of the malt and of the unmalted cereals. The latter are, therefore, properly malt adjuncts, not substitutes.