weight may however be ascribed to the kiln drying, and consists of water which the barley would have lost had it been exposed to the same temperature.

A very simple method will in general ascertain the quality of malt sufficiently correct. Put a small quantity into a tumbler glass containing pump water, and the number of corns which immediately (after a slight stirring) fall to the bottom, will show the proportionate inferiority of the sample: if they should all float, the malt must be excellent; but if even a few sink, the sample should not be regarded as of bad quality, especially if they stand on one end at the bottom of the glass. This test however will not apply to the blown porter malts.

The wort drawn from the palest malt, it is well known, is more ready to ferment than that from the browner sorts; and malt may become what brewers term "foxed," either by careless stowing away in a damp situation, or by the dishonesty of the maltster in wetting it whilst throwing off from the kiln, in order to increase its measure, and make it appear plump and full: the smell, however, will soon
detect this injury. Wheat and rye make very superior malt, but few persons have ever given it a trial: those who once do it will always continue it in a proportion corresponding to its relative value to barley. Oats is too inferior a seed to bear a duty of two shillings and sixpence per bushel; and as every sort of corn, when malted, will pay the same amount of duty by measure, the following is the relative quantity of extract afforded by the four species named; viz.

<table>
<thead>
<tr>
<th>Grain</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>36</td>
</tr>
<tr>
<td>Rye</td>
<td>32</td>
</tr>
<tr>
<td>Barley</td>
<td>25</td>
</tr>
<tr>
<td>Oats</td>
<td>17</td>
</tr>
</tbody>
</table>

Thus it will be seen that nine bushels of wheat, ten of rye, and nineteen of oats, are respectively equal to thirteen of barley, and will produce equal quantities of beer of the same strength: the calculation, therefore, of the advantage or disadvantage of malting either of these species of corn, can at any time be ascertained from the market price.

From this description of the malting process, it may be seen, that it is in the power of any servant to make malt as
unproductive as he pleases, by wilful neglect or carelessness: it therefore appears rather surprising, that the inventive powers of the present age have not been applied to the improvement of this process, by the substitution of machinery, which is at all times free from obstinacy, idleness, or drunkenness; unless, indeed, the excise regulations have rendered it forbidden ground for the application of science. But it cannot be doubted that permission may be obtained to try any new plans (however much the necessity of asking such permission is to be deplored); and therefore, as it has been already stated, that malting is nothing but an artificial vegetation, which requires motion to regulate its course, there is every probability of the following plan succeeding. Let Fig. 3. be a cylinder in a horizontal position, with ends of wood, and side or circumference of wove wire, with the meshes not finer than necessary to prevent the smallest barley corn from falling through. The shaft S must be attached to some water or other power capable of keeping it in a continued, but very slow motion; the cylinder must now be filled about three quarters full of barley, either through
a door in one of the ends, or by a wire aperture opening in some part of the circumference; water must now be sprinkled over the cylinder until all the corn therein be equably wetted, which the revolving motion will soon accomplish, and the sprinkling, or wetting, continued at intervals, whenever the vegetating process may require it. This slow motion will be constantly exposing fresh surfaces of the corn to the atmosphere, and the vegetation checked or expedited according to the rate at which the cylinder revolves, which rate may be made capable of any adjustment; so that when once the proper degree is found, very little attention to it may afterwards be required, except in as far as the heat of the atmosphere undergoes sudden variations. The number of the cylinders employed must of course depend on the extent of the trade; and it is very possible to conduct the whole process in them, even to the drying of the malt when finished. A variety of other plans for accomplishing the same purpose may be proposed, and the present is only suggested for the purpose of directing the attention of maltsters and others to the subject.
Unmalted Corn.

Good beer, of an equal quality to that brewed from malt alone, has been frequently produced from a mixture of malted and unmalted corn; but that a portion of malt must be used is unavoidable, and this portion should be of the best sort; which, mixed with the proportions of unmalted corn indicated hereafter, and brewed as directed, will yield in many instances a larger quantity of wort, of equal strength, than can be drawn from a like number of bushels of malt.

Barley that has been malted seems to possess the power of malting a further quantity in the mash-tub; that is, a certain portion of it appears to act as a malt-ferment on raw grain, turning the whole sweet. This plan is applicable to any sort of corn, and even to wheat bran. From whatever sort is used, the beer appears not to be dissimilar in quality or taste. It is all equally pleasant and wholesome, and when brought to similar strengths, no one can discover, on its attaining a proper age, that it was not made from malt alone, when
judiciously managed. The grains too will be found to possess a greater degree of nutriment for pigs, &c. than those from malt, for this plain reason—a bushel of barley, when dried to the same degree as the malt which is generally sold, will be found to weigh ten pounds heavier. This extra weight must of course be left in the grains, after the usual quantity and strength of wort is drawn, as from malt alone; and if they are pressed closely into a tub or cask, they will keep good any reasonable length of time. When such a difference of price exists as three to four shillings per bushel, between the malt and the barley from which it is made, the possible saving by this mode of brewing is at once obvious and immediately realized.

Good malt thus employed, mixed with unmalted corn, and ground as will be directed, appears to have a peculiar action on the latter in the mash-tun, by breaking down the viscidity, or glutinous quality of it, (which at first seems to set the whole mass together like hasty pudding) so as to allow the wort at the proper time for draining, to run off freely, which at first is held so fast imprisoned as if the hot
water were mixed with starch: indeed, it is this latter principle, contained in all sorts of corn, which is rendered sweet and fluid by being mixed or in contact with a small proportion of malt. The flour of barley is certainly of more difficult solution than that of malt, and requires the constant guide of the thermometer, and more mechanical agitation in the mash tub, and the variation of a few degrees of heat is not so unimportant, as if all malt were used; still the proper mode of management is easily acquired, with the assistance of the thermometer, for without this instrument the process of brewing in no case can be conducted correctly, and we therefore mean to speak its definitive language in all our subsequent instructions.

Potatos.

On so novel a subject as the introduction of potatos in brewing, it will be necessary for us to preface it with some observations on the utility of this root, which in an agricultural, a manufacturing, and even in a national point of view, is not by any means duly appreciated.
In saying this, we know that we shall be opposed to the opinions of one class of persons; viz. the owners of land, who in general are disposed to discourage the extended cultivation of the potato, under the impression that it would proportionally impoverish the soil.

That, on a partial view of the question, this may occasionally be the case, is probable; but, take it more comprehensively, and the following reasons will serve to show that all the different species of corn impoverish the soil much more than the potato, in proportion to the quantity of food produced.

As our explanation of these reasons may be considered by many as too abstrusely philosophical, we address ourselves only to those, in this particular case, who will take the trouble of expanding their minds so as to embrace the question generally. Observation enables us to pronounce decidedly, that an acre or any other measure of potatoes will sustain animal life longer than the same surface of any other known vegetable cultivated. It further teaches us that the whole of this extra nourishment cannot be drawn from the soil, as its fer-
tility is by no means lessened in the same proportion. The proof of these two propositions it is certainly difficult to bring to mathematical demonstration; but in all such complicated cases as this, we have one equally to be relied on; viz. universal experience.

Let the question be put in another shape. We will suppose a certain quantity of land, of precisely equal fertility throughout every part of it, to be divided into equal portions; one of these portions shall be cultivated with potatoes for seven successive years, and the other with the various succession of crops at present in use. Let as many animals, as nearly as possible of the same kind, be fed by the produce of these two portions, as they will conveniently sustain; and let care be taken that the whole of the manure produced by each set of animals be returned over each portion of the land which is feeding them, we will then venture to say that the number of animals, at the end of the seven years, which have been fed from the potato ground, (at all times taking condition into consideration) will so greatly exceed that from the other portion, as amply to repay,
and with a large surplus of value, the expenses of manure in bringing the potato ground again to the same state of fertility as the other part, (provided that it has been impoverished) or, which amounts to the same thing, the potato ground, in five years, will have produced much more food than the other in seven.

After all, we may be told, "This is mere assertion and you give no proof." If there were not thousands of difficulties of giving other proofs, in such cases, but those of general experience, these questions would long since have been decided; but although an appeal to Ireland may be satisfactorily made in favor of our assertion, we do not stand in need of its assistance, but we will proceed to take another view of the same subject.

Referring to our statement, which will follow, of the comparative produce of land in potatoes and grain, we only now ask for an admission that an acre of potatoes will produce more food or nutriment (that is, that it will sustain in the same condition, a greater number of human beings, or animals of the brute creation) than an acre of any known vegetable production, whether
of corn, roots, or plants, or any mixture of the same, *without impoverishing the soil in proportion to the excess of such food*—if this be granted, the potato has drawn nutriment from some source independent of the soil—the conclusion is inevitable. Here is an extra quantity of food produced, and that extra quantity does not come totally from the soil, as from the supposition it is not impoverished in the same degree: from whence then does it come? The reply is ready—*from the air of the atmosphere*. Here then is a source of manure, or "maintenance" very little thought of, and frequently disregarded altogether: but we are told the atmosphere is surrounding every possible variety of crop, and why does it not afford the same support to all? We reply, that nature's laboratory, which is incessantly at work in decomposing the air that flows over our fields, and assimilating its various principles for the support of animals—which attracts therefrom those portions that are fitted for the supply of the farinaceous and saccharine parts of plants, together with the moisture which the air contains—we say that nature's laboratory, for all these purposes, is to be found in the
multitude and the extended surface of the leaves these plants throw out. These leaves are incessantly occupied in snatching from the air which glides over them all those portions from which food is formed: and why should this be thought surprising, when all nature is moving in a circle?—when the principles of animals and vegetables are decomposing and recombining; to form the like again, in constant succession and eternal rotation? Is there not a tendency in all bodies on the surface of the globe, to return to their original elements—air, water, and earth? (We speak in popular language, and purposely avoid subdividing them further into oxygen, hydrogen, nitrogen, and carbon.) It is obvious to common understandings, that the two latter are again destined to form afresh other bodies, but the first principle, air, is disregarded, because invisible: it nevertheless performs as important a part in renewing the animal and vegetable kingdoms as the other two. We would also ask what becomes of the apparently solid substance of a large body of manure, when sufficiently decomposed for use? All that it has lost in weight cannot be water: then
the steam which flies from it into the atmosphere is not simply water in a state of vapour? No, it contains another and most important principle, already mentioned under the head 'Fermentation,' formerly called 'fixed air,' (carbonic acid gas,) which is received into the atmosphere to be conveyed by the winds to the leaves of plants, and by them to be again converted into their solid and liquid substances; and in this manner the farmer loses a great part of his manure, because 'it takes to itself wings, to fly away' to strange lands. Thus it appears that the quantity of nutriment plants draw from the soil is small in proportion to that which they apply for to a messenger that would pass over them without benefit, and convey its riches to their neighbours, were it not for the mouths with which they are furnished in the shape of leaves; and of course, the more these mouths are multiplied, the greater the consumption of the food conveyed by the air, which in their absence passes on its journey to fertilize those portions of the earth where these plants are more numerous. The different species of corn not being furnished with them in such
abundance as roots, of course depend more on the soil for support, and therefore exhaust it more in proportion to the food they yield. Amongst all the varieties of vegetables which abound with these *air traps*, the potato is by far the most useful and valuable, as applicable for the benefit of man; and whatever obstructions may be placed in the way of its extended cultivation, there is yet a sufficient quantity of land in the British isles out of the control of its enemies, even if the present restrictive system among landowners should continue. We have thought it proper to say thus much on the *cultivation* of the potato, trusting that the landowners of Great Britain will see that it is futile to make these objections, and their interest to abandon them.

This root contains, intermixed with its fibrous part, a juice which is not pleasant to the taste, (although a great detergent, or substitute for soap) and also a large quantity of fecula, or starchy matter, a great part of it in no degree inferior to the finest arrow-root. It is this fecula alone which constitutes the value of the potato in brewing; and the method of extracting and using it
for this purpose will be explained in due course. The quantity of fecula contained in different varieties of the potato varies greatly. We have now before us a statement of the comparative produce of no less than forty-seven different sorts, but in consequence of the want of a nomenclature of the potato tribe, it will be impossible for us to affix names to each sort, which can be recognized, or understood generally. The following are a few of the known sorts, with their respective produce in fecula, but this quantity will of course vary in different seasons, although the relative proportion may still be correct.

The Champion yields 18 lbs. of dry fecula per 112 lbs.
The Oxnoble yields 25 lbs. ditto ditto.
The Kidney yields 18 lbs. ditto ditto.

The average produce, of the forty-seven sorts, is however 20 ½ pounds of fecula per cwt. and this quantity may always be expected by a proper selection of the sample, or of the seed from whence it is grown.

We can now ascertain the astonishing difference in the produce of an acre of land when planted with potatoes or with corn, and we will include this calculation in the
following table, supposing the land to be of medium quality.

<table>
<thead>
<tr>
<th>Produce per Acre</th>
<th>1.</th>
<th>2. Whole Produce in dry Food, including Husks, Gluten, &amp; Sugar.</th>
<th>3. Difference in Stač,</th>
<th>4. Extractive Matter for Brewing.</th>
<th>5. Solid Matter left after Brewing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorts.</td>
<td>lbs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>17920</td>
<td>1350</td>
<td>1350</td>
<td>1350</td>
<td>1332</td>
</tr>
<tr>
<td>Wheat</td>
<td>1500</td>
<td>1289</td>
<td>1242</td>
<td>750</td>
<td>629</td>
</tr>
<tr>
<td>Barley</td>
<td>1500</td>
<td>61</td>
<td>108</td>
<td>900</td>
<td>629</td>
</tr>
<tr>
<td>Oats</td>
<td>1480</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The foregoing Table first expresses the gross weight of the average produce which in Column 1. is reduced to a perfectly dry state, as even corn, when fit for grinding, contains moisture. Column 2. is the total quantity of nutriment afforded by each sort, supposing that to reside exclusively in the three principles, starch, gluten, and sugar, according to the analysis of Sir H. Davy and other chemists. Column 3. the quantity of matter presumed to contain no nutriment. Column 4. the solid fermentable matter capable of being drawn from each sort by the brewing process. Column 5. the quantity left in the shape of grains, &c. as food for cattle.

N. B. In this statement the native juice of the potato is totally omitted, (being washed away in the preparation of the fecula) although it contains in solution 80 pounds of solid matter in every ton of potatoes, and no doubt forms part of their nutriment when eaten in the ordinary way.

Thus it will be seen that, if an acre of barley will produce 750 measures of any sort of beer or fermented liquor, the same quantity of land with wheat will yield 900
of the same measures, and with potatoes no less than 2200, or three times the produce from the barley.

Although we have no intention of recommending the use of the potato fucula alone for the purpose of brewing, still, whatever may be the proportion of its mixture with grain, the statement herein given, of its relative value, will not in the least be affected thereby.

That the potato has not been cultivated even more extensively than is at present the case, is in consequence of the ignorance of a method of preserving it, and of the new uses to which it may be applied, one of which it is my present object to point out. In France the whole nation is alive to it, and many extensive distilleries, and some breweries, are already established, to work from potatoes alone; but, in this case, the potato flour is sweetened by a chemical process, which it would be foreign to our present purpose to describe.

It is singular that the flour which may be extracted from an acre of potatoes, is double in weight to the whole quantity of wheat which can be grown on the same land, including its fine flour, coarse flour,
and bran; and this potato flour is far superior to the best wheaten, for every culinary or other purpose except that of making bread, in which the principle called gluten so abundantly exists, and to which, from its tenacity, bread owes its lightness; still, a proportion of the potato flour, or fecula, may with advantage be introduced therein, without injury to this quality.

It is to this fecula that the cereals, potatoes, and all vegetables owe the principal part of their nourishment, (whether in this shape or in that of sugar, as these two principles scarcely differ by chemical analysis) and those that contain the greatest quantity, are most sought after for the use of man.

As the fecula can be readily converted into sugar, and as sugar is the only basis of the vinous fermentation, it is not at all necessary to make use, for this purpose, of those vegetables or roots whose immediate principles consist of sugar, or in which that substance is ready formed in the native juice, such as that of carrots, parsnips, beet root, &c. &c. Indeed the saccharine juice of these roots is always mixed so
much with other principles, which add a
variety of nauseous tastes to it, and thereby
injure its quality, that a pure sweet is
much more easily obtainable from the fe-
cula in question, than from almost any
substance in nature; for, as it is insoluble
in cold water, every foreign substance can
be readily washed away, before it is sub-
mitted to the sweetening process.

The potato in its entire state is a perish-
able root, and no method has hitherto been
discovered for preserving it, even for a
single year; but, let the vegetable prin-
ciple be once destroyed by the process I
am about to point out, and the fecula, which
would have thereby disappeared to form
the nutriment of the future infant plant, is
now secured for any purpose—the potato
is thus as it were rendered indestructible.
Unfortunately, on account of the excise
laws of this country, the purposes to which
it is capable of being applied are in a great
degree prohibited, as neither the public
breweries nor the distilleries can use it—the
latter certainly are allowed so to do under
particular circumstances, such as renders
the boon of no use to them. In progress of
time it is to be hoped, that the government of this country will see and remedy the national loss that is sustained by these laws interfering, to fetter and stifle almost every new use to which the vegetable kingdom may be applied in the manufacture of fermented liquors; when that time arrives the agriculturist may reckon on great encouragement in the extended cultivation of this root, even in the interior parts of the country, for whilst its most valuable part can be so concentrated in the manner to be described, not only may the potato be said to be rendered capable of being transmitted to the most distant parts, at a comparatively small rate for carriage, but the quantity of manure left behind, in the shape of its fibrous part, which is separated in this mode of manufacture, and which may be either employed directly on the land, or after it has passed through the body of any sort of stock, will be an ample substitute for that quantity which is supposed to be contained in the straw of the corn crops, and the want of which in the potato crop has been a handle for many objectors to its extended cultivation.
Hops.

Before we proceed in the instructions for the management of the different materials we have enumerated, as applicable to brewing, we must say a few words on this essential article.

A great variety in the sorts of hops is grown in England, and each of them produces a different flavor in the beer, which can however be more easily distinguished when new, than after it has acquired some age. The sorts which bear the highest price in one part of the kingdom are rejected in another, and it would appear that, in the greater number of cases, an imaginary value is stamped on them, according to the prejudice which reigns in particular places, and although the different growths, under skilful hands, have each its specific quality, and may be applied to uses where another kind may be improper, yet with ignorant operators, advantage cannot be taken thereof.

In the western part of England, the Farnham, and what are called country hops,
(growing in the same neighbourhood,) are preferred by those who brew their own beer; in the eastern parts the Kent and Sussex; and these latter, mixed with the Worcester, are used by the inhabitants of the north western parts of England, for keeping beers and ales; but for those intended for present drinking, the Worcester alone is used in these parts, as the mildness of their flavor particularly suits them for it.

Lately, hops of an excellent quality, and fit for any purpose to which they may be applied, have been grown near Taunton; they are cultivated after the Farnham method, and partake of their fine quality, with a greater degree of strength. They are successfully cultivated also at Milborne, St. Andrew, in Dorsetshire, and at Whimple, in Devonshire; in each of which places the quality appears only to vary in proportion to the skill with which they are managed, and they bid fair to root out a prejudice which has for so many years given the preference to a district possessing no local peculiarities or extraneous advantages.
PRACTICAL

DIRECTIONS FOR BREWING.

Before we proceed, we must define properly the object we have in view. Let it then be considered that strength in beer, or the increase of its quantity of alcohol, is a very remote consideration, and that its excellence ought to, and does, depend on its nutritive qualities, above those of every other common beverage. To secure these it is absolutely necessary that the fermentation be checked at the earliest period at which it becomes sufficiently palatable for drinking; for the extract of malt or corn, which enters into the composition of beer, is, as it were, the very essence of nutriment, and consists of a certain quantity of saccharine matter, united to a large portion of a fine mucilage and fecula, and it is this which is so essential to the production of a good malt liquor.
During the course of the fermentation, the wort, as already stated, is constantly undergoing a reduction in weight, so that when arrived at its extreme length, (as in the distillery) the same wort, which was at first considerably heavier than water, will, at the conclusion of the process, be about the same weight, or very little more; the consequence is, that the sugar being first attacked, all the nutritious part of the wort, is at length decomposed, and in its place remains little else than ardent spirit—thus, in proportion as we approach the extreme of fermentation, is malt liquor deteriorated, and the operation cannot in our climate be conducted too slowly. When therefore palatable beer can be produced, containing a small quantity of alcohol, united to a large portion of the fecula or mucilage, we are then conveying food under the shape of a beverage, and it may not unaptly be compared to mixing raw spirit with a quantity of soup before we permit it to be drank.

Let it then be kept in mind that every particle of spirit formed in beer by the fermenting process, beyond the quantity really necessary, as now explained, is at the
expense of the real nutritive or valuable substance.

A mixture of malted and unmalted corn and secula, when judiciously managed, and the wort drawn under the directions to be found in the subsequent part of the work, produces a liquid containing an abundant sweetness for every purpose to which it may be applied.

A very general prejudice seems to exist against the public brewers, under the idea that they add a variety of drugs to their beer, as it has commonly a very different taste to the home brewed sorts. Now, without insisting much on the impossibility of their adding any other ingredient than malt and hops, whilst watched so strictly by the excise, and on the absurdity of the attempt when exposed to such heavy penalties, the case may be explained without resorting to imaginary substitutes for these articles, (drugs which can never be used with any profit even if permitted) by explaining in what manner the process followed by the public brewers differs from that of private ones. The former having large mash-tubs, which so effectually preserve the heat as to allow little to escape,
in proportion to the mass, are enabled to mash at a much lower degree than when the tub is very small—this alone gives a different flavor to the wort. Secondly, the fermentation is conducted in the public breweries in such manner as will produce speedy ripeness, in order to obtain quick returns; it therefore proceeds to a greater extent, and in much less time, than it can possibly do in small masses; and as the flavor of the hop is only partially incorporated, the beer scarcely ever keeps so well as that brewed by private families.

As we mean to proceed in describing the process of domestic brewing, on a small scale, from the different materials already specified, until we have brought all the worts into the coolers, ready for the fermentation, we shall begin with

1.—*Mashing with Malt, for Beer.*

Malt, 4 bushels,
Hops, 3 pounds,
Quantity of water required for the first mash 40 imperial gallons.

After the mash-tub is prepared with its
false bottom, as described in the General Observations, let the above quantity of water be put into it at the boiling heat, and agitated with the mashing oar until the heat descends to 190° by the thermometer; (Fahrenheits) then add the malt, stirring it well until every part of it be free from clots, and completely wetted, which may be accomplished in ten minutes; when finished cover the mash-tub with sacks, or any thing conveniently at hand, and let it stand two hours and a half in that state; meantime, fill the boiler to about three quarters full with water, and make it boil by the expiration of this period, when the cock underneath the mash-tub must be turned in such manner that the wort may run off from the malt slowly, and in a small stream; at the same time commence sprinkling boiling water over the surface of the malt in the mash-tub, as fast as the wort runs off below, so as to keep the malt fully immersed in the water, but still not more than just sufficient to do it. Continue this sprinkling (as gently and softly as possible on the surface) until the wort below has amounted to 30 gallons, when the cock must be stopped; and, in domes-
tic brewings, no further mashing will be necessary, from the small quantity of malt used, which will not be so closely pressed together as to prevent the water from having access to every part, differently to the case in the larger masses of the public breweries. The mash-tub must now be covered as before, and the boiler is supposed empty, or must be made so, to give room for the wort, which is waiting to be boiled with the hops. The boiler is presumed to be of a capacity sufficient to do it without the risk of running over during the ebullition—that is, it must contain at least 45 gallons. Now get the wort into it, and add the hops thereto, making it boil with as much expedition as possible, and keeping it boiling as rapidly as it can be done with safety, for the space of one hour; at the expiration of this time set the cock of the mash-tub again running slowly as before, and then remove the wort from the boiler, passing it through a hair sieve into any shallow tubs or vessels exposed in an airy situation for cooling it—in these vessels the wort should not be above three or four inches deep in mild weather, and if of less depth so much the better. As soon
as this is accomplished, put the second wort into the boiler as fast as it runs from the mash-tub, adding the hops to it which have been separated by the sieve from the first wort, or boiling, and commence sprinkling cold water, if necessary, (according to the quantity and quality of the beer intended to be made) over the mash, until the wort for the table-beer has been drawn off, which however should not generally be less in quantity than that of the first boiling, (30 gallons) and this will be more than sufficient to expel all the wort from the malt. This second boiling must be strained from the hops as the first, and in order to dislodge the portion of the wort absorbed by the hops, cold water may be sprinkled over them in the strainer, as directed in the mash, and time allowed for them to drain properly into the cooling vessels. It is usual to let the second wort remain in the boiler until the coolers are emptied of the first; and that, in winter, is generally ready for fermenting in a few hours.

As the local situation of all brewing offices, in private houses, differs so much in temperature, the only method of ascer-
taining correctly the proper heat of the water for the first mash, is, to observe particularly that the heat of the wort, as it issues from the tap below, should be between 145° and 150°, and the heat for mashing, in any subsequent brewings, may then be corrected accordingly.

We have said nothing about grinding the malt, as that is generally done by the maltster, and no particular instructions need be given him for it.

2.—*Mashing with Malt, for Porter.*

Malt, 1½ bushels porter-brown,
Ditto, 2½ ditto, common amber,
Hops, 4 pounds,
Water, 40 gallons for first mash.

The peculiar flavor of porter is given by the brown malt, and it requires no other material or ingredient whatever, different from other sorts of beer. The brown or porter-malt is dried, or rather roasted, until the interior of the corn becomes almost of a light chocolate colour, and has the flavor
more of coffee than of malt. In consequence of this high heat in the preparation, the heat for the mashing must be proportionately reduced, and here the thermometer is particularly required. As this is a liquor never attempted to be brewed by private families, on account, probably, of the difficulty of obtaining porter-malt, which is scarcely ever sold by retail, we shall proceed to point out a simple mode of preparing it. Let the malt, required to be browned, be sent to a baker's, requesting him at his first leisure to heat his oven to the same temperature as for bread, and then to put the malt into it, which should not be in a quantity more than sufficient to cover the bottom above three inches—at the end of half an hour the door of the oven should be removed, and the malt stirred up from the bottom; and be afterwards occasionally inspected, until, on breaking some corns, the interior be found of a chocolate colour, when it must be taken out, and sent to the maltster to be ground, and it is then fit for use; but much more so if it lies exposed to the air, in its ground state, a week or more before it is used.

Previous to mashing, the water must be
brought down, in the mash-tub, to 170° before the malt is added to it, and therefore, if the heat be reduced by cold water, (to save time) care must be taken that the whole quantity be not increased above 40 gallons. Proceed in the mashing precisely as directed before for beer, and then leave the tub covered up as closely as possible for two hours and a half, when the tap may be set running, and the malt sprinkled over with boiling water, following the directions already given through the whole process, with this variation only;—viz. that the second wort must be boiled as violently as possible for three hours, but the quantity of wort, drawn from the two mashes, must be the same as for beer (60 gallons.) As, however, there will not be two qualities of porter required in general, these two boilings will be mixed together, when sufficiently cold, and they will not amount in quantity to so much as the ale and table-beer taken together, on account of the extra time of boiling the second wort of the porter, which will, and is intended to, lessen it considerably; at the same time that it is allowed to extract a greater portion of the astringent quality of the hop.
3.—Mashing, with a mixture of Malt and Corn.

The following mixture will make one hogshead of strong beer, and one hogshead of mild ale, or table-beer; and so in proportion for any greater or less quantity:

- Malt, 3 bushels,
- Barley, 3 ditto,
- Oats, 4 ditto,
- Hops, 7 pounds,
- Water, 90 gallons for first mash.

It will be first necessary to say a few words on the subject of grinding this mixed grist, or mash.

Where there is the liberty of choice, malt ground, or rather bruised, by smooth rollers, is much the better for this mode of brewing. The oats and barley must be sent to a common grist-mill, with particular directions that the oats be ground as fine as possible, and the barley cracked as a common steel mill grinds malt, but considerably smaller, although, if too fine or floury, the wort will not drain off well. As it is impossible to give any precise directions
with respect to the proper size of grinding the barley, that must be left in some measure to experience, which will soon indicate it. It must neither be as fine as meal, nor as coarse as malt is generally ground, but between both.

Prepare the mash-tub as before directed, with its false bottom, and let the water into it at such heat that it may soon be reduced to 170° in mild weather, or 175° in cold, as it is always better to keep it up above the required temperature in the mash-tub, that it may have time to warm the tub thoroughly. At the above degree of heat add the malt alone, and stir it well, until every ball or clot is broken, and it is completely wetted; then the oats and barley may be thrown in, and the whole well mashed and stirred together, for the space of a quarter of an hour or twenty minutes, or until it is completely wetted and saturated, and all the clots broken. Now cover the tub well to retain the heat, and at the end of two hours and half from the commencement of mashing, run off the wort into the underback, upon some or all of the hops intended to be used. The heat of the wort, as it drains from the tap, should be
140°, and if in the first brewing, it be above or below that degree, the heat of the mash must be corrected in the next, as the alteration of temperature is dependent on the local situation of the brewing-place, and therefore no degree can be given which is suitable to all situations. As this wort is to remain some time in the underback, which is unavoidable, unless there is the conveniency of two boilers, the hops must be mixed and stirred into the wort, to preserve it from injury.

For the second mash, when the wort of the first is well drained off, (which should be done in a very small stream, so as to require three quarters of an hour, or more, to do it completely,) put boiling water again to the corn in the mash-tub, but not more than sufficient to allow the whole of the grain being stirred or mixed up therewith; and this quantity cannot be exactly defined, as it depends on the draining from the first mash being more or less complete. This stirring must be employed every time any fresh quantity of water is put with the corn; that is, what is called every mash, must be a complete mashing—unlike brewing with malt alone, where, after the first mash, it is
directed to sprinkle water repeatedly over the grain, and to allow it to trickle through the whole mass, without moving it about with the mashing-stick the second time—here it must be so moved about every time hot water is added.

This being the second mash, it must remain in the tub one hour from the time the hot water is put to it, or from the commencement of the mashing, which should continue for about ten minutes or a quarter of an hour. After the expiration of this hour, let the wort again run off slowly as before, so that the whole shall be three quarters of an hour in doing it.

Then mash for the third time with boiling water, precisely as for the second, allowing it to remain also one hour at rest. If the table-beer be intended to be as good as possible, put no more water with this mash than just sufficient to allow the grains to be moved or stirred up with it, and when run off, the quantity absorbed by them can be expelled by sprinkling water over its surface, as directed in the case of malt alone.

The third mashing must empty the boiler of all the water that was previously put
into it, which is then prepared to receive the first and second wort mixed together, already waiting in tubs to be boiled. This, with the whole of the hops, must now be put into the boiler, and boiled as violently as possible for two hours, when it is to be run through the hop-strainer, as before, into the cooling vessels. One hour before this boiling is finished the tap must be opened for the third mash, now in the mash-tub, to be drained off slowly into the underback, ready to be removed into the boiler as soon as the first boiling is emptied therefrom; and the whole of the hops is to be returned into it; at which time, or before, if opportunity offers, the grains in the mash-tub may be sprinkled over with cold water, to make up the quantity of wort required, and this second wort must be boiled also for two hours.

We have thus brought the corn wort through the necessary operations into the coolers; and before we proceed, it will be better to conduct the potato-wort to the same point; as the instructions for the subsequent operations will, with few variations, be applicable generally, and can be comprised under one head.