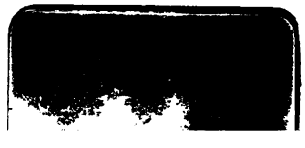
LEVESQUE

ON

BREWING, FERMENTING,

Making of Malt,

&c. &c.



It being an admitted fact, that as the weather increases in warmth the more hops are required. The following Tables show the addition that it is necessary to make, per quarter, or per barrel, proportioned to every degree of increase in the temperature, from 50° to 75°; and from 4 lbs. to 9 lbs. per quarter; and from 1 lb. to 5 lbs. per barrel, and progressing.

TABLE I. TABLE II.

Temperature of the Air at the time of Brewing.	4 lbs. Per Quarter.	5 lbs. Per Quarter.	6 lbs. Per Quarter.	7 lbs. Per Quarter.	8 lbs. Per Quarter.	9 lbs. Per Quarter.	1 lb. Per Barrel.	2 lbs. Per Barrel.	3 lbs. Per Barrel.	4 lbs. Per Barrel.	5 lbs. Per Barrel.
50	4·00	5·00	6·00	7·00	8·00	9·00	1·00	2·00	3 00	4·00	5·00
51	4·08	5·10	6·12	7·14	8·16	9·18	1·02	2·04	3·06	4·08	5·10
52	4·16	5·20	6·24	7·28	8·32	9·36	1·04	2·08	3·12	4·16	5·20
53	4·24	5·30	6·36	7·42	8·48	9·54	1·06	2·12	3·18	4·24	5·30
54	4·32	5·40	6·48	7·56	8·64	9·72	1·08	2·16	3·24	4·32	5·40
55	4·40	5·50	6·60	7·70	8·80	9·90	1·10	2·20	3·30	4·40	5·50
56	4·48	5·60	6·72	7·84	8·96	10·08	1·12	2·24	3·36	4·48	5·60
57	4·56	5·70	6·84	7·98	9·12	10·26	1·14	2·28	3·42	4·56	5·70
58	4·64	5·80	6·96	8·12	9·28	10·44	1·16	2·32	3·48	4·64	5·80
59	4·72	5·90	7·08	8·26	9·44	10·52	1·18	2·36	3·54	4·72	5·90
60	4·80	6·00	7·20	8·40	9·60	10·80	1·20	2·40	3·60	4·80	6·00
61	4·88	6·10	7·32	8·54	9·76	10·98	1·22	2·44	3·66	4·88	6·10
62	4·96	6·20	7·44	8·68	9·92	11·16	1·24	2·48	3·72	4·96	6·20
63	5·04	6·30	7·56	8·82	10·08	11·34	1·26	2·52	3·78	5·04	6·30
64	5·12	6·40	7·68	8·96	10·24	11·52	1·28	2·56	3·84	5·12	6·40
65	5·20	6·50	7·80	9·10	10·40	11·70	1·30	2·60	3·90	5·20	6·50
66	5·28	6·60	7·92	9·24	10·56	11·88	1·32	2·64	3·96	5·28	6·60
67	5·36	6·70	8·04	9·38	10·72	12·06	1·34	2·68	4·02	5·36	6·70
68	5·44	6·80	8·16	9·52	10·88	12·24	1·36	2·72	4·08	5·44	6·80
69	5·52	6·90	8·28	9·66	11·04	12·42	1·38	2·76	4·14	5·52	6·90
70	5·60	7·00	8·40	9 80	11·20	12 60	1·40	2·80	4·20	5·60	7·00
71	5·68	7·10	8·52	9·94	11·36	12·78	1·42	2·84	4·26	5·68	7·10
72	5·76	7·20	8·64	10·08	11·52	12·96	1·44	2·88	4·32	5·76	7·20
73	5·84	7·30	8·70	10·22	11·68	13·14	1·46	2·92	4·38	5·84	7·30
74	5·92	7·40	8·82	10·36	11·84	13·32	1·48	2·96	4·44	5·92	7·40
75	6·00	7·50	8·94	10·50	12·00	13·50	1·50	3·00	4·50	5·00	7·50

The above, as well as all other tables in which Gravity is concerned, is according to the best Saccharometer, invented by John Richardson, of Hull, Yorkshire.

The annexed Table shows the gravity required in raw worts to produce the desired gravity in worts after boiled 1 hour.

TABLE III.

Gravity required after boiling one hour.	Gravity required in the raw wort.	Gravity required after boiling one hour.	Gravity required in the raw wort.
8	6·60	27	21·60
9	7·20	28	22·40
10	8·00	29	23·20
11	8·80	30	24·00
12	9·60	31	24·80
13	10·40	32	25·60
14	11·20	33	26·40
15	12·00	34	27·20
16	12 80	35	28·00
17	13·60	36	28·80
18	14·40	37	29·60
19	15·20	38	30·40
20	16·00	39	31·20
21	16·80	40	32·00
22	17·60	41	32·80
23	18·40	42	33·60
24	19·20	43	34·40
25	20·00	44	35·20
26	20·80	45	36·00

Tables, showing the price of beers, per gallon, and per quart, at every rise of 5s. per barrel; and also at every rise at 6s. per barrel.

TABLE IV.

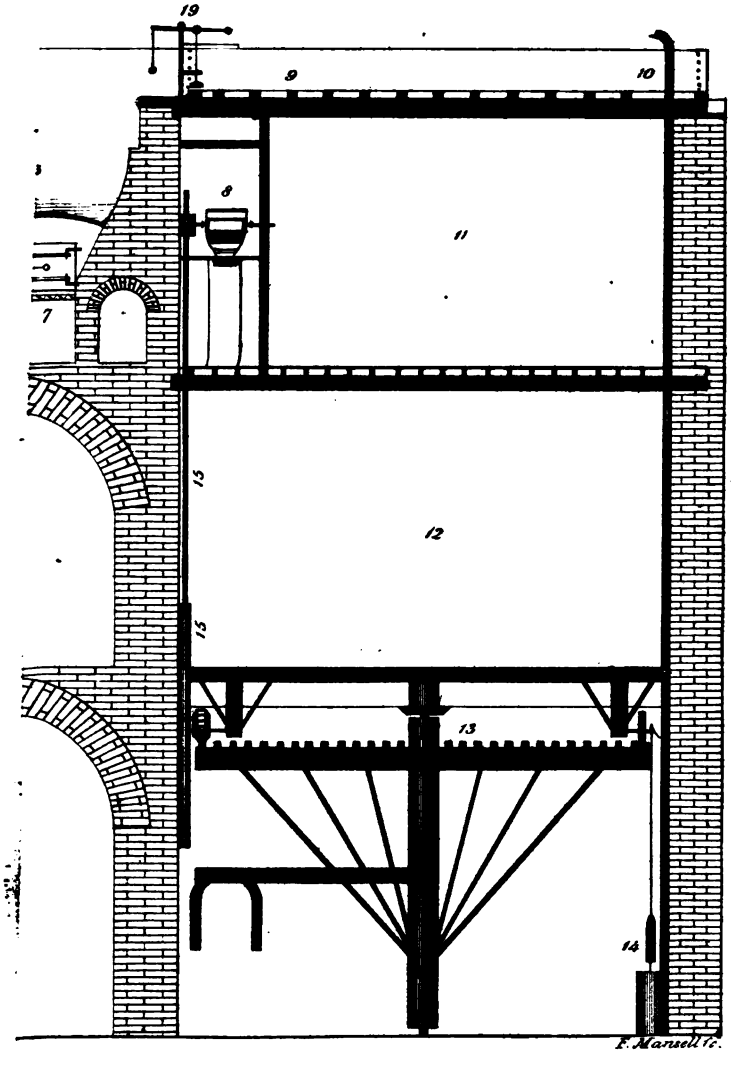
Shillings, per Barrel.	Pence and Cents, per Gallon.	Pence and Cents, per Quart.
5	1·66 $\frac{24}{30}$	0·41
10	3·33 $\frac{12}{30}$	0·83
15	5·00	1·25
20	6·66 $\frac{24}{30}$	1·66
25	8·33 $\frac{12}{30}$	2·08
30	10·00	2·50
35	11·66 $\frac{24}{30}$	2·91
40	13·33 $\frac{12}{30}$	3·33
45	15·00	3·75
50	16 66 $\frac{24}{30}$	4·16
55	18·33 $\frac{12}{30}$	4·58
60	20·00	5·00
65	21·66 $\frac{24}{30}$	5·41
70	23·33 $\frac{12}{30}$	5·83
75	25·00	6·25
80	26·66 $\frac{24}{30}$	6·66
85	28·33 $\frac{12}{30}$	7·08
90	30·00	7·50
95	31·66 $\frac{24}{30}$	7·91
100	33·33 $\frac{12}{30}$	8·33

TABLE V.

Shillings, per Barrel.	Pence, per Gallon.	Pence, per Quart.
6	2	$\frac{1}{2}$
12	4	1
18	6	$1\frac{1}{2}$
24	8	2
30	10	$2\frac{1}{2}$
36	12	3
42	14	$3\frac{1}{2}$
48	16	4
54	18	$4\frac{1}{2}$
60	20	5
66	22	$5\frac{1}{2}$
72	24	6
78	26	$6\frac{1}{2}$
84	28	7
90	30	$7\frac{1}{2}$
96	32	8
102	34	$8\frac{1}{2}$
108	36	9


BIBLIOTHECA·BO

A BREWHOUSE.



EXPLANATION.

No. 11.—Grinding Room.
12.—Malt and Hop Room.
13.—Mill Track and Horse Wheel.
14.—Liquor Pumps.
15. 15.—Band Wheel and Snap to drive the Rollers.
No. 16.—Hot Liquor Back.
17.—Cistern to Mash Tun and Hot Liquor Back.
18. 18.—Cocks to the Coppers.
19.—Valve to the Liquor Back.

THE ART OF

BREWING AND FERMENTING,

IN THE SUMMER,

AND ALL OTHER SEASONS, TO THE GREATEST ADVANTAGE,

AND THE

Making of Malt,

EXHIBITED IN

ESSAYS, AND DECIMAL TABLES,

ACCURATELY CALCULATED,

THE RESULT OF UPWARDS OF FORTY YEARS' EXPERIENCE;

ALSO

A DESCRIPTION OF THE AUTHOR'S NEWLY-INVENTED

THERMOMETER,

By the Application of which extreme Precision and considerable Saving will be effected:

AND

A COPPER-PLATE ENGRAVING

OF AN

Economical Plan

FOR

THE ERECTION OF A BREWHOUSE,

INCLUDING HIS

Newly-invented Copper with moveable Pan:

LIKEWISE

A COMPARATIVE STATEMENT OF THE MALT LIQUOR BREWED IN LONDON

In the Years 1759 and 1835,

WITH THE NAMES OF THE BREWERS.

By JOHN LEVESQUE,

FORMERLY OF THE ANCHOR BREWHOUSE, OLD STREET, ST. LUKE'S.

SECOND EDITION.

LONDON,

Printed by PEART & Co. 143, St. John's Street Road, and

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1836

ENTERED AT STATIONERS' HALL.

PREFACE.

The author of this work is fully sensible that he requires the indulgence of the critic, as far as regards the diction of his Essays; but his aim is not to propagate theories founded on delusive and uncertain flights of imagination, but to convey, in the most comprehensive language, though necessarily encumbered with technical terms, such information as close observation, during a period of more than forty years' study and practice in breweries of the first respectability, has enabled him to offer, without detracting from the exertions of others, who have unfortunately failed in making those useful and essential discoveries in the art, which he himself has thus far brought to perfection, and which, he trusts, every impartial and qualified reader will admit. The rule of proportion is extensively delineated in every department, in a manner never before attempted.

The author, aware that when works are carried to extreme lengths, the remunerating charge for which must, to the majority of readers, nearly amount to a prohibition, has, by avoiding all extraneous matter from the science of producing a brilliant, generous, and exhilarating beverage, purely from malt and hops, offered, at as moderate a price (a limited number only being printed) as he possibly could; and presents to his readers the facility of acquiring such knowledge, as will enable them to

become safe Purchasers, successful Growers of the raw materials, skilful Maltsters, and scientific Brewers. Those persons who may have occasion to erect brewhouses, or to re-construct them, are referred to the Copper-plate Engraving facing the title-page, in which is represented, especially, his newly-invented Copper with moveable Pan, simple in principle, though important for use—the situation in which it is placed effecting a most important saving of time; the whole sufficiently demonstrating that, by adopting the construction of this truly economical Plan, the most beneficial and satisfactory results will unquestionably be accomplished.

No Brewer can reasonably expect favourable results from his practice, without an intimate knowledge of the heats requisite for the different stages of the process; and, as ultimate success depends on the utmost accuracy in that important department, the author has invented a Thermometer (referred to in the work) on such unerring principles in the application, as to insure precision and prevent the possibility of error,—that great desideratum in the Art of Brewing.

The Author concludes, that the more his Tables and newly-invented Thermometer is studied, the more they will be referred to and adopted, as the standard of calculation, &c. of the materials for brewing.

JOHN LEVESQUE, Brewer,

***Horsham, Sussex, July,* 1836**

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THE

ART OF BREWING,

MALTING, FERMENTING,

&c. &c.

ESSAY I.

On the Brewhouse and Utensils

As this work is intended to embrace every object connected with the Brewery, it would seem strange indeed not to begin from the foundation, or the place of brewing, or brewhouse, which must have suitable construction and convenience.

CELLARAGE is, therefore, the first consideration, which should be under-ground, with arches; and, if expence is not an object, make them spacious, and carry the piers up six feet before the spring of the arch; the outer, or main walls of the brewery, are required to be substantial and secure, and the inner lofty, for temperature and convenience; and good drainage must not be omitted.

LIQUOR.—Provide a cast-iron liquor-back, after the rate of ten barrels per quarter; if for a 50 quarter brewery, it should be one of 500 barrels, which will supply the place of roofing; and, let the liquor come from what source it may, it will certainly be much improved by being exposed to the sun and air, therefore, let them be supplied whenever opportunity offers:

the liquor may be still further improved by the judicious application or disposition of a quantity of lime-stone, chalk, marle, shells, or flint, all of which possess beneficial qualities for brewing.

THE VAT ROOM should be lofty and well ceiled; and if butts, or only barrels, are used in the trade, there ought to be seven feet under the girders, for head room; and the walls should be carried up three or four feet higher than the vats, before the roof is put on.

MALT and HOP ROOMS and BINS ought to be in a dry situation, firmly ceiled and floored, and the walls battened and boarded, if the least damp, but not without; therefore, as boarding will harbour and breed the weevil, malt bins, &c. should be frequently washed with hot lime-wash, for which take the opportunity in dry weather.

The brewhouse also should not be omitted, when convenient opportunity offers, lime being a great sweetener, or anti-putrescent.

BREWING UTENSILS are next in rotation, beginning with the copper. Some brewers are very particular in regard to shape and make. Whether a dome copper with a pan, or an open copper, it is, in the first place, to be made with a round lag, (by no means with a sharp lag, which is apt to crack in the manufacture,) of the best and toughest copper, and the breadth ought to be twice the depth; the fire place must, of course, be in proportion: the heating and boiling will be quicker, and a considerable saving effected in fuel.

MASH TUN, to wet 50 quarters, will require in copper room, 150 barrels, or 3 barrels, per quarter; and the second copper, or boiling-off copper, ought to be two-thirds the content of the great, or liquor copper, and of the same flat shape and lag.

TIMBER.—All timber employed in the making of brewing utensils requires to be of the very best quality, without sap, and as free from knots as possible.

English or Hamburgh oak, and Dantzic deal, ought to be seasoned twelve months at least previous to manufacture; subsequently undergo a thorough seasoning of salt, quick lime, and boiling liquor; and, finally, of malt dust, spent hops, and boiling liquor, that it may imbibe as little of the taste of the new timber as possible.

Dantzic deal is particularly recommended, as it is the hardest, firmest, and most durable; and not so apt as softer timber to imbibe the oxygen, or atmospheric air, which has a bad tendency, as it causes the creaming of the worts in the coolers.

Dantzic timber may be used for any utensil, but oak cannot, as in the mash-tun bottom the hot liquor would in time warp it out; therefore, all the utensils will be described, with the timber or material most proper for the purpose. Beginning with the

MASH TUN, which ought to be confined to the size first required. Aim at mashing the same quantity, and mash the tun full, or nearly so, as it is unwise to plan too large in utensils, or vats, for an increase of business; he must be a wary brewer indeed if he does not defeat his purpose, by mashing, working, or fermenting quantities disproportioned to the size of the utensils, as he will be deceived in the heats, &c. he expected to find at a given period.

We will now proceed to the materials of the mash tun, and the shape, which ought to be, as 5 to 15, or 4 to 12, or 3 to 6, and as nearly straight as the draught of the hoops will admit; the staves, English or Hamburgh oak, two inches thick, a Dantzic deal bottom two inches thick also, with a cast-iron false bottom, and cover, of half inch deal, painted on both sides, to prevent casting; and four or five stop cocks, of two inch bore, perpendicularly over the under-back.

UNDER-BACK, of two inch oak, Dantzic deal bottom, and placed out of the way of any draught of air, such

being injurious to worts in that stage. Light is here wanted, to see the character of the worts. Pumps, or engines of the best description, of three-throws, for expedition.

HOP-BACK.—The shape of this utensil to be square; and, if convenient, should be made broad rather than deep; all of Dantzic deal, with cast-iron bottom.

COOLERS.—All of Dantzic deal, two inch sides, six inches deep, and the floor, inch and quarter, or inch and half, with plain joints, secured to the joists by Dantzic deal pins; all rough places carefully smoothed, to prevent the accumulation of dirt, and laid to a gentle drip or current.

REFRIGERATOR.—If one is employed, half the quantity of coolering will be sufficient: and, in these days of invention and improvement, the refrigerator is of indispensible importance, inasmuch as worts require a low, in preference to a high fermentation; and, where competition prevails, they must be adopted. The expence will be no more in the end than if laid out in common coolering; and a certain gain, by producing superior malt liquor.

GYLE TUNS, should be square, and of English oak, three inches thick, and close yeast-boarded; or may be round, and air-tight, with a safety-valve, which must be regulated by a weight, to prevent accident by bursting: this principle seems agreeable to the nature of fermentation, inasmuch as it is calculated to accelerate the process and to retain the carbonic acid, a portion of which, as well as the heat, would in all probability otherwise escape, when fermentation is carried on in open tuns, be the yeast-boarding made ever so perfect.

The author, therefore, recommends close tuns with the safety-valve, similar to the plan of Gray and Dacre, West Ham: to which he would further recommend, that the construction of the tuns be made sufficiently

deep, to admit of the worts laying in a cube, or in equal breadth and depth, or nearly so, which would be more favourable to low pitching.

CLEANSING CASKS, of six barrels each, are very commodious, and proper to be adopted; in some instances, in preference to rolling upon stillions, as in the system of vatting and racking; the safety-valve may also be used for the discharge of the yeast.

STILLIONS are to be made of three inch Dantzic deal, a whole plank in depth, bottom one inch and half, and about two inches wider at top than at bottom, which ought to be for barrels 18 inches wide, 21 inches for hogsheads, 24 inches for puncheons, and so on in proportion for larger or smaller casks: the widths here recommended are favourable to filling up with clean beer, and to contain the yeast; a side plug-hole is necessary to draw off the beer, bored with a taper bit; the hole inside to be within about three quarters of an inch of the sole edge or bottom, to keep back the yeast; another hole of 3 inches in the bottom, to get the yeast out; and the stillion laid to a current of one inch to ten feet.

SETTLING-BACK.—A settling back is required of shallow depth, six inches, to settle any thick beer of the stillions, previous to filling up.

VATS require to be made of various sizes, according to circumstances: for instance, to contain one wort of strong ale, or double stout; others, to contain one brewing of a different, or lower quality, of two or three worts; others, to contain two or three brewings, wherein it is proper to blend a gyle containing a return with another gyle that has no return wort in it; and the return worts will be best disposed of in this manner, provided there is no other method.

Vats should not exceed in content more than two or three brewings, because they ought to be quickly filled and emptied; an ullage is a great evil, and should be studiously avoided. Vats are made from one inch and

half to two inches thick, of clean English oak; top and bottom of the same material. Stop them close as soon as emptied; the same may be filled several times to advantage upon the bottoms, and particularly porter or stout. Vats are most liable to get foul underneath the head, and cannot be well cleansed without taking out the bottoms, and scraping. Washing and scouring all over is not always required; but when it is done, leave the cocks open, that the air may thoroughly dry them, to receive the beer in the regular course of operation.

Flat beer put into a damp vat or cask will be difficult to recover, with all the care of stopping, as it is liable to mother and sour, without the aid of a stimulant.

Be careful to pass a lighted candle from the top to the bottom of a vat previous to the men entering to clean it: this precaution may prevent the loss of life.

When a vat is ordered for cleaning, take off the hatch and set the cocks open, twenty-four hours before, for the evaporation of the fixed air.

SCALDING, TRIMMING, &c. in large houses.—This is a separate establishment, where all the empty casks brought in are unloaded, carefully drained, and examined; and, if damaged, then stopped, bung-tap and spile, before scalding; after which another examination takes place.

To employ pen upon this subject appears very simple; but, considering this work will most likely fall into the hands of many who are young and inexperienced, it is of the utmost importance to know when the business of scalding, &c. is properly performed, or much mischief may be done. It is of the utmost importance to fill casks sweet and dry. If there be no cooperage, there must be a back provided for hot liquor, near to the brewing-copper, for the purpose of scalding: run the liquor into this back, boiling hot, and use it without delay. The liquor may

lay in the casks about fifteen or twenty minutes, well handled, turned out, rinced again, and then left to drain, without the corks; and, when thoroughly dry, to be housed. If the casks are not immediately wanted, they keep better unwashed, for a time, than when scalded.

Whenever vats and casks are perfectly dry, they are of course ready for filling; but it often happens that some remain unfilled for several days, which, in damp weather, are rendered unfit for use: when this is the case, they must be scalded again; for, let beer be ever so well brewed and managed, up to the operation of racking, it may be easily injured, or totally spoiled, by casks being thus overlooked, or neglected. The flatness of the wood will always absorb more or less of the life of the beer; and, that it may be in the best order, aim at having your casks bone dry, although it is not always possible; at all events, be on the opposite side of neglect.

It is better to rack into a cask fresh emptied, than one wet, damp, or flat.

ESSAY II.

On Barley.—1st. Its Qualities.—2nd. The Best Kinds. 3d. The Soil and Situation.—4th. Time of Sowing. 5th. Harvesting.—6th. The Choice for Malting.

1st.—As to the qualities, which are many, and good for food and medicine; as for food, it is too well known to be repeated here; its medicinal qualities may not be quite so well known, therefore an account of them may not be unacceptable to the more curious; nor is it conceived that it will lessen the consumption of malt-liquor, properly brewed.

The medicinal qualities are, according to a celebrated physician, cooling and drying in the first degree; they are gently repercussive, abstersive, diuretic, and anodyne, appropriated to the lungs and reins, and galactogenetic. All barleys have the same qualities.

2nd.—The barley most proper and profitable for malting is the rath, or early ripe, which ripens two or three weeks before other kinds, and is that which growers ought to select, not only for its being so early ripe, but also on account of its making malt superior to any other, by reason of the thinness of its skin, being more plump and heavier, and for the sweetness of its nature.

The Chevalier barley is also in high repute, and is, unquestionably, a superior grain, both in weight and quality.

3rd.—The soil and situation; the best soil is the light sandy, or hazel-mould; good also upon a chalky bottom, and if in an open country, so much the better; nothing can be better for the sowing of barley, than land having previously borne turnips, and fed off.

4th.—The spring of the year is the time for sowing.

5th.—Harvesting, which requires the farmer's attention and judgment, first, in cutting, when the barley is

fully ripe, having then attained all its natural qualities; the night-dews are also very beneficial in mellowing, and causing it to come in much sooner for malting, than if it were carried without. Barleys that have not had the advantage of the night-dews, will not work evenly, or make such tender malt, before January. A few light showers of rain will have nearly the same effect, but is apt to discolour the grain; yet it is not the worse for malting, if the germ is not injured or sprung, and provided it be carried in a dry state.

6th.—The selection of barley, or any other grain, for malting, after being got together in the stack, undergoes more or less fermentation: and, if stacked too damp, it will generate so much heat as will destroy the germ; hence the powers of vegetation, which will cause it to rot on the floor, or in the earth, if there sown.

And further, respecting malting barley, the most choice should ever be selected, in point of weight and quality, not only as regards the purpose of brewing pleasant and good beer, but also the duty of the Excise, and other incidental expences; because, in the first instance, the expence is the same for the bad as it is for the good; and, as the worst article generally bears the least profit, so the expence is, in reality, greater, independent of the satisfaction of making the best malt.

Upon calculation, the difference in the payment of Excise duty, upon the best and worst barley, amounts to 10d. 32 cents and a fraction, per quarter, or eighty-six shillings per cent.

Admitting that malt be made from wheat, weighing 67lbs. per bushel, the difference will be 22d. 15 cents, per quarter, or £9 4s. 7d. per cent.: however, it is not to be presumed that the maltster is ever likely to get all of the worst, when seeking after the best barley; but, seeing the difference, it may induce the maltster to give it his serious attention.

The maltster will also find his interest in screening his barley close, instead of paying the duty on the screenings: the handsomest sample will always command the best price.

Barley, when in high condition, has but little smell, which is sweet and pleasant.

Barley, after being thrashed out, and laying damp or exposed, will soon lose its freshness, smell strong and disagreeable, which must of course depreciate its value.

Large quantities of barley come coastwise to the London market; great care is required, and no doubt is taken, to ship it in the best order; but contrary winds will prolong the voyage, and therefore spoil the cargo, by overheating, so as to render it unfit for the purpose of malting. In order to ascertain the condition of the cargo, samples are drawn out of the middle of the bulk.

When barley has been overheated in the stack, the germ-end of the grain is turned of a blackish red colour, which denotes that the germ is killed; and, in order to distinguish the one from the other, take the skin off the germ end of the corn, so discoloured, when it will appear shrivelled or dried up; but, in an uninjured state, the germ is full; and if the skin is carefully taken off, it will be yellow in colour, and similar to butter.

Barley of the best quality is of uniform size, and is bright in colour; but, if of two colours, denotes it to be a mixture: or it may be hedge-grown, which is objectionable for malting, as it will not work even.

The maltster should be careful in avoiding mixed barley, old and new, as such will never grow evenly or work well together: the size, shape, colour, and hardness, may be so similar, that it is difficult to perceive the difference.

The maltster, in examining the germ, will perceive a very visible difference; the new, being of a pale, and the old, of a darker yellow, which sufficiently proves that there is a mixture, either of old and new, of an inferior quality.

The missed corns, of course, will not vegetate, and therefore reduces the value of the barley, more or less, according to the number missed. The author has seen wettings, in which not one corn among two hundred has missed; and others, in very unfavourable seasons, in which not one in five would vegetate, in some districts.

In good seasons, the maltster's judgment will seldom fail; but when crops are unfavourable, he requires the test: therefore, if the least doubt occurs, let him by no means omit putting a sample of the doubtful grain, loose in a bag, into the cistern, there to steep with other barley, and from thence to the couch, taking its chance in the bag with the other, always keeping it underneath the surface, until its vegetative powers are displayed, sufficiently for his purpose.

Barley produced from light land, is thin skinned, and of a pale yellow, as before observed; so the barley from clayey land is thicker skinned, and of a deeper yellow, and altogether of a coarser quality.

The very best thin skinned barley, in some seasons, will weigh 56lbs. per bushel; and, while the maltster is looking after quality, he should also be mindful of the weight, remembering always that the lighter barleys pay the most duty; therefore, he should not malt any below 50lbs. per bushel, but from necessity.

Barley ought not to be cut before it is quite ripe; because it has not obtained all the natural qualities required for malting.

Barley, from not having had sufficient warmth for ripening, or not having sweated in the mow, may yet sweat in the bulk, in a bin; or it may have a warming on the kiln, at a summer heat, previous to being steeped.

ESSAY III.

On the Construction of the Malthouse.

First, consider the situation, the convenience of water, and the drainage.

For size and construction, use the ground-floor, as it is best adapted, and unquestionably the most preferable.

The ground-floor, being cooler and damper, is much more beneficial for the process of malting. The advantages of which are further increased, if the floor is sunk four feet below the surface of the earth; rendering it still cooler for malting in the summer.

The cistern should be at one end of the floor, over which should be the barley-loft.

The kiln should be placed at the opposite end of the floor, and the storeage, or loft for the malt, over the malting-floor; and as fast as the malt comes off the kiln, it is gradually worked and trodden, up to the opposite end to that of the kiln; therefore, the oldest made malt always comes first to hand.

As the dimensions of the malthouse must depend on the quantity intended to be wetted each time, observe, that one quarter will require one hundred and forty-nine superficial feet floor-room, and likewise forty superficial feet kiln-room, and twelve cubic feet per quarter, in the cistern; therefore, the amount required need only be multiplied by the number of quarters intended to be wetted each time.

The next important article for consideration is the malting-floor, which must be well laid, firm, and durable: the ground to be carefully examined for springs, which, if any, will certainly spoil the floor, as far as they may extend; therefore they must be turned away, if possible.

The brickwork of the building.—The bricks inside of the malthouse, six inches below the floor, and twelve above, should be laid in cement; and the wall to be cemented twelve inches above the floor, to prevent any lodgment of corn in the imperfect or accidental interstices.

Respecting the floor.—The next business is, that the ground be not stony, and that it be dug up all over, one spit deep, well rammed, made particularly smooth, and laid to a very gentle current, about one inch to twenty feet; then put on a layer of road-scrapings, or, in lieu of which, well-tempered clay, moist and pliable, two inches thick, and very even; and when that is sufficiently dry, lay on the cement one good inch in thickness. The Roman cement will do very well; or, if more convenient, one-third coal-ashes, beat and finely sifted, one-third brick-rubbish, beat and finely sifted, one-third quick lime, well mixed and tempered, altogether, will make a very firm, smooth, and durable floor.

The cistern should be built of brick, laid in cement, with a capping of 3-inch plank, leaded with strong milled lead throughout turned over the capping, and then nailed round the outer side; otherwise, it may be made of 3-inch oak, and leaded; but timber, alone, will not answer, because, after being in use two or three years, the liquor will penetrate and rot the surface of the timber and it can never after be kept sufficiently clean; such is not the case with lead.

The kiln-floor may be laid with a wire, which is wove for that purpose, and superior to any other, as it freely admits the hot air to the grain.

The malt loft.—If in the country, a thatched loft is the best; but in towns or cities, they are not considered safe against fire. The interior must be well ceiled; and if the walls are imperfect, they ought to be cemented, to guard against weevil, &c.

When the malting season is finished, the house should be washed with hot lime-wash, and the floor washed thoroughly; and repeated, a few days prior to recommencement.

During the interval, the maltster should not allow any use to be made of the floor, whereby it may be damaged.

ESSAY IV.

On making of Malt.

BARLEY, or other grain, is converted into malt, by the process of fermentation, which is effected by steeping, (for without steeping, the grain will not vegetate,) which must take place before barley can change its nature, and become malt. When this change is produced, its qualities are, perfect sweetness and friability; and although every species of barley, or other grain, will not always produce the same desirable qualities, perfection ought always to be the maltster's aim.

Malting is not confined to barley, but oats, peas, beans, maize, buck-wheat, and common wheat, which are all capable of being malted, and have been experimented upon, but barley is the grain most prized.

Wheat, on account of its weight, has had many trials, to bring it into more general use among brewers; but, from many communications the author has had with those who have brewed wheat malt, either alone, or mixed, complain of a heaviness of flavour, and not altogether so pleasant as the liquor brewed from barley malt.

The author will dilate further on the subject of wheat malt, under the head of BREWING. It would be a most desirable object to obtain as pleasant an extract from wheat as from barley, independent of other advantages.

The heaviest grain is recommended, provided it is in good malting condition; which will, of course, produce the heaviest malt.

What is here intended to be understood by the heaviest malt is, that it shall be malt of a tender and friable nature throughout, and without hard ends, which partake, more or less, of the nature of barley than of malt. Perfect malt is not always obtainable, under the best skill and management; and it would be highly improper to pass lightly or carelessly over so important a subject without dilating more minutely, as if there were no difference.

Malt may be very heavy and yet very hard, and too hard to be called malt; and, without sufficient experience, the young brewer may be greatly deceived.

Experienced brewers know there is a very great difference in the qualities of malt; therefore, the brewer's attention is much required to discriminate between the variety of samples that are offered him; at the present time, the difference, on the average, is from one to eight shillings per quarter; and, within the last thirty years, the difference has been as high as from one to sixteen shillings per quarter; and be it remembered, that if malt is short of the extract, in comparison with the best, it is also short of fine flavour.

The maltster's utmost skill is required to produce malt of the most abundant and perfect sweetness and friability; these essentials obtained, malt will never be too heavy for the brewer.

As to the colour and shade of malt. If the brewer is also a maltster, (which every brewer ought to be, both in knowledge and practice,) he can order whatever colour

he pleases; or, if he is not a maltster, there is no great difficulty in giving the necessary order for malt of any particular colour and flavour, either of pale, amber, or brown, or the shades between.

Directions cannot be precisely given, as to how thick, or how thin, the grain is to lay on the floor in the bed, which is next to the couch, or in the steep, at all times and temperatures.

The various signs which are developed during the process, must be carefully attended to, or the signs will pass away unnoticed, and the injury is done.

After steeping in the cistern the intended quantity already screened down, and nicely levelled therein, charge the cistern with liquor, to six or seven inches above the barley; and although the barley be well screened, there will always be some light floating matter on the surface of the liquor, which skim off.

The grain should lay in the cistern until it will no longer swell; after which, the liquor should be drawn off, and left to drain for six hours, before it is emptied into the couch.

The time of laying in the cistern, will depend on the weight and dryness of the grain, as also the season of the year; and as the season advances, after January, it will gradually require less time to steep, because of the inclination Nature hath to put forth root; for air and moisture are her food.

The time of steeping varies, according to circumstances: in very cold weather, it will require more; and in warm, less time:—the time is reckoned, technically, by the term, tide, or tides; each tide being twelve hours.

In winter, when Nature moves but slowly, without art, the time of steeping may be five and a half, or six tides, from the time the liquor is put into the cistern to the time of letting, (66 or 72 hours;) at others it will

cease to swell in less time, which is the period the liquor may be drained off the grain; then the skin of the grain is somewhat loosened from the kernel; and, by pressing the two ends, it will be seen partly separated on one side of the kernel.

The grain being in the couch and full of moisture, that moisture, combined with the air, is to force the growth of the root: but the root, or sprit, must not appear while the grain is in the couch, where the law says it shall lay for the space of twenty-six hours; and, if in the warm season, the sprit appears before that time has expired, the time of draining, and, if necessary, that of steeping must be shortened.

If the grain is suffered to sprit in the couch, it will never come even afterwards, as the sprit corns will attract more than their due share of moisture; which, moving and turning, in due time will retard and cause every corn to sprit very nearly at the same time, which otherwise would not have spritted, to the amount of one-tenth, more or less, until several days after the rest; therefore, at the time the forward corns are mellow, the later will be in a waxy state, which is one cause of hard, or steely malt. Herein lays the principal art of malting; and the maltster who is aware of it, must be attentive and industrious, to perform it well.

From the couch the grain is turned inside-out into the bed, which occupies about twice or thrice the space of the couch, according to the temperature. Here it may lay six hours more, observing, during its progress, that it is all in a fair way to sprit; or, if otherwise, to give it a gentle turn, before the six hours are expired, and spread it a little thinner. Let it occupy the whole width of the floor, and lay about six hours more; at the end of which time, all the healthy corns will have sprit: thin it again, and from this period keep turning it often, while it is in full vigour; by which means the root is

kept short and bushy, retaining the moisture, as long as it is required, without sprinkling, to the period of the withering of the root, if the process be sufficiently slow, as it ought to be, for making sweet and heavy malt.

The root will begin to wither about the eleventh or twelfth day.

The maltster will know when the grain requires turning, by putting his hand into the floor of grain and taking out a handful, and if it smells faint, and the skin appears glossy, or wet, it must be turned. As soon as these signs are perceivable, and after turning, it will smell fresh, and the skin of the grain will be dry, instead of glossy. The omission of turning, in due time, will cause the root to run out, of unequal length.

During this period, the acrospire is progressing; the frequent turning preventing the greater absorption of the moisture, the acrospire is benefitted, and encouraged to proceed.

When the grain begins to wither, the floor may be gradually spread thicker, to encourage a little more warmth, and to mellow it; still keeping it frequently turned, to keep off the glossy appearance until the moisture is further spent; it will also prevent the acrospire going too far. It is sufficient, when the acrospire has advanced two-thirds the whole length of the grain; it ought not to protrude.

The acrospire is the substance and flavour of the malt; and the further it is suffered to proceed beyond these limits, two-thirds, the more will the substance be exhausted, and the flavour changed: if suffered to protrude, either by neglect, or fancy of the maltster, this acrospire is so extremely tender and delicate, that it is difficult to dry it without scorching, which injures the flavour; and, in proportion to the protrusion of the acrospire, so is the malt made hollow and light, and so

much has it lost in weight, and consequently substance and fine flavor.

In continuation of the acrospire, frequent turning will most certainly keep the grain within due bounds; and the gradual spending, or exhaustion of the moisture, will also admit of the floor being gradually thickened until it comes to the last throw towards the kiln, in which state every particle will rub to meal between the fingers, the skin being first taken off.

In this mealy state it may be put on the kiln, to the amount of one-half, or one-third, of that wet ting, according to the size of the kiln; there to be dried by a gentle fire, with a gradual increase of heat, for the first twelve hours: the next twelve hours will make it a one-day kiln. The drying is finished by a clear sweet fire, increasing the strength according to the colour required. Thus the drying is conducted from one shade to another; sharpening the fire for each darker shade, up to the high dried brown malt. Some maltsters prefer drying off the same quantity in two days, by which the malt receives more sweetness and friability.

The thinner the grain is spread upon the kiln, the sweeter it is dried, as the steam passes away more freely; consequently, the kiln should not be loaded more than from three to six inches in thickness.

The time required for making a floor of malt in the very best manner, including the drying, will occupy twenty-two days from the beginning of the steeping: possibly the outward colour may not be quite equal to that which is produced in much less time, but the inward qualities will overbalance that deficiency.

There are some insurmountable objections, why the shorter period of working the grain has been adopted for many years past, and the motives for preferring its continuance: but there is no reason for brewers, who make their own malt, to continue the short method.

In reference to sprinkling upon the floor, which the law does not allow till after the twelfth day, it is of no avail; and, if required at all, must be about the seventh or eighth day at farthest.

The Hertfordshire maltsters consider sprinkling quite unnecessary; of course, they do not pursue that system, yet make excellent malt; and, as they work with but little root, thereby retaining the moisture for its maintenance, as far as required.

When the malt is thoroughly dried, the root or tail will separate with little friction; but, if under-dried, it is difficult to be removed by treading. Malt, which is slack dried, will not keep; neither will the beer that is brewed from it.

Coloured malt will require, towards the finish of the drying, some dry billet wood, of beech or birch, procured in time for the purpose.

Malt, which is thrown off the kiln one day, must be well trodden the day following, and then shovelled away, to make room for the next kiln.

Wheat will take a longer time in malting, in proportion to its extra weight; and oats will require less time, in consequence of being lighter than barley. Peas, beans, maize, or any other grain, may be malted, according to fancy. The same attention is required in regard to the swelling in the steep as in the couch: the acrospire in wheat and maize appear outside the skin, contrary to barley.

Malt, perfectly sound, in a thorough dry loft and excluded from the air, may remain in the dust for a considerable time, without injury:—screen it down, as wanted.

ESSAY V.

On Hops;—their Nature, Quality, Cultivation and Growth.

HOPS are of two kinds, viz. *Lupulus Hortensis*, or the Garden or Manured Hop; and *Lupulus Sylvestris; Lupulus Fœmina*, the Wild Hop.

Nature of the Plants.—These luxuriant plants grow better in temperate than in more southern climates, and flourish in low grounds, where they have sufficient moisture; and yet not too much, for they are generally planted on hillocks, with trenches constructed to receive and carry off any superabundant quantity of water, so that the plants may not be inundated when delightfully vegetating in fat and fertile soil.

The wild hop grows among briers and thorns, about the borders of fields: and, when transplanted into gardens, well manured, and judiciously treated, will in a short period be odoriferous, in great perfection, and of equal value to the best produced.

New shoots, from the old roots, spring up and bud in April, and flower the latter end of June. Hops begin to ripen from the middle of August to the middle of September, when they are gathered, dried, and packed, for preservation.

The flower, in the early stage, is of a light green colour, which afterwards change to a pale yellow, and are then fit to be gathered; the bottom of the flower contains the seed, which is brown, or of a reddish colour, small and round.

Qualities.—Hops are hot, and in the third degree, inciting, aperitive, abstersive, subastringent, digestive, discussive, diuretic, stomachic, and sudorific:—indeed, the spirit of the hop is truly cordial.

The hop is a very tender plant, and in some seasons suffers so much from frosty nights and easterly winds, that a bountiful harvest is not to be depended upon every year; yet they will sometimes bear a good crop for two or three years, and succeeded, perhaps, by two or three bad or indifferent ones. The Goldings are extremely tender. Those known by the name of Canterbury are of the hardier kind. The Flemish are the hardiest of all, and bear the largest flower, but of the smallet value.

The hop-plant requires a sheltered situation, a rich and deep soil, and plenty of good manure, that it may thrive and be productive; and also to enable it to withstand the diseases to which it is liable.

Frosts, in the early period of its growth, invariably destroy the forward and most vigorous shoots, and thereby weaken the plant; and, unless the ground is in good condition, the following shoots will be proportionably weak, consequently, large crops cannot be expected.

The easterly winds have also a destructive tendency, as they not only check the growth of the plant, but fill the leaves with vermin, who deposit their eggs in vast number under the leaf; and, when these unwelcome visitors come to life, they crawl and devour the juice of the tender buds and leaves, and ultimately destroy the plant, to complete their devastation: and the partiality of those plunderers for the vine, sometimes induce them to continue till the blowing season is past.

Wherever these distressing visitations take place, nothing but a timely change of wind, fine weather with showers of rain, thunder and lightning, and warm nights, can remedy the infection, or stop the progress of those peculating insects.

It is astonishing what influence the changes of weather, and other circumstances, have upon the hop

market; for hops, which are a mere drug to-day, may, in a few weeks, or even days, rise to an extravagant price.

And, further, respecting the situation of hops, experience says, that hops succeed well in rocky places, where the soil is rich, and produce a superior quality; and competent judges give a preference to hops grown in such situations.

Hops, called the Golding, (the name of the producer,) are of a rich and delicate flavour, but the most tender plant in cultivation, and the crop is very uncertain: taking measure for measure, the Golding hops are the heaviest, and therefore possess the greatest quantity of farina, or condition, in the same compass, and the flower is the smallest.

The Golding hops are planted chiefly in the district of Farnham, in Surry; and are managed in a superior manner, as regards picking, by which two sorts are made; one of which consists of the most delicate flowers.

The Farnham hops are in high estimation, and command the best price in the market, generally by two pounds per cwt.

The Flemish plant produces a very large flower; often three inches in length, and is considered the most hardy of any: it is productive, but of light weight, and ill-flavoured for ales.

The Canterbury Grape, is much cultivated in the districts of Kent and Sussex, and is a very good and useful hop in the trade.

There are other varieties grown, in different parts of the kingdom, particularly in a district called North Clay, in the county of Nottingham; a strong and rank hop, fit only for porter-brewing, when mellowed by age.

The soil alters the quality of hops, as it does other plants; and will sometimes change their appearance so much as to give them the face of a different variety.

Having mentioned the best varieties, the author presumes it to be unnecessary to extend this part of the subject to any greater length, except noticing that the counties of Kent and Sussex pay two-thirds of the whole of the duty charged in the kingdom of England and Wales, as will be seen in the Tables at the end of this work.

Cultivation and Growth.—Hops require the best land, a sunny aspect, and to be well sheltered from easterly winds. The plant has many strong and deep roots, and therefore requires a greater proportion of well-melted manure, to keep them in the best condition; to the want of which is often attributed the failure of the crop; because the plant, wanting nourishment, has not strength to rally or shoot again, after an attack of the disease to which it is subject. Clean farming, and stirring the land occasio ally, between the plants, is conducive to their growing strong and healthy.

A small portion of hops are, every year, picked in an unripe state, to make an early show at market, and also to please some customers, who think the greenest hops are always the best. This is quite a mistaken opinion; because fruit, in an unripe state, must undoubtedly be deficient in flavour and quality; consequently entirely unfit for the purposes of the experienced brewer.

The seeds of unripe hops are in a milky state; the hops, of course, will have a cold and unpalatable flavour, unlike the agreeable bitter of those which are ripe. The seeds, when ripe, have a hard shell, and the milk turns to a nutty substance. The flower has also changed its colour, from green to yellow, and has also obtained all the farina (in which the seeds are embedded) that Nature and art could give; consequently, all the bitterness, which is the quality of the farina, instead of being poor and cold, will be rich and warm; and, with

proper management in the drying, will contain all the fine flavour and preservative quality, necessary for brewing.

In respect to drying, which is so essential, and so nice a point to perform well, particular attention is requisite; for, if under-dried, they will not preserve, but in a short space of time will certainly become mouldy. To over-dry them, will injure their flavour and fermentative quality,

To bag hops hot off the oast will not only cause them to crumble, but to come out of the copper in a muddy state, and drain badly; therefore, hops should not be bagged until they are nearly cold, or it will give them a tough quality.

It is presumed that hops might be dried in perfection, with greater certainty, by the aid of a thermometer, judiciously placed in the oast, where the proper heat might be ascertained, and adopted as a rule, in addition to trying the hop-strig, or stalk of the flower, which, if it snaps, from brittleness, is sufficiently dried; and, if it bends, more drying is necessary.

The young brewer and practitioner, who is ambitious of fame, and who wishes to be curious in his business, should keep a book of record, for the purpose of inserting any particular circumstance concerning his business, for future reference: he should also embrace every opportunity of obtaining that kind of knowledge which is consistent and applicable.

When hops are bought, it is proper to make entries of the grower's name, the district and parish where grown, to find out those growers whose fame stands high in the management of hops, and likewise to ascertain those parishes, in every district, in which the best hops are grown. The same course should also be pursued with respect to barley and malt; for the finest qualities of either do not always pass through the markets, but

frequently find their way direct to the first-rate, and other substantial houses.

Suit the colour of the hops to the colour of the beer. The ripest hops are always the brownest, and best adapted for porter-brewing. It must be here observed, that as different growths are of different qualities, you should select such bags or pockets which are heaviest; because it is the farina that gives weight; and hops which lose a part of that farina, from over ripeness and fine weather, will cause it to shake out in picking, and, turning on the oast, considerably diminish their weight.

In hopping your beers, use brown hops for brown beer, and pale coloured hops for all pale beers, in just proportion; remembering always to prefer those whose seeds have obtained the hard shell and nutty substance, in which only reside that warm, aromatic and grateful flavour, in perfection: such are called, brewer's hops; all others are fallacious.

New hops should not be brewed until after Christmas, except with a portion of old.

Hops require straining in the month of October, and again in March; because, when slack, drying winds and weather will penetrate and waste their strength.

The observing brewer may always know the state of hop plantations, without going to see them, by noticing the duration of the easterly winds, &c.

The season for flowering is the latter end of June, or the beginning of July; and, if the plant has not a healthy appearance at this period, the crop becomes doubtful. Between the flowering and the picking, the flower is subject to the red and blue moulds, which begins where the flower is set on the stalk, and often consumes a considerable portion of the farina, or more valuable part. The mould, in all probability, is produced by the want of sun and air, during the ripening season.

A General Rule in the Choice of Hops.—Hops should be of a clammy nature in the handling, even in colour, without greenish specks in the flower, full of hard seeds and farina, or condition. Mould may be discovered in the sample, by the strig of the flower being partly bare of leaf; lastly, beware of crust, which proceeds from damp and bad keeping; it destroys the quality much more than age.

As the heat imparted by the fire, in the drying, is of great importance, the author recommends that heat, in no instance, exceed 119° or 120° of Fahrenheit.

The farina, which in the course of drying, falls through the hair-cloth, or wire, is a valuable article, and is termed hop-dust; and is scarcely less useful to the brewer than hops, if care is taken that no particles of fire fall into the kiln-pit, to injure it; and that it be frequently removed therefrom. One pound of hop-dust is equal to four pounds of hops. In brown and common beer, a small portion might always be used, without the least injury. It is of about one-fourth the price of hops.

ESSAY VI.

On Grinding the Malt.

THIS operation is performed with stones or rollers, or a steel mill, adapted to horse or hand power, which will, if in good order, answer the purpose required: yet rollers have the preference, inasmuch as they make but little waste of flour, and are kept in repair at a trifling expence; care being taken, that the malt passes through a wire screen from the feeder, to keep hard substances from accidentally going through the rollers.

It is necessary to regulate the feed, so as to prevent an over-charge; and to set the machinery, so as to grind or crush every corn, to imbibe the liquor freely.

Make it an invariable rule to grind the malt the day before brewing; for the benefit of cooling.

When a mixed grist is used, as for porter, grind the paler malts first into the tun, and the browner malts last, and level each; because the paler qualifies the liquor before it touches the browner malt.

When patent malt is used, instead of brown and amber, let that also be put upon the pale malt; and remember to grind it finer.

ESSAY VII.

On the Necessity of Cleanliness in the Brewhouse and Utensils.

WITHOUT care and cleanliness, the brewer may soon go to ruin. There are two diseases to which every brewer is liable; and yet, with care and circumspection, and a previous knowledge of the causes which produce those effects, he is able to avoid them.

The first of those diseases is the Fox, or taint of the worts in the coolers, which is generally supposed to proceed from a want of cleanliness; but experienced brewers think otherwise: but, there is that intruder named Fox, who has a private door by which he enters, in the still, sultry, and cloudy weather: the butchers know it well, by its effects upon animal food before it is cold; in fact, sometimes as soon as it is dressed and hung up.

Lime, although an admirable purifier and antiputrescent, is an enemy to timber and fermentation; therefore, wash clean after liming. It is used as a precipitant after fermentation, by some persons who brew their own beer, consequently, it is antifermentative; and as there is some portion of animal matter, or gluten, contained in malt worts, that principle is subject in the same manner, to the like taint or infection, while under the degree of blood-heat, or 98°. Here then, the utility and value of the refrigerator is pre-eminent to all other methods of cooling. If the brewer is without this invaluable machine, he must be, in such sultry weather, in dread of the foxy taint, more or less strong, or he must let down his worts at 98°, to avoid it, adding the yeast immediately; but the refrigerator

enables the brewer to pass his worts through it long before the heat descends to 98°, because he may begin to refrigerate as soon as the wort is out of the copper, without any danger of taint. The author therefore recommends a copious refrigerator, the cost of which is only tantamount to the price of coolers made of timber. However, should the foxy taint infect the utensils, it must be removed by quick lime, slacked into a white-wash with boiling liquor, and laid on the coolers, &c. as hot as possible, after they have been washed down, and then covered with liquor to a little more than the general depth of the worts; but there is no effectual cure for the beer so affected. If too bad to be sent out, vat it with a brewing of spent hops, put in hot, for mixing, or breaking beer.

In the sultry season, as an improvement, so soon as the first wort is off the coolers, flow them with limed liquor, and let it remain till the next wort is turned out; then strew some salt on the coolers, like seed, at the rate of an ounce, per barrel. In hot weather, limed liquor ought to be used for washing the brewhouse or utensils; and all false bottoms should be scraped cleanly and laid under liquor, as well as the utensils, in the intervals of brewing.

As it will take 500 parts of liquor to dissolve one part of lime, one bushel of lime to twenty barrels of liquor will make it strong enough, being a powerful anti-putrescent. Rotten, or decayed brewing utensils, ought to be carefully avoided.

Next to the fox-taint, is the creaming of the worts, which is occasioned by the coolers getting dry, before the worts are let into them; for, as the coolers dry, so they imbibe the atmospheric air, and the softer the wood the more freely it is admitted, but may afterwards be reimbibed by the worts: because, as they cool, the cream appears on the surface, which is neither more

or less than yeast, formed by atmospheric air, or spontaneous fermentation, at a very high temperature; the liquor so affected never can be good. Further mischief may be prevented, by letting the worts into the tun, and the yeast applied as soon as the creaming is perceived, which will be about blood heat, or 98°, regulating the temperature by succeeding worts: it will be better to work off quickly, and the worts otherwise must be treated in a manner similar to those affected with the foxy taint. Lime-wash the coolers, as before, for the next wort. This shews the necessity of using the hardest deal where required, which, it will be readily admitted, cannot imbibe the atmospheric air so quickly as softer wood; also be particular in getting the coolers ready for the worts within a quarter of an hour before turning out. The refrigerator is here again evidently preeminent. If the liquor has been in the coolers, or other utensils, a few days, they ought to be clean lime-washed the same as for brewing; but, in cool weather, one brewing may succeed another, without washing, if there is no interval between. Let the copper be scoured after every third brewing.

ESSAY VIII.

On the various Modes of Brewing.

THE great desideratum in the art of brewing is, to extract the essential virtues of hops and malt; and, by the judicious incorporation of them, produce ale, porter, and other malt beverage, of the utmost purity,

greatest strength, brighest colour, and richest flavour, which may be readily accomplished by strictly conforming to the following instructions.

Brewing is, to extract the virtue of the malt with liquor heated to a certain degree, according to the colour and dryness which it receives in the kiln, the palest requiring the greater, and the brownest the lesser heat.

There are six different shades in the colour of malt, every shade requiring a variation of 5° in the heat of the liquor applied.

The day previous to brewing, the brewer should have all the utensils perfectly clean, the copper charged, the liquor back filled, and the fire laid, with a sufficient quantity of coals to complete the operation. The malt of the first day's brewing may be shot in the mash-tun; but if you brew every day, the shooting of the malt may be deferred till the next morning; because it is necessary, after the grains are gone, that the mash tun should be washed out clean, and left to cool. The brewer should carefully clear off the grains immediately after the last mash is drawn off; for, if allowed to remain, will certainly do serious mischief, as they will soon ferment, and strike an acid in the wood; and the latent heat of the mash will also spend itself, and impart a degree of acidity into the malt, by the stagnation of the heat.

Leave nothing to be done on the brewing day which ought to be done the day before, that the brewer's time and attention may be entirely devoted to the brewing.

It is requisite that the brewer should ascertain that the thermometers agree to a nicety, and to be particular in keeping them in their proper places; and, not on any account, to use a gyle-tun thermometer, either for the cooler, or the copper. One thermometer should be a fixture in the north part of the brewhouse, under

shelter, yet exposed in the open air, outside the window of the brewer's room, and another in the fermenting-room. Each department should have a suitable supply of mops, brooms, &c.

ESSAY IX.

General Rules for Mashing.

PREVIOUS to and at the time of performing the important operation of mashing, observe the temperature of the air, and note it down in the brewing-book, with the day of the month, the hour of mashing, and the quantity and quality of the malt and hops; the quantity of liquor intended to be brewed; the number of barrels of liquor for each mash, and the heats of the liquor. (See the Table of Heats, and Quantities of Liquor, for the First Mash, in all Temperatures.)

In all cases, one barrel and half to one barrel and three firkins is sufficient for a stiff mash, either with a mashing machine, or with oars.

The machine is much quicker and more certain in its operation, by preventing the malt from running into balls, which is not only a loss, but a serious injury; because such portions of malt having escaped breaking or mashing, forms into balls, and is the consequence of careless mashing with oars: the malt will likewise be more subject to run into balls, if more liquor is applied than recommended for the stiff mash, and giving more trouble to break them. The malt is not only wasted by balling, but those balls being but

partially wetted inside, and surrounded by a greater heat, generate acidity in the second degree, if unbroken in the second mash, which may be fully proved by inspection.

As soon as the malt is uniformly broken, add the remainder of the liquor, and mash all together for five minutes; or, if with a machine, let it go once more round the tun with the quick movement: at this period, take the heat of the mash, which should be done in the following manner, with a Thermometer, invented by the author for that purpose. (A description of this Instrument is given at the end of the Work.)

Take this Instrument, and at arms' length, sink the bulb into the middle of the depth of the goods, the heat of which should not exceed 148°, nor be less than 143°. (See the Table of the 4 Classes of Mashing Heats, &c. for the First Mash, page 92.)

Another method of mashing is, to turn all the liquor intended for the first mash, boiling, into the mash-tun, and cool down to the required heat, and then add the malt; but for this method, the heat must be taken considerably lower than when the liquor is applied to the malt, by running under the goods. The heat for the latter method must be 8° lower; but the final heat, at the finishing of the mash, must be the same.

Attention and judgment, united with caution and practice, will render this method of taking the heat at the conclusion of the mash more perfect than any hitherto practised: for, at the time of turning on for the making up the mash, with the man at the copper-cock, the machine, or the oars, working at the same time, and the brewer, with the thermometer in the mash, directing his eye to the index, to ascertain the degree of heat, has only to say the word *stop!* to the man at the cock. The method here pointed out is applicable to every kind of malt, in respect to colour, dryness, slackness, weight, friability, or tenderness.

The author has observed that the heaviest and palest malt will absorb the greatest quantity of liquor, because being of greater substance; consequently, in proportion to the substance, more or less, so will be the absorbing power. The colour and dryness, or slackness, will also cause a variation in the liquor and heat; always taking into the account that weight and colour must direct the brewer as to the quantity of liquor, as well as quality of heat requisite; for light coloured or pale, being much heavier than brown malt, will absorb more liquor in proportion; or, if more liquor is not put to the heavier malt, the heat must be added accordingly.

The author having found the best results arise from the method of bringing the mash always to the same degree of heat in the mash-tun, at the conclusion, is thoroughly convinced that the plan may, without fear, be universally adopted, and will be more certain in its effects, as it excludes all intervening circumstances between the copper and the mash-tun, varieties of malt, &c.: to render this more clear to the reader, suppose there be any question relative to the quality of the malt, as to its newness, hardness, weight, slackness, or dryness, all which circumstances require a variation of the heat or the quantity of liquor; the brewer being already acquainted with the final heat of the first mash of a good operation, has only to copy it for his future direction.

The first mash ought not to exceed one hour, in any quantity of malt; smaller quantities in proportion, down to 20 minutes, with a machine. If oars are used, strength should not be wanting, in order to mash as quick as possible.

As soon the mash is made up, re-charge the copper *instantly*, open the fire-dampers, and prepare liquor for the second mash; this gives the stoker an opportunity, not found in any other part of the brewing, to burn up

all the rubbish to clinkers, which it will do with little attention: the fire is to be damped with the rubbish, when required for the first mash.

(For the time of standing of the first, *vide* the Table of the 4 Classes of Mashing Heats.)

Half an hour before the time of standing has expired, the under-back is to be cleanly scalded, and mopped out dry, to receive the extract, or sweet-wort.

Note down the time the mash has stood; as also the heat of the tap, when about half spent. (For the heats of the taps, *vide* the Table of the 4 Classes of Mashing Heats, &c. in which the heats of the taps will be found under their respective heads.)

In warm, and in very hot weather, let the first mash stand less time.—(See the Table.)

In setting the tap, be careful to turn on very gently, at first, and gradually increase to not exceeding half-cock: faster than that is likely to draw the grains into the under-back.

To raise one degree in the mash, will raise one degree in the tap.

The proof of a good tap:—the head should be close and tough, and of silvery whiteness; and when examined in the brewer's silver pint, the head should resolve into a delicate cream on the surface, full, effervescing, and fine flavoured. This is the character likely to produce a good yeasty fermentation, and a liquor that will drop fine.

In raising the heat of the first mash, the liquor must always be let in under the false bottom, because heat ever ascends, and will quickly indicate increase, by the Thermometer.

In heats taken too high, the silvery white head has a tinge of brown; and the higher the heat the browner will be the head.

In low heats the silvery head does not appear, neither is it so close, firm, bright, or lively in flavor; in very low

heats the head will not stand, but fly off instantly, and the tap will be thick and muddy.—Here arises the danger of acidity, from the penetration of the external air, which, if once caught, will never be a sound liquor.

In brewing very small quantities, in places exposed, the same retention of heat in the mash cannot be expected; and although the heat of the tap will, on this account, differ, yet the character of the tap will be similar. Such exposed places should be remedied; and the best remedy is, in not letting the mash stand so long; because the liquor will not draw the malt, while thus cooling.

If two mashes are made for the strong, the second mash may be taken 10 or 12° higher than the first mash; if three mashes, instead of 10 or 12°, take 5 or 6° for each, and the fourth mash 160°.

A large body of malt will obtain the required heat in the mash, with a heat somewhat lower than a small quantity, on account of the greater capacity and depth, and the less surface of wood and metal; the effervescence and powers of retention of heat, for the above reasons, are increased.

No brewer need feel at a loss in making-up his mash with such ample assistance as my thermometer will afford him in taking the heat in the mash-tun.

The author having had experience in this method, of finally obtaining the heat in the mash-tun, gives it as a test, to prevent many errors creeping in, to which every brewer is, more or less liable, in every change of weather, and particularly the less experienced, in reference to the component parts of the heat of the mash, consisting of the air, the malt, and the liquor. In making due allowance for the loss or gain of heat, there must always be a loss of heat, from evaporation, and a gain of heat, when higher dried malt is used, &c. and the liquor must be raised or lowered accordingly. There is also a great loss of heat in cold weather, which must

be counterbalanced in the application of mashing heats; the errors may not be very great, yet nicety in this point is most essential, and may be thus finally and safely corrected by the foregoing method, which certainly appears reasonable to common practice, that every first mash to be correct, must finally arrive at the same degree of heat in the mash-tun, whether of small or large quantities of malt; and that heat is composed of the temperature, heat of liquor, the dryness, and the weight or substance of the malt; and thus the Table of Mashing Heats and Quantities, per Quarter, together with the thermometer, will assist the brewer to the fullest extent of his wishes and demands.

The wort of the first mash being weighed, the character observed, the heats taken, and the quantity ascertained, may all be pumped up into the boiling-off copper. Record all these particulars in their proper places in the brewing-book; they will enable the brewer to ascertain how much is drawn, per quarter, with any given quantity of liquor, and how much will be required of the second wort, to make up the strength; making due allowance for the waste in boiling, evaporation, &c. &c.

Here it must be strictly observed, that no delay takes place; and when the tap is spent, must be narrowly watched, to prevent the thick running after the clear; then it is the brewer's province to be ready with his next liquor, instanter.

Fly Mashing, which is modernly termed Sparging, is to pass the succeeding liquors over the goods, while the tap is spending; for instance, as soon as the goods have sunk about four inches from the original mark, the top inside cover being put on after the conclusion of the first mash, to break the force of the liquor. (This cover is described in the brewing utensils.) The force of the liquor being thus broken, will scarcely mingle with that underneath, but will follow, and supply the place of the

former, and displace it, thereby obtaining a greater quantity of the rich first wort, and drawing the goods with a smaller quantity of liquor, for strong ales, &c. This is repeated, instead of the second and third mashes; and mashing the last for small, or returns. In this method of fly-mashing, the after liquors pass through every interstice of the goods; by which method, concentrating the strength, saving valuable time, and helping return worts, as they contain nothing but the worst quality, and are by no means desirable. It may seem extravagant to throw away a return wort, the gravity of which is five or six pounds per barrel; it is, however, like skimmed milk, but of little value.

ESSAY X.

On the various Methods of Boiling.

Let there be plenty of room in the copper, for it is favourable to quick boiling. The author recommends short boiling, for the preservation of the fine aromatic flavour, and the medicinal quality of the hop; therefore, to aim at long boiling, and to use more liquor for brewing on that account, is to deviate from the purpose in view; incurring at the same time an extra expence of time and fuel.

The criterion to be observed in boiling is, the separating and coagulating of the farinaceous particles of the extract of malt and hops, which will generally take place in about fifteen minutes, when the interstices of

the wort become transparent, denoting the union, or combination of the same, in the first period: nevertheless, the boiling is erroneously continued far beyond this period, sometimes two hours, for the first wort, dissipating those fine qualities which it was the brewer's intention to preserve, under the idea that the beer will not keep without, which is an error in judgment; because the defect lays in the mashing heats, or in some extraordinary delay in the passage of the worts from the under-back to the copper.

Observe, in ordinary ale brewing, to boil the first wort one hour; and the second, two hours: and, if there be three worts, boil the first, one hour; the second, one hour and half; and the third, two hours.

In ordinary porter brewing, boil the first wort, one hour; the second, two hours; and the third, three hours; observing, that when strong ale or stout is brewed for long keeping, and is heavily hopped in the copper, that longer boiling is necessary, for penetration, to the amount of one-fourth part of the time allotted for each wort.

Second Method.—Boil the first wort forty minutes; then add the hops, and boil until the separation of the farinaceous particles take place; fifteen minutes will be sufficient for this mode; less time being given for evaporation, the fine flavour will be preserved in a greater degree. Boil the other worts as before directed.

Third Method.—Boil until the breaking of the farinaceous particles, and the transparency of the interstices of the wort takes place, then discharge the whole together, hops and all, into the cask in which the liquor is intended to be kept, and bung down, for the present, the cask then being quite full: at your leisure fix the safety-valve, and there let the liquor remain untouched, to ferment and depurate, without any addition of yeast, which will require twelve months, for ordinary ale.

The vacuum caused in cooling, will furnish room for the expansion occasioned by this mode of spontaneous fermentation. The time required for fermentation and depuration will be from eighteen months to two years, for the strongest ales; or of a gravity of 45°, in a temperate cellar.

Each succeeding wort will require the addition of fresh hops, which will give the liquor an improvement of flavour not to be obtained by boiling the hops over and over again. Worts of meaner strength will, of course, require less time for fermenting and depuration, in proportion.

Fourth Method.—Boil the wort, without the hops, thirty or forty-five minutes, (having the intended quantity of hops previously rubbed with the hands and deposited in the cask in which such liquor is intended to remain,) then turn the boiling wort into the cask, and, when full to the bung, fix the safety-valve. The treatment of this, and the succeeding worts, is the same as observed in the third method.

It may be inconvenient to adopt this method of boiling a considerable quantity together; but, in the smaller moveable bodies, there can be no objection, if the time of keeping is not an object. This process will suit the nobleman, or private gentleman, where expence is not spared to procure that wholesome and exhilarating old English luxury of superlative quality.

Fifth Mode.—Boil but a small quantity of hops with the worts, to the amount of one-fourth part, or, in fact, any quantity the brewer's judgment may dictate; and reserve the remainder to be put into the vat at the time of racking and storing the beer.

In respect to obtaining the fine flavour of the hop, long boiling is totally at variance with that desirable object; consequently, short and quick boiling is favourable

to that purpose. It is impossible to boil without dissipation, to a certain extent.

It may be objected to by practitioners of minor experience, who are unacquainted with the principles and the chemical operation of brewing, that the liquor will not keep without long boiling the worts with the hops, which is a mistaken idea, and extremely fallacious; for the preservative quality of all malt liquor is resident in the soundness and purity of the extract drawn from the malt in the mash-tun, by the judicious application of the mashing heats, in which, alone, the brewer can expect to find the principles of the preservative quality; and the smallest degree of acidity, in this stage of the operation, can never be extinguished. It may be neutralized by a chemical application, for a time, but no boiling will ever restore a wort, unsound before going into the copper: therefore, the greatest care and nicety is required in obtaining a true knowledge of the fundamental principles of the Art of Brewing.

In the general process of making wine, no boiling is required for the extract; the fruit is mixed with the extracting medium in the state of nature, and boiling is not requisite, and yet there is no acidity in the result. Why is it? because it is allowed to ferment spontaneously; the principles of which being solvent, in a cold menstruum, pass from the vinous to the spirituous quality, without the application of heat, to open their pores, for the reception of the acetous particles, of which the atmospheric air is composed; the wine drawn off when the vinous fermentation is completed, and the depuration is going on; at which time the atmospheric air is excluded, to a certain extent.

The precipitating principle of the liquor, brewed and fermented without the addition of yeast, need not be doubted, if the place provided for the purpose is within

the limits of temperature, where the fermentation and depuration is allowed to progress without the interruption occasioned by the sudden transition of heat and cold. Such favourable situations can only be obtained under-ground, or in the cliffs, contiguous to towns and cities, in different parts of the kingdom; in some of which the author has had opportunity of experience and observation, where fermentation and depuration was conducted with the greatest nicety and advantage, as to brilliancy and flavour, till the last pint drawn from the cask.

The author does not, under any circumstances, approve of the erroneous and anti-chemical method of steeping the hops, either in hot or cold liquor, previous to putting them into the copper, under the false idea of extracting more of the bitter of the hop; it is a mistaken notion.

The author fears not but his readers will readily admit that his plan is superior to all others yet discovered; except where a double expence is incurred, as in that of boiling in the double or inverted wort copper, surrounded with liquor, on which the force of the fire is intended to operate, totally excluding the slightest empyreumatic flavour to the worts, or wasting a particle of the saccharine quality.

The brewer is well aware, that the infusion of hops, in either hot or cold liquor, will draw a far greater proportion of the bitter quality. The same method may be pursued to an unlimited extent, and still extract a bitter liquor, or fluid, which is of no value. It may be truly conceived and said, that the first operation of extracting the bitter with *aquæ pura*, is founded in error; and the last certainly confirms it. The liquor, thus used, had far better be turned into the mash-tun. There again, excess is to be studiously avoided.

If the richness of the worts require an alteration in the bitter, increase the quantity of hops, by putting them into the vat, or cask, where the spirituous qualities, obtained by fermentation, is of a thinner and more penetrating nature, which may be compared with the powers of alcohol; therefore, for all philosophical and chemical reasons, totally refrain from steeping the hops in liquor; and avoid, by all possible means, the evaporation of the aromatic quality, when it can be retained by the adoption of the means I have before recommended.

The virtue of malt, when extracted by the application of heats, and properly blended with hops, will produce a perfect combination of the essential qualities of both.

The author approves of the tap spending upon the hops in the under-back, or pumping the worts to the hops in the copper-back; but strongly recommends the adoption of his Newly-Invented Copper and moveable Pan, which stands directly under the mash-tun to receive the wort, instead of the circuitous method of the under-back and after pumping-up, as represented in the Engraving of a Plan for the Erection of a Brewery, at the commencement of this work.

ESSAY XI.

On the Process of Cooling.

THIS operation ought to be performed by the quickest method possible, because of the liability of the worts to injury, by the action of the over-charged atmosphere upon two of the component parts, consisting of the saccharine and the animal matter, or the acetous and the putrefactive fermentation, commencing in the coolers; the seeds of which are communicated by the pressure of a corresponding principle in the air, in warm and hot weather, which is thus imparted to the worts.

Let the worts lay not more than one inch deep in the shallowest part of the cooler, when spread to cool, and keep them moving, by shifting as often as may be convenient.

Since the inestimable discovery and invention of the refrigerator, the expence of which is little more than that of coolers, no brewer need be at a loss, in the hottest weather, provided he has the advantage of a plentiful well at his command; the expence is of no consideration, compared with its utility. When the brewer requires a refrigerator, he should not be too sparing in the size, because he will reap the greater advantages.

ESSAY XII.

On the Application of Yeast.

YEAST cannot be used too fresh, provided the quantity required can be ascertained; therefore, it is necessary to wait until it be sufficiently solid, for the separation of the beery particles, unless particular circumstances occur, such as when the worts are ready to go down, and no other yeast can be obtained; then the brewer must make use of that which he has, according to the best of his judgment.

It is absolutely necessary to preserve yeast for pitching in due time; therefore, when the yeast has attained sufficient solidity, which it will, in well-regulated fermentations, in twenty-four hours after cleansing, draw off the beer, and put the yeast into a cask that will hold twice the quantity intended to be put in; stop the cask with a safety-valve, to prevent bursting by refermentation.

Country brewers may sometimes find a difficulty in obtaining yeast; but they should never wet their malt until the yeast is procured, because, when yeast is used, it must be added at the time the worts begin to run into the gyle-tun; previous to which the yeast should be expanded, by putting about one-fourth part of its weight of worts, at a temperature of 80°; and about an hour before it is wanted, add the warm wort to the yeast. When the yeast is added, rouze it in with the worts, that the pores may be completely opened.

ESSAY XIII.

On the Principles of Fermentation.

FERMENTATION is a slow motion of the intestine particles of a mixed body arising, usually, from the operation of some active acid matter, which rarifies, exalts, and subtilizes the soft and sulphureous particles, as when leaven or yeast lightens and ferments bread or wort. This motion differs much from that usually called ebullition or effervescence, which is a violent boiling and struggling between an acid and an alkali, when mixed together.—This is the opinion of the intelligent Mr. Harris.

Fermentation is a resident principle, either silent or active, in all bodies, mineral, animal, and vegetable, and connected and intermingled with the circumambient air.

The author intends to treat more particularly on vegetable fermentation, as far as relates to the farinaceous particles of malt and hops, for it is the basis on which beers of every denomination are brought to perfection.

Yeast is the seed of fermentation, and destined to effect purity, and for reproduction.

THE FOLLOWING ESSENTIALS REQUIRE THE MOST MINUTE ATTENTION OF THE BREWER.

First.—The situation and temperature of the fermenting-room.

Second.—The temperature of the air, at the time of pitching the worts.

Third.—The strength or gravity of the worts, and the quantity in barrels and firkins.

Fourth.—The quantity of yeast in lbs. and parts, per barrel, according to the strength and temperature of the worts.—(*Vide* Table of proportional Quantities of Yeast, for every Strength and Temperature.)

Fifth.—To remark and record in the brewing-book the progress of the fermentation to the cleansing point of the increasing heat and decreasing gravity every six hours.

Sixth.—The filling-up.

Seventh.—The racking, for immediate use.

Eighth.—The racking, for stores.

Ninth.—The hopping in the cask.

Tenth.—The hopping in the vat.

Eleventh.—The hopping in general.

Twelfth.—The racking.

In respect to heat, while fermentation is progressing; the temperature of the fermenting-room, and the situation of the gyle-tuns.

The gyle-tuns were formerly embedded in the earth, the bottom and sides of which were surrounded with highly tempered clay to the thickness of three or four inches, and of such yielding consistency, as caused it to lay so close to the wood as to exclude the perishing effects of stagnant air. About thirty or thirty-six inches of the tuns were above the surface of the earth, and the body of the worts were nearly even with the surface.

Sometime about the year 1794 or 5, this valuable method was abandoned by many brewers in London, for the adoption of tuns, placed sufficiently lofty for running-off. All were anxious to obtain this desirable facility, and were as regardless of expence as unconscious of the effects of the transition, from the even to the uneven temperature, which was highly inimical to obtaining those desirable results arising only from a low fermenting heat.

When the tuns were in the ground, the brewer had no difficulty in calculating the time a gyle would come off; but for years after that alteration the brewers were in a chaos of doubt and uncertainty. They had to tread an entirely new, uncertain, and intricate path; they found themselves in a new element, and in a mysterious labyrinth: but it was a pleasant thing to turn on and cleanse; as neither horse, man, or jigger were required. It was a great march of economy, in one sense; but at the ten-fold expence of the quality of the liquor, by sacrificing that degree of perfection in the fermentation, which could only be obtained when the gyle-tuns were in the ground.

The great brewers, in consequence of the large bodies they fermented, and in more solid and substantial buildings, did not feel it comparatively to the minor brewers, who could not command those advantages. They had no idea of the then existing causes and effects; consequently, could not see the necessity of retracing their steps, while so delighted with the new mode, which was an important as well as economical improvement in all points, excepting one—*an uninterrupted progress of fermentation.*

The author hopes his readers will not accuse him of undue prolixity, while he is studiously endeavouring, by all possible means, to instruct the inexperienced brewer in the causes and effects which he himself has witnessed during his own practice, and by which he is enabled to convey more to his reader's mind than by precept. His object is to warn him against falling into such errors in the construction of his brewhouse, which, if erected without a knowledge of what is absolutely requisite for his future success, must ultimately lead to disappointment; and also, that he may possess the same advantages as the great brewer, though in miniature, and be enabled to supply his customers with an article

equally as good; that the consumer may enjoy the gratification of liquor, skilfully brewed, well fermented, and free from adulteration; to prove that malt and hops are best and cheapest; and that drugs, or other ingredients, are dearest; and that those who use them, are entirely misguided and deceived by the crafty, and generally sacrificing both fame and fortune.

For all the foregoing reasons, the author advises his readers to adopt the plan of having their gyle-tuns under-ground, especially in small breweries; so that the whole body of the worts may be on a level with the surface of the ground, and lay in the form of a cube, as near as circumstances will admit, to allow thirty-six inches for the rising of the head. The tuns should be made air-tight, with a safety-valve, for the retention of the carbonic acid gas: and also have a fixed thermometer, with an index, fitted up so as to be viewed outside of the gyle-tuns, for the observation of the advancing heat: with tuns so situated, the brewer may bring his worts down to a temperature as low as 45°, if required, and the air will permit, which tuns above-ground will not admit of. If that expedient should be absolutely necessary, he must guard, as well as he can, by thick walls, &c.; and after all, it will not be near so perfect as the situation under-ground, which the author so particularly recommends, for small bodies of wort. It is true, that gyle-tuns under-ground are attended with some additional trouble; but the perfection of fermentation will make ample amends, by producing brilliant and fine flavoured malt liquor.

For Pitching.—When the gyle-tuns are above-ground, more yeast must be added, to ferment the worts within the same period of time, at the same pitching heats.

The situation of gyle-tuns having been treated on thus far, the next question is concerning the pitching

heat, in either situation: therefore, if the gyle-tuns are in the ground, the brewer may pitch his worts at 45°, even in the winter time, at a gravity of 45 lbs. per barrel (which is the greatest strength worts can with propriety be brewed) adding 3·75 of yeast, or three pounds and three quarters per barrel. Worts of 6 lbs. per barrel, and the temperature 45°, will require 0·4998, or half a pound, within a small fraction; but it is only accidental circumstances that require the brewer to pitch his worts so low: in fact, it is only a remedy for accident or inattention.

The brewer may pitch his worts at a gravity of 45, 47½°, or 47°·50, and in exact proportion will require 3·6250, or three pounds and ten ounces of yeast.

Worts of 6 lbs. gravity, per barrel, and pitched at the same temperature, 0·4843, or seven ounces and three-quarters, nearly, of yeast, per barrel, is the exact proportional part.

The pitching worts at 47°·50 and gr. 45, will admit an advance of heat, during the fermentation, of 22°·50, making 70°, at the cleansing point, in the gyle-tun.

The unattenuated matter will be 11·25 lbs. and the matter attenuated 33·75 lbs.; which may be performed in 135 hours, in air-tight tuns with the safety-valve.

The waste during the fermentation will amount, in ten barrels, to twenty-five gallons and a half, on a gravity of 45 lbs. per barrel; which loss is accounted for in the production of yeast, and by evaporation.

It is not expected the brewer can always command the temperature, to get his worts down to 47°·50; neither is it common to brew ale at a gravity of 45lbs. 25, 30, 35, and 40lbs. is more general. (See the Author's Tables graduated for this purpose.)

The brewer, of course, will brew his choicest ales in the best brewing season, which is from October to the end of March, and sometimes to the end of April. He

cannot cool his worts below the temperature of the air, or that of well water; the cleansing point must therefore go beyond 70°, when not in the brewing season, unless the gyle-tun attemperature is used.

The first visible signs of fermentation are in a delicate white line all round the gyle-tun, which increases gradually, until the whole surface is covered with a thin cream, which rises very gradually; it then breaks out into a fine cauliflower head, increasing in size and depth until it again resolves into the spiral or rocky head; the next change is into a head with a smooth surface, which produces the first indication of yeast, and grows thicker and heavier towards the cleansing point; when skimming or separtion is necessary for the discharge of the yeast. The skimming to be repeated every two or three hours, for the first twelve hours; or, it may be drawn off at the cleansing point into casks, filled up full to the bung every two or three hours, for the first twelve hours.

Skimming cannot be performed in air-tight casks; of course, it must be drawn off, and then filled up.

After the first twelve hours, the filling up may take place every four hours; the latter fillings up must be with clean, and finally with bright beer.

Whatever proportion of old beer is intended to be used, it is better to break it in the tun an hour before cleansing; rouze all together, when it will more perfectly unite, and mingle with the new.

This is, all through the process, the effect of the intestinal motion, by which the saccharine is changed into the vinous; hence the spirituous liquor. It may be carried on, if required, to the spirituosity of distillers' wash.

The intestinal motion, is either spontaneous, or only by the attraction of the atmospheric air, as in wines, the progress of which is slow, silent, and almost invisible

to the eye; or, that which is caused and effected more speedily by the addition of yeast; either of which being carefully conducted, without interruption, will produce the end desired. By recording the progress of the fermentation, the brewer is led on to observations both interesting and profitable, as it introduces him to a general acquaintance with the principles of fermentation of all bodies contained in the grand arcana of nature: for, by observation and application, we discover the best methods of brewing and fermenting, or any other art.

Ferment all keeping beers to one-fourth part of their original gravity, in a temperature of the gyle not exceeding 70°, which is most preferable for fine flavor, high condition, and spirituous quality. In the brewing season, in many instances, the gyle may be kept within the limits of 70°, by the attemperature.

When lighter beers are brewed, the temperature may be kept in the gyle-tuns within the limits of 70° by the assistance of the attemperator or refrigerator in the gyle-tuns, which every brewer will find it absolutely necessary to adopt, to enable him to compete with others.

Without the attemperator, the brewer must regulate the cleansing point by the advance of heat or temperature of the gyle; but, having the attemperator, or refrigerator, he may with safety affix the cleansing point at 70°; observing that his attenuations are within the limits of one-third or one-fourth of the original gravity.

Acetous Fermentation arises, either from premature fermentation, or from liquor not having been sufficiently fermented. It will commence in under-fermented liquor, which, from its peculiar sweetness, is of that fretty nature, as to be continually generating acidity, in direct opposition to the precipitation of the grosser particles, which are included and entangled in the sweet liquor;

this precipitation takes place when the gravity of the worts is sufficiently diminished by fermentation, or attenuation, within the limits before described, 70°.

Acetous fermentation will also occur in the mash-tun, from the application of mashing heats taken at too low degrees of heat, whereby the pores of the liquor are so much opened, that they readily imbibe too large a portion of atmospheric air; so that it is possible for the whole body of the goods in the mash-tun to be changed from sweetness to acidity before the tap is set. Worts of this description will ferment very rapidly, and produce a large quantity of yeast; but the liquor will be acid. Acidity may be caught in any of the mashes, although the first mash may have escaped; but if caught in the first, all subsequent mashes must share the same injury; neither extra hopping or boiling will be of any avail.

Acetous fermentation ensues when the mashing heats are taken too high, thereby, in a great measure, closing the pores of the wort to the fermentative matter, or yeast: the consequence is, that the fermentation proceeds with great difficulty; the head is very low, and brown or fiery in appearance, with a hissing noise; sometimes it will appear as if boiling. Worts of this description require more yeast, to force the fermentation to discharge the yeast; yet the discharge is not sufficient: the rest remains in the liquor, which is the cause of acidity and fret in the opposite degree of mashing heats taken too low.

Racking.—This process requires ability and care, to retain the effervescing spirit and fine flavor of the liquor.

If the liquor is drawn off in too flat a state, it will not recover in the cask, without art; and even that is insufficient for the perfect recovery of flatness: therefore, the best brewing and fermenting may, by neglect in this stage, be rendered useless; for, if the liquor is tapped while flat, it will not afterwards recover.

The brewer must be well acquainted with the time necessary for recovering liquor from flatness, as well as the time it will require being in the vat, or in the cask, when racked new from the stillions, and the time it will require in the publican's cellar, or that of the private customer; so that here are many considerations that he must absolutely bear in mind, at every season of the year, or disappointment must follow. The arrangement necessary for this unerring regularity requires no small experience, to have all beers ready in successive and effervescing order for sending out.

Racking from the Stillions, for sending out.—The liquor must be drawn off within twenty-four hours after cleansing, and bunged down immediately, so that a little yeast may rise again; the bungs may be drawn, when sufficiently recovered.

Racking into the Vat may be deferred a little longer; it is there to form a large instead of a small body.

For Mild Beers.—Let them remain in the vat, close stopped, with a safety-valve, until the effervescence is full up; then rack and hop in the cask, (with hops soaked in the same liquor,) bunged down tight, and let it remain so until the effervescence is again up, before tapping. A quick draught is necessary, for liquor to retain its briskness and goodness to the last.

Examine the Liquor previous to sending out.—Draw the bung of a cask of such a number as you wish to send; and, if it is fit, its effervescing quality will appear, in a delicate cream arising on the surface of the liquor.

Hopping in the Vat for keeping.—Fill the vat sufficiently to allow room for the hops. Rub the intended quantity of hops to pieces into a stand-tub, and well mash them in some of the same liquor; then start them into the vat; well rouze, and stop down, air-tight, and cement round the hatchway.

When a vat is intended to be drawn off, sufficient dry casks must be in readiness, that it may be accomplished

without delay; bung down tight; ullage vats are bad. If you have beer ready, the vat may be filled again, on the same grounds, several times without injury, so long as there is no delay; but keep it close stopped.

Hopping in general.—The brewer must, in a great measure, be guided by his customers' palates. Bitterness is often complained of, as being disagreeable, which may be owing to two causes; one of which is from ill-flavoured hops; the other from long boiling: the aromatic properties, which give the pleasant gust, are dissipated into a disagreeable rankness; therefore, let the brewer be particular in his selection. Hop lightly in the copper, and reserve the remainder for the period of storing, or racking, when in a mild state, which should not be drank until the liquor begins to bite the hop; then the liquor will be effervescing and fine flavoured.

If the brewer wishes to increase the quantity of hops in his beers, he must do it by small degrees, in which my Hop Tables will direct him to the fullest extent, by adopting either of the methods laid down, either of pounds and parts, per quarter; or of pounds and parts, per barrel; by which means he may increase the bitter, almost imperceptibly.

ORIGINAL

DECIMAL TABLES,

ACCURATELY CALCULATED;

WITH

EXPLANATIONS.

EXPLANATION OF THE TABLES.

TABLE I.

Hops, per Quarter, for Malts of every Strength.

THIS Table is composed of 61 columns; the first is the column of gravity, for malt, from 70 to 105 lbs. per quarter.

The second column shows one-eighth of a pound of hops. The third column one-fourth of a pound; and the following columns progress one-fourth of a pound up to 56-fourths.

I will now suppose a gravity of 70 lbs. per quarter, and I require 10 lbs. of hops, per quarter? In the 43rd column will be found 10 lbs. ·0000 cents.

Then I require to know the proportional quantity of hops, for malt of 71 lbs. gravity, per quarter, after the rate of 10lbs. per quarter? Underneath 10lbs. ·0000 cents. will be found 10lbs. 1428 cents. For 72lbs. gravity, will be found underneath the last number, 10lbs. 2856 cents. For 80lbs. gravity, per quarter, lower down in the same column, you will find 11 lbs. 4280 cents.; that number, multiplied by 100 quarters, will give 1142lbs. ·8000 cents.

Then I require to know what proportion of the whole quantity of the hops each wort will draw, and what value or quantity of the hops will be left in the return wort, as a set-off againt the hops of the next brewing; the brewer making some allowance for loss of quality in the bitter.

To ascertain the quantity each wort will draw of the hops, as well as malt, divide 11 lbs. 4280 cents by 80, the malt's gravity, per quarter, and the product will be 00lbs. ·1428 cents, and a remainder of 40.

Therefore, supposing the first wort to draw 42 lbs. per quarter, out of 80, or 42-80th parts; then multiply the 80th part, 00·1428 by 42, and the product will be 005 lbs. ·9976 cents, which set down.

Suppose the second wort to draw 22 lbs. per quarter; then multiply 00 lbs. ·1428 cents by 22, and the product will be 03·1416, which also set down.

Then I find my third wort will draw 12lbs. per quarter; multiply 00·1428 by 12, and the product will be 01·7136, which likewise set down.

I find in my return wort 4 lbs. per quarter; then multiply 00·1428 by 4, and the product will be 00·5172. These operations are further explained by the following

EXAMPLE:

		Gravity lbs. per. Qr.	Hops. lbs. cents.	
1st	Wort	42	05·9976	
2nd	Wort	22	03·1416	
3rd	Wort	12	01·7136	
4th	Wort	4	00·5712	last number.
	per qr.	80	11·4240	
		—	40	remainder.
	lbs. Hops, per qr.		11·4280	

Gr. lbs.	Hops. lbs. cents.	lbs. cents.

Divide by 80)11·4280(00·1428

80

342
320

228
160

680
640

40 remainder.

The last number, in the return, 00·5712 multiplied by 100 quarters, will give 57 lbs. ·1200 cents of hops. The same number, multiplied by any number of quarters, will give the same satisfactory information.

It must be here observed, that this calculation has nothing to do with the quality of the hops, either of good or bad; for the proportions will be drawn according to the weight of the extract, and the quantity of hops employed. The heavier the wort is, the less will it draw of the hop, and *vice versa;* but the former will draw the most soluble and more valuable part of the hop; which the author presumes is equivalent to greater strength, without the fine quality.

With respect to the price of hops, per barrel, having drawn 42lbs. gravity, per quarter, in the first wort, and from the hops 42-80th parts, as before stated, 05·9976, say at one shilling per lb. then 05·9976 multiplied by 12 pence, gives 71d. 9712 cents.; and this, divided by, say 2 barrels at 21 gravity, gives 35d. 9856 cents, per barrel.

The same operation applied to any other numbers, great or small, in a relative position, will produce a similar result.

TABLE I.

Gr.	1-8th.	1-4th.	2-4ths	3-4ths	4-4ths	5-4ths	6-4ths
70	0·1250	0·2500	0·5000	0·7500	1·0000	1·2500	1·5000
71	0·1267	0·2535	0·5070	0·7607	1·0142	1·2678	1·5214
72	0·1284	0·2570	0·5140	0·7714	1·0284	1·2856	1·5428
73	0·1301	0 2605	0·5210	0·7821	1·0426	1·3034	1·5642
74	0·1318	0·2640	0·5280	0·7928	1·0568	1·3212	1·5856
75	0·1335	0·2675	0·5350	0·8035	1·0710	1·3390	1·6070
76	0·1352	0·2710	0·5420	0·8142	1·0852	1·3568	1·6284
77	0·1369	0·2745	0·5490	0·8249	1·0994	1·3746	1·6498
78	0·1386	0·2780	0·5560	0·8356	1·1136	1·3924	1·6712
79	0·1403	0·2815	0·5630	0·8463	1·1278	1·4102	1·6920
80	0·1420	0·2850	0·5700	0·8570	1·1420	1·4280	1·7140
81	0·1437	0·2885	0·5770	0·8677	1·1562	1·4458	1·7354
82	0·1454	0·2920	0·5840	0·8784	1·1704	1·4636	1·7568
83	0·1471	0·2955	0·5910	0·8891	1·1846	1·4814	1·7782
84	0·1488	0·2990	0·5980	0·8998	1·1988	1·5092	1·7996
85	0·1505	0·3025	0·6050	0·9105	1·2130	1·5260	1·8210
86	0·1522	0·3060	0·6120	0·9212	1·2272	1·5438	1·8424
87	0·1539	0·3095	0·6190	0·9319	1·2414	1·5616	1·8638
88	0·1556	0·3130	0·6260	0·9426	1·2556	1·5794	1·8852
89	0·1573	0·3165	0·6330	0·9533	1·2698	1.5972	1·9066
90	0·1590	0·3200	0·6400	0·9640	1·2840	1·6050	1·9280
91	0·1607	0·3235	0·6470	0·9747	1·2982	1·6228	1·9494
92	0·1624	0·3270	0·6540	0·9854	1·3124	1·6406	1·9708
93	0·1641	0·3305	0·6610	0·9961	1·3266	1·6584	1·9922
94	0·1658	0·3340	0·6680	1·0068	1·3408	1·6762	2·0136
95	0 1675	0·3375	0·6750	1·0175	1·3550	1·6940	2·0350
96	0·1692	0·3410	0·6820	1·0282	1·3692	1·7118	2·0564
97	0·1709	0·3445	0·6890	1·0389	1·3834	1·7296	2·0778
98	0·1726	0·3480	0·6960	1·0496	1·3976	1·7474	2·0992
99	0·1743	0·3515	0·7030	1·0603	1·4118	1·7652	2·1206
100	0·1760	0·3550	0·7100	1·0710	1·4260	1·7830	2·1423
101	0·1777	0·3580	0·7170	1·0817	1·4402	1·8008	2·1634
102	0·1794	0·3620	0·7240	1·0924	1·4544	1·8186	2·1848
103	0·1811	0·3655	0·7310	1·1031	1·4686	1·8364	2·2062
104	0·1828	0·3690	0·7380	1·1108	1·4828	1·8542	2·2276
105	0·1845	0·3725	0·7450	1·1245	1·4970	1·8720	2·2490

TABLE I.—*(Continued.)*

Gr.	7-4ths	8-4ths	9-4ths	10-4ths	11-4ths	12-4ths	13-4ths
70	1·7500	2·0000	2·2500	2·5500	2·7500	3·0000	3·2500
71	1·7750	2·0285	2·2821	2·5864	2·7892	3·0428	3·2964
72	1·8000	2·0570	2·3142	2·6228	2·8284	3·0856	3·3428
73	1·8250	2·0855	2·3463	2·6592	2·8676	3·1284	3·3892
74	1·8500	2·1140	2·3784	2·6956	2·9068	3·1712	3·4356
75	1·8750	2·1425	2·4105	2·7320	2·9460	3·2140	3·4820
76	1·9000	2·1710	2·4426	2·7684	2·9852	3·2568	3·5284
77	1·9250	2·1995	2·4747	2·8048	3·0244	3·2996	3·5748
78	1·9500	2·2280	2·5068	2·8412	3·0636	3.3424	3·6212
79	1·9750	2·2565	2·5389	2·8776	3·1028	3·3852	3·6676
80	2·0000	2·2850	2·5710	2·9140	3·1420	3·4280	3·7140
81	2·0250	2·3135	2·6031	2·9504	3·1812	3·4708	3·7604
82	2·0500	2·3420	2·6352	2·9868	3·2204	3·5136	3·8068
83	2·0750	2·3705	2·6673	3·0232	3·2596	3·5564	3·8532
84	2·1000	2·3990	2·6994	3·0596	3·2988	3·5992	3·8996
85	2·1250	2·4275	2·7315	3·0960	3·3380	3·6420	3·9460
86	2·1500	2·4560	2·7636	3·1324	3·3772	3·6848	3·9924
87	2·1750	2·4845	2·7957	3·1688	3·4164	3·7276	4·0388
88	2·2000	2·5130	2·8278	3.2052	3·4556	3·7704	4·0852
89	2·2250	2·5415	2·8599	3·2416	3·4948	3·8132	4·1316
90	2·2500	2·5700	2·8920	3·2780	3·5340	3·8560	4·1780
91	2·2750	2·5985	2·9241	3·3144	3·5732	3·8988	4·2244
92	2·3000	2·6270	2·9562	3·3508	3·6124	3·9416	4·2708
93	2·3250	2·6555	2·9883	3·3872	3·6156	3·9844	4·3172
94	2·3500	2·6840	3·0204	3·4236	3·6908	4·0272	4·3636
95	2·3750	2·7125	3·0525	3·4600	3·7300	4·0700	4·4100
96	2·4000	2·7410	3·0846	3·4964	3·7692	4·1128	4·4564
97	2·4250	2·7695	3·1167	3·5328	3·8084	4·1556	4·5028
98	2·4500	2·7980	3·1488	3·5692	3·8476	4·1984	4·5492
99	2·4750	2·8265	3·1809	3·6056	3·8868	4·2412	4·5956
100	2·5000	2·8550	3·2130	3·6420	3·9260	4·2840	4·6420
101	2·5250	2·8835	3·2451	3·6784	3·9652	4·3268	4·6884
102	2·5500	2·9120	3·2772	3·7148	4·0044	4·3696	4·7348
103	2·5750	2·9405	3·3093	3·7512	4·0436	4·4124	4·7812
104	2·6000	2·9690	3·3414	3·7876	4·0828	4·4552	4·8276
105	2·6250	2·9975	3·3735	3·8240	4·1220	4·4980	4·8740

TABLE I.—*(Continued.)*

Gr.	14-4ths	15-4ths	16-4ths	17-4ths	18-4ths	19-4ths	20-4ths
70	3·5000	3·7500	4·0000	4·2500	4·5000	4·7500	5·0000
71	3·5500	3·8035	4·0571	4·3107	4·5642	4·8178	5·0714
72	3·6000	3·8570	4·1142	4·3714	4·6284	4·8856	5·1428
73	3·6500	3·9105	4·1713	4·4321	4·6926	4·9534	5·2142
74	3·7000	3·9640	4·2284	4·4928	4·7568	5·0212	5·2856
75	3·7500	4·0175	4·2855	4·5535	4·8210	5·0890	5·3570
76	3·8000	4·0710	4·3426	4·6142	4·8852	5·1568	5·4284
77	3·8500	4·1245	4·3997	4·6749	4·9494	5·2246	5·4998
78	3·9000	4·1780	4·4568	4·7356	5·0136	5·2924	5·5712
79	3·9500	4·2315	4·5139	4·7963	5·0778	5·3602	5·6426
80	4·0000	4·2850	4·5710	4·8570	5·1420	5·4280	5·7140
81	4·0500	4·3385	4·6281	4·9177	5·2062	5·4958	5·7854
82	4·1000	4·3920	4·6852	4·9784	5·2704	5·5636	5·8568
83	4·1500	4·4455	4·7423	5·0391	5·3346	5·6314	5·9282
84	4·2000	4·4990	4·7994	5·0998	5·3988	5·6992	5·9996
85	4·2500	4·5525	4·8565	5·1605	5·4630	5·7670	6·0710
86	4·3000	4·6060	4·9136	5·2212	5·5272	5·8348	6·1424
87	4·3500	4·6595	4·9707	5·2819	5·5914	5·9026	6·2138
88	4·4000	4·7130	5·0278	5·3426	5·6556	5·9704	6·2852
89	4·4500	4·7665	5·0849	5·4033	5·7198	6·0382	6·3566
90	4·5000	4·8200	5·1420	5·4640	5·7840	6·1060	6·4280
91	4·5500	4·8735	5·1991	5·5247	5·8482	6·1738	6·4994
92	4·6000	4·9270	5·2562	5·5854	5·9124	6·2416	6·5708
93	4·6500	4·9805	5·3133	5·6461	5·9766	6·3094	6·6422
94	4·7000	5·0340	5·3704	5·7068	6·0408	6·3772	6·7136
95	4·7500	5·0875	5·4275	5·7675	6·1050	6·4450	6·7850
96	4·8000	5·1410	5·4846	5·8282	6·1692	6·5128	6·8564
97	4·8500	5·1945	5·5417	5·8889	6·2334	6·5806	6·9278
98	4·9000	5·2480	5·5988	5·9496	6·2976	6·6484	6·9992
99	4·9500	5·3015	5·6559	6·0103	6·3618	6·7162	7·0706
100	5·0000	5·3550	5·7130	6·0710	6·4260	6·7840	7·1420
101	5·0500	5·4085	5·7701	6·1317	6·4902	6·8518	7·2134
102	5·1000	5·4620	5·8272	6·1924	6·5544	6·9196	7·2848
103	5·1500	5·5155	5·8843	6·2531	6·6186	6·9874	7·3562
104	5·2000	5·5690	5·9414	6·3138	6·6828	7·0552	7·4276
105	5·2500	5·6225	5·9985	6·3745	6·7470	7·1230	7·4990

TABLE I.—*(Continued.)*

Gr.	21-4ths	22-4ths	23-4ths	24-4ths	25-4ths	26-4ths	27-4ths
70	5·2500	5·5000	5·7500	6·0000	6·2500	6·5000	6·7500
71	5 3250	5·5785	5·8321	6·0857	6·3392	6·5928	6·8464
72	5·4000	5·6570	5·9142	6·1714	6·4284	6·6856	6·9428
73	5·4750	5·7355	5·9963	6·2571	6·5176	6·7784	7·0392
74	5·5500	5·8140	6·0784	6·3428	6·6068	6·8712	7·1356
75	5·6250	5·8925	6·1605	6·4285	6·6960	6·9640	7·2320
76	5·7000	5·9710	6·2426	6·5142	6·7852	7·0568	7·3284
77	5·7750	6·0495	6·3247	6·5999	6·8744	7·1496	7·4248
78	5·8500	6·1280	6·4068	6·6856	6·9636	7·2424	7·5212
79	5·9250	6·2065	6·4889	6·7713	7·0528	7·3352	7·6176
80	6·0000	6·2850	6·5710	6·8570	7·1420	7·4280	7·7140
81	6·0750	6·3635	6·6531	6·9427	7·2312	7·5208	7·8104
82	6·1500	6·4420	6·7352	7·0284	7·3204	7·6136	7·9068
83	6·2250	6·5205	6·8173	7·1141	7·4096	7·7064	8·0032
84	6·3000	6·5990	6·8994	7·1998	7·4988	7·7992	8·0996
85	6·3750	6·6775	6·9815	7·2855	7·5880	7·8920	8·1960
86	6·4500	6·7560	7·0636	7·3712	7·6772	7·9848	8·2924
87	6·5250	6·8345	7·1457	7·4569	7·7664	8·0776	8·3888
88	6·6000	6·9130	7·2278	7·5426	7·8556	8·1704	8·4852
89	6·6750	6·9915	7·3099	7·6283	7·9448	8·2632	8·5816
90	6·7500	7·0700	7·3920	7·7140	8·0340	8·3560	8·6780
91	6·8250	7·1485	7·4741	7·7997	8·1232	8·4488	8·7744
92	6·9000	7·2270	7.5562	7·8854	8·2124	8·5416	8·8708
93	6·9750	7·3055	7·6383	7·9711	8·3016	8·6344	8·9672
94	7·0500	7·3840	7·7204	8·0568	8·3908	8·7272	9·0636
95	7·1250	7·4625	7·8025	8·1425	8·4800	8·8200	9·1600
96	7 2000	7·5410	7·8846	8·2282	8·5692	8·9128	9·2564
97	7·2750	7·6195	7·9667	8·3139	8·6584	9·0056	9·3528
98	7·3500	7·6980	8·0488	8·3996	8·7476	9·0984	9·4492
99	7·4250	7·7765	8·1309	8·4853	8·8368	9·1912	9·5456
100	7·5000	7·8550	8·2130	8·5710	8·9260	9·2840	9·6420
101	7·5750	7·9335	8·2951	8·6567	9·0152	9·3768	9·7384
102	7·6500	8·0120	8·3772	8·7424	9·1044	9·4696	9·8348
103	7·7250	8·0905	8·4593	8·8281	9·1936	9·5624	9·9312
104	7·8000	8·1690	8·5414	8·9138	9·2828	9·6552	10·0276
105	7·8750	8·2475	8·6235	8·9995	9·3720	9·7480	10·1240

TABLE I.—*(Continued.)*

Gr.	23-4ths	29-4ths	30-4ths	31-4ths	32-4ths	33-4ths
70	7·0000	7·2500	7·5000	7·7500	8·0000	8·2500
71	7·1000	7·3535	7·6071	7·8607	8·1142	8·3678
72	7·2000	7·4570	7·7142	7·9714	8·2284	8·4856
73	7·3000	7·5605	7·8213	8·0821	8·3426	8·6034
74	7·4000	7·6640	7·9284	8·1928	8·4568	8·7212
75	7·5000	7·7675	8·0355	8·3035	8·5710	8·8390
76	7·6000	7·8710	8·1426	8·4142	8·6852	8·9568
77	7·7000	7·9745	8·2497	8·5249	8·7994	9·0746
78	7·8000	8·0780	8·3568	8·6356	8·9136	9·1924
79	7·9000	8·1815	8·4639	8·7463	9·0278	9·3102
80	8·0000	8·2850	8·5710	8·8570	9·1420	9·4280
81	8·1000	8·3885	8·6781	8·9677	9·2562	9·5458
82	8·2000	8·4920	8·7852	9·0784	9·3704	9.6636
83	8·3000	8·5955	8·8923	9·1891	9·4846	9 7814
84	8·4000	8·6990	8·9994	9·2998	9·5988	9·8992
85	8·5000	8·8025	9·1065	9·4105	9·7130	10·0170
86	8·6000	8·9060	9·2136	9·5212	9·8272	10·1348
87	8·7000	9·0095	9·3207	9·6319	9·9414	10·2526
88	8·8000	9·1130	9·4278	9·7426	10·0516	10·3704
89	8·9000	9·2165	9·5349	9·8533	10·1698	10·4882
90	9·0000	9·3200	9·6420	9·9640	10·2840	10·6060
91	9·1000	9·4235	9·7491	10·0747	10·3982	10·7238
92	9·2000	9·5270	9·8562	10·1854	10·5124	10·8416
93	9·3000	9·6305	9·9633	10·2961	10·6266	10·9594
94	9·4000	9·7340	10·0704	10·4068	10·7408	11·0772
95	9·5000	9·8375	10·1775	10·5175	10·8550	11·2950
96	9·6000	9·9410	10·2846	10·6282	10·9692	11·3128
97	9·7000	10·0445	10·3917	10·7389	11·0834	11·4306
98	9·8000	10·1480	10·4988	10·8496	11·1976	11·5484
99	9·9000	10·2515	10·6059	10·9603	11·3118	11·6662
100	10·0000	10·3550	10·7130	11·0710	11·4260	11·7840
101	10·1000	10·4585	10·8201	11·1817	11·5402	11·9018
102	10·2000	10·5620	10·9272	11·2924	11·6544	12·0196
103	10·3000	10·6655	11·0343	11·4031	11·7686	12·1374
104	10·4000	10·7690	11·1414	11·5138	11·8828	12·2552
105	10·5000	10·8725	11·2485	11·6245	11·9970	12·3730

TABLE I.—*(Continued.)*

Gr.	34-4ths	35-4ths	36-4ths	37-4ths	38-4ths	39-4ths
70	8·5000	8·7500	9·0000	9·2500	9 5000	9·7500
71	8·6214	8·8750	9·1285	9·3821	9·6357	9·8892
72	8·7428	9·0000	9·2570	9·5142	9·7714	10·0284
73	8·8642	9·1250	9·3855	9·6463	9·9071	10·1676
74	8·9850	9·2500	9·1140	9·7784	10·0428	10·3068
75	9·1070	9·3750	9·6425	9·9105	10·1785	10·4460
76	9·2284	9·5000	9·7710	10·0426	10·3142	10·5852
77	9·3498	9·6250	9·8995	10·1747	10·4499	10·7244
78	9·4712	9·7500	10·0280	10·2068	10·5856	10·8636
79	9·5926	9·8750	10·1565	10·4389	10·7213	11·0028
80	9·7140	10·0000	10·2850	10·5710	10·8570	11·1420
81	9·8354	10·1250	10·4135	10·7031	10·9927	11·2812
82	9·9568	10·2500	10·5420	10·8352	11·1284	11·4204
83	10·0782	10·3750	10·6705	10·9673	11·2641	11·5296
84	10·1996	10·5000	10·7990	11·0994	11·3998	11·6988
85	10·3210	10·6250	10·9275	11·2315	11·5355	11·8380
86	10·4424	10·7500	11·0560	11·3636	11·6712	11·9772
87	10·5638	10·8750	11·1845	11·4957	11·8069	12·1164
88	10·6852	11·0000	11·3130	11·6278	11·9426	12·2556
89	10·8006	11·1250	11·4415	11·7599	12·0783	12·3948
90	10·9280	11·2500	11·5700	11·8920	12·2140	12·5340
91	11·0494	11·3750	11·6985	12·0241	12·3497	12·6732
92	11·1708	11·5000	11·8270	12·1562	12·4854	12·8124
93	11·2922	11·6250	11·9555	12·2883	12·6211	12·9516
94	11·4136	11·7500	12·0840	12·4204	12·7568	13·0908
95	11·5350	11·8750	12·2125	12·5525	12·8925	13·2300
96	11·6564	12·0000	12·4410	12·6846	13·0282	13·3692
97	11·7778	12·1250	12·5695	12·8167	13·1639	13·5084
98	11·8992	12·2500	12·6980	12·9488	13·2996	13·6476
99	12·0206	12·3750	12·8265	13·0809	13·4353	13·7868
100	12·1420	12·5000	12·9550	13·2130	13·5710	13·9260
101	12·2634	12·6250	13·0835	13·3451	13·7067	14·0652
102	12·3848	12·7500	13·2120	13·4772	13·8424	14·2044
103	12·5062	12·8750	13·3405	13·5093	13·9781	14·3436
104	12·6276	13·0000	13·4680	13·7414	14·1138	14·4828
105	12·7490	13·1250	13·5965	13·8735	14.2495	14·6220

TABLE I.—(*Continued.*)

Gr.	40-4ths	41-4ths	42-4ths	43-4ths	44-4ths	45-4ths
70	10·0000	10·2500	10·5000	10·7500	11·0000	11·2500
71	10·1428	10·3964	10·6500	10·9035	11·1571	11·4107
72	10·2856	10·5428	10·8000	11·0570	11·3142	11·5714
73	10·4284	10·6892	10·9500	11·2105	11·4713	11·7321
74	10·5712	10·8356	11·1000	11·3640	11·6284	11·8928
75	10·7140	10·9820	11·2500	11·5175	11·7855	12·0535
76	10·8568	11·1284	11·4000	11·6710	11·9426	12·2142
77	10·9996	11·2748	11·5500	11·8245	12·0997	12·3749
78	11·1424	11·4212	11·7000	11·9780	12·2568	12·5356
79	11·2852	11·5676	11·8500	12·1315	12·4139	12·6963
80	11·4280	11·7140	12·0000	12·2850	12·5710	12·8570
81	11·5708	11·8604	12·1500	12·4385	12·7281	13·0177
82	11·7136	12·0068	12·3000	12·5920	12·8852	13·1784
83	11·8564	12·1532	12·4500	12·7455	13·0423	13·3391
84	11·9992	12·2996	12·6000	12·8990	13·1994	13·4998
85	12·1420	12·4460	12·7500	13·0525	13·3565	13·6605
86	12·2848	12·5924	12·9000	13·2060	13·5136	13·8212
87	12·4276	12·7388	13·0500	13·3595	13·6707	13·9819
88	12·5704	12·8852	13·2000	13·5130	13·8278	14·1426
89	12·7132	13·0316	13·3500	13·6665	13·9849	14·3033
90	12·8560	13·1780	13·5000	13·8200	14·1420	14·4640
91	12·9988	13·3244	13·6500	13·9735	14·2991	14·6247
92	13·1416	13·4708	13·8000	14·1270	14·4562	14·7854
93	13·2844	13·6172	13·9500	14·2805	14·6133	14·9461
94	13·4272	13·7636	14·1000	14·4340	14·7704	15·1068
95	13·5700	13·9100	14·2500	14·5875	14·9275	15·2675
96	13·7128	14·0564	14·4000	14·7410	15·0846	15·4282
97	13·8556	14·2028	14·5500	14·8945	15·2417	15·5899
98	13·9984	14·3492	14·7000	15·0480	15·3988	15·7496
99	14·1412	14·4496	14·8500	15·2015	15·5559	15·9103
100	14·2840	14·6420	15·0000	15·3550	15·7130	16·0710
101	14·4268	14·7884	15·1500	15·5085	15·8701	16·2317
102	14·5696	14·9348	15·3000	15·6620	16·0272	16·3924
103	14·7124	15·0812	15·4500	15·8155	16·1843	16·5531
104	14·8552	15·2276	15·6000	15·9690	16·3414	16·7138
105	14·9980	15·3740	15·7500	16·1225	16·4985	16·8745

TABLE I.—*(Continued.)*

Gr.	46-4ths	47-4ths	48-4ths	49-4ths	50-4ths	51-4ths
70	11·5000	11·7500	12·0000	12·2500	12·5000	12·7500
71	11·6642	11·9178	12·1714	12·4250	12·6785	12·9321
72	11·8284	12·0856	12·3428	12·6000	12·8570	13·1142
73	11·9926	12·2534	12·5412	12 7750	13·0320	13·2963
74	12·1568	12·4212	12·6856	12·9500	13·2105	13·4784
75	12·3210	12·5890	12·8570	13·1250	13·3890	13·6605
76	12·4852	12·7568	13·0284	13·3000	13·5675	13·8426
77	12·6494	12·9246	13·1998	13·4750	13·7460	14·0247
78	12·8136	13·0924	13·3712	13·6500	13·9245	14·2068
79	12·9778	13·2602	13·5426	13·8250	14·1030	14·3889
80	13·1420	13·4280	13·7140	14·0000	14·2815	14·5710
81	13·3062	13·5958	13·8885	14·1750	14·4600	14·7531
82	13·4704	13·7636	14·0568	14·3500	14·6385	14·9352
83	13.6346	13·9314	14·2282	14·5250	14·8170	15·1173
84	13·7988	14·0992	14·3996	14·7000	14·9955	15·2994
85	13·9630	14·2670	14·5710	14·8750	15·1740	15·4815
86	14·1272	14·4348	14·7424	15·0500	15·3525	15·6636
87	14·2914	14·6026	14·9138	15·2250	15·5310	15·8457
88	14·4556	14·7740	15·0852	15·4000	15·7095	16·0278
89	14·6198	14·9382	15·2566	15·5750	15·8880	16·2099
90	14·7840	15·1060	15·4280	15·7500	16·0665	16·3920
91	14·9482	15·2738	15·5994	15·9250	16·2450	16·5741
92	15·1124	15·4416	15·7708	16·1000	16·4235	16·7562
93	15·2766	15·6694	15·9422	16·2750	16·6020	16·9383
94	15·4408	15·7772	16·1136	16·4500	16·7805	17·1204
95	15·6050	15·9450	16·2850	16·6250	16·9590	17·3025
96	15·7692	16·1128	16·4564	16·8000	17·1375	17·4846
97	15·9334	16·2806	16·6278	16·9750	17·3160	17·6667
98	16·0976	16·4484	16·7992	17·1500	17·4945	17·8488
99	16·2618	16·6162	16·9706	17·3250	17·6730	18·0309
100	16·4260	16·7840	17·1420	17·5000	17·8515	18·2130
101	16·5902	16·9518	17·3134	17·6750	18·0300	18·3951
102	16·7544	17·1196	17·4848	17·8500	18·2085	18·5772
103	16·9186	17·2874	17·6562	18·0250	18·3870	18·7593
104	17·0828	17·4552	17·8276	18·2500	18·5655	18·9414
105	17·2470	17·6230	17·9990	18·3750	18·7440	19·1235

TABLE I.—(*Continued.*)

Gr.	52-4ths	53-4ths	54-4ths	55-4ths	56-4ths
70	13·0000	13·2500	13·5000	13·7500	14·0000
71	13·1857	13·4392	13·6928	13·9464	14 2000
72	13·3714	13·6284	13·8865	14·1428	14·4000
73	13·5571	13·8176	14·0784	14·3392	14·6000
74	13·7428	14·0068	14·2712	14·5356	14·8000
75	13·9285	14·1960	14·4640	14·7320	15·0000
76	14·1142	14·3852	14·6568	14·9284	15·2000
77	14·2999	14·5744	14·8496	15·1248	15 4000
78	14·4856	14·7636	15·0424	15 3212	15·6000
79	14·6713	14 9528	15·2352	15·5176	15·8000
80	14·8570	15·1410	15·4280	15·7140	16·0000
81	15·0427	15·3302	15·6208	15·9104	16·2000
82	15·2284	15·5194	15·8136	16·1068	16 4000
83	15·4141	15·7086	16·0064	16·3032	16 6000
84	15·5998	15·8978	16·1992	16·4996	16 8000
85	15·7855	16·0870	16·3920	16·6960	17·0000
86	15·9712	16·2762	16·5848	16·8924	17·2000
87	16·1569	16·4654	16·7776	17·0888	17·4000
88	16·3426	16·6546	16·9704	17·2852	17·6000
89	16·5283	16·8438	17·1632	17·4816	17·8000
90	16·7146	17·0320	17·3560	17·6780	18 0000
91	16·8997	17·2212	17·5488	17·8744	18·2000
92	17·0854	17·4104	17·7416	18·0708	18·4000
93	17·2711	17·6096	17·9344	18·2672	18·6000
94	17·4568	17·7988	18·1272	18·4636	18 8000
95	17·6425	17·9880	18·3200	18·6600	19·0000
96	17·8282	18·1772	18·5128	18·8564	19·2000
97	18·0139	18·3664	18·7056	19·0528	19·4000
98	18·1996	18·5556	18·8984	19 2492	19·6000
99	18·3853	18·7448	19·0912	19 4456	19·8000
100	18·5710	18·9340	19·2840	19·6420	20·0000
101	18·7567	19·1232	19·4768	19·8384	20·2000
102	18·9424	19·3124	19·6696	20·0348	20·4000
103	19·1281	19·5016	19·8624	20·2312	20·6000
104	19·3138	19·6908	20·0552	20·4276	20·8000
105	19·4995	19·8800	20·2480	20·6240	21·0000

TABLE II.

In reference to the quantity of hops required, per barrel, of any strength, from one to forty-five pounds, per barrel; and hops, from one-eighth of a pound, per barrel; progressing by quarters of a pound.

To find the required quantity for any gravity, per barrel, look into the first column, or column of gravities, for 25lbs.; and on the same line will be found 0·1250, or, decimally, one-eighth of a pound.

By multiplying this number by the number of barrels, and cutting off four figures from the right hand towards the left, the remaining figures show the pounds, and cents of a pound.

For example: 0·lbs. 1250 cents, multiplied by 100 barrels, is equal to 12lbs. 5000 cents. This is the line from which all other quantities must be found; it cuts through all the columns, beginning with one-eighth of a pound, or 0·lb. 1250 cents, and progressing, by quarters, up to four pounds of hops, per barrel; therefore, every gravity, for which hops are required, must be first found on the line gravity, above and below, which the required quantity will be indicated; and the figures expressed must be multiplied as before.

Suppose I require two pounds, per barrel, the tenth column will express 2lbs. ·0000 cents, on the line 25 gravity.

Then I require the same proportion of hops for 24lbs. gravity; the line above will express 1lb. ·9200 cents, and for 26lbs. gravity, the line below gives 2·0800; thus every quantity will be accurately expressed within the limits described, which extends to seven pounds and a half, or 7lbs. ·5000 cents, per barrel, for the gravity of 45lbs. per barrel.

With respect to the value, or quantity of hops contained in the return wort, supposing the return to weigh four pounds, per quarter, and the malt to weigh 80lbs. per quarter; then there are four 80th parts of the whole quantity of hops used in the brewing, as no adequate allowance can be made for the impoverished quality of the return wort, to make it equal to the first wort; so it would be in vain to attempt it, either with hops or malt: therefore, if the brewer calculates two pounds in the return wort, for one in the next brewing, it will be sufficiently accurate.

G.	1-8th	1-4th	1-half	3-4ths	4-4ths	5-4ths	6-4ths	7-4ths	8-4ths
1	0·0050	0·0100	0·0200	0·0300	0·0400	0·0500	0·0600	0·0700	0·0800
2	0·0100	0·0200	0·0400	0·0600	0·0800	0·1000	0·1200	0·1400	0·1600
3	0·0150	0·0300	0·0600	0·0900	0·1200	0.1500	0·1800	0·2100	0·2400
4	0·0200	0·0400	0·0800	0·1200	0·1600	0·2000	0·2400	0·2800	0·3200
5	0·0250	0·0500	0·1000	0·1500	0·2000	0·2500	0·3000	0·3500	0·4000
6	0.0300	0·0600	0·1200	0·1800	0·2400	0·3000	0·3600	0·4200	0·4800
7	0.0350	0·0700	0·1400	0·2100	0·2800	0·3500	0·4200	0·4900	0.5600
8	0·0400	0·0800	0·1600	0·2400	0·3200	0·4000	0·4800	0·5600	0·6400
9	0·0450	0·0900	0·1800	0·2700	0·3600	0·4500	0·5400	0·6300	0·7200
10	0·0500	0·1000	0·2000	0·3000	0·4000	0·5000	0·6000	0·7000	0·8000
11	0·0550	0·1100	0·2200	0·3300	0·4400	0·5500	0·6600	0·7700	0·8800
12	0·0600	0·1200	0·2400	0·3600	0·4800	0·6000	0·7200	0·8400	0·9600
13	0·0650	0·1300	0·2600	0·3900	0·5200	0·6500	0·7800	0·9100	1·0400
14	0·0700	0·1400	0·2800	0·4200	0·5600	0·7000	0·8400	0·9800	1·1200
15	0·0750	0·1500	0·3000	0·4500	0·6000	0·7500	0·9000	1·0500	1·2000
16	0·0800	0·1600	0·3200	0·4800	0·6400	0·8000	0·9600	1·1200	1·2800
17	0·0850	0·1700	0·3400	0·5100	0·6800	0·8500	1·0200	1·1900	1·3600
18	0·0900	0·1800	0·3600	0.5400	0·7200	0·9000	1·0800	1·2600	1·4400
19	0·0950	0·1900	0·3800	0·5700	0·7600	0·9500	1·1400	1·3300	1·5200
20	0·1000	0·2000	0·4000	0·6000	0·8000	1·0000	1·2000	1·4000	1·6000
21	0·1050	0·2100	0·4200	0·6300	0·8400	1·0500	1·2600	1·4700	1·6800
22	0·1100	0·2200	0·4400	0·6600	0·8800	1·1000	1·3200	1·5400	1·7600
23	0·1150	0·2300	0·4600	0·6900	0·9200	1·1500	1·3800	1·6100	1·8400
24	0·1200	0·2400	0·4800	0·7200	0·9600	1·2000	1·4400	1·6800	1·9200
25	0·1250	0·2500	0·5000	0·7500	1·0000	1·2500	1·5000	1·7500	2·0000
26	0·1300	0·2600	0·5200	0·7800	1·0400	1·3000	1·5600	1·8200	2·0800
27	0 1350	0·2700	0·5400	0·8100	1·0800	1·3500	1·6200	1·8900	2·1600
28	0 1400	0·2800	0·5600	0·8400	1·1200	1·4000	1·6800	1·9600	2·2400
29	0·1450	0·2900	0·5800	0·8700	1·1600	1 4500	1·7400	2·0300	2·3200
30	0·1500	0·3000	0·6000	0·9000	1·2000	1·5000	1·8000	2·1000	2·4000
31	0·1550	0·3100	0·6200	0·9300	1·2400	1·5500	1·8600	2·1700	2·4800
32	0·1600	0 3200	0·6400	0·9600	1·2800	1·6000	1.9200	2·2400	2·5600
33	0·1650	0·3300	0·6600	1·9900	1·3200	1·6500	1·9800	2·3100	2·6400
34	0·1700	0 3400	0·6800	1·0200	1·3600	1·7000	2·0400	2·3800	2·7200
35	0·1750	0·3500	0·7000	1·0500	1·4000	1·7500	2·1000	2·4500	2·8000
36	0·1800	0·3600	0·7200	1·0800	1·4400	1·8000	2·1600	2·5200	2·8800
37	0·1850	0·3700	0·7400	1·1100	1·4800	1·8500	2·2200	2·5900	2·9600
38	0·1900	0·3800	0·7600	1·1400	1·5200	1·9000	2·2800	2·6600	3·0400
39	0·1950	0 3900	0·7800	1·1700	1·5600	1·9500	2·3400	2·7300	3·1200
40	0·2000	0·4000	0.8000	1·2000	1·6000	2·0000	2·4000	2·8000	3·2000
41	0·2050	0·4100	0·8200	1·2300	1·6400	2·0500	2·4600	2·8700	3·2800
42	0·2100	0·4200	0·8400	1·2600	1·6800	2·1000	2·5200	2·9400	3·3600
43	0·2150	0·4300	0·8600	1·2900	1·7200	2·1500	2·5800	3·0100	3·4400
44	0 2200	0·4400	0·8800	1·3200	1·7600	2·2000	2·6400	3·0800	3·5200
45	0·2250	0·4500	0·9000	1.3500	1·8000	2·2500	2·7000	3·1500	3·6000

G.	9-4ths	10-4ths	11-4ths	12-4ths	13-4ths	14-4ths	15-4ths	16-4ths
1	0·0900	0·1000	0·1100	0·1200	0·1300	0·1400	0·1500	0·1600
2	0·1800	0·2000	0·2200	0·2400	0·2600	0·2800	0·3000	0·3200
3	0·2700	0·3000	0·3300	0·3600	0·3900	0·4200	0·4500	0·4800
4	0·3600	0·4000	0·4400	0·4800	0·5200	0·5600	0·6000	0·6400
5	0·4500	0·5000	0·5500	0·6000	0·6500	0·7000	0·7500	0·8000
6	0·5400	0·6000	0·6600	0·7200	0·7800	0·8400	0·9000	0·9600
7	0·6300	0·7000	0·7700	0·8400	0·9100	0·9800	1·0500	1·1200
8	0·7200	0·8000	0·8800	0·9600	1·0400	1·1200	1·2000	1·2800
9	0·8100	0·9000	0·9900	1·0800	1·1700	1·2600	1·3500	1·4400
10	0·9000	1·0000	1·1000	1·2000	1·3000	1·4000	1·5000	1·6000
11	0·9900	1·1000	1·2100	1·3200	1·4300	1·5400	1·6500	1·7600
12	1·0800	1·2000	1·3200	1·4400	1·5600	1·6800	1·8000	1·9200
13	1·1700	1·3000	1·4300	1·5600	1·6900	1·8200	1·9500	2·2800
14	1·2600	1·4000	1·5400	1·6800	1·8200	1·9600	2·1000	2·0400
15	1.3500	1·5000	1·6500	1·8000	1·9500	2·1000	2·2500	2·4000
16	1·4400	1·6000	1·7600	1·9200	2·0800	2·2400	2·4000	2·5600
17	1·5300	1·7000	1·8700	2·0400	2·2100	2·3800	2·5500	2·7200
18	1·6200	1·8000	1·9800	2·1600	2·3400	2·5200	2·7000	2·8800
19	1·7100	1·9000	2·0900	2·2800	2·4700	2.6600	2·8500	3·0400
20	1·8000	2·0000	2·2000	2·4000	2·6000	2·8000	3·0000	3·2000
21	1·8900	2·1000	2·3100	2·5200	2·7300	2·9400	3·1500	3·3600
22	1·9800	2·2000	2·4200	2·6400	2·8600	3·0800	3·3000	3·5200
23	2·0700	2·3000	2·5300	2·7600	2·9900	3·2200	3·4500	3·6800
24	2·1600	2·4000	2·6400	2·8800	3·1200	3·3600	3·6000	3·8400
25	2·2500	2·5000	2·7500	3·0000	3·2500	3·5000	3·7500	4·0000
26	2·3400	2·6000	2·8600	3·1200	3·3800	3·6400	3·9100	4·1600
27	2·4300	2·7000	2·9700	3·2400	3·5100	3·7800	4·0500	4·3200
28	2·5200	2·8000	3·0800	3·3600	3·6400	3·9200	4·2000	4·4800
29	2·6100	2·9000	3·1900	3·4800	3·7700	4·0600	4·3500	4·6400
30	2·7000	3·0000	3·3000	3·6000	3·9000	4·2000	4·5000	4·8000
31	2·7900	3·1000	3·4100	3·7200	4·0300	4·3400	4·6500	4·9600
32	2·8800	3·2000	3·5200	3·8400	4·1600	4·4800	4·8000	5·1200
33	2·9700	3·3000	3·6300	3·9600	4·2900	4·6200	4·9500	5·2800
34	3·0600	3·4000	3·7400	4·0800	4·4200	4·7600	5·1000	5·4400
35	3·1500	3·5000	3·8500	4·2000	4·5500	4·9000	5·2500	5·6000
36	3·2400	3·6000	3·9600	4·3200	4·6800	5·0400	5·4000	5·7600
37	3·3300	3·7000	4·0700	4·4400	4·8100	5·1800	5·5500	5·9200
38	3·4200	3·8000	4·1800	4·5600	4·9400	5·3200	5·7000	6·0800
39	3·5100	3·9000	4·2900	4·6800	5·0700	5·4600	5·8500	6·2400
40	3·6000	4 0000	4·4000	4·8000	5·2000	5·6000	6·0000	6·4000
41	3·6900	4·1000	4·5100	4·9200	5·3300	5·7400	6·1500	6·5600
42	3·7800	4·2000	4·6200	5·0400	5·4600	5·8800	6·3000	6·7200
43	3·8700	4·3000	4·7300	·51600	5·5900	6·0200	6·4500	6·8800
44	3·9600	4.4000	4·8400	5·2800	5·7200	6·1600	6·6000	7·0400
45	4·0500	4·5000	4·9500	5·4000	5·8500	6·3000	6·7500	7·2000

TABLE III.

This Table refers to the value of a pound of saccharine, of any malt, weighing between 70 and 105 lbs. gravity, per quarter, and at any price between 50 and 70 shillings, per quarter; therefore, I require to know the price of the pound saccharine, when the malt's gravity is 70lbs. per quarter, and the price is 60 shillings per quarter?

Find the price, 60 shillings, in the first column, and on the same line in the second column is 10d. 80 cents; proceed on the same line, and, under 90lbs. gravity, per quarter, will be 8d.·00 per lb.

Then multiply any gravity, per barrel, by the cost, per lb. gravity, of the malt, and the prime cost of the malt, per barrel, will be correctly ascertained.

TABLE III.

Gr.	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
50	8·57	8·44	8·33	8·24	8·11	8·00	7·89	7·79	7·69	7·59	7·50	7·40	7·31	7·22	7·14	7·04
51	8·74	8·61	8·50	8·38	8·27	8·16	8·05	7·94	7·84	7·74	7·65	7·56	7·46	7·37	7·28	7·20
52	8·91	8·78	8·66	8·54	8·44	8·32	8·21	8·10	8·00	7·89	7·80	7·70	7·62	7·51	7·42	7·34
53	9·08	8·95	8·83	8·71	8·59	8·48	8·36	8·25	8·15	8·05	7·95	7·86	7·75	7·66	7·57	7·47
54	9·25	9·12	9·00	8·87	8·75	8·64	8·52	8·41	8·31	8·20	8·10	8·00	7·90	7·80	7·70	7·62
55	9·42	9·29	9·16	9·04	8·91	8·80	8·69	8·57	8·46	8·35	8·24	8·14	8·04	7·95	7·85	7·76
56	9·60	9·46	9·33	9·20	9·08	8·96	8·84	8·72	8·61	8·50	8·40	8·29	8·19	8·09	8·00	7·90
57	9·79	9·63	9·50	9·37	9·23	9·12	9·00	8·88	8·76	8·65	8·55	8·44	8·34	8·24	8·15	8·04
58	9·94	9·80	9·66	9·53	9·40	9·28	9·15	9·03	8·92	8·81	8·70	8·59	8·48	8·38	8·28	8.18
59	10·11	9·97	9·83	9·69	9·56	9·44	9·31	9·19	9·07	8·96	8·85	8·74	8·64	8·53	8·42	8·33
60	10·28	10·10	10·00	9·80	9·75	9·60	9·47	9·35	9·23	9·11	9·00	8·88	8·78	8·68	8·57	8·47
61	10·45	10·30	10·16	10·02	9·89	9·76	9·64	9·50	9·38	9·20	9·15	9·03	8·92	8·81	8·71	8·61
62	10·62	10·47	10·33	10·19	10·05	9·92	9·78	9·66	9·53	9·41	9·30	9·18	9·07	8·96	8·85	8·75
63	10·80	10·64	10·50	10·35	10·21	10·08	9·94	9·81	9·69	9·56	9·45	9·33	9·21	9·10	9·00	8 89
64	10·97	10·81	10·66	10·52	10·37	10·24	10·10	9·97	9·84	9·72	9·60	9·48	9·36	9·25	9·14	9·03
65	11·14	10·98	10·83	10·68	10·55	10·40	10·26	10·10	10·00	9·87	9·75	9·64	9·51	9·39	9·28	9·17
66	11·31	11·17	11·00	10·84	10·70	10·56	10·42	10·28	10·15	10·00	9·90	9·77	9·65	9·54	9·42	9·31
67	11·48	11·32	11·16	11·00	10·86	10·72	10·57	10·44	10·30	10·17	10·05	9·92	9·80	9·68	9·57	9·45
68	11·65	11·49	11·33	11·17	11·02	10·88	10·73	10·59	10·46	10·32	10·20	10·01	9·95	9·83	9·71	9·60
69	11·82	11·66	11·50	11·34	11·18	11·04	10·89	10·75	10·61	10·48	10·35	10·22	10·09	9·97	9·85	9·74
70	12·00	11·83	11·66	11·50	11·35	11·20	11·05	10·90	10·76	10·63	10·50	10·37	10·24	10·12	10·00	9·88

Gr.	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
50	6·97	6·91	6·82	6·74	6·68	6·59	6·52	6·46	6·38	6·31	6·25	6·18	6·12	6·06	6·00	5·94	5·88	5·82	5·76	5·71
51	7·11	7·03	6·95	6·87	6·80	6·72	6·65	6·58	6·51	6·44	6·37	6·30	6·24	6·18	6·12	6·06	6·00	5·94	5·88	5·82
52	7·25	7·17	7·09	7·01	6·93	6·85	6·78	6·71	6·64	6·57	6·50	6·43	6·37	6·31	6·25	6·19	6·13	6·07	6·01	5·95
53	7·39	7·31	7·22	7·14	7·06	6·98	6·91	6·84	6·77	6·70	6·63	6·56	6·50	6·43	6·35	6·29	6·23	6·17	6·11	6·05
54	7·53	7·44	7·36	7·28	7·20	7·12	7·05	6·98	6·91	6·84	6·77	6·70	6·63	6·56	6·49	6·42	6·35	6·29	6·23	6·17
55	7·67	7·58	7·50	7·40	7·33	7·25	7·17	7·09	7·01	6·93	6·85	6·77	6·69	6·63	6·57	6·51	6·45	6·39	6·33	6·27
56	7·81	7·72	7·63	7·56	7·46	7·38	7·30	7·22	7·14	7·06	6·99	6·92	6·85	6·78	6·71	6·65	6·59	6·53	6·47	6·41
57	7·94	7·86	7·72	7·68	7·60	7·51	7·43	7·35	7·27	7·19	7·11	7·04	6·97	6·90	6·83	6·76	6·70	6·64	6·58	6·52
58	8·09	8·00	7·90	7·82	7·73	7·64	7·56	7·48	7·40	7.30	7·24	7·17	7·10	7·03	6·96	6·89	6·83	6·77	6·71	6·65
59	8·23	8·13	8·03	7·95	7·86	7·78	7·69	7·60	7·51	7·43	7·35	7·27	7·20	7·13	7·06	6·99	6·92	6·86	6·80	6·74
60	8·37	8·27	8·18	8·08	8·00	7·91	7·82	7·73	7·64	7·55	7·47	7·39	7·31	7·23	7·16	7·09	7·03	6·97	6·91	6·85
61	8·51	8·41	8·31	8·22	8·13	8·04	7·94	7·86	7·77	7·68	7·60	7·52	7·44	7·36	7·29	7·22	7·15	7·09	7·03	6·97
62	8·65	8·55	8·44	8·35	8·26	8·17	8·08	7·99	7·90	7·81	7·73	7·65	7·57	7·49	7·41	7·34	7·27	7·20	7·14	7·08
63	8·79	8·68	8·59	8·49	8·40	8·30	8·21	8·12	8·03	7·94	7·85	7·77	7·69	7·61	7·53	7·46	7·39	7·32	7·26	7·20
64	8·93	8·83	8·72	8·62	8·53	8·43	8·34	8·25	8·16	8·07	7·98	7·90	7·82	7·74	7·66	7·58	7·51	7·44	7·37	7·31
65	9·06	8·93	8·86	8·76	8·66	8·57	8·48	8·39	8·30	8·21	8·12	8·03	7·94	7·86	7·78	7·70	7·63	7·56	7·49	7·42
66	9·20	9·10	9·00	8·90	8·80	8·70	8·61	8·52	8·43	8·34	8·25	8·17	8·07	7·99	7·91	7·83	7·75	7·68	7·61	7·54
67	9·34	9·24	9·13	9·03	8·93	8·84	8·75	8·66	8·57	8·48	8·39	8·30	8·21	8·13	8·05	7·97	7·89	7·81	7·73	7·65
68	9·48	9·38	9·25	9·16	9·06	8·96	8·87	8·78	8·69	8·60	8·51	8·42	8·33	8·25	8·17	8·09	8·01	7·93	7·85	7·77
69	9·62	9·51	9·40	9·30	9·20	9·09	9·00	8·91	8·82	8·73	8·64	8·55	8·46	8·37	8·29	8·20	8·12	8·04	7·96	7·88
70	9·76	9·65	9·54	9·44	9·34	9·23	9·14	9·05	8·96	8·87	8·78	8·69	8·60	8·51	8·42	8·33	8·24	8·16	8·08	8·00

TABLE IV.

The Price of Hops, per lb. and per cwt.

Hops. Price per lb.	Hops. Price per Cwt.			Hops. Price per lb.	Hops Price per Cwt.		
d.	£.	*s.*	*d.*	*d.*	£.	*s.*	*d.*
1	0	9	4	19	8	17	4
2	0	18	8	20	9	6	8
3	1	8	0	21	9	16	0
4	1	17	4	22	10	5	4
5	2	6	8	23	10	14	8
6	2	16	0	24	11	4	0
7	3	5	4	25	11	13	4
8	3	14	8	26	12	2	8
9	4	4	0	27	12	12	0
10	4	13	4	28	13	1	4
11	5	2	8	29	13	10	8
12	5	12	0	30	14	0	0
13	6	1	4	31	14	9	4
14	6	10	8	32	14	18	8
15	7	0	0	33	15	8	0
16	7	9	4	34	15	17	4
17	7	18	8	35	16	6	8
18	8	8	0	36	16	16	0

TABLE V.

Column 1. Shows the gravity of the gyle, from 45 down to 6 lbs. per barrel.

Column 2. The pitching heat required to reach 70° at the cleansing point, from 45 down to 6 lbs. per barrel.

Column 3. The advance of heat required to make 70°, from 45 gravity down to 6 lbs. per barrel.

Column 4. The heat 70° made up, in every instance, by the pitching and the advancing heats.

Column 5. The gravity required for transparency, spirituosity, or preservative quality; which is from one-third to one-fourth of the original gravity.

Column 6. Gravity lost in fermentation; leaving from one-third to one-fourth unattenuated matter, as in column 5.

Column 7. The waste, in gallons and parts, per 10 barrels, occasioned by fermentation, to be found in the solid yeast of the gyle, and the bottoms of the tun.

Column 8. The number of hours required to ferment a gyle, according to the statement in the foregoing columns, in a place of even and proper temperature.

The temperature of the fermenting-room is supposed to be 56°.

TABLE V.

Gravity	Pitching Heat.	Advance of Heat.	Cleansing Point.	Gr. at Cleansing Point.	Gravity reduced	Waste per 10 Barrels.	Hours for fermenting
45	47·50	22·50	70	11·25	33·75	25·51	135
44	48	22	70	11	33	24·94	132
43	48·50	21·50	70	10·75	32·25	24·38	129
42	49	21	70	10·50	31·50	23·82	126
41	49·50	20·50	70	10·25	30·75	23·26	123
40	50	20	70	10	30	22·70	120
39	50·50	19·50	70	9·75	29·25	22·13	117
38	51	19	70	9·50	28·50	21·57	114
37	51.50	18·50	70	9·25	27·75	21·01	111
36	52	18	70	9	27	20·45	108
35	52·50	17·50	70	8·75	26·25	19·89	105
34	53	17	70	8.50	25·50	19·32	102
33	53·50	16·50	70	8·25	24·75	18·76	99
32	54	16	70	8	24	18·20	96
31	54·50	15·50	70	7·75	23·25	17·64	93
30	55	15	70	7.50	22·50	17·08	90
29	55·50	14.50	70	7·25	21·75	16·51	87
28	56	14	70	7	21	16·95	84
27	56·50	13·50	70	6·75	20·25	15·39	81
26	57	13	70	6·50	19·50	14·83	78
25	57·50	12·50	70	6.25	18·75	14·27	75
24	58	12	70	6	18	13·70	72
23	58·50	11·50	70	5·75	17·25	13·22	69
22	59	11	70	5·50	16·50	12·66	66
21	59·50	10·50	70	5.25	15·75	12·10	63
20	60	10	70	5	15	11·54	60
19	60·50	9·50	70	4·75	14·25	10·97	57
18	61	9	70	4·50	13·50	10·31	54
17	61·50	8·50	70	4.25	12·75	9·75	51
16	62	8	70	4	12	9·19	48
15	62·50	7·50	70	3·75	11·25	8·53	45
14	63	7	70	3·50	10·50	7·96	42
13	63·50	6·50	70	3·25	9·75	7·40	39
12	64	6	70	3	9	6·84	36
11	64·50	5·50	70	2·75	8·25	6·28	33
10	65	5	70	2.50	7·50	5·72	30
9	65·50	4·50	70	2.25	6·75	5·16	27
8	66	4	70	2	6	4·60	24
7	66·50	3·50	70	1·75	5·25	4·04	21
6	67	3	70	1·50	4·50	3·48	18

TABLE VI.

REFERS to the quantity of yeast required in pounds and parts of a pound, per barrel, of worts of any strength.

This Table is composed, first, of a column of gravity, beginning at 45 lbs. per barrel, and 36 columns of proportions of yeast, for any degree the brewer may think proper to pitch at, or to add the yeast to his worts, beginning at 45 degrees, and progressing on to 80.

Suppose the worts are altogether at 50°, and weighing 32 lbs. gravity, per barrel, and there are 100 barrels; at 32 lbs. gravity, 2 lbs. ·4864 × 100 barrels = 248 lbs. ·6400 cents is expressed.

Before leaving the subject of this Table, the author begs to impress on the minds of his readers the absolute necessity of attending more particularly to the rule of proportion for the application of the yeast to the worts, in order to conduct the fermentation, which is a very delicate and interesting department.

A wort of double the strength must require a double portion of yeast at the same pitching heat; and double the quantity of fermentable matter, to dissolve into a spirituous quality. In respect to the freshness of yeast, the author means that of the freshest and best quality, (as referred to under the head of Yeast) and produced from a good fermentation.

The brewer will, of course, at all times endeavour to secure that which is most advantageous for his purpose.

It may sometimes be necessary to make an allowance for lightness or the want of freshness; this will happen from necessity, and he must go to another brewer for his yeast, for change.

Let the most successful brewer compare the Table with his general practice; and if he finds only one statement in the Table which his judgment approves, all the rest will most assuredly meet the same approbation. He may use more or less yeast; but the proportions between one and the other will remain unaltered.

The yeast is always to be added to the worts in an expanded state, as soon as they commence running into the gyle-tun.

TABLE VI.

G.	45	46	47	48	49	50	51	52	53
45	3·7500	3·7000	3·6500	3·6000	3·5500	3·5000	3·4500	3·4000	3·3500
44	3·6652	3·6168	3·5684	3·5200	3·4672	3·4188	3·3704	3·3220	3·2736
43	3·5819	3·5346	3·4873	3·4400	3·3884	3·3411	3·2928	3·2465	3·1992
42	3·4986	3·4524	3·4062	3·3600	3·3096	3·2634	3·2172	3·1710	3·1248
41	3·4163	3·3702	3·3251	3·2800	3·2308	3·1857	3·1406	3·0955	3·0504
40	3·3320	3·2800	3·2440	3·2000	3·1520	3·1080	3·0640	3·0200	2·9760
39	3·2487	3·2058	3·1629	3·1200	3·0732	3·0303	2·9874	2.9445	2·9316
38	3·1654	3·1236	3·0818	3·0400	2·9924	2·9526	2·9108	2·8690	2·8272
37	3·0821	3·0414	3·0007	2·9600	2·9156	2·8749	2·8342	2·7935	2·7528
36	2·9988	2·9592	2 9196	2·8800	2·8368	2·7972	2·7576	2·7180	2·6784
35	2·9115	2·8770	2·8385	2·8000	2·7580	2·7195	2·6810	2·6425	2·6040
34	2·8322	2·7948	2·7574	2·7200	2·6792	2·6418	2·6044	2·5670	2·5196
33	2·7489	2·7126	2·6763	2·6400	2·6004	2·5641	2·5178	2·4915	2·4552
32	2·6656	2·6304	2·5952	2·5600	2·5216	2·4864	2·4512	2·4160	2·3808
31	2·5823	2·5482	2·5141	2·4800	2·4428	2·4087	2·3746	2·3405	2·3064
30	2·4990	2·4660	2·4330	2·4000	2·3640	2·3310	2·2980	2·2650	2·2320
29	2·4157	2·3838	2·3519	2·3200	2·2852	2·2533	2·2214	2·1895	2·1876
28	2·3324	2·3016	2·2707	2·2400	2·2068	2·1756	2·1448	2·1140	2·0832
27	2·2491	2·2194	2·1897	2·1600	2·1276	2·0979	2·0882	2·0385	1·9888
26	2·1658	2·1372	2·1086	2·0800	2·0488	2·0202	1·9916	1.9630	1·9344
25	2·0825	2·0550	2·0275	2·0000	1·9700	1·9425	1·9150	1·8875	1·8600
24	1·9992	1·9728	1·9464	1·9200	1·8912	1·8648	1·8384	1·8120	1·7856
23	1·9159	1·8906	1·8653	1·8400	1·8124	1·7871	1.7618	1·7365	1·7112
22	1·8326	1·8084	1·7842	1·7600	1·7336	1·7094	1·6852	1·6610	1·6368
21	1·7493	1·7262	1·7031	1·6800	1·6548	1·6317	1·6086	1·5855	1·5624
20	1·6660	1·6440	1·6220	1·6000	1·5760	1·5540	1·5320	1·5100	1·4880
19	1·5827	1·5618	1·5409	1·5200	1·4972	1·4763	1·4554	1·4345	1·4136
18	1·4994	1·4796	1·4598	1·4400	1·4084	1·3986	1·3788	1·3590	1·3392
17	1·4161	1·3974	1·3787	1·3600	1·3396	1·3209	1·3022	1·2835	1·2648
16	1·3328	1·3152	1·2976	1·2800	1·2608	1·2432	1·2256	1·2080	1·1904
15	1·2495	1·2330	1·2165	1·2000	1·1820	1·1655	1·1490	1·1325	1·1160
14	1·1662	1·1508	1·1354	1·1200	1·1032	1·0878	1·0724	1·0570	1·0416
13	1·0829	1·0686	1·0543	1·0400	1·0244	1·0101	0·9958	0·9815	0·9672
12	0·9996	0·9864	0·9732	0·9600	0·9456	0·9324	0·9192	0·9060	0·8928
11	0·9163	0·9042	0·8921	0·8800	0.8668	0·8547	0·8426	0·8305	0.8184
10	0·8330	0·8220	0·8110	0·8000	0·7880	0·7770	0·7660	0·7550	0.7440
9	0·7497	0·7398	0·7299	0·7200	0·7092	0·6993	0·6894	0·6795	0·6696
8	0·6664	0·6576	0·6488	0·6400	0·6304	0·6216	0·6128	0·6040	0·5952
7	0·5831	0·5754	0·5677	0·5600	0·5516	0·5439	0·5362	0·5285	0·5208
6	0·4998	0·4932	0·4886	0·4800	0·4728	0·4662	0·4596	0·4530	0·4464

TABLE VI.—*(Continued.)*

G.	54	55	56	57	58	59	60	61	62
45	3·3000	3·2500	3 2000	3·1500	3·1000	3·0500	3·0000	2·9500	2·9000
44	3·2252	3·1768	3·1284	3·0800	3·0272	2·9708	2·9304	2 8820	2·8336
43	3·1519	3·1046	3 0573	3·0100	2·9584	2·9111	2·8638	2 8165	2·7692
42	3·0786	3·0324	2·9862	2·9400	2·8896	2·8434	2·7972	2·7510	2·7048
41	3·0053	2·9602	2·9151	2·8700	2·8208	2·7754	2·7306	2·6865	2·6404
40	2·9320	2·8880	2·8440	2·8000	2·7520	2·7080	2·6604	2·6200	2·5760
39	2·8587	2·8158	2-7729	2·7300	2·6832	2·6403	2·5974	2·5545	2·5116
38	2·7854	2 7436	2·7018	2·6600	2·6144	2·5726	2·5308	2·4890	2·4472
37	2·7121	2·6714	2·6307	2·5900	2·5456	2·5049	2·4642	2·4235	2·3828
36	2·6388	2 5992	2·5596	2·5200	2·4768	2·4372	2·3976	2·3380	2·3184
35	2 5655	2 5270	2·4885	2·4500	2·4080	2·3695	2·3310	2·2925	2·2540
34	2·4222	2 4548	2·4174	2·3800	2·3392	2·3018	2·2644	2·2270	2·1896
33	2·4189	2 3826	2·3463	2·3100	2·2704	2·2341	2·1978	2·1615	2·1252
32	2·3456	2·3104	2·2752	2·2400	2·2016	2·1664	2·1312	2·0960	2·0508
31	2·2783	2 2382	2·2041	2·1700	2·1328	2·0987	2·0646	2·0305	1·9964
30	2·1990	2·1660	2·1330	2·1000	2·0640	2·0310	1·9980	1·9650	1·9302
29	2·1257	2 0938	2.0619	2 0300	1·9952	1·9633	1·9384	1·8995	1·8576
28	2 0524	2·0216	1·9908	1·9600	1·9264	1·8956	1·8648	1·8340	1·8032
27	1·9791	1·9494	1·9197	1 8900	1·8576	1·8249	1·7982	1·7685	1·7388
26	1·9058	1 8776	1·8486	1·8200	1·7888	1·7602	1·7316	1·7030	1·6744
25	1·8325	1·8050	1·7775	1·7500	1·7200	1·6925	1·6650	1·6375	1·6100
24	1·7592	1·7328	1·7064	1·6800	1·6512	1·6248	1·5984	1·5720	1·5456
23	1·6859	1·6606	1·6353	1·6100	1·5824	1·5571	1·5318	1·5065	1·4712
22	1·6126	1·5884	1·5642	1·5400	1·5136	1·4894	1.4652	1·4410	1·4168
21	1·5393	1·5162	1·4931	1 4700	1·4448	1·4217	1·3986	1·3755	1·3524
20	1·4660	1 4440	1·4220	1 4000	1·3760	1·3540	1·3320	1·3100	1·2880
19	1·3927	1·3718	1·3509	1·3300	1·3072	1·2863	1·2684	1·2345	1·2286
18	1·3194	1·2996	1·2798	1·2600	1·2384	1 2186	1·1988	1·1790	1·1592
17	1·2461	1 2274	1·2087	1·1900	1·1696	1·1509	1·1322	1·1135	1·0948
16	1·1728	1·1552	1·1376	1·1200	1·1008	1·0832	1 0656	1·0480	1·0304
15	1·0995	1·0830	1·0665	1·0500	1·0320	1·0155	0·9990	0·9925	0·9660
14	1·0262	1·0108	0·9954	0·9800	0·9532	0·9448	0·9324	0·9170	0·9016
13	0·9529	0·9386	0·9243	0·9100	0·8944	0·8801	0·8658	0·8575	0·8372
12	0·8796	0·8664	0·8532	0·8400	0·8256	0·8124	0·7982	0·7860	0·7728
11	0·8063	0·7942	0·7821	0 7700	0·7568	0·7447	0·7326	0·7205	0·7084
10	0·7330	0·7220	0·7110	0·7000	0·6880	0·6770	0·6660	0 6550	0·6440
9	0·6597	0 6498	0·6399	0·6300	0·6192	0·6093	0·5994	0·5895	0·5796
8	0·5864	0·5776	0·5688	0.5600	0·5504	0·5416	0 5228	0·5240	0·5152
7	0·5131	0·5054	0·4977	0·4900	0·4716	0·4739	0·4662	0·4585	0·4508
6	0·4398	0·4332	0·4266	0·4200	0·4128	0·4062	0·3996	0·3930	0·3864

TABLE VI.—(*Continued.*)

G.	63	64	65	66	67	68	69	70	71
45	2·8500	2·8000	2·7500	2·7000	2·6500	2·6000	2·5500	2·5000	2·4500
44	2·7852	2·7358	2·6884	2·6400	2·5872	2·5388	2·4904	2·4420	2·3936
43	2·7219	2·6746	2·6273	2·5800	2·5284	2·4811	2·433[illegible]	2·3865	2·3392
42	2·6586	2·6124	2·5662	2·5200	2 4696	2·4234	2·3772	2·3310	2·2848
41	2·5953	2·5502	2·5051	2·4600	2·4108	2·3657	2·320[illegible]	2·2755	2·2304
40	2·5320	2·4880	2·4440	2·4000	2·3520	2·3080	2·2640	2 2200	2·1760
39	2·4687	2·4258	2·3829	2·3400	2·2932	2·2503	2·2074	2·1645	2·1216
38	2·4054	2·3636	2·3218	2·2800	2·2344	2·1926	2·1508	2·1190	2·0672
37	2·3421	2·3014	2 2607	2·2200	2·1756	2·1349	2·0942	2·0535	2·0128
36	2·2788	2·2392	2·1996	2·1600	2·1168	2·0772	2·0376	1·9980	1·9584
35	2·2155	2·1770	2·1385	2·1000	1·0580	2·0215	1·9810	1·9425	1·9040
34	2·1522	2·1148	2·0774	2·0400	1·9992	1·9618	1·9244	1·8870	1·8496
33	2·0889	2·0526	2·0163	1·9800	1·9404	1·9041	1·8677	1·8315	1·7952
32	2·0256	1·9904	1·9552	1·9200	1·8816	1·8464	1·8112	1·7760	1·7408
31	1·9623	1·9282	1·8941	1·8600	1·8228	1·7887	1·7546	1·7205	1·6864
30	1·8990	1·8660	1·8330	1·8000	1·7640	1·7310	1·6980	1·6650	1·6320
29	1·8357	1·8038	1·7719	1·7400	1·7052	1·6733	1·6414	1·6095	1·5776
28	1·7724	1·7416	1·7108	1·6800	1·6464	1·6156	1·5848	1·5540	1·5232
27	1·7091	1 6794	1·6497	1·6200	1·5876	1·5579	1·5282	1·4985	1·4688
26	1·6458	1·6172	1·5886	1·5600	1·5288	1·5002	1·4716	1·4430	1·4144
25	1·5825	1·5550	1·5275	1·5000	1·4700	1·4425	1·4150	1·3875	1·3600
24	1·5192	1·4928	1.4664	1·4400	1·4112	1·3848	1·3584	1·3320	1·2956
23	1·4559	1·4306	1.4053	1·3800	1 3524	1·3271	1·3018	1·2765	1·2512
22	1·3926	1·3684	1·3442	1·3200	1·2936	1·2694	1·2452	1·2210	1·1968
21	1·3293	1·3062	1·2831	1·2600	1·2348	1·2017	1·1886	1·1655	1·1424
20	1·2660	1·2440	1·2220	1·2000	1·1760	1·1540	1·1320	1·1100	1·0880
19	1·2027	1·1818	1·1609	1·1400	1·1172	1·0963	1·0754	1·0545	1·0336
18	1·1394	1·1196	1·0998	1·0800	1 0584	0·0386	1·0188	0·9990	0·9792
17	1·0761	1·0574	1·0387	1·0200	0·9996	0·9809	0·9622	0·9435	0·9348
16	1·0128	0·9952	0·9776	0·9600	0·9408	0·9232	0·9056	0·8880	0·8704
15	0·9495	0·9330	0·9165	0·9000	0·8820	0·8655	0·8490	0·8325	0·8160
14	0·8862	0·8708	0·8554	0·8400	0·8232	0·8078	0·7924	0·7770	0·7616
13	0·8229	0·8086	0·7943	0·7800	0 7644	0·7501	0·7358	0·7215	0·7072
12	0·7696	0·7464	0·7332	0·7200	0·7056	0·6924	0·6792	0·6660	0·6528
11	0·6963	0·6842	0·6721	0·6600	0 6468	0·6347	0·6226	0·6105	0·5984
10	0·6330	0·6220	0·6110	0·6000	0 5880	0 5770	0·5660	0·5550	0·5440
9	0·5697	0·5598	0·5499	0·5400	0·5292	0·5193	0·5094	0·4995	0·4896
8	0·5064	0·4976	0·4888	0·4800	0·4704	0·4616	0·4528	0·4440	0·4352
7	0·4431	0·4354	0·4277	0·4200	0·4116	0·4039	0·3962	0·3895	0·3808
6	0·3798	0 3732	0·3666	0·3600	0·3528	0·3462	0·3396	0·3330	0·3264

TABLE VI.—*(Continued.)*

G.	72	73	74	75	76	77	78	79	80
45	2·4000	2·3500	2·3000	2·2500	2·2000	2·1500	2·1000	2·0500	2·0000
44	2·3452	2·2968	2·2484	2·2000	2·1472	2·0988	2·0504	2·0020	1·9536
43	2·2919	2·2446	2·1973	2·1500	2·0984	2·0511	2·0048	1·9565	1·9092
42	2 2386	2·1924	2·1462	2 1000	2·0496	2·0034	1·9572	1·9110	1·8648
41	2·1853	2·1402	2·0951	2·0500	1·0008	1·9557	1·9106	1·8655	1·8204
40	2·1320	2·0880	2·0440	2·0000	1·9520	1·9080	1·8640	1·8200	1·7760
39	2·0787	2·0358	1·9929	1·9500	1·9012	1·8603	1·8174	1·7745	1·7316
38	2·0254	1·9836	1.9418	1·9000	1·8544	1·8126	1·7708	1·7290	1·6872
37	1·9721	1·9314	1·8807	1·8500	1·8056	1·7649	1·7242	1·6835	1·6428
36	1·9188	1·8796	1·8396	1·8000	1·7568	1·7172	1·6776	1·6380	1·5984
35	1·8655	1·8270	1·7885	1·7500	1·7080	1·6695	1·6310	1·5935	1·5440
34	1·8122	1·7748	1·7374	1·7000	1·6592	1·6118	1·5844	1·5470	1·5090
33	1·7589	1·7226	1·6863	1·6500	1·6104	1·5741	1·5378	1·5015	1·4652
32	1·7056	1·6704	1·6352	1·6000	1·5616	1·5264	1·4912	1·4560	1·4208
31	1·6523	1·6182	1·5841	1·5500	1·5128	1·4787	1·4446	1·4105	1·3764
30	1·5990	1·5660	1·5330	1·5000	1·4640	1·4310	1·3980	1·3650	1·3320
29	1·5457	1·5138	1·4819	1·4500	1·4152	1·3833	1·3514	1·3195	1·2876
28	1·4924	1·4616	1·4308	1·4000	1·3664	1·3356	1·3088	1·3740	1·2432
27	1·4391	1·4094	1·3797	1·3500	1·3176	1·2879	1·2582	1·2285	1·1888
26	1·3858	1·3572	1·3286	1·3000	1·2688	1·2402	1·2116	1·1830	1·1544
25	1·3325	1·3050	1·2775	1·2500	1·2200	1·1923	1·1650	1·1375	1·1100
24	1·2792	1·2528	1·2264	1·2000	1·1712	1·1448	1·1184	1·0920	1·0656
23	1·2259	1·2006	1·1753	1·1500	1·1224	1·0971	1·0718	1·0465	1·0212
22	1·1726	1·1484	1·1242	1·1000	1·0736	1·0494	1·0252	1·0010	0·9768
21	1·1193	1·0962	1·0731	1·0500	1·0548	1·0011	0·9786	0·9555	0·9324
20	1·0660	1·0446	1·0220	0·0000	0·9760	0·9540	0·9320	0·9100	0·8880
19	1·0127	0·9918	0·9709	0·9500	0·9272	0·9063	0·8854	0·8645	0·8336
18	0·9594	0·9396	0·9198	0·9000	0·8784	0·8586	0·8388	0·8190	0·7992
17	0·9061	0·8874	0·8687	0·8500	0·8296	0·8109	0·7922	0·7735	0·7548
16	0·8528	0·8352	0·8176	0·8000	0·7808	0·7632	0·7456	0·7280	0·7104
15	0·7995	0·7830	0·7665	0·7500	0·7320	0·7155	0·6990	0·6825	0·6660
14	0·7482	0·7308	0·7154	0·7000	0·6832	0·6678	0·6524	0·6370	0·6216
13	0·6929	0·6786	0·6643	0·6500	0·6344	0·6201	0·6058	0·5915	0·5772
12	0·6396	0·6264	0·6122	0·6000	0·5856	0·5724	0·5592	0·5460	0·5328
11	0·5863	0·5742	0·5621	0·5500	0·5368	0·5247	0·5126	0·5005	0·4884
10	0·5330	0·5220	0·5100	0·5000	0·4880	0·4770	0·4660	0·4500	0·4440
9	0·4977	0·4698	0·4599	0·4500	0·4392	0·4293	0·4194	0·4095	0·3996
8	0·4264	0·4176	0·4088	0·4000	0·3904	0·3816	0·3728	0·3640	0·3552
7	0·3731	0·3654	0·3577	0·3500	0·3416	0·3339	0·3262	0·3185	0·3008
6	0·3198	0·3132	0·3066	0·3000	0·2928	0·2862	0·2796	0·2730	0·2664

TABLE VII.

Column 1. Shows the temperature of the air.

Column 2. Shows the heats for mashing, at any required temperature; the degrees and cents of a degree are exhibited: therefore, 25 is a quarter, 50 the half, and 75 is three-fourths of a degree. When above 50, or the half of a degree, take one degree; when under 50, abate one. This exhibition is merely to show the effects of calculation; for without which it would appear, in some parts of the Table, that the graduations are unequal, when the reader might expect to find equality.

Column 3. Shows the hours and minutes for the standing of the mash; observing, that when the air is higher than temperature, the time of the standing of the mash is to be diminished in ratio, through the four classes of mashing heats.

The other heads show the firkins, per quarter, required for mashing, and the heat of the mash at the conclusion.

The heat of the tap is to be taken in the middle of the spending.

For every shade of malt higher than the palest, a reduction of five degrees must be made. If the liquor is cooled down in the mash-tun to receive the malt, the liquor must be taken eight degrees lower than in the other method.

The heats of the tap will correspond very nearly with the statement, in well-constructed breweries, and when the tun is mashed full, or nearly so.

TABLE VII.

Temperature of the Air at Mashing.	CLASS I. Heat of the Mash 146 to 148°	Time of Standing of the Mash	Temperature of the Air at Mashing.	CLASS II. Heat of the Mash 145° to 147°		Time of Standing of the Mash.	Temperature of the Air at Mashing	CLASS III. Heat of the Mash 144° to 146°		Time of Standing of the Mash	Temperature of the Air at Mashing	CLASS IV. Heat of the Mash 143° to 145°		Time of Standing of the Mash.
	Firkins per quarter 6			Firkins ℔ Quarter 7	Firkins ℔ Quarter 8			Firkins ℔ Quarter 9	Firkins ℔ Quarter 10			Firkins ℔ Quarter 11	Firkins ℔ Quarter 12	
		H. M.				H. M.				H. M.				H. M.
10°	197·00	4 . 00	10°	189·00	184·00	3 . 00	10°	178·00	175·00	2 . 00	10°	172·00	170·00	1 · 00
15	195·17	4 . 09	15	187·42	182·59	3 . 00	15	176·84	173·92	2 . 00	15	171·00	169·19	1 · 00
20	193·34	4 . 00	20	185·84	181·18	3 . 00	20	175·68	172·84	2 . 00	20	170·00	168·28	1 · 00
25	191·51	4 . 00	25	184·26	179·77	3 . 00	25	174·52	171·76	2 . 00	25	169·00	167·37	1 · 00
30	189·68	4 · 00	30	182·68	178·36	3 . 00	30	173·36	170·68	2 . 00	30	168·00	166·46	1 · 00
35	187·85	4 . 00	35	180·10	176·95	3 . 00	35	172·20	169·60	2 . 00	35	167·00	165·55	1 · 00
40	186·02	4 . 00	40	179·52	175·54	3 . 00	40	171·04	168·52	2 . 00	40	166·00	164·64	1 · 00
45	184·19	4 . 00	45	177·94	174·13	3 . 00	45	169·88	167·44	2 . 00	45	165·00	163·73	1 · 00
50	182·36	4 . 00	50	176·36	172·72	3 . 00	50	168·72	166·36	2 . 00	50	164·00	162·82	1 · 00
55	180·53	4 . 00	55	174·78	171·31	3 . 00	55	167·56	165·28	2 . 00	55	163·00	161·91	1 · 00
60	178·70	3 . 40	60	173·20	169.90	2 . 45	60	166·40	164·20	1 . 50	60	162·00	161·00	0 · 55
65	176·87	3 . 20	65	171·62	168·49	2 . 30	65	165·24	163·12	1 · 40	65	161·00	160·19	0 · 50
70	175.04	3 . 00	70	170·04	167·07	2 . 15	70	164·08	162·04	1 · 30	70	160·00	159·28	0 · 45
	Heat of the Tap from 144 to 146 degrees			Heat of the Tap from 143 to 145 degrees				Heat of the Tap from 142 to 144 degrees				Heat of the Tap from 141 to 143 degrees		

TABLE VIII.

Patent Malt required for mixing with Pale Malt, instead of Amber and Brown with Pale, according to the Old Porter Grist.

B.	F.	G.	Pints Parts
1	0	0	5·18
1	1	0	6·49
1	2	0	7·78
1	3	0	9·67
2	0	0	10·36
2	1	0	11·65
2	2	0	12·94
2	3	0	14·23
3	0	0	15·52
3	1	0	16·81
3	2	0	18·10
3	3	0	19·39
4	0	0	26·68

TABLE IX.

Worts imbibed by the Hops.

lbs. of Hops	Quarts Parts	lbs. of Hops	Quarts Parts	lbs. of Hops	Quarts Parts
1	2·40	13	31·20	25	60·00
2	4·80	14	33·60	26	62·40
3	7·20	15	36·00	27	64·80
4	9·60	16	38·40	28	67·20
5	12·00	17	40·80	29	69·60
6	14·40	18	43·20	30	72·00
7	16·80	19	45·60	31	74·40
8	19·20	20	48·00	32	76·80
9	21·60	21	50·40	33	79·20
10	24·00	22	52·80	34	81·60
11	26·40	23	55·20	35	84·00
12	28·80	24	57·60	36	86·40

TABLE X.

The first column states the length required to be drawn from the Malt. The second column states the liquor required to obtain the length, including all waste, the return excepted.

Length required per Quarter.			Liquor required per Quarter			Length required per Quarter			Liquor required per Quarter			Length required per Quarter			Liquor required per Quarter		
B.	F.	G.	B.	F.	G.	B.	F.	G.	B.	F.	G.	B.	F.	G.	B.	F.	G.
1	2	0	3	0	0	4	3	0	7	1	3	8	0	0	11	2	6
1	3	0	3	1	3	5	0	0	7	2	6	8	1	0	12	0	0
2	0	0	3	2	6	5	1	0	8	0	0	8	2	0	12	1	3
2	1	0	4	0	0	5	2	0	8	1	3	8	3	0	12	2	6
2	2	0	4	1	3	5	3	0	8	2	6	9	0	0	13	0	0
2	3	0	4	2	6	6	0	0	9	0	0	9	1	0	13	1	3
3	0	0	5	0	0	6	1	0	9	1	3	9	2	0	13	2	6
3	1	0	5	1	3	6	2	0	9	2	6	9	3	0	14	0	0
3	2	0	5	2	6	6	3	0	10	0	0	10	0	0	14	1	3
3	3	0	6	0	0	7	0	0	10	1	3	10	1	0	14	2	6
4	0	0	6	1	3	7	1	0	10	2	6	10	2	0	15	0	0
4	1	0	6	2	6	7	2	0	11	0	0	10	3	0	15	1	3
4	2	0	7	0	0	7	3	0	11	1	3						

EXAMPLES

FOR

THE BREWING BOOK.

For greater facility the Author has reduced his Examples to One-Quarter Brewings, which can be conveniently multiplied by any number that may be required. The malt is to be considered according to the number of lbs. gravity, or saccharine it may contain; and also the number of lbs. avoirdupois weight, per quarter; thoroughly malted, tender, and soluble in the mash-tun, with the application of proper mashing heats.

All the waste of liquor is duly accounted for in the following Examples, and the brewer has only to multiply by the number of quarters he intends to brew.

Observe—this calculation is made according to a fair quantity of boiling-room in the copper, which ought to be one-fifth part of the whole content, because it will make a considerable difference in the waste, in the event of a lighter or heavier charge of worts to be boiled, which cannot be ascertained but by experiment beyond the limits here specified; for instance, it may be required to waste after the rate of one barrel in ten, in one hour's boiling, with one-fifth of boiling-room, and without that limit, it may waste more or less than a barrel in the given time: therefore, the brewer must boil by guage or quantity, and not by time. A quarter of tender, well made malt, thin skinned, of 44 lbs. per bushel, or 352 lbs. solid, or avoirdupois, will yield 2 b. 0 f. 3 g. strong ale, of 40 lbs. gravity, per barrel, with 4 b. 0 f. 5 g. liquor for the mashes for the said ale, 2 b. 2 f. more liquor for the return wort; making in the whole 6 b. 2 f. 5 g. liquor, per quarter; then, previous to brewing, state as follows—

EXAMPLE I.

Malt's weight, 44 lbs. per bushel, 352 lbs. per quarter.
Gravity 95 lbs per quarter. Malt 1 quarter, Hops 12 lbs.

	B.	F.	G.
Length required, net quantity . . .	2	0	3
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	0	7½
Waste by evaporation, one in ten . .	0	1	5
The Hops will imbibe, per 12 lbs. . .	0	0	7½
For the copper wort	3	0	1
The Malt will imbibe, per quarter . .	1	0	4
Quantity of liquor for the mashings of the strong	4	0	5

DIVISION OF THE LIQUOR.

First mash, under the Malt . . .	2	2	0
	1	2	5
Second mash, over the goods, and cover up immediately	0	3	5
	0	3	0
Third mash, over the goods, and cover up immediately	0	3	0
Fourth mash, under the goods, and mash for returns	2	2	0
Brought down	4	0	5
Total quantity of liquor, per quarter	6	2	5

	B.	F.	G.
Liquor	4	0	5
Length	2	0	3
Waste	2	0	2

N.B. If the 2nd and 3rd are mashed, the 2nd heat must be 174°, and the third 179°.

PLAN OF THE BREWING BOOK.

EXAMPLE I.—(*Continued.*)

Temperature of the air, at the time of mashing	Mark, or quality brewed. Year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor each mash.	Heat of the liquor.	Time of standing of the mash.	Gravity of the extract, heat of the taps, and time of boiling.	Number of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heats and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours to the cleansing point.
		Q. B.		B. F. G.		H. M.	Gravity	B. F. G.					H. H. Gravity
40°	1836	1 0	12	2 2 0	169°	2 0	40	2 0 8	37.47	83.20		50°	50° 3648
				0 3 5	179°		38						12 51° 35
				0 3 0	189°		36	is equal to				lbs. parts	24 52° 33
				2 2 0	155°	0 20	30	2 0 3	40.00			2.8749	36 54° 30
							28					per barrel	48 55° 27
				6 2 5			24					lbs. ozs.	60 57° 24
							19	2 2 0	4.72	11.80	95.00	6 14	72 59° 21
							16						84 61° 1750
							12						96 63° 15
							9)243						108 65° 13
							27lbs.						120 70° 12
													Cleansed

EXAMPLE. II

Malt's Weight, 44 lbs. per bushel, 352 lbs. per quarter.
Gravity, 95 lbs. per quarter. Malt. 1 quarter. Hops 12 lbs

	B.	F.	G.
Length required, net quantity . .	2	2	3
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	1	0
Waste by evaporation, one in ten . .	0	1	6
Imbibed by the Hops, per 12 lbs. . .	0	0	7½
For the copper wort	3	2	3½
Imbibed by the Malt	1	0	4
Quantity of liquor for mashing the strong .	4	2	7½

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
Second mash, over the goods, and cover up immediately	1	0	7½
	1	0	0
Third mash, over the goods, and cover up immediately	1	0	0
Fourth mash, over the goods and mashes .	1	3	6½
Brought down	4	2	7½
Total quantity of liquor, per quarter	6	2	5

	B.	F.	G.
	4	2	7½
Length	2	2	3
Waste	2	0	4½

PLAN OF THE BREWING BOOK.

EXAMPLE II.—*(Continued.)*

Temperature of the Air at the time of mashing.	The mark or quality of the Beer. The year and day of the month.	Malt, quarters and bushels	Hops, No. of lbs.	Barrels of liquor for each mash.	Heat of the liquor	Standing of the mash. Gravity of the extract. Heat of the taps, and time of boiling.	No. of barrels in the gyle-tun.	Gravity per barrel.	No. of lbs. in each wort.	Gravity, per quarter.	Pitching heat, and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours, to the cleansing point.
		Q. B.		B. F. G.		H. M.	B. F. G.					H.
40°	1836	1 0	12	2 2 0	169°	2 0 40lbs. G.	2 2 8	30.35	82.88		54°	54° Gravity 31.75
				1 0 7½	179°	38						12 56° 29
				1 0 0	186°	36	is equal to				lbs. parts	24 58° 25
				1 3 6½	155°	29	2 2 3	32.00			2.1990	36 60° 21.25
				6 2 5		27					per barrel	48 64° 17.50
						0 30 24					lbs. ozs.	60 66° 14
						20	1 3 6½	6.27	12.12	95.00	6 3	72 68° 12
						17						84 70° 10
						14						96 71° 9
						12						
						9						Cleansed
						11) 266						
						24·18						

EXAMPLE III.

Malt's Weight, 44 lbs. per bushel, 352 lbs. per quarter.
Gravity, 95 lbs. per quarter. Malt, 1 quarter. Hops, 12 lbs.

	B.	F.	G.
Length required, net quantity . .	3	1	1
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	1	3
Waste by evaporation, one in ten . .	0	1	5
Imbibed by the Hops, 12 lbs. . . .	0	0	7½
For the copper wort	4	1	3½
Imbibed by the Malt, per quarter . .	1	0	4
Quantity of liquor for mashings for the strong	5	1	7½

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
	2	3	7½
Second mash, over the goods, and cover up immediately.	1	2	0
	1	1	7½
Third mash, over the goods, and cover up immediately	1	1	7½
Fourth mash, under the goods for table beer, which may be improved as much as is desired, by adding a portion of the stronger wort.	1	0	6½
Brought down	5	1	7½
Total quantity of liquor, per quarter	6	2	5

	B.	F.	G.
Liquor	5	1	7½
Length	3	1	1
Waste	2	0	6½

PLAN OF THE BREWING BOOK.

EXAMPLE III.—*(Continued.)*

Temperature of the air, at the time of mashing.	Mark, or quality brewed. Year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor each mash.	Heat of the liquor.	Time of standing of the mash.	Gravity of the extract, heat of the taps, and time of boiling	Number of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heats and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours, to the cleansing point.
		Q. B.		B. F. G.		H. M.	Gravity.	B. F. G.					H. 57° Gravity
40°	1836	1 0	12	2 2 0	164°	2 0	40	3 1 6	24 01	83.32		57°	12 58 2418
	Ale 25lbs. gravity per barrel	Turned colour pale malt		1 2 0	174°		35						24 60 23
				1 1 7½	184°		28	3 1 1	25.00			lbs. ozs. qr. 6 5 1	36 63 21
				1 0 6½	160°	0 30	25						48 66 18
				6 2 5			20						60 68 14
							16						72 70 10
							12						Cleansed
							8						
							6	1 0 6½	9.80	11.68	95.00		
							9)190						
							21.10						

EXAMPLE IV.

Malt's weight, 44 lbs. per bushel, 352 lbs. per quarter. Gravity, 95lbs. per quarter. Malt, 1 quarter. Hops, 12 lbs.

	B.	F.	G.
Length required, net quantity . . .	4	2	1
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	1	7
Waste by evaporation, one in ten . .	0	2	1
Imbibed by the Hops, 12 lbs. . . .	0	0	7½
For the two copper worts	5	3	3½
Imbibed by the malt	1	0	4
Total quantity of liquor for mashing .	6	3	7½

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
	4	1	7½
Second mash, under the goods and mash	1	3	0
	2	2	7
Third Mash, under the goods and mash	1	1	7
Fourth mash, over the goods . . .	1	1	0

	B.	F.	G
Liquor	6	3	7½
Length	4	2	1
Waste	2	1	6½

PLAN OF THE BREWING BOOK.

EXAMPLE IV.—(*Continued.*)

Temperature of the air, at the time of mashing.	Mark, or quality brewed. Year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor each mash.	Heat of the liquor.	Time of standing of the mash. Gravity of the extract, heat of the taps, and time of boiling.	Number of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heats and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours to the cleansing point.
		Q. B.		B. F. G.		H. M. Gravity	B. F. G.					H H. Gravity
40°	1836	1 0	12	2 2 0	164°	2 0 39	2 1 4	28.46	63.32		60°	12 60° 2050
				1 3 0	169°	1 0 33	2 1 2	13.70	31.66			12 61° 18
	Table Ale, lbs. 21 Gravity per Barrel	Turn'd colour pale malt.		1 1 7½	174°	0 45 25					lbs. parts 1.3986 per barrel	24 63° 1650
				1 1 0	155°	0 30 17	4 2 6	20.08				36 65° 13
				6 3 7½		11 22.23						48 67° 10
						9	4 2 1	21.00	94.98	94.98		60 69° 8
						8						72 70° 6
						7					lbs. ozs. qrs 5 10 0	Cleansed
						6 10.55						
						1st wort, boiled 1 hour 2nd wort, boiled 1½ hour.						

EXAMPLE V.

Malt's weight, 44 lbs. per bushel, 352 lbs. per quarter. Gravity, 95 lbs. per quarter. Malt, 1 quarter.

For *Porter*.—2 gallons and 1 pint of patent malt, 6 pounds of strong new brown hops, and 6 pounds of strong old brown, or North Clay hops.

	B.	F.	G.
Length required, net quantity . . .	3	1	0
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	1	3
Waste by evaporation, one in ten . .	0	2	0
The Hops will imbibe, per 12 lbs. . .	0	0	7½
For the copper wort	4	1	6½
The Malt will imbibe, per quarter . .	1	0	4
Quantity of liquor for the mashings of the strong	5	2	1½

DIVISION OF THE LIQUOR.

First mash, under the Malt . . .	2	2	0
	3	0	1½
Second mash, over the goods, and cover up immediately	1	2	1½
	1	2	0
Third mash, over the goods, and cover up immediately	1	2	0
Fourth mash, under the goods, and mash for returns	1	2	0
Brought down	5	2	1½
Total quantity of liquor, per quarter	7	0	1½

	B.	F.	G.
Liquor	5	2	1½
Length	3	1	0
Waste	2	1	1½

PLAN OF THE BREWING BOOK.

EXAMPLE V.—*(Continued.)*

Temperature of the air, at the time of mashing	The mark, or quality of the beer. The year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor for each mash.	Heat of the liquors.	Time of standing of the mash, Gravity of the extract. Heat of the tap, and time of boiling.			No. of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heat, and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every 6 or 12 hours, to the cleansing point.		
		Q. B.		B. F. G.		H. M.	Gravity	Gravity	B. F. G.		Grav.			H.	Heat	Gravity
40°	Porter	1 0	6lbs. Strong new brown.	2 2 0	165°	2 0	39		2 0 0	27.08	54.16		57°.50		57°.50	25.00
	25.00			1 2 1½	175°		34		1 1 5	19.48	27.09			12	50	22.00
	Gravity per barrel.	turned colour pale. 2 gallons 1 pint of patent malt		1 2 0	180°		29						lbs. parts	24	60 .50	19.00
				1 2 0	155°	0 30	21	21.66	3 1 5	24.26	8125		1.7500	36	62	16.00
	1836		6lbs. Strong old brown.				15		3 1 0	25.00			per barrel	48	64	14.00
				7 0 1½			12						lbs. ozs.	60	66	12.00
							9		2 0 0	6.87	13.75	95.00	5 11	72	68	11.00
							8							75	70	9.00
							7	14.01								Cleansed
						1st wort boiled 1 hour 2nd wort boiled 2 hours.										

EXAMPLE. VI

Malt's Weight, 44 lbs. per bushel, 352 lbs. per quarter.
Gravity, 95 lbs. per quarter. Malt. 1 quarter. Hops 12 lbs

	B.	F.	G.
Length required, net quantity . .	2	3	8
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	1	4
Waste by evaporation, one in ten . .	0	1	4
Imbibed by the Hops, per 12 lbs. . .	0	0	7½
For the copper wort	4	0	1½
Imbibed by the Malt	1	0	4
Quantity of liquor for mashing the strong .	5	0	5½

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
	2	2	5½
Second mash, over the goods, and cover up immediately	1	2	0
	1	0	5½
Third mash, over the goods, and cover up immediately	1	0	5½
Fourth mash, over the goods and mashes .	1	1	8½
Brought down	5	0	5½
Total quantity of liquor, per quarter	6	2	5

	B.	F.	G
Liquor	5	0	5½
Length	2	3	8
Waste	2	0	6½

PLAN OF THE BREWING BOOK.

EXAMPLE VI.—*(Continued.)*

Temperature of the Air at the time of mashing.	The mark or quality of the Beer. The year and day of the month	Malt, quarters and bushels	Hops, No. of lbs.	Barrels of liquor for each mash.	Heat of the liquor.	Standing of the mash. Gravity of the extract. Heat of the taps, and time of boiling.	No. of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs. in each wort.	Gravity, per quarter.	Pitching heat, and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours, to the cleansing point.
		Q. B.		B. F. G.		H. M.	B. F. G.					H. Gravity
45°	1836	1 0	6	2 2 0	167°	2 0 40lbs.G.	1 2 0	36.66	54.90		56°	56° 27.00
			New strong brown	1 2 0	177°	35	1 2 3	17.37	27.98			12 58° 25.00
	Brown Stout.	Two gallons Patent Malt		1 0 5½	187°	28					lbs. parts	24 60° 21.56
	28lbs. Gravity per Barrel		6			22	3 0 3	27.01			1.9197	36 64° 19.00
			Old strong brown			20	2 3 8	28.00			per barrel	48 66° 16.36
				1 1 8½	160°	0 30 17 27.00	after fermentation				lbs. ozs.	60 68° 13.79
						15	1 1 2½	9.11	12.12	95·00	6 2	72 70° 11.22
				6 2 5		12						81 71° 10.00
						10 13.50						Cleansed
						Boil the 1st wort 1 hour 2nd do. 2 hours						

EXAMPLE VII.

Malt's Weight, 44 lbs. per bushel, 352 lbs. per quarter.
Gravity, 95 lbs. per quarter. Malt, 1 quarter. Hops, 14 lbs

	B.	F.	G.
Length required, net quantity . .	1	3	3
Waste by fermentation	0	0	5
Waste by boiling ¾ hour, one in ten .	0	0	8
Waste by evaporation, one in ten . .	0	1	1
Imbibed by the Hops, 14 lbs. . . .	0	0	8½
For the copper wort	2	2	7½
Imbibed by the Malt, per quarter . .	1	0	4
Quantity of liquor for mashings for the strong	3	3	2½

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
	1	3	2½
Second mash, over the goods, and cover up immediately.	1	3	2½
	0	0	0
Third mash, over the goods, and cover up immediately	1	1	5½
Fourth mash, under the goods . .	1	1	6
Brought down	3	3	2½
Total quantity of liquor, per quarter	6	2	5

	B.	F.	G.
Liquor	3	3	2½
Length	1	3	3
Waste	1	3	8½

PLAN OF THE BREWING BOOK.

EXAMPLE VII.—*(Continued.)*

Temperature of the air, at the time of mashing.	Mark, or quality brewed. Year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor each mash.	Heat of the liquor.	Time of standing of the mash. Gravity of the extract, heat of the taps, and time of boiling	Number of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heats and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours, to the cleansing point.
		Q. B.		B. F. G.		H. M. Gravity.	B. F. G.					H. Gravity
40°	1836 Strong Ale 45lbs. gravity per barrel	1 0	14	2 0 0	176°	3 0 45	1 3 8	42.10	82.35		47°50 lbs. of yeast 3 6500 per barrel.	47°·50 42.10
				1 3 2	186°	44						12 49 37
				1 1 6	184°	33	1 3 3	45.00				24 51°·50 34·94
				1 1 6	155°	0 30 26						36 53° 31·88
						21	after fermentation					48 55° 28.80
				6 2 5		15 30.00						60 57° 26
						9					lbs. ozs.	72 59° 24·50
						6					6 11	84 62° 22
						4	1 1 6	5.00	7.10			96 65° 19
						3	1 1 6	3.48	5.05	94.50		108 67° 16·50
												120 69° 14
												132 70° 12·50
												Cleansed

EXAMPLE VIII.

Malt's weight, 40 lbs. per bushel, 320 lbs. per quarter. Gravity, 85lbs. per quarter. Malt, 1 quarter. Hops, 8 lbs.

	B.	F.	G.
Length required, net quantity . . .	6	0	0
Waste by fermentation	0	0	5
Waste by boiling one hour, one in ten .	0	2	4
Waste by evaporation, one in ten . .	0	2	7
Imbibed by the Hops, 8 lbs. . . .	0	0	5
For the two copper worts	7	2	3
Imbibed by the malt	1	0	0
Total quantity of liquor for mashing .	8	2	3

DIVISION OF THE LIQUOR.

First mash, under the malt . . .	2	2	0
	6	0	3
Second mash, under the goods and mash	2	0	0
	4	0	3
Third Mash, under the goods and mash	2	0	0
	2	0	3
Fourth mash, over the goods . . .	2	0	3

	B.	F.	G
Liquor	8	2	3
Length	6	0	0
Waste	2	2	3

PLAN OF THE BREWING BOOK.

EXAMPLE VIII.—(*Continued.*)

Temperature of the air, at the time of mashing	Mark, or quality brewed. Year and day of the month.	Malt, quarters and bushels.	Hops, No. of lbs.	Barrels of liquor each mash.	Heat of the liquor.	Time of standing of the mash.	Gravity of the extract, heat of the taps, and time of boiling.	Number of barrels in the gyle-tun.	Gravity, per barrel.	No. of lbs.	Gravity, per quarter.	Pitching heats and No. of lbs. of yeast, per barrel.	Advance of heat, and decrease of gravity, every six or twelve hours to the cleansing point.
		Q. B.		B. F. G.		H. M.	B. F. G.	B. F. G.					H / H. / Gravity
40°	1836	1 0	8	2 2 0	167°	2 0	1 2 0	3 0 0	18.88	56.66		63°	63° 1395
		Turned colour pale malt.		2 0 0	170°	1 0	2 0 0	3 0 5	9.02	28.33			12 64° 1290
				2 0 0	173°	0 45						lbs. parts	24 66° 10
	Table Beer, lbs.			2 0 3	155°	0 20	3 2 0	6 0 5	13.95			0.8862 per barrel	36 68° 8
	14.16 Gravity per Barrel	If more colour is required use amber, or a portion of patent malt.		8 2 3			2 0 0	6 0 0	14.16		84.99	lbs. ons. qrs. 5 4 0	42 70° 7
							2 0 0						Cleansed
							4 0 0						
							1st wort, boiled 1 hour						
							2nd wort, boiled 2 hours.						

The foregoing Examples are merely to show the form of the Brewing-book, and the method of insertion. The statement of the waste of all kinds will be found nearly correct, (an important point) and which every brewer ought to calculate previous to brewing, in order to avoid having too small or too large a quantity of liquor, because that must cause a waste of profit, without a benefit.

The fourth mash may be made into an article of secondary strength, when the quantity is too small for a return for mashing in the next brewing, by the help of a portion of the stronger worts.

The author would advise the brewer to keep within the limits of 6 bar. 2 firks. 5 gal. as the whole quantity of liquor for mashing a quarter of malt, except under very particular circumstances, because quantity and quality are very different, the weaker worts are the worse they are, and more likely to produce a serious loss than a trifling gain; the quantity of hops must be according to the palate of the consumer: but if the brewer wishes to increase the bitter of his beers, to save malt, he should do it by imperceptible degrees, in which the Hop Tables will assist.

To increase the bitter with the increase of the warmth of the weather, calculate how much will be the increase between April and the end of August, and divide the increase by the number of brewings likely to be made during that period, and make the addition according to the division.

The divisions of the liquors will assist materially; for instance, when three mashes are made for the strong, whatever quantity of liquor is taken for the first mash, divide the remainder into two equal parts.

APPENDIX.

THE METHOD OF TAKING HEATS FOR MASHING.

CHARGE the copper for brewing, in winter time, to three-fourths of the whole content; but in summer two-thirds will be sufficient; which is intended to give room for cooling, because it is necessary to bring the copper so charged to the boiling point, preparatory to brewing. The heat of the liquor is then to be reduced from boiling to the heat required for mashing.

This is the process for turning the liquor under the false-bottom of the mash-tun, in which the malt is shot; but if the malt is to be shot into the liquor in the mash-tun, then it will be necessary to charge the copper to within two or three inches less than full, bring the liquor to the boiling point; turn the boiling liquor into the mash-tun, and let it cool down to the required heat for mashing: the intention is, to warm or to season the mash-tun, and to obtain the mashing heat with greater precision. Time may be saved, by letting the liquor in the mash-tun 20 or 30 degrees hotter than what is required for adding the malt. Rouzing the liquor will expedite the cooling.

The Mash-tun Thermometer will always enable the brewer finally to make up the heat of his mash with the greatest precision.

TO REDUCE DECIMAL PARTS,

With Examples.

EXAMPLE I.

To reduce any number of decimal parts of a pound avoirdupois, into ounces and parts, multiply the decimals by 16, and cut off the four figures on the right hand, and those figures on the left hand are the ounces.

0.8862
16
.52172
.8862
ozs. 14,0792

EXAMPLE II.

To reduce any number of decimal parts of a barrel, multiply the decimals by 36, and cut off two figures on the right hand, and those on the left represent the gallons.

75
36
450
225
gs. 27,00 or $\frac{3}{4}$ of a barrel

EXAMPLE. III.

To reduce gallons into decimal parts of a barrel, multiply 2777 by the number of gallons.

.2777
27
19439
5554
.74979 or $\frac{3}{4}$ of a barrel. nearly

ON THE

VARIOUS SHADES OF MALT.

There are six shades of malt in general use; a difference from one shade to the next, darker, only just visible to the eye, will require a variation of the heat of the liquor for mashing, five degrees.—viz.

First.—Pale, or white malt.

Second.—Pale, or turned colour.

Third.—Low amber.

Fourth.—High amber

Fifth.—Low brown.

Sixth.—High brown.

Whatever portions of either kind or shade are required, multiply the degree of heat, each will require, by the number of quarters, and then divide by the whole number of quarters, for the mean of the heat.

If thirds are required, as in the old grist, for porter, &c. then take of the 2nd, 4th, and 6th, but which is nearly out of date, since the introduction of the patent malt; in selecting which, be careful that the article is not cindered, for that would totally destroy a portion of the colour.

The above varieties are sufficient for all the purposes of brewing. The brewer has only to make choice of certain portions of each, to produce the required colour.

The author would advise keeping within the limits of the amber coloured ales, for sound quality and full flavor.

A LIST OF
THE BREWERS IN LONDON,
AND
THE QUANTITY BREWED BY EACH IN ONE YEAR,
Between 1759 *and* 1760.

	Barrels.		Barrels.
Calvert & Seward	74,734	Brought forward	770,258
Whitbread	63,408	Scott	11,927
Truman	60,140	Couzemakers	10,654
Hope	55,306	Beazeley	10,557
Sir William Calvert	52,785	Meux	10,012
Gifford.....	46,710	Green	9,770
Lady Parsons	34,098	Feist	9,611
Thrale	32,740	North	9,501
Harman	30,317	Ekins	9,499
Hucks	28,615	Ambrose	9,153
Collison	23,185	Walker	9,109
Dickinson	23,335	Mayor	8,872
Cokars	21,101	Keeling	8,026
Britner	20,965	Clarke	7,842
Jordan	20,043	Waring	7,748
Roberts	19,263	Edwards	6,884
Climpson	19,158	Little	6,722
Hares	17,817	Pepys	6,640
Harwood	17,760	Lilley	6,534
Edwards	17,027	Trender	6,126
Mason	17,005	Eyres	4,787
Sweet	15,176	Warrington	3,569
Cross	14,811	Marsden	3,346
Morley	12,897	Smith and Co. ...	3,081
Dawson	12,724	Hawkins	2,818
Pearer	12,341		
Carried up	770258	Total Barrels	975217

Which, calculating at three barrels per quarter, would require 325,072 quarters of Malt.

A STATEMENT

OF THE

QUANTITY OF MALT CONSUMED

BY

THE BREWERS IN THE METROPOLIS

In the Year 1835.

	Quarters.		Quarters.
Barclay and Co.	106098	Richmond	3268
Hanbury and Co.	78087	Staines	3106
Whitbread and Co. ..	55209	Batteley	2892
Read and Co.	49430	Maynard	2828
Combe and Co.	36922	Mann, James	2780
Calvert and Co.	33263	Ball and Co.	2687
Hoare and Co.	31525	Page	2506
Elliot and Co.	28728	Cox, John	2499
Meux and Co.	24376	Hodgson	2414
Taylor and Co.	23885	Williamson	2264
Charrington and Co...	19213	Satchell	2147
Steward, Head and Co.	19213	Griffiths, P. (late Whitmore)	2120
Goding and Co.	16312		
Gardner	14699	Ing	2108
Thorne	10913	Hill and Rice	2042
Bricheno	9762	Sherborne and Co.....	2031
Courage & Donaldson	8790	Lambert	1917
Goding, Thomas	7618	Masterman	1877
Wood and Co.	7320	Gray and Dacre	1750
Hazard and Co.	6544	Nicholls and Co.	1464
M'Leod	5360	Collyer (late Young, J. and B.)	1432
Tickell	5218		
Harris, Thomas	4964	Hume, G.	1256
Laxton	4187	Verey and Co.	1208
More	4130	Chapman, A.	1191
Halford and Topham ..	3650	Collins, J.	1105
Farren	3577	Young, Charles	1066
Hale	3466	Kerry and Co.	1023

	Quarters.
King, (late E. Smith) ..	1016
Clarke, Charles	1006
Boreham and Co.	976
Blogg, William	968
Plimmer	867
Buckley and Co.	838
Manvell	834
Honeyball	800
Clarke, S.	793
Mantell and Co.	757
Mann, Joel	735
Holt	734
Jenner	734
Turner, John	709
Braithwaite	708
Clarke, Robert	706
Addison	671
Hood	671
Abbott, Edward	654
Harris, Robert	557
Thompson, George ..	553
Mattam	538
Turner, R.	531
Wicks	527
Collins, William	519
Wright	519
Hagan	506
Woodward	502
Lock	496
Holloway	486
Ufford	472
Thurlby	469
Wells	468
Reynolds, late Aldridge	447
Higgs	447
Blogg, B.	424
West	406
Farquarson	403
Lloyd	384
Cowel, late Tizard & Co.	381

	Quarters
Clarke	357
Lindsey	319
Bury	286
Pugh	284
Brace	261
Griffiths, J.	253
Jones, Evan	248
Hainstock	241
Olley	239
Meeton	234
Jackson	234
Prosser	217
Smith	209
Turner, R. & W.	207
Tubb	200
Cooper, William	199
Easton	199
Powditch	192
Craddock	173
Hacker	172
Turner, W. S.	172
Donn	164
Stirling	162
Field and Co.	138
Baker	134
Ward	131
Clark and Co.	130
Keen	129
Mulley	129
Burt	124
Stalwood	118
Baker, R.	115
Sizmur	110
Whitaker	109
Muggeridge	109
Brown, William	108
Beaumont	106
Jewitt	102
Mortlock	101
White	97

	Quarters.
Priddle	95
Steventon	94
Prescott	91
Bacon	91
Debenham	91
Parker, W.	90
Keaney	90
Wood, D.	87
Hudson	80
Hudson	80
Harris, John	78
Bradfield	78
Carpenter, J. P.	74
Sellon	74
Batt	73
Batt	73
Thorpe	70
Norris	68
Remnant	66
Brooks	62
Rose	59
Mudle	58
Bennett	58
Shepherd	52
Gould	52
Cleverly	52
Beedle	49
Potter, H.	48
Potter, E.	45
Pickering	42
Godfrey	41
Sadler	39
Porter, W.	38
Knight	37
Phillips	37
Churches	36
Denman	35
Danks	35
Knapton	28
Beecroft	26

	Quarters
King	25
Shepherd	22
Shearpoint	22
Mills	21
Bull	16
Miller	16
Rayner	16
Bull	16
Wileman	12
Bush	12
Turner, S.	12
Townley	8
Abrook	8
Jones	6
Whissell	5
Ind and Smith	4432
Kershaw	770
Dean	648
Baynton	456
Bailey	363
West, Job	322
Elder	264
Adams	250
Crouch	189
Cox	175
Williams, John	151
Turner	141
Smith, W.	141
Crow	137
Smith, W.	133
Lambert	100
Leathes	98
Sumner	75
Marlow	62
Larner	60
Steer	57
Busk	56
Bonnell	49
Smith	48
Smith	46

	Quarters.		Quarters
Savage	44	Young, H.	299
Pilcher	44	Black	250
Pape	43	Barker, John	203
Rabbitts	43	Jafferies	195
Smith, Jacob	40	Thompson, Juby	127
Leach	38	Allen	103
Cartland	38	Butler	93
Bunn	37	Pointer, R. Jun.	89
Adams	37	Fountain	86
Butt	37	Wheeler	73
Sykes	36	Jennings	66
Theale	35	Richardson	69
Chapman, S.	34	Ross and Carter	66
Hall	33	Sarson	62
Thompson	33	White, F.	59
Brett	32	Moody	53
Boulley	32	Pointer, R.	52
Farnell, I. C. and W.	7500	Scott	50
Cater & Co. (late Wyatt)	945	Clarke, W. and S.	50

MALT DUTY.

	Per Quarter. £. s. d.
In the reign of King William and Queen Mary the Duties levied between the years 1689 and and 1702, amounted to	0 4 0
In 1787, increased to	0 10 6
In 1791, do.	0 12 6
In 1802, do.	0 18 8
In 1804, do.	1 12 8
In 1817, reduced to	1 0 8

(OLD DUTY.)

YEARLY AMOUNT OF THE HOP DUTY,

From the Year 1745 *to* 1835.

Year.	Duty.	Year.	Duty.	Year.	Duty.
1745	34,635	1776	125,691	1807	100,071
1746	91,879	1777	43,581	1808	51,809
1747	60,000	1778	159,891	1809	63,952
1748	87,000	1779	55,800	1810	73,514
1749	36,305	1780	122,724	1811	157,085
1750	65,000	1781	120,218	1812	30,561
1751	73,954	1782	14,895	1813	131,482
1752	79,000	1783	75,716	1814	140,292
1753	81,000	1784	94,359	1815	123,878
1754	112,000	1785	112,634	1816	46,302
1755	82,157	1786	95,973	1817	66,522
1756	48,106	1787	42,227	1818	199,465
1757	69,713	1788	143,168	1819	242,076
1758	72,896	1789	104,063	1820	138,330
1759	42,115	1790	106,841	1821	154,609
1760	117,992	1791	90,059	1822	203,724
1761	79,776	1792	162,112	1823	26,058
1762	79,295	1793	22,619	1824	148,832
1763	88,315	1794	203,063	1825	24,317
1764	17,178	1795	82,342	1826	269,381
1765	73,778	1796	75,223	1827	140,848
1766	116,445	1797	157,458	1828	172,027
1767	25,997	1798	56,032	1829	38,398
1768	114,002	1799	73,289	1830	88,027
1769	16,201	1800	72,928	1831	174,864
1770	101,131	1801	241,227	1832	139,018
1771	33,143	1802	15,463	1833	156,905
1772	102,050	1803	199,205	1834	189,713
1773	45,847	1804	177,217	1835	235,207
1774	138,887	1805	32,904	1836	
1775	41,597	1806	153,102	1837	

HOP DUTY, 1835

	£.	s.	d.
Barnstaple	28	16	0
Bedford	142	18	6
Cambridge	26	2	6
Canterbury	98,975	9	8
Chester	0	16	2
Cornwall	13	14	3
Derby	30	17	4
Dorset	15	0	9
Essex	2,131	19	2
Exeter	14	15	8
Gloucester	0	6	10
Grantham	3	4	4
Hants	4,386	1	10
Hereford	22,734	11	10
Hertford	57	19	6
Lincoln	350	3	4
Lynn	0	18	4
Northampton	0	8	6
Oxford	26	10	6
Plymouth	5	0	2
Reading	5	1	5
Rochester	144.681	8	0
Salisbury	2,464	10	6
Salop	0	2	10
Stourbridge	1,083	15	0
Suffolk	791	17	2
Surry	3	17	6
Sussex	127,458	14	4
Uxbridge	9	13	2
Wales, Middle	95	4	2
Wellington	31	11	4
Worcester	3,480	7	11
	£409,055	18	3

Old Duty, 10s. 8¾d. per Cwt.	235,207	2	11¾
New Duty, 7s. 11¼d. do.	173,848	15	3¼
Total £18. 8s.	409,055	18	3

HOP DUTY.

Growths of 1834 *and* 1835.

Collection.	1834	1835	*Decrease.*	*Increase.*
Canterbury	38,575	56,910		18,335
Rochester	62,369	83,191		20,822
Sussex	59,192	73,288		14,096
Worcester	13,909	15,696		1,034
Farnham	9,236	3,941	5,295	
North Clays	3,584	220	3,364	
Essex	1,708	1,696	12	
England	1,140	265	122	
	189,713	235,207	8,793	54,287
				8,793
				45,494

CONTRACT PRICES OF HOPS.

FOR

The Royal Hospital, Greenwich, from 1729 *to* 1818.

	£.	s.	d.		£.	s.	d.
1729	2	5	0	1790	6	13	9
1730	2	5	10	1795	7	7	10
1735	1	0	3	1800	16	15	9
1740	2	10	7½	1805	6	11	6
1745	3	11	1	1806	7	13	6
1750	5	4	0	1812	9	17	0
1755	2	15	0	1813	11	13	8
1760	4	13	4	1814	9	10	0
1765	7	3	6	1815	9	13	7
1770	5	16	4	1816	14	0	0
1775	4	16	6	1817	22	4	0
1780	2	14	8	1818	7	15	0
1785	5	6	4				

J. CHITTENDEN, Hop Merchant,
206, *Tooley Street.**

* Of whom the Yearly List of the quantity of Beer brewed may be had.

APHORISMS.

The difficulty of Brewing in Summer arises, in some measure, from the want of due allowance being made for the change of temperature, which my Tables of Mashing Heats are calculated to direct, and my Thermometer to regulate.

The stiffer the mash, and the stronger the extract; the higher should be the heat of the tap in the middle of the spending, and *vice versa.*

The stronger the wort, the less power it has upon the hops, but the finer will be the quality extracted; therefore, quality must be the set-off against quantity.

Marry or mix old and new beers at the cleansing point, before cleansing, in order to effect their better unity, or incorporation.

Never rack or tap beers while in a flat state, for they never recover; yet it is sometimes necessary to rack, on purpose to flatten them.

Purchase malt in or before the month of May, to avoid the summer-made malts, (unless under particular circumstances.) Malt is also generally cheaper at that period than at any other.

Mashing heats, when too low, impoverish the quality by excessive fermentation; and heats too high, prevent fermentation: in neither case will the liquor be sound.

Purchase hops in October and November; if in a good ripening season, and they are in fine condition, lay in your stock. Seasons differ greatly. To stock at £5 per cwt. is a safe price.

It is better to throw a return wort away, if of doubtful quality, than endanger a whole brewing by using it.

Draw neither malt or hops to extremes; especially for fine ales. You may obtain quantity at the expence of quality.

To supply great consumers of small beer is desirable.

Always purchase the best well-cured malt and hops. There is frequently more difference in the quality than in the price.

It is a maxim with some, in the summer and warm weather brewing, to begin later, in order to get the worts off in the cooler part of the day; but, by so doing, the mashes are endangered more than the hop worts, which the refrigerator will secure at any time.

In the purchase of hops, have an eye to the manner in which they have been kept; damp places encrust the outsides and ends of the bags or pockets, and occasion rottenness.

Acidity in beer cannot be totally destroyed; but it may be neutralized for a time by alkaline salts and substances.

In the absence of a refrigerator, cool worts as quickly as possible, and never allow them to remain after

sun-rise, but get them into the gyle-tun an hour before; add the yeast immediately, and watch for the cleansing point.

Select choice and excellent malt for the strongest ales, &c. as flavour generally accompanies strength.

Malt liquors, well brewed and fermented, will improve by care and age; but no after-care will compensate for bad management, and they will continue getting worse by age.

Easterly winds are bad for brewing, and worts exposed to them rarely escape injury; the sweet-wort, particularly, will often contract an acidity not to be eradicated: therefore, always shut out easterly winds wherever it is possible.

The mash-tun, under-back, vats, pontos, and all standing casks and utensils, ought to be painted when new and dry; first by priming, which should be followed by three coats of paint, each successive coat increasing in substance: thus forming an unyielding mass. Wood so guarded will never shrink.

Never let the copper boil-off more than six or eight worts at the most, without scouring, and made thoroughly bright, because it is impossible to prevent the copper from furring, (especially the bottom) which will cause it to burn, and wear the faster; therefore, the oftener the copper is scowered the longer it will last. A small portion of acid beer-grounds is essential for this purpose.

The brewer is advised, whenever it is practicable, to brew entire gyles, rather than party gyles, in which

every gyle is composed of the best and the worst of the materials, which can only be done when the whole of the liquor employed for mashing forms the gyle, after deducting the waste, and no return wort. The practice can only be adopted in low gravities of about or under 23 lbs. per barrel.

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