

DOUGLAS'S RECEIPT BOOK

FOR THE

BACON, PORK, AND MEAT TRADES

BY

LOUDON M. DOUGLAS.

Price 2/6.

DOUGLAS'S
RECEIPT
BOOK.

DOUGLAS,
LONDON.



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DOUGLAS'S RECEIPT BOOK.

DOUGLAS'S
RECEIPT BOOK:

A COMPLETE SET OF

R E C I P E S

FOR

BACON CURERS,
PORK AND MEAT PURVEYORS, SAUSAGE MAKERS,
AND PROVISION MERCHANTS:

BY *MacQueen*

LOUDON M. DOUGLAS, *1863-1944*

AUTHOR OF THE "MANUAL OF THE PORK TRADE."

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RECEIPT BOOK

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DOUGLAS'S RECEIPT BOOK.

BACON CURING.

THE conditions under which the curing of bacon may be conducted successfully are well known. They may be summed up as follows :

1. A uniform coolness in cellar.
2. A uniform strength of pickle.
3. Scrupulous cleanliness in all the operations.

A cellar to be effective in the ordinary way must not exceed in temperature 50° F., although operations may be conducted at higher temperatures. They involve greater risk, however, and certain loss.

The requisites necessary for bacon-curing are salt, saltpetre, pure cane sugar, and a safe neutral antiseptic.

In general, bacon is cured by simply rubbing the sides with powdered salt to which has been added a little saltpetre, then placing on flags or on the cellar floor. They are then covered with salt, to which has been added about 5 per cent. of saltpetre, and allowed to lie for a week. The salt is removed, and they are turned, rubbed again with salt, saltpetre, and a little sugar, and allowed to lie covered with a fresh quantity of salt and saltpetre for another week. The salt is then all removed, and the sides are either hung up to dry, or allowed to lie in the cellar for another week, after which the bacon is ready for sale in the "green" state, or it may then be smoked and sold as smoked

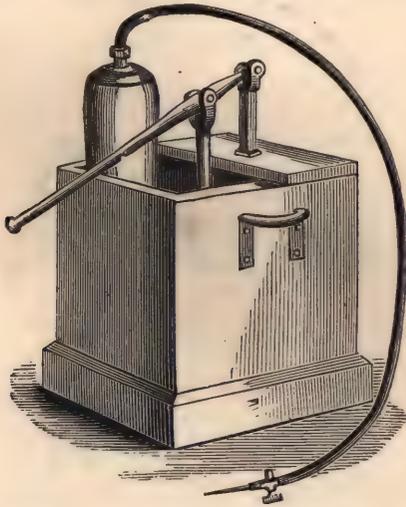


FIG. 1.—BRINE PUMP, WITH COMPRESSED AIR CYLINDER.

bacon. It is not possible, however, to produce bacon so satisfactorily by this old-fashioned method as by the improved methods which have come into use during recent years.

Nearly every county has its own method of bacon curing, although that which obtains the greatest favour is the Wiltshire cure, so long associated with the county of that name.

PUMPING MACHINES.

Before proceeding to describe the various methods adopted for curing, it is convenient to refer to the instrument known as a pump, which is necessary

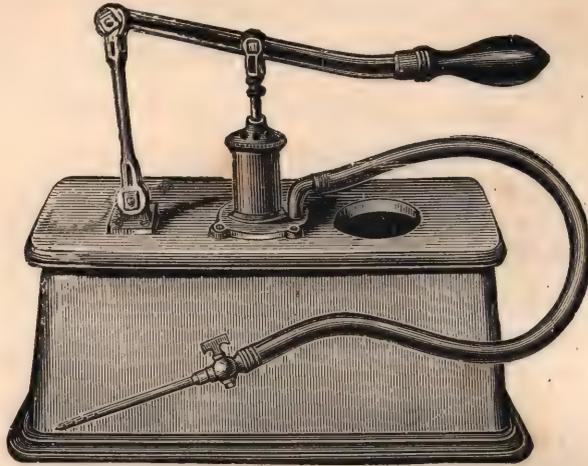


FIG. 2.—BRINE PUMP, WITH ENAMELLED IRON RESERVOIR.

in all cellars. The "pickle pump" is made in various forms, but these are mostly alike in principle.

The box in fig. 1 is made of wood, lined with lead, and is very durable.

The pump in fig. 2 is mounted on an iron tank, which is enamelled inside. The objection to this pump lies in the liability of the enamel to get chipped off, and the consequent oxidation of the iron, thus rendering the brine brown in colour and objectionable.

Another, of more recent design, is as shewn in fig. 3.



FIG. 3.—PICKLE PUMP, MOUNTED ON PUMPING TABLE.

The feature of this pump is, that it is very simple and can be used for any pickle, as no tank or box goes with it. The table is certainly an advantage, as it enables the hams or bacon to be more conveniently handled. An opening at the lower end of the table enables the surplus pickle to be carried away into a receiver.

For convenience and handiness a small hand syringe is also made in the following form:—

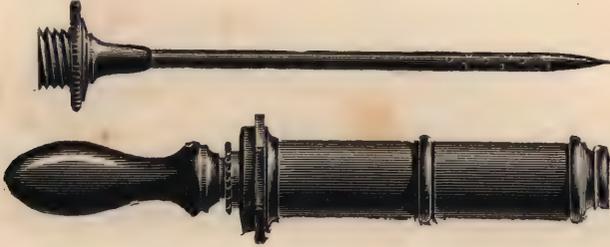


FIG. 4.—HAND SYRINGE.

The cylinder is made of non-corrosive metal, and is therefore not acted on by the pickle.

WILTSHIRE BACON.

The hogs are usually fasted from twelve to twenty-four hours previous to slaughter, and are cut up and dressed to the standard "cut" known as "Wiltshire;" the bladebone is removed, and all kernals are squeezed out by hand. Sometimes the sides when dressed are sprinkled with a little salt to expel the blood, and are so allowed to hang for twelve hours before being put into the cellar. But this is a refinement of curing which is not often practised. When the sides are properly trimmed they are taken into the cellar, and there pumped with one of the pumps already referred to, with pickle.

THE USE OF THE SALINOMETER.

The salinometer is of very great service to the bacon curer, as by its means he can readily determine the density of the pickle being used. There is a scale or register on the stem and the lower bulb is weighted with shot or mercury. The centre bulb is an air space which keeps the salinometer afloat. The instrument is meant to supersede the old fashioned and inaccurate method of determining the density of pickle by floating a pig's foot or a potato in it—manifestly a method liable to great inaccuracy. By the use of the salinometer, the density can be reduced to an intelligible figure which anyone can understand.



FIG. 5.
SALINOMETER

BACON CURING BY THE MOST MODERN PROCESS.

When the hogs are slaughtered they are dressed and split down the back, the vertebral column being removed, and are then hung up in an open space or hanging house for a night or a day, or in summer for at least six hours and should then be placed in the chill room. A thermometer should be used to

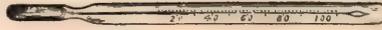


FIG. 6.—MEAT THERMOMETER.

ascertain the temperature of the meat while in the chill room, and the carcasses should not be removed to the curing cellar until a temperature of 40° F. is registered. This temperature is attainable by keeping the chill room down to 38° F. dry, cold air. When this temperature has been obtained, remove the meat from the chill room and trim and dress the sides, hams, middles or whatever kinds of meat it is proposed to cure. When sides of the "Wiltshire" pattern are wanted the following will be the process:

First of all make a pickle from the following recipe:

Salt	...	...	...	...	50 lbs.
Finest granulated saltpetre	...	...	...	...	5 "
Pure cane sugar	...	...	...	...	5 "
Douglas's food antiseptic	...	...	...	...	5 "

To this add twenty gallons pure water and if there is any scum, remove it, and should that not be sufficient to clear the liquid, it must be boiled and the scum removed as it rises to the surface. The pickle thus made should

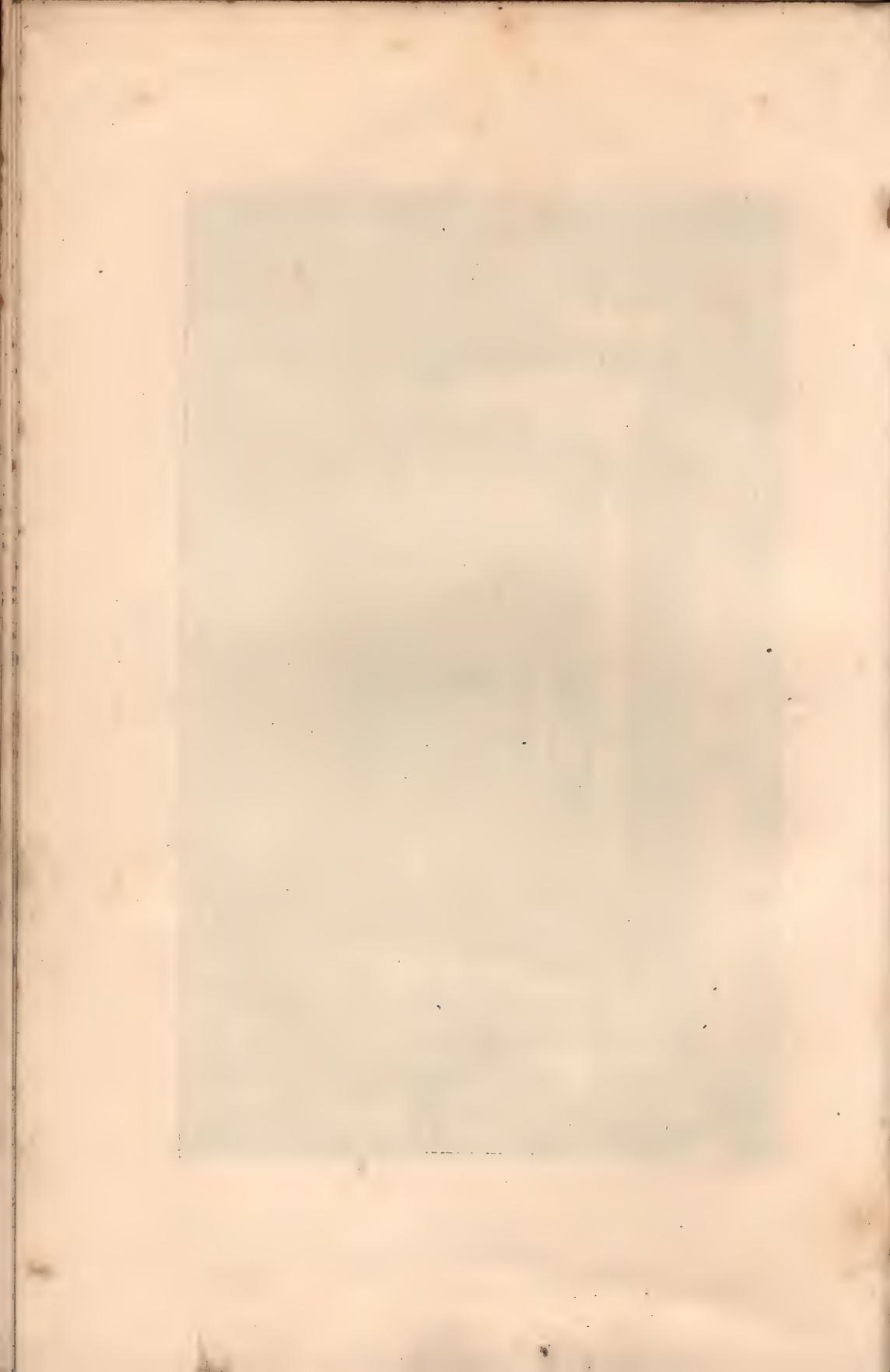


FIG. 7.—OVERHEAD TRACK WEIGHING MACHINE.

indicate on Douglas's salinometer or pickle tester, 95°; should this density not be obtained, pure salt must be added until it is. Now lay the sides on a bench or pumping table, and insert the needle of the pickle pump



PLATE I.—PIGS CUT UP INTO SIDES WITH VERTEBRAL COLUMN REMOVED.
(From Photograph of a Hanging-house).



into all the fleshy parts of the meat; the pump should be worked at a pressure of about twenty lbs. to the square inch. When the meat has been pumped with this pickle lay it down in a light bed of salt.

Now have prepared a mixture of equal quantities of fine granulated saltpetre and Douglas's bacon curing food antiseptic, and when the side is lying in the salt, sprinkle this mixture over the cut surfaces lightly. Immediately afterwards, cover the meat with fine salt. At the end of three days, lift the side and dump it either on the floor or table, so as to remove the pickle and salt which may be left, and if the sides have been stacked the one on top of the other, see that in the future cure, the topmost side is put at the bottom of the stack. When "stacking" has to be done, always make a space between the sides by means of three pieces of beech or ash wood, so as to allow free circulation of air. These pieces of wood serve also to preserve the shape of the meat.

Sprinkle the sides, after they have been dumped, with pure salt and allow them to remain for from nine to twelve days (according to the size and mildness of the meat required). At the end of that time the bacon is practically cured, but it is customary to turn the sides face downwards for a few days, according to convenience, so as to allow them to drain. If the space of the curing cellar is valuable this process of draining can go on in an outer cellar, the meat being piled, where the temperature may be a little higher than the cellar itself. When the sides have sufficiently drained, which will take place in seven days, brush and wash them in cold water mixed with two per cent. of Douglas's food antiseptic, so as to remove the slime, wipe them with a cloth, and if it is proposed to sell them as "Green Bacon," they might be either sent out at once or dried in the drying room, and sent out then as "Pale Dried," or if it is proposed to send them out as "Smoked Bacon," they should then be placed in the smoke stoves (after having been dusted over with fine ground Canadian pea meal) for a period of not less than three days. The temperature in smoke stores should never be allowed to rise much above 80° F.

The smoke stores are best made of a square shape, and should have proper ventilation in the shape of louvres at the top. A forced draft by means of a fan drawing the smoke through tubes of six to eight inches in diameter has been proved to be very successful, especially in heavy weather.

The best material for smoking is oak sawdust. Any hard wood sawdust, however, may be employed, and wheat straw may be added if sawdust is scarce.

The pocket holes are the weakest parts of the side, and can only be maintained sweet by dusting into them some powdered antiseptic, mixed with a small quantity of ground husks.

DATA FOR CURING.

TEMPERATURES.

Temperature of chill rooms	-	-	-	-	38° F.
„ cellars	-	-	-	-	40° F.
„ smoke stoves	-	-	-	-	80° to 90° F.

STRENGTH OF PICKLE.

Density of pickle by scale of salinometer - - - 95° F

DAYS IN SALT.

Seven to nine score pigs (140 to 180 lbs.) should first be treated according to the recipe, with salt, saltpetre, and food antiseptic for first three days, then they should lie in salt for other nine days; nine to ten score pigs (180 to 200 lbs.) should lie in salt, in addition to first three days, other eleven days; ten to twelve score pigs (200 to 240 lbs.), in addition to first three days, should lie in salt other twelve days.

After which they should be "struck" or removed from pile and piled face, or cut, surface downwards, so as to drain. If possible this should continue for nine days, but in the majority of cases this length of time would mean carrying too heavy a stock, so that the length of time allotted to this process must always depend upon the vicissitudes of business.

A plain pickle for pumping, or to be used as a brine for curing—Wiltshire:

Clear water	..	...	...	...	48 gallons.
Salt	...	...	...	...	140 lbs.
Saltpetre	...	...	...	..	6 "
Douglas's food preservative	....	....	....	...	10 "

Stir up with a stick until the salt nearly all disappears.

SMOKING BACON.

This branch of the business is very often carried on as a separate business altogether from curing, but to most curers it is becoming a daily necessity to know how to smoke their own bacon. The sides are usually turned up in the outer cellar—with the rind side upwards—to drain for about five days, and are then dusted over with some finely ground Canadian pea meal. They are then hung up in the smoke room, and the fire is lighted on the floor. The fire should be at least fourteen feet from the bottom of the bacon hanging over it. The material used for smoking is preferably oak or ash sawdust, but where these are not attainable wheat or barley straw may be used. The sawdust should be piled in the four corners of the smoke room, and each pile lighted separately. This arrangement prevents a direct current of heat from touching the bacon, as the meat will naturally be hung some distance from the walls all round. Juniper chips mingled with the sawdust impart a rich flavour to the meat. The smoking may be continued for three days, and the temperature should be kept at from 80° to 90° F.

Of late, many experiments have been tried to produce the flavour of smoke without smoking. While it is possible by the immersing of the flitches in a weak solution of pyroligneous acid, which has been properly refined, to give the flavour, it is always necessary to smoke at least for a brief

time in order to obtain the uniformity or colour desired by buyers of this commodity. Perhaps in no class of bacon or hams is it more necessary to smoke for a brief period than in that of American origin. They arrive in this country in a soft condition, and if smoked in the ordinary way will lose a very large percentage of their weight. The pyroigneous solution may therefore be used with greater advantage with them than with home-bred hogs.

YORKSHIRE BACON.

Begin by rubbing in a little saltpetre into all the exposed or broken parts, along with some food preservative, and immediately rub in salt. Allow to cure for two weeks in a brine of 88° on salinometer, or sufficiently dense to float a potato. Remove at the end of that time and wash the flitches. Return to the curing vat for another fortnight, after which they may be removed and wiped with a cloth, powdered with a little curing powder, and sometimes some flour; they may then be hung up in a dry room to dry. Smoking is not generally adopted in Yorkshire.

SCOTCH BACON.

In a valuable book published in 1811, at Annan, by Robert Henderson, a farmer, under the title of "A Treatise on the Breeding of Swine and Curing of Bacon," the author tells his experience of the manner of smoking bacon then practised in the South of Scotland.

"I practised," he writes, "for many years the custom of carting my flitches and hams through the country to farmhouses, and used to hang them in their chimneys and other parts of the house to dry, some seasons to the extent of 500 carcasses. This plan I soon found was attended with a number of inconveniences, having to take along with the bacon pieces of timber to fix up in the different houses, for the purpose of hanging the flitches and hams. For several days after they were hung up they poured down salt and brine upon the women's caps, and now and then a ham would fall down and break a spinning-wheel, or knock down some of the children, which obliged me to purchase a few ribbons, tobacco, etc., to make up the peace."

It may be safely said that the methods of curing and smoking have since that time altered considerably. The flitches are laid in a bed of salt of about $\frac{1}{2}$ in. thick, and powdered over with salt and a small quantity of saltpetre. They are rubbed well with the mixture, and allowed to cure thus for a week. After that time they are cleansed of salt, etc., and powdered with curing powder, then the salt is added alone and the flitches are allowed to cure in it for two weeks. They are then washed with slightly warm water, dried, and powdered with preservative powder, after which they may be dried or smoked as desired.

HAM CURING BY THE MOST MODERN PROCESS.

Hams are cured in many more ways than bacon, each county and many towns having their separate methods. Foreign hams are imported into Great

Britain very largely, bearing the names of towns or countries, such as Westphalian, Hamburg, American, etc. We have at home Irish, Yorkshire, Cumberland, and many others. The systems of curing, however, all bear a close resemblance to one another.

To make a complete success of curing hams they should never be taken out of the chill room until they indicate by the meat thermometer 40° F. The meat thermometer is simply pressed into the fleshy parts of the ham, and allowed to remain for a minute or two, when the thermometer can be read off. This temperature is attainable by keeping the chill room down to 38° F., dry, cold air. When the hams are in this condition throw them into a pickle of the following constitution :

Salt	...	...	...	...	...	50 lbs.
Finest granulated saltpetre	...	...	...	...	...	5 "
Pure cane sugar	..	...	...	...	...	5 "
Douglas's bacon curing antiseptic	...	...	...	...	...	5 "

To this add twenty gallons pure water, and if there is any scum remove it, and should that not be sufficient to clear the liquid it must be boiled, and the scum removed as it rises to the surface.

This pickle will be more liable to go wrong than any other in the curing cellar, owing to the fact that the blood from the blood-vein will be drawn out; indeed, this is the intention of putting the hams into pickle to start with, so that the blood may be drawn from the blood-vein, and thus prevent any possibility of taint.

Allow the hams to remain in this pickle for twelve hours, and then remove and pump with a clear pickle of the same constitution. It must be noted here that on no account must the pickle, in which the hams are thrown for twelve hours, be used for pumping.

To restore this pickle, which will contain a quantity of blood, it will be necessary to boil it. To altogether dispense with any risk, however, it is generally advisable to make a fresh pickle when the original becomes too much contaminated.

When the hams have been pumped with fresh pickle in all the fleshy parts, lay them in beds of salt in such a position that the cut surface or fleshy parts will be level, and the shank pointing downwards. Lay the hams side by side as close together as they will go, and as each is laid down sprinkle over the cut surface an equal mixture of saltpetre and Douglas's food antiseptic. This mixture should always be made beforehand. Put on sufficient of the mixture to lightly cover the whole surface, and press with the finger an extra quantity into the opening of the blood-vein, on the top of this sprinkle heavily fine salt, and allow the hams to remain thus for three days. At the end of that time, take them up one by one and squeeze out all that may remain of the coloured liquid from the blood-vein, wiping the same clean from the cut surface. Immediately then lay them down in beds of salt, as before, and cover them up with fine salt. The smallest ham should now remain at least fifteen days in this position, and it is customary where hams

are to be kept for a period to allow them to remain twenty-one days. After twenty-one days the length of time they have to remain is according to the rule that it requires one day to cure one pound of meat, so that heavier hams will require a day for every pound above twenty-one pounds. At the end of this period take the hams up, wash them in cold water, wipe them clean, and if they are to be sold as "Pale Dried" dry them in hot air rooms at a temperature not exceeding 80° F. until they are quite dry.

In order to produce the excessive paleness which is characteristic of some hams, they are dipped in scalding hot water and then allowed to dry before sending them out.

If the hams are to be smoked they are taken up from the cellar, washed,

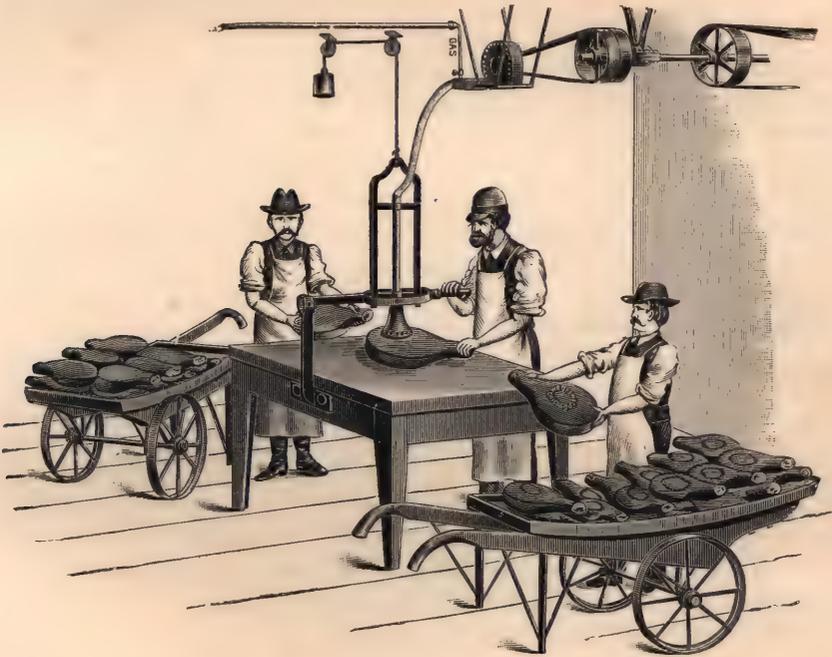


FIG. 8.—HAM BRANDER.

and immediately hung in the smoke stoves, where they are allowed to hang for not less than three days.

To produce the glossy appearance familiar in some smoked hams, a little vaseline is rubbed over the skin.

WESTPHALIAN HAMS.

The hams which bear this name come mostly from Hamburg, and are distinguishable from others by peculiarity of cut and distinctive flavour. The legs of pork used average about 14 lbs. to 16 lbs. in weight, and are cut long

and narrow, inclining to a peak. Rub them well with a mixture of the following :

Saltpetre	...	...	...	...	...	1 lb.
Sal. Prunella	...	...	...	...	...	1 ,,
Egyptian sugar	...	...	...	...	...	1 ,,
Bay salt	..	...	...	...	...	1 ,,
Bruised juniper berries	...	...	...	...	...	2 ,,
Bay leaves	...	...	...	...	...	$\frac{1}{2}$,,
Food preservative (dry antiseptic)	...	...	...	...	...	1 ,,

Turn them frequently for three days, then rest them for a week, after which make a brine with the above ingredients, with the addition of—

Water	...	...	...	...	...	1 gallon.
Vinegar	...	...	...	...	...	1 ,,

Baste them for a fortnight with this, and then take them up and wipe dry. Hang up in a current of air and smoke for two or three weeks with oak sawdust and juniper chips. They must be placed at the very top of the smoke-house, so that the smoke will come in contact with them only when it is very cool. Bracken or fern may be added as well as juniper chips or branches to the oak sawdust.

FRENCH HAMS.

Make a brine of the following ingredients :—

Water	...	...	...	...	...	6 gallons.
Salt	...	...	...	...	...	20 lbs.
Rock salt	...	...	...	...	...	2 ,,
Egyptian sugar	...	...	...	...	...	6 ,,
Saltpetre	...	...	...	...	...	2 ,,
Food preservative	...	...	...	...	...	2 ,,

Put the whole into a copper and boil for ten minutes, skimming off any scum that comes to the surface. Stir frequently the while.

Make an infusion in 1 gallon of water of—

Bay leaves	...	...	...	...	...	1 lb.
Juniper berries	..	...	...	...	...	1 ,,
Rosemary	...	...	...	...	...	1 ,,
Coriander seed	...	...	...	...	...	1 ,,

Of this infusion add to the brine, when it is cold, 1 quart, and stir altogether.

Trim the hams so that they have a rounded appearance, and beat them with a broad-faced mallet, so that the blood may all be liberated. Wipe this all off. Rub the hams with a little saltpetre, then rub them with a mixture of sugar and salt: ten parts of sugar to ninety parts of salt—or 10 per cent. See that this mixture is forced into all exposed portions. Place the hams on

the floor of cellar or on the cellar benches in a bed of salt, and cover $\frac{1}{2}$ in. thick with the mixture as before—ninety parts salt and ten parts sugar. Two days later turn them and rub again with the same mixture. The fourth day turn and rub them again, and the succeeding day put them into the brine already prepared, keeping them there for three weeks if large hams, and two weeks if small. At the end of that time remove and wipe them with a cloth; then steep for two hours in cold, pure water, wipe them, and hang up to dry in an airy place for a fortnight. Smoke in cool smoke. They will keep for an indefinite period, and will be possessed of a magnificent flavour.

HAMBURG HAMS.

The leg is washed with soft water or brandy, and a mixture composed of the following is rubbed into it:

Salt	...	...	...	...	...	8 oz.
Saltpetre	...	...	...	...	...	2 „
White pepper	...	...	...	...	...	2 „
Powdered cloves	...	...	...	...	...	$\frac{1}{2}$ „
Food preservative	...	...	...	...	...	2 „

It is then put in a vessel with bay leaves and garlic, and covered with a clean cloth. At the end of twenty-four hours it is washed with cold water, and put for a fortnight into a tub of wine dregs. It is then enveloped by thin paper, and hung in a chimney or smoke house for a month or six weeks. It is then smoked with juniper wood, after which it is preserved in fine wood ashes.

SMOKING MATERIALS.

The various materials used for imparting the delicious smoky flavour to hams and bacon are: oak dust, oak chips, peat, wheat straw, ash dust or chips, or other hard woods. The two of greatest value are the oak dust and peat, each imparting a characteristic flavour.

THERMOMETER SCALES.

Three different thermometer scales are in use throughout the world. In England the scale most commonly used is that of "Fahrenheit," generally expressed ° F., but the other scales are sometimes used. They are the "Reamur," as used extensively in Germany, and "Celsius" or "Centigrade" as used in France. In order, therefore, to freely convert one scale into the expression of the other, the following data is necessary:

			Freezing Point of Water is	Boiling Point of Water is
Fahrenheit	...	...	32°	212°
Centigrade	...	...	0°	100°
Reamur	...	...	0°	80°

The scales are always designated by their initials, thus:—

F. = Fahrenheit.

C. = Centigrade or Celsius, which are similar

R. = Reamur.

The conversion of the one scale into the other may then be carried out thus:—

$$C. = \frac{5}{9} (F. - 32) = \frac{5}{9} R.$$

$$R. = \frac{9}{5} (F. - 32) = \frac{9}{5} C.$$

$$F. = \frac{9}{5} (C. + 32) = \frac{9}{5} R. + 32.$$

THERMOMETERS USED IN BACON CURING.



FIG. 9.

WHITE PORCELAIN THERMOMETER.

(Large size, so as to be easily read). For cellars.

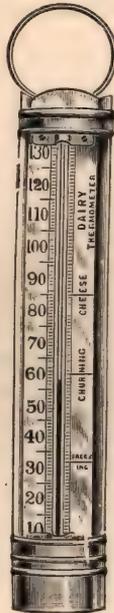


FIG. 10.

PICKLE THERMOMETER.]

For testing temperature of pumping and other pickles.



FIG. 11.

CHILL ROOM THERMOMETER.

The bulb is inserted through the wall of chill room, while the scale is fixed outside. The temperature can thus be read without any trouble.

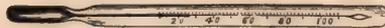


FIG. 12.—MEAT THERMOMETER.

A small thermometer which can be inserted into the meat, and so the temperature can be quickly determined.

This concise way of stating the matter is taken from the able work of J. E. Siebel—"Compend of Mechanical Refrigeration"—as is also the following comparison of tables:

COMPARISON OF THERMOMETER SCALES.

R.	C.	F.	R.	C.	F.
+80	+100	+212	+23	+28.75	+83.75
79	98.75	209.75	22	27.50	81.50
78	97.50	207.50	21	26.25	79.25
77	96.25	205.25	20	25	77
76	95	203	19	23.75	74.75
75	93.75	200.75	18	22.50	72.50
74	92.50	198.50	17	21.25	70.25
73	91.25	196.25	16	20	68
72	90	194	15	18.75	65.75
71	88.75	191.75	14	17.50	63.50
70	87.50	189.50	13	16.25	61.25
69	86.25	187.25	12	15	59
68	85	185	11	13.75	56.75
67	83.75	182.75	10	12.50	54.50
66	82.50	180.50	9	11.25	52.25
65	81.25	178.25	8	10	50
64	80	176	7	8.75	47.75
63	78.75	173.75	6	7.50	45.50
62	77.50	171.50	5	6.25	43.25
61	76.25	169.25	4	5	41
60	75	167	3	3.75	38.75
59	73.75	164.75	2	2.50	36.50
58	72.50	162.50	1	1.25	34.25
57	71.25	160.25	0	0	32
56	70	158	-1	-1.25	29.75
55	68.75	155.75	2	2.50	27.50
54	67.50	153.50	3	3.75	25.25
53	66.25	151.25	4	5	23
52	65	149	5	6.25	20.75
51	63.75	146.75	6	7.50	18.50
50	62.50	144.50	7	8.75	16.25
49	61.25	142.25	8	10	14
48	60	140	9	11.25	11.75
47	58.75	137.75	10	12.50	9.50
46	57.50	135.50	11	13.75	7.25
45	56.25	133.25	12	15	5
44	55	131	13	16.25	2.75
43	53.75	128.75	14	17.50	0.50
42	52.50	126.50	15	18.75	-1.75
41	51.25	124.25	16	20	4
40	50	122	17	21.25	6.25
39	48.75	119.75	18	22.50	8.50
38	47.50	117.50	19	23.75	10.75
37	46.25	115.25	20	25	13
36	45	113	21	26.25	15.25
35	43.75	110.75	22	27.50	17.50
34	42.50	108.50	23	28.75	19.75
33	41.25	106.25	24	30	22
32	40	104	25	31.25	24.25
31	38.75	101.75	26	32.50	26.50
30	37.50	99.50	27	33.75	28.75
29	36.25	97.25	28	35	31
28	35	95	29	36.25	33.25
27	33.75	92.75	30	37.50	35.50
26	32.50	90.50	31	38.75	37.75
25	31.25	88.25	32	40	40
24	30	86			

PIGS' HEADS.

When pigs are weighed, cut off the heads and put them in the cellar or chill room on a rack until next morning, and then split them into four parts. One half (the lower), is called the "chaps," and the upper the "eye-pieces." They are put into a pickle tank for four or five hours to purge them of blood, and then thrown out and allowed to drain for an hour or so. They are then pumped with the antiseptic pickle in the lean parts, and thrown into the brine



FIG. 13.—PORTABLE WEIGHING MACHINE.

and allowed to remain for four days. They are then taken out and salted, in piles, in the same way as bacon, using the antiseptic and saltpetre first. They are allowed to remain thus for seven days, and may then be taken up and used, or the chaps may be smoked. In the smoked state the chaps are known as "Bath chaps."

LARD.

The following description of the manufacture of this commodity is taken from bulletin 13 of the U.S. Department of Agriculture, 1889:

(a) *Lard* is a term applied to the fat of the slaughtered hog, separated from the other tissues of the animal by the aid of heat.

In the crude state it is composed chiefly of the glycerides of the fatty acids, oleic and stearic or palmitic, with small portions of the connective tissues, animal gelatine, and other organic matters.

(b) *Kinds of Lard*—According to the parts of the fat used, and the methods of rendering it, lard is divided into several classes. According to

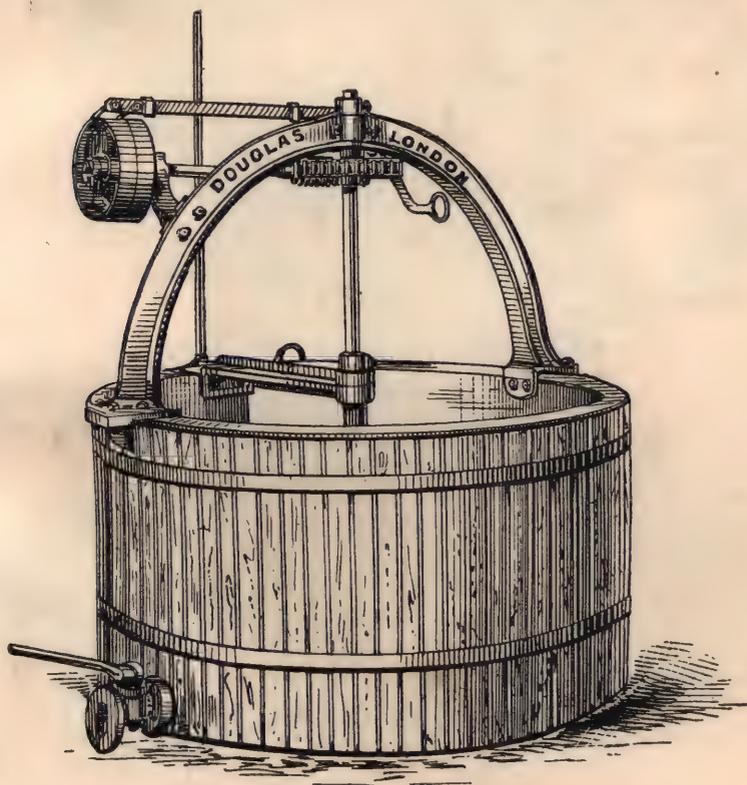


FIG 14.—LARD RENDERING PAN WITH STIRRING APPARATUS.

methods of rendering, lard is classified as kettle and steam. From material used the following classification may be made:

(c) *Neutral Lard*—Neutral lard is composed of the fats derived from the leaf of the slaughtered animal, taken in a perfectly fresh state. The leaf is



FIG. 15.—MACHINE FOR CUTTING FAT FOR LARD.

either chilled in a cold atmosphere, or treated with cold water to remove the animal heat. It is then reduced to pulp in a fat-cutting machine, and passed at once to the rendering kettle. The fat is rendered at a temperature 105° to 125° F. (40°–50° C.) Only a part of the lard is separated at this temperature, and the rest is sent to other rendering tanks to be made into another kind of product. The lard, obtained as above, is washed in a melted state with water containing a trace of sodium carbonate, sodium chloride, or a dilute acid. The lard then formed is almost neutral, and should not contain more than .025 per cent. free acid; but it may contain a considerable quantity of water and some salt. This neutral lard is used almost exclusively for making butterine (oleomargarine).

Leaf Lard—The residue unrendered in the above process is subjected to steam heat under pressure, and the fat thus obtained is called leaf lard. Formerly this was the only kind of lard recognised in the Chicago Board of Trade, and was then made of the whole leaf.

(e) *Choice kettle-rendered Lard. Choice Lard*—The quantity of lard required for butterine does not include all of the leaf produced. The remaining portions of the leaf, together with the fat cut from the backs, are rendered in steam-jacketed, open kettles, and produce a choice variety of lard known as “kettle-rendered.” The hide (rind) is removed from the back fat before rendering, and both leaf and back fat are passed through a pulping machine before they enter the kettle.

Choice lard is thus defined by the regulations of the Chicago Board of Trade:

Choice lard to be made from leaf and trimmings only, either steam or kettle-rendered—the manner of rendering to be branded on the tierce.

(f) *Prime Steam Lard*—The prime steam lard of commerce is made as follows: The whole head of the hog, after the removal of the jowl, is used for rendering. The heads are placed in the bottom of the rendering tank. The fat is pulled off the small intestines, and also placed in the tank. Any fat that may be attached to the heart of the animal is also used. In houses where kettle-rendered lard is not made, the back fat and trimmings are also used. When there is no demand for leaf lard, the leaf is also put into the rendering tank with the other portions of the body mentioned. It is thus seen that prime steam lard may be taken to represent the fat of the whole animal, or only portions thereof. The quantity of fat afforded by each animal varies with the market to which the meat is to be sent. A hog trimmed for the American market will give an average of about 40 lbs.; while from one destined for the English market, only about 20 lbs. of lard will be made.

Prime steam lard is thus defined by the Chicago Board of Trade:

Standard prime steam lard shall be solely the product of the trimmings and other fat parts of hogs, rendered in tanks by the direct application of steam, and without subsequent change in grain or character by the use of agitators or other machinery, except as such change may unavoidably come from transportation. It shall have proper colour, flavour, and soundness for

keeping, and no material which has been salted shall be included. The name and location of the renderer and the grade of the lard shall be plainly branded on each package at the time of packing.

This lard is passed solely on inspection; the inspector having no authority to supervise rendering establishments in order to secure a proper control of the kettles. According to the printed regulations, any part of the hog containing fat can be legally used.

Since much uncertainty exists in regard to the disposition which is made of the guts of the hog, I have had the subject carefully investigated. Following are the results of the study:

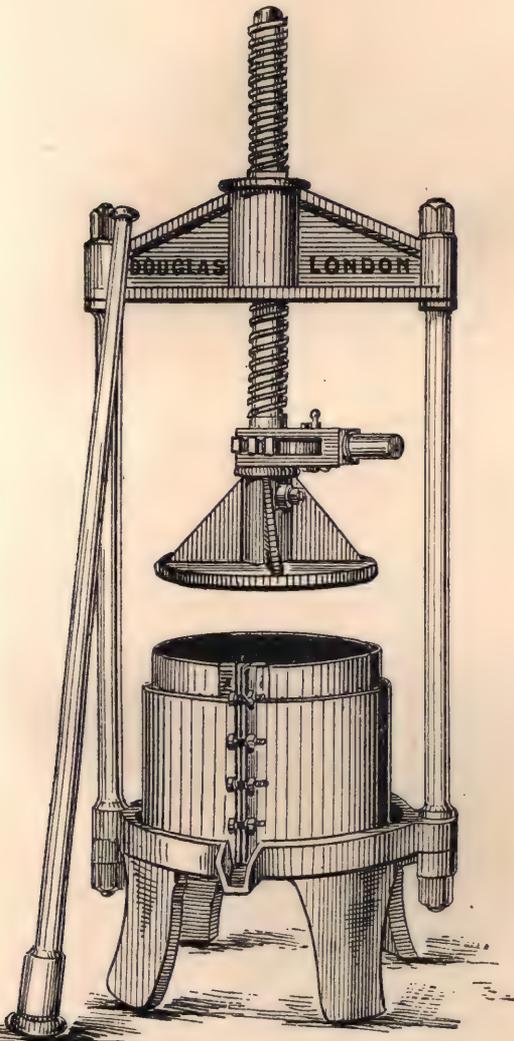
(g) *Guts*—The definition of the term as used by hog packers is—everything inside a hog except the lungs and hearts, or in other words, the abdominal viscera complete. The material is handled as follows:

When the hog is split open the viscera are separated by cutting out the portion of flesh surrounding the anus, and taking a strip containing the external urino-generative organs. The heart is thrown to one side and the fatty portions trimmed off for lard. The rest goes into the offal tank or sausage. The lungs and liver go into the offal tank (or sausage). The rectum and large intestines are pulled from the intestinal fat and peritoneum and, along with the adhering flesh and genito-urinary organs, sent to the trimmer. All flesh and the above-mentioned organs are trimmed off, and the intestine proper is used for sausage casings. The trimmings, including the genito-urinary organs, are washed and dumped into the rendering tank. The small intestine is also pulled from the fatty membrane surrounding it and saved for sausage casings. The remaining materials, consisting of the peritoneum, diaphragm, stomach, and adhering membranes, together with the intestinal fat, constitute the "guts," and undergo the process of washing, which is conducted usually in three or four different tanks.

As the "guts" pass into the first tank the stomach and peritoneum are split open, and also any portion of the intestines which sometimes adhere to the peritoneum. After receiving a rough wash they are passed from tank to tank, when, after a third or fourth wash, they are ready for the rendering tank. The omentum fat is cut from the kidneys, and the kidneys with a little adhering fat go into the rendering tank. Spleen and pancreas go into the rendering tanks, as do also the trachea, vocal chords, and cesophagus.

To sum up, it is safe to say that everything goes into the rendering tank, with the following exceptions:

- (1) The intestines proper, which are saved for sausage casings.
- (2) The liver and lungs.
- (3) That part of the heart free from fat.



Cullender 18 in. diameter.
FIG. 16.—LARD PRESS.

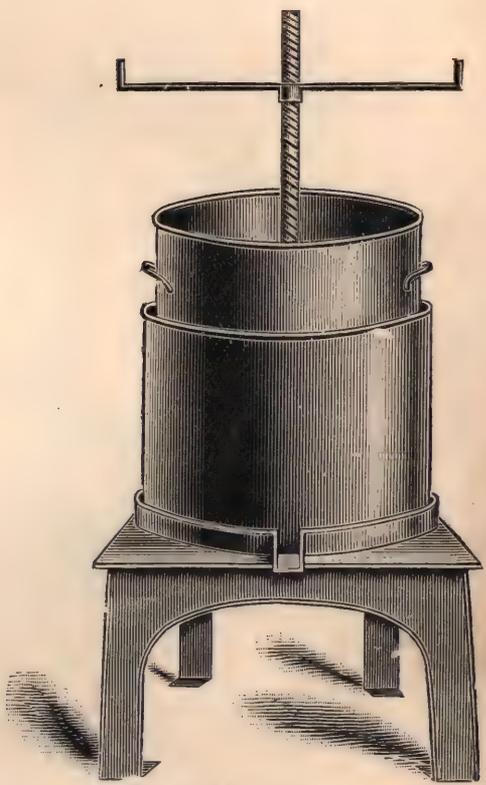


FIG. 17.—LARD PRESS.

SAUSAGE MAKING.

INGREDIENTS.

Sausages made in the ordinary way are seldom made from pure meat with spices alone. It is the common practice to add some other substances so as to make the richness disappear, and, at the same time, give body and solidity. This applies more particularly to sausages made from pork, beef, or



FIG. 18—BREAD PRESS.

what are generally known as German sausages. The rarer kinds of sausages, such as those of Frankfurt or Brunswick, are often made of pure meat, but they are so composed and treated that the richness disappears. A further consideration is that the price of ordinary sausages is very low, and it would

be unprofitable to do otherwise than to introduce ingredients so as to cheapen them. These ingredients are for the most part bread, sausage meal, granulated rice, biscuit dust, cornflour, farina (potato flour), and common flour. One of these may be added, but more often two are used, as for example, bread and sausage meal in equal parts.

BREAD.

Bread is used very extensively in the "pressed" state, and is usually prepared as follows: The bread selected is generally stale and hard by being kept, and the baker thus finds a ready outlet for his unsold loaves. The loaves are used entire if they are not blackened or too brown. If they are such, the objectionable crusts must be removed, as otherwise their presence will injure the colour of the sausages. They are broken into pieces and soaked in water for some hours, or may be left all night. (It is always desirable to add some food preservative, in the proportion of one ounce to one gallon of the water used for soaking, so as to counteract the liability to fermentation produced by the yeast used in baking). When properly soaked, the bread is put into a bread press and the whole of the water pressed out. Remove the bread from the press, break down into fragments with the hands, and it is ready for use.

SAUSAGE MEAL.

Sausage meal is the most valuable ingredient used next to the meat itself, as, if it is properly made, it will not sour, and will hold the fat and moisture present during the process of cooking, and thus enable the sausages to be presented at table in a firm and good condition. The following is the description of it circulated by its inventors and makers:

"An absolute substitute for bread in sausage making, possessing a splendid flavour, free from sweetness, perfectly dry, and easily used, as it does not require to be soaked like bread, but is best used dry, a little water being added while mixing in chopping or mincing machine. It will hold about three times its own weight of fat and water, and keep both from running out after being cooked, thus producing a firm nicely eating sausage. It will not *sour*, and in this particular respect surpasses all other ingredients used in sausage making."

The experience of many years seems to have demonstrated these statements to be substantially correct.

It is always best used dry, although some prefer to put a small quantity of warm water, weight for weight, into it the night before using, and allow this to be absorbed, so that in the morning, when it is wanted, it is not wet but just slightly damp. The dry method, however, seems to be mostly adopted, as by that means the free fat in the mixture is more readily absorbed.

GRANULATED RICE.

Granulated rice is used by some in preference to bread as it is more easily handled, and at the same time imparts an agreeable flavour. The rice

best suited for the purpose is Patna, Rangoon rice being of a harder nature and more difficult to render soft. Scalding water, sufficient to cover the rice used, is added to it and allowed to be absorbed. It may even be boiled with the rice, but this is not necessary, as the rice will absorb as much water by scalding as by boiling. It should be carefully noted that an undue quantity of water will have the effect of rapidly souring the rice when mixed with the meat and put into the sausage-casings. When vegetable colour is used so as to colour the sausages, it is convenient to add it either in the liquid or the dry form to the rice during the process of scalding or boiling. There are several colours made for this purpose, and are sold under the names of "Rose Pink Solution," "Rose Pink Powder," "Indian Red," "Poppy Red," etc. In all cases it should be ascertained whether they are innocuous or not, so that there may be no danger to the consumers of the sausages.

BISCUIT DUST

May be used sparingly, and in the same way as sausage meal; but the sweet taste and biscuity flavour are easily detected, and are very objectionable. It will not hold anything like the same quantity of fat and water that is taken up by sausage meal. A large proportion of what is sold is simply the refuse from biscuit factories, and is therefore objectionable.

CORN FLOUR, FARINA, AND WHEAT FLOUR

Are valuable ingredients for some kinds of sausages, such as Bologna (Poloney) or Weasand sausages. They have the effect of binding together the other ingredients, while at the same time absorbing a large quantity of moisture. They are all used in the same way and for the same purpose. Previous to using they are scalded with sufficient water to cover them, and are then added as required.

FOOD PRESERVATIVE.

Food preservative is necessary in nearly every operation connected with the pork business, whether for fresh goods, cooked meats, or curing. It is absolutely necessary that an article of this sort should be perfectly pure, as on that depends its being wholesome and effective. A perfectly pure preservative is made from a base of borates, and calcined at such a temperature as to drive off all moisture and offensive organic matter. The product should be perfectly neutral. Of late years a number of unscrupulous people have introduced spurious compounds—either acid or alkaline, both of them injurious—although to all appearance similar to a calcined neutral compound. The only excuse possible for such people is that they are wholly ignorant of the first principles of chemistry and of hygiene. It has been found that neutral "Food Preservative" (Dry Antiseptic) passes through the system, doing no injury whatever; whereas in certain states of health the others are very injurious. It is, therefore, at all times desirable that a pure "Food Preservative" (Dry Antiseptic) should be used.

SMOKE POWDER.

Smoke powder is used for producing the flavour imparted by smoking hams or sausages with oak sawdust. This process simply consists of eliminating by combustion the fine particles of tarry matter present in oak and other woods. It is, therefore, reasonable to suppose that if by chemical processes this matter can be collected as a distinct article, we will be able to impart the same flavour without the trouble and loss of smoking. The heat produced during smoking acts injuriously on hams and sausages unless very carefully regulated; but even if regulated a certain loss is sure to take place, which by the use of this commodity can be avoided. The conventional colour of smoking is easily produced by harmless and tasteless dyes.

ROSE PINK COLOUR.

Rose pink colour is a vegetable colour which is used to impart a uniform flesh tint to all sausages sent out in the uncooked state. The best way to use it is to make it into a paste with warm water an hour or so before it is required, stirring it well just before use. A sufficient quantity of paste is then added to the chopping to produce the shade required. This colour is also prepared in a liquid form.

SEASONINGS.

The composition of seasonings is a much vexed question, and there are in existence an inconceivable number of recipes for their manufacture. It may be safely said that the most profitable way for anyone to adopt who does not know much of this subject, is to get a respectable spice house to make up a seasoning suited to the locality for which the sausages are intended. The following list shows the seasonings prepared by William Douglas & Sons, 29 Farringdon Road, London, and it comprises all that are necessary:

SAUSAGE SEASONINGS.

- No. 1, for beef sausages ($\frac{1}{2}$ oz. to 1 lb. meat), plain or coloured.
- No. 1, for pork sausages ($\frac{1}{2}$ oz. to 1 lb. meat).
- No. 2, for beef sausages (1 oz. to 1 lb. meat), plain or coloured.
- No. 3, for Cambridge sausages (1 oz. to 1 lb. meat).
- No. 4, for Yorkshire poloney sausages ($\frac{1}{2}$ oz. to 1 lb. meat).
- No. 5, for German or Bologna sausages ($\frac{1}{2}$ oz. to 1 lb. meat).
- No. 6, for ham, chicken, and tongue sausages ($\frac{1}{2}$ oz. to 1 lb. meat).
- No. 7, for black puddings—(black pudding spice)—(1 oz. to 14 lbs. pudding material).
- No. 8, special plain seasoning, without spices ($\frac{1}{2}$ oz. to 1 lb. meat).
- No. 9, for pork pies ($\frac{1}{2}$ oz. to 1 lb. meat).

The advantage of using ready-made seasoning lies in their being always of the same uniform strength.

It should be a rule with every buyer of peppers, spices, or seasonings to see that they are delivered in tins, as the natural essential oils present are

very subject to ~~evaporation~~ by heat, or injury by steam or damp. Pepper will lose 10 per cent. of its value in a few months if kept in an open barrel.

The ingredients in seasonings are very numerous, and there is undoubtedly an art in compounding them. It always depends mainly upon the seasoning whether goods get a ready sale or not. The list of various spices, etc., necessary comprises the following :

A guarantee of absolute purity should always be obtained when buying these.

GROUND PEPPERS.

(Guaranteed Pure)—

White, No. 6, Fair.
 „ No. 5, Good.
 „ No. 4, Fine.
 „ No. 3, Best Fine.
 „ No. 2, Extra Fine.
 „ No. 1, Finest Coriander.
 Black, No. 3, Good.
 „ No. 2, Fine.
 „ No. 1, Finest.
 Cayenne.

GROUND SPICES.

Allspice.
 Carraways.
 Cassia.
 Cinnamon.
 Cloves.
 Corianders.
 Curry Powder.
 Ginger.
 Jamaica Pepper.
 Mace, No. 1.
 „ No. 2.
 Mixed Spice.
 Nutmegs, No. 1.
 „ No. 2.
 Pimento.

Some prefer to buy peppers in the whole state and grind them for themselves. Special small mills are made for the purpose.

HERBS.

Basil.
 Celery Seed.
 Lemon Thyme.
 Marjoram.
 Mint.
 Mixed Sweet.
 Parsley.
 Pennyroyal.
 Rosemary.
 Sage.

Savory.
 Thyme.
 Cardamoms(Ground).
 Cummin Seed „
 Laurel or Bay Leaves.
 Juniper Berries.
 Juniper Berry Extract,
 for Brines.
 Black Pudding Spice.

FLAVOURING ESSENCES

Lemon.
 Sage.
 Pennyroyal.
 Marjoram.
 Vanilla.

CASINGS OR SAUSAGE SKINS.

Casings or sausage skins should be very carefully prepared. Those used for pork sausages are invariably pork casings, and these should be properly cleaned by being turned, scraped, bleached, and purified, and properly salted in fine, powdered salt. When thus prepared they should be free from all

objectionable smell. Before using they should be soaked for an hour or more in slightly warmed water, and if they are brittle and do not slide on to the funnel easily put a pinch of baking soda into the water in which they are being soaked, so as to counteract acidity. They will then run on smoothly.

THE CUTTING, MIXING, AND FILLING OF SAUSAGES.

CUTTING UP.

The meat used for the purpose of sausage making is generally of the heavy sort for pork sausages, such as meat from pigs weighing about twelve to twenty score. A large proportion also is derived from the cuttings and

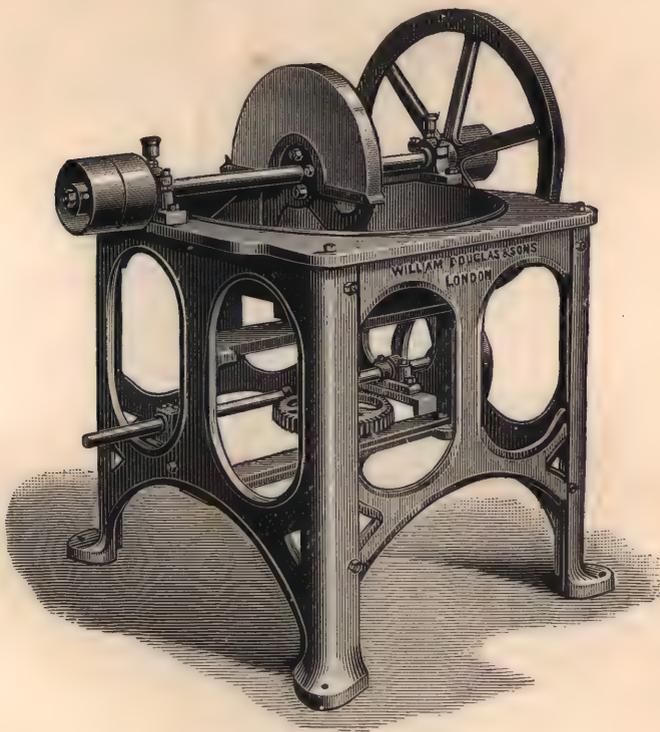


FIG. 19.—SILENT MEAT CUTTER.

trimmings of bacon and hams. It is for this reason that sausage making is of so great importance to bacon curers; they are enabled to work up fragments which are entirely wholesome, but are almost unsaleable in the fragmentary state. Beef sausages are also largely made of cuttings and trimmings, while older animals which could not be sold for prime beef are cut up to a large extent for German or luncheon sausage making.

When the meat or pork has been procured with which it is proposed to make sausages, it should be carefully assorted into fat and lean, so that no undue proportion of either may get into the mixture. It should then be care-

fully cut into lumps of three inches or so square, by hand, and if a small hand machine of the screw type is available, the bread, rice, sausage meal, and seasoning should then be mixed throughout the mass, and the whole put through the machine. If, however, an open bowl or "silent" machine is available, the meat should be put into the bowl of the machine at once by itself, and when the machine has cut it slightly the other ingredients should then be added. It will generally be found necessary when chopping to add a little water so as to lubricate the knives, and enable them to pass through the meat swiftly. It must be borne in mind that the mixture must be sufficiently soft to slide easily through the nozzle of the sausage filler, and this result can only be attained by the addition of water in proportion to the dryness of the

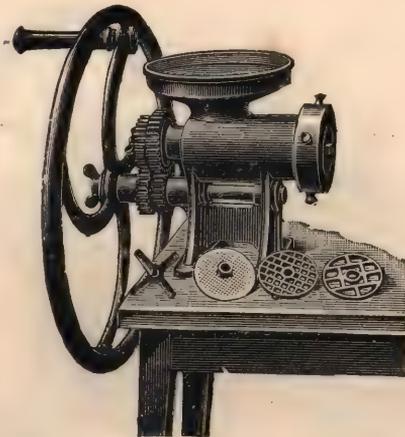


FIG. 20.—HAND POWER MEAT CUTTER.

mixture. The directions for cutting up with a "silent" machine such as are generally used may be put thus:

The bread and meat are cut roughly by the machine, and then the sausage meal and other ingredients are added, the sausage meal being added either dry or damp as preferred. The whole mixture is cut to a very fine state, until the various ingredients become thoroughly mixed, and in such a fine condition as to present to the eye the appearance of one homogeneous mass. In ordinary machines this process takes only a few minutes. The mixture should then be removed, with the aid of a wooden butter-scoop, and placed on a table adjacent to filling machine. The next process is to fill the mixture into casings or skins.

FILLING SAUSAGES INTO CASINGS OR SKINS.

It is very objectionable to be constantly handling the meat or mixture by the hands, as their high temperature while at work is apt to set up fermentation. A butter-scoop should, therefore, be used as often as possible. When the mixture is removed from the machine it will be found quite convenient to use a wooden butter-scoop for that operation, assisted by the hand

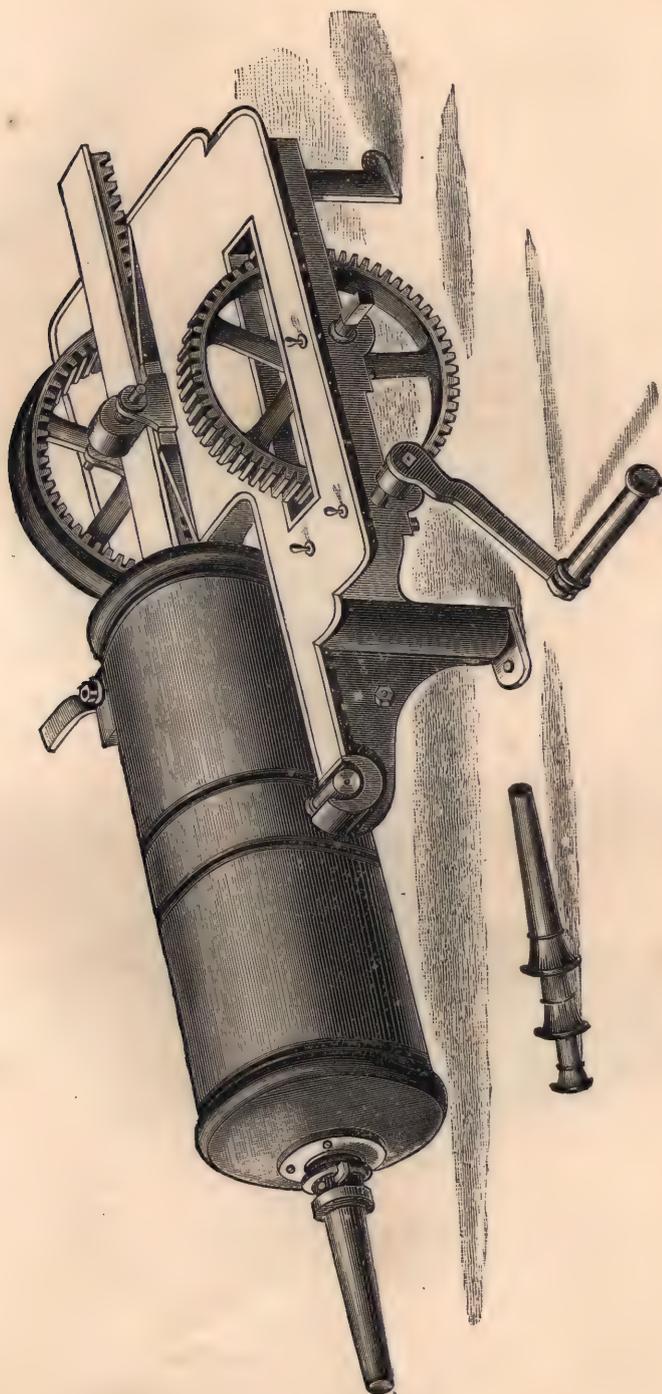


FIG. 21.—SAUSAGE FILLER.

and in dividing the mixture so as to get convenient portions to throw into the filler the scoop should also be used. In the filling of all sausages a filler is necessary, and the operation is as follows: Separate a portion from the general mass of sausage meat, and having previously dipped the hands in *cold, fresh* water, take it up in both hands and throw into the barrel of the filler (the barrel should be tilted up at an angle of about 15° , otherwise this cannot be done). Continue doing so until the barrel is full, then adjust the cylinder on a plane with the piston, and proceed to put the casing on the nozzle (the

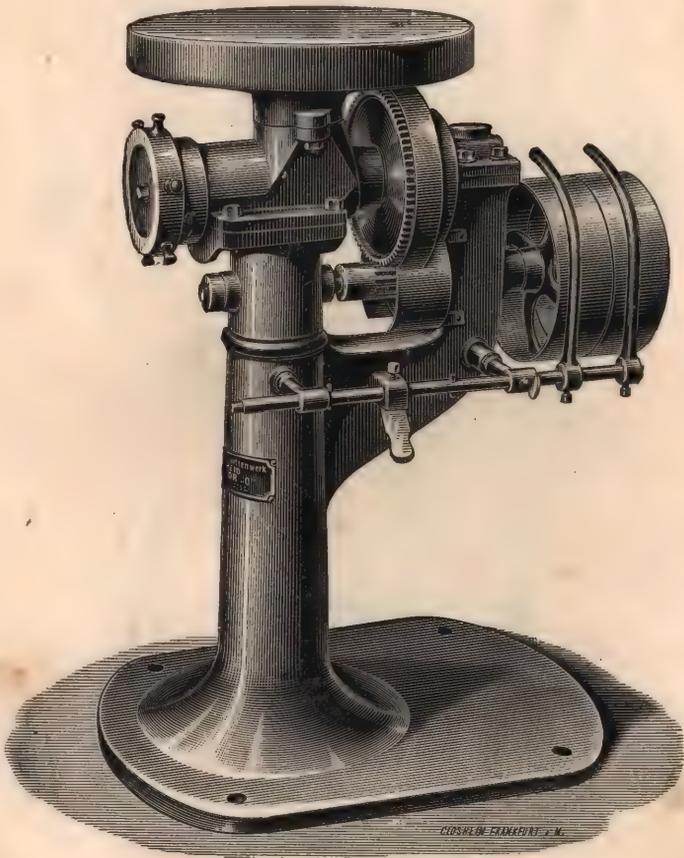


FIG. 22.—POWER MEAT CUTTER.

nozzles are of various sizes, and adjustable to any size of sausage). See that the casing is perfectly sound and wholesome, and has been well soaked in clean water. Open the end of it between the forefinger and thumb, and put it on the nozzle, and then immediately pull the whole casing on with the finger and thumb. When this is accomplished, catch the protruding end of the casing between the forefinger and thumb of the left hand, and turn the handle of the filler with the right, very slowly, and thus proceed to fill out the

sausages. If pork sausages are being filled out they should be linked into bundles of six to the pound, so also with beef sausages. With saveloys and larger sausages it is a matter of custom; with German or poloneys it depends entirely on the size of the casings. Poloneys, however, should as far as attainable be made up into links of a $\frac{1}{2}$ lb. each.

CASINGS OR SKINS USED.

Pork sausages are filled into pork skins, and these should be as white and clear as possible. When filled they should be weighed out into single pounds, and these should each be linked into bundles of six sausages.

Beef sausages are filled into sheep casings, while beast runners are used for black puddings; ox bungs for German or luncheon sausages; weasands for Yorkshire poloneys and certain kinds of luncheon sausages; wide beast runners or "middle gut" for Devon and Cornish puddings, Liverwurst, etc.; and wide hog casings for cheap poloneys.

SAUSAGE RECIPES.

Recipe No. 1.—PORK SAUSAGES (FINEST).

Sausages of pork may be made in various ways, according to the price at which they are to be sold. They are rarely made of the pure meat, as when so made they are too rich and unpalatable. If, however, a large proportion of the meat used be lean the richness will to a great extent disappear. It is in all cases, however, advisable to have present some sausage meal, bread, or granulated rice, even if added in small quantities, as by that means only, firmness can be obtained. The following recipe is for a first-class sausage:

Lean pork	...	...	...	...	15 lb.
Fat pork	...	...	...	...	6 "
Pressed bread	...	...	...	...	2 "
Sausage meal	...	...	...	...	2 "
Seasoning ("No. 1 pork," or from recipe below)	...	...	...	...	14 oz.
Food preservative (dry antiseptic)	...	...	...	...	2 "
Rose pink colour (made into a paste according to tint required).	...	...	...	...

To this may be added one oz. of rubbed sage leaves, if the flavour of sage is desired. It is in many parts considered objectionable, so it is not included in the recipe.

SEASONING.

Salt	...	...	...	...	9 lb.
White pepper	...	...	...	...	6 "
Ground nutmeg	...	...	...	...	$\frac{1}{2}$ "
Mace	...	...	...	...	$\frac{1}{4}$ "

Small quantities of cloves, cayenne pepper, or ginger may be added to taste.

A little basil, rubbed, also imparts a splendid flavour.

The addition of a little ginger keeps the sausages from repeating.

METHOD OF PREPARATION.

The pork, lean and fat, is all cut with a hand knife into pieces of about three in. square, and thoroughly mixed together on a table. The pressed

bread is then added, and the mixture put into the bowl of the machine, provided that it is a silent or other open machine that is used.*

The bread and meat are cut roughly by the machine, and then the sausage meal and other ingredients are added. The whole mixture is cut to a very fine state, until the various ingredients become thoroughly mixed, and in such a fine condition as to present to the eye the appearance of one homogeneous mass. In ordinary machines this process takes only a few minutes.

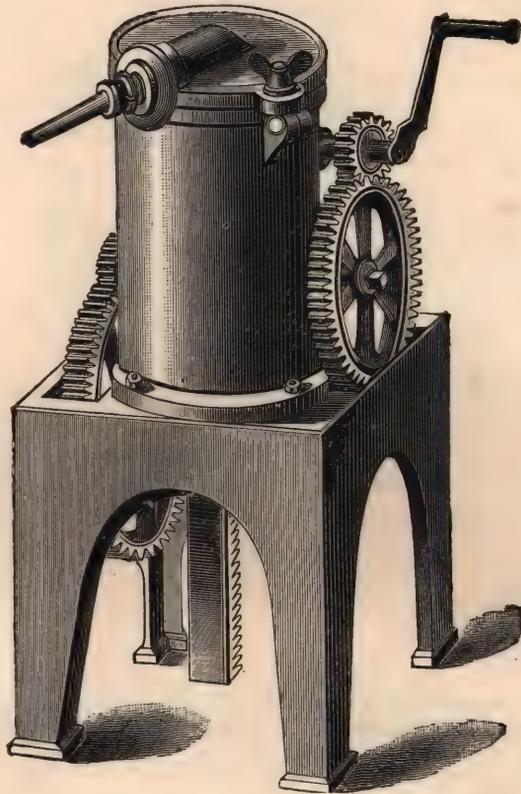


FIG 23.—VERTICAL SAUSAGE FILLER.

The mixture should then be removed from the machine and placed in a mass upon the work table. (This table should preferably have a marble slab on the top, as it keeps the mixture clean and cool) The mixture is then taken up in double handfuls and thrown into filler until it is full. It is then adjusted, and the mixture is slowly forced into the casings.

Pork sausages are filled into pork skins, and these should not be too wide. They are linked into bundles of six to the pound weight.

* Should it be a close machine, in which there is a screw propeller, it is necessary to mix *all* the ingredients together *first* on the table, then put slowly into hopper of the machine, adding a little water as the cutting up proceeds.

NOTE ON INGREDIENTS.

The quality of the pork used must be very good, any part of the pig being used. Large pork is generally preferred, as it is much cheaper and firmer.

Recipe No. 2.—PORK SAUSAGES.

A good ordinary sausage.

Lean and fat pork and pork trimmings	...	..	15 lb.
Pressed bread (or scalded rice)	...	...	4 "
Sausage meal	..	...	4 "
No. 1 Pork sausage seasoning (or as shown below)	...	...	11 oz.
Food preservative (dry antiseptic)	...	...	2 "
Rose pink colour,	...	...	... about 2½ oz.

Add 1 oz. sage leaves, rubbed, if sage flavour is desired.

SEASONING.

Salt	...	...	9 lb.
White pepper	...	...	6 "
Ground nutmeg	...	...	½ "

Small quantities of cloves, cayenne pepper, or ginger may be added to taste.

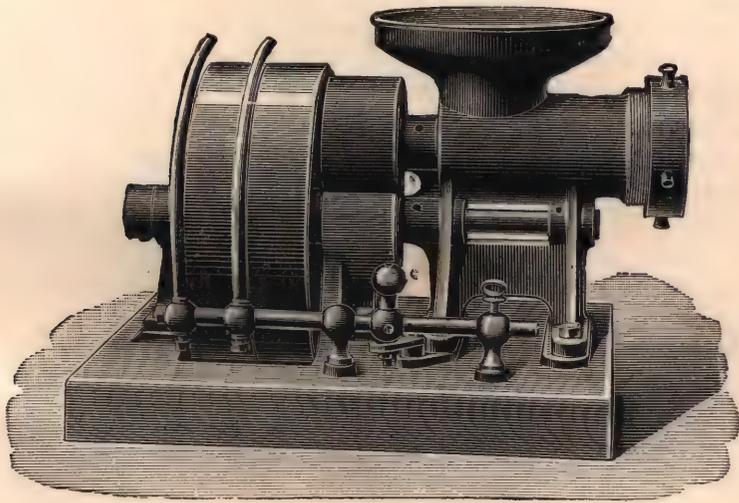


FIG 24.—SAUSAGE MEAT AND FAT CUTTER.

METHOD OF PREPARATION.

Similar to Recipe No. 1.

NOTE ON INGREDIENTS.

Pork trimmings and other pork products of a similar kind are largely utilised in these sausages.

Recipe No. 3.—SMOKED PORK SAUSAGES.

Lean and fat pork	...	...	...	...	15 lb.
Farina or flour	...	...	...	...	3 "
Sausage meal	...	...	...	...	4 "
No. 1 Pork sausage seasoning (or as below)	...	...	...	...	11 oz.
Food preservative (dry antiseptic)	...	...	...	...	2 "
Saltpetre	...	...	...	...	1 "
Smoke powder	...	...	...	...	1 "
Sugar	...	...	...	...	$\frac{1}{2}$ "

SEASONING.

Salt	....	...	...	...	9 lb.
White pepper	...	...	...	...	6 "
Ground nutmeg	...	...	...	...	$\frac{1}{2}$ "
Ground corianders	...	...	...	...	1 "
Cayenne	...	...	...	...	$\frac{1}{2}$ oz.

Small quantities of cloves or ginger may be added.

METHOD OF PREPARATION.

The pork is cut up into pieces of about 3 in. square and mixed on a table. The pressed bread is added and mixed with the pork. The mixture is then placed in the machine, and after being cut somewhat the sausage meal is added *dry*; should the mixture become stiff, water is added till the required consistency is attained. The seasoning and other ingredients are then added, and the whole chopped very fine. Fill in wide hog casings. Hang in open air for an hour in order that they may dry and get firm, then place in smoke house for three hours, and cook for thirty minutes at 180° F. Previous to sending out, rub them with a cloth into which has been dropped some salad oil.

NOTES ON INGREDIENTS.

Saltpetre is added to impart flavour, and also to heighten the colour during cooking. It should be added in a finely powdered state.

Smoke powder is essential to all smoked sausages which are not smoked for an extended period. The flavour of smoke is only attainable by this means.

Recipe No. 4.—WILTSHIRE PRIME PORK SAUSAGES.

Lean pork	...	...	...	...	24 lb.
Fat pork	...	...	...	...	8 "
Pressed bread	..	...	...	...	5 "
Sausage meal (damped)	...	...	...	...	1 "
Salt	...	...	...	...	10 oz.
White Pepper	...	...	...	...	4 "
Dried and rubbed sage	...	...	...	...	$\frac{1}{4}$ "

Fill into pork skins; six links to the pound.

This recipe makes a splendid Wiltshire sausage as extensively sold. The appearance is very much enhanced by the addition of some rose pink colour. It is best to use the meat the day after it is killed.

Recipe No. 5.—BEEF SAUSAGES.

Lean beef (a bullock's heart or melt may be added in place of same weight of lean meat) ...	12 lb.
Fat	8 „
Pressed bread	4 „
Sausage meal	4 „
No. 1 Beef sausage seasoning (or as below) ...	14 oz.
Food preservative (dry antiseptic)	2 „
Rose pink colour	about 3 „

SEASONING.

Salt	9 lb.
White pepper	7 „
Ground coriander seed	8 „
(Sage, if desired)	2 „



FIG. 25.—PORTABLE SMOKE OVEN.

METHOD OF PREPARATION.

Cut the beef (or heart, or melt—whatever is used) and fat into squares about three inches in size, and mix in the pressed bread on a table. Put into the bowl of mincing machine, and cut moderately fine. Add the sausage meal *dry*, and if the mixture becomes stiff add water till it becomes of proper consistency. If frozen meat is used, the sausage meal should be added very slowly, so as to allow of its taking up the moisture eliminated from the meat. The other ingredients are then added, and the whole chopped to fineness.

Beef sausages are usually filled into sheep casings; but very narrow hog casings will do quite as well, so long as they do not show veins. They are very much more reliable, and less costly than sheep casings.

NOTES ON INGREDIENTS.

The *meat* may either be home grown or frozen. If the latter, care must be taken to add sausage meal very slowly. Should a cheaper sausage than what is made from this recipe be wanted, all that is necessary is to increase the proportions of pressed bread and sausage meal, the seasoning being also increased if the gross quantity is greater.

Recipe No. 6.—MUTTON SAUSAGES.

Mutton	...	...	...	...	10 lb.
Pork	...	...	...	...	1 ,,
Sausage meal	...	...	...	...	1 ,,
Pressed bread	...	...	...	...	1 ,,
Food preservative (dry antiseptic)	...	...	...	...	1½ oz.
Seasoning (as below)	...	...	...	...	7½ ,,
Fresh sheep's blood	...	...	...	...	2 quarts.

SEASONING.

Salt	...	...	...	...	6 lb.
White pepper	...	...	...	...	1 ,,
Ground ginger	...	...	...	...	1 ,,
Winter savory	...	...	...	...	½ ,,
Ground coriander seed	...	...	...	...	½ ,,
Parsley (rubbed)	...	...	...	...	1 oz.

METHOD OF PREPARATION.

Cut the mutton and pork into small pieces, and mix the sausage meal and bread together on a table, then put into mincing machine, adding some water at the same time. Add the other ingredients, and chop till the mixture is moderately fine. Fill into sheep casings and link in ordinary manner.

Plunge them into cold water in a copper or large pot, and gradually heat to nearly boiling (about 200° F.). Withdraw the heat and allow them to cool in the water. Take them out, wipe, and hang up to dry. When required for use, these sausages should be *fried* in a little lard.

NOTES ON INGREDIENTS.

Sheep's blood should be obtained at the time the sheep is being slaughtered, and should be stirred at once. Add to every gallon—

Salt	...	...	...	...	1 oz.
Food preservative	...	...	...	...	1 ,,
Warm water	...	...	...	...	2 gills.

Seasoning may be altered to suit the taste of different localities by substituting marjoram or sage for the winter savory.

Recipe No. 7.—GERMAN SAUSAGES.*Sometimes called Bologna or Breakfast Sausages.*

The ordinary German sausage, as made in this country, is manufactured in a variety of ways, according to the locality, and as meat is easy to get or not. It is, therefore, difficult to lay down any general rule in the matter of the meats to be chosen. Where hams and salt pork or salt meat are the principal items to be used, it is necessary that the maker should make allowance for the salt present. In all cases some judgment is necessary in substituting anything else for beef, veal, or pork. These are the only items on the recipe which call for any variation, and that variation will depend on the meats which are available. If the sausage maker chooses to follow this recipe entirely he will produce a splendid sausage, but must not expect if he departs from it to any great extent to meet with much success.

RECIPE FOR GERMAN SAUSAGES.

Beef	...	...	...	...	...	16 lb.
Veal or pork	...	...	...	...	...	8 "
Back fat	...	...	...	...	...	8 "
Flour	...	...	...	...	...	5 "
Sausage meal	...	...	...	...	...	5 "
Dry antiseptic (food preservative)	...	...	...	...	...	2 oz.
Salt	...	...	...	...	...	11 "
Saltpetre	...	...	...	...	...	3 "
White pepper	...	...	...	...	...	4 "
Ground coriander seed	...	...	...	...	...	1 "
Ground nutmegs	...	...	...	...	...	1 "
Ground ginger	...	...	...	...	...	$\frac{1}{2}$ "
Cane sugar dissolved in water	...	...	...	...	...	1 "
Smoke powder	...	...	...	...	...	3 "
Bole, Armenian (No. 1)	...	...	...	...	...	$\frac{1}{4}$ a teaspoonful.

Where smaller quantities are desired, simply reduce the recipe by dividing each of the quantities of ingredients by same figure, so as to maintain always the same proportion.

METHOD OF PREPARATION.

Before placing meats to be used in machine, cut them all, excluding back fat, into pieces about 2 inches square, and mix together by hand, having previously dipped the hands in cold water. When mixed in this way put into machine and proceed to chop. Scald the *flour* previous to use and put it in next, then add the *sausage meal*, *dry*, very slowly, running it through the fingers. This will enable it to be thoroughly incorporated with the mixture, and allow it to suck up the fat. Add next *all* the other ingredients. The mixture, except where very wet frozen meat is used, will become very dry, and it is then necessary to add some *water* until the proper consistency is reached.

When the mixture is thoroughly well mixed add the back fat, which should be either cut into small pieces by hand or cut through a fat cutting

machine. Sometimes it will serve to cut it up into pieces of about 2 in. square and simply put it into machine at this stage, but it is much more desirable to have the fat cut into pieces of the proper size and then added to mixture. The proper size is about $\frac{1}{2}$ in. square. After adding to mixture give machine a few turns so as to mix the back fat and the other ingredients, then stop the machine, withdraw the mixture, and fill by means of sausage filler, with a big funnel, into ox-bungs—preferably the “cup” ends.

When the sausages are filled and properly tied, a piece of stout string should be tied round each end so as to form a loop to lift them by. Drop them into jacketed pan or copper, in which the water is not quite boiling (or about 180° F.), and allow them to *simmer*, not to *boil*, for two hours, then

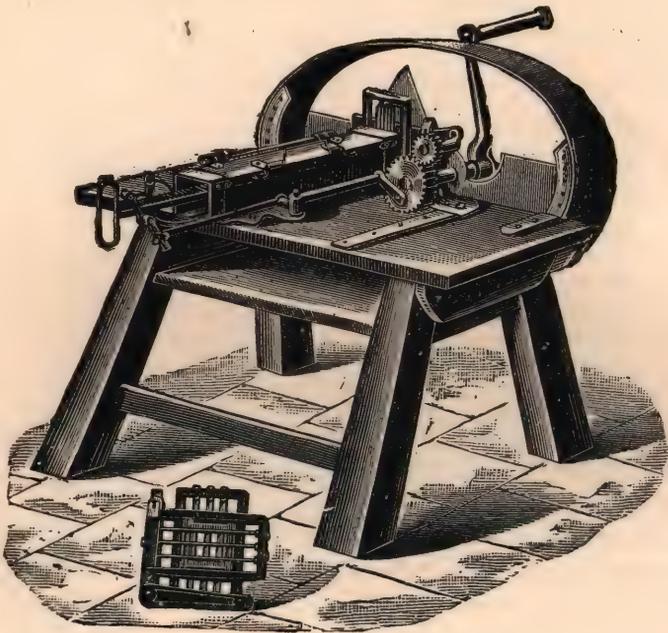


FIG. 26.—FAT CUTTER, FOR CUTTING FAT INTO SMALL SQUARES.

withdraw them. Should they be very large, however, they will require about three hours.

Before taking them out of the copper it is necessary to have the dye ready. It is prepared thus :

Take a barrel, or tin vessel, of about 20 gallon capacity, and into this put 4 oz. of “Brown German Dye” ; add to this 4 oz. “Food Preservative” (Dry Antiseptic), and then put in about 16 gallon of hot water and stir up. Every time this dye has to be used it must be heated, but it does not need to be boiled, and a very good plan for getting the proper heat is to lead a steam pipe, if such is available, into the barrel, and by this means heat the solution when required. It is not necessary to have *all* this quantity of solution so

long as the proportion of 1 oz. dye and 1 oz. preservative to 4 gallon of water is kept. A smaller quantity is easily heated on the fire, or by putting the vessel containing it on the side of copper while the "Germans" are being cooked.

It is also necessary to have a tub or barrel for cooling and fixing the dye. An ordinary butter keg of about 1 cwt. size will answer this purpose. Into this put 2 lb. of alum and fill up with cold water to within 6 in. or so of the top. The solution should always be kept cold, as the colder the temperature the better is the fixing property, and in this way the dye will be prevented from going through the skin.

THE PROCESS OF DYEING THE SKINS.

As soon as the sausages are withdrawn from the copper or jacketed pan, dip them into the warm solution of dye, and let them remain for two or three minutes. Remove them after that time, dip them into the fixing tub, and allow them to remain about the same time there. Remove the sausages, lay them on a rack with shelves made of wire netting, and allow them to cool. Or perhaps the better plan is to tie a cord round the sausage and suspend until cool and dry.

TO BRIGHTEN THE SKINS.

When cold, it will be found advisable to rub the skins with a cloth on which a little salad oil has been poured; this will brighten them, and they will then be ready for sale.

NOTE ON BUNGS.

Ox-bungs are to be bought either cured in salt or in the dried state. In the dried state they keep much longer than in salt. The salt is apt to make little holes through the skins after a time and so render them useless. In the dried state they ought to be kept in a dry place, so as to prevent their being attacked by maggots, and they should also be kept in a place where mice will not get at them, as they are very partial to nibbling them all round the edges.

Recipe No. 8.—GERMAN SAUSAGES.

(Another recipe).

Bull beef	...	...	...	...	15 lb.
Salt American pork	...	...	...	...	10 "
Back fat	...	...	...	...	12 "
Farina	...	...	...	...	12 "
Sausage meal	...	...	...	...	3 "
Water	...	...	...	...	8 "
White pepper (No. 2 super)	...	...	...	...	4 oz.
Ground ginger	...	...	...	...	1 "
Dry antiseptic	...	...	...	...	2 "
Ground corianders	...	...	...	...	2 "
Ground cayenne	...	...	...	...	$\frac{1}{2}$ "
Ground nutmegs	...	...	...	...	1 "
Ground sage	...	...	...	...	1 "
Powdered saltpetre	...	...	...	...	3 "
Armenian Bole (No. 1)	...	...	...	...	$\frac{1}{4}$ teaspoonful.
Cane sugar (dissolve in hot water)	...	...	...	...	2 "

METHOD OF PREPARATION.

Chop beef in machine till fine, adding seasoning during process, then throw in pork until the whole is cut fine. Mix farina with water and pour it in, then put in the back fat (having cut it into squares, as described in previous recipe), and mix the whole well together. Remove from machine, and fill out into bungs. Hang the sausages in the open air until the skin is well dried, and then smoke them well. On withdrawing them from smoke house, place in copper, and boil for two hours at a temperature of 180° F.

These German sausages will keep for some months in good condition.

It may be remarked that no salt is added as the quantity derived from the salt pork is enough. Should, however, it be deemed necessary to add to this, a handful thrown in, with seasoning, will suffice.

NOTE ON ABOVE RECIPE.

This sausage is of very good quality and well suited for a good trade. The price ought to be about 6d. per lb., and the cost may be seen from following statement :

	<i>s.</i>	<i>d.</i>
15 lb. beef, at 4½d. per lb.	5	7½
10 ,, salt pork, at 3d. per lb.	2	6
15 ,, farina and sausage meal	3	1½
12 ,, back fat, at 5d. per lb.	5	0
Seasoning, bungs, and labour	2	6
	18	9
60 lb. produced, at 6d. per lb.	£1	10 0
Profit	9	3

Recipe No. 9.—SAVELOYS.

Saveloys are made from various common meats, and are the vehicle by which returned sausages are very often worked up. Such ingredients also as lights are sometimes added with any inferior salted pork, or anything that would not otherwise sell without being chopped up. Thus it happens that occasionally some unscrupulous sausage maker adds unwholesome meat, and is called to account for so doing. It is quite possible to make a cheap saveloy out of wholesome food without introducing that which is not so.

Beef	16 lb.
Fat	4 ,,
Pressed bread	8 ,,
Sausage meal	5 ,,
Food preservative (dry antiseptic)	2 oz.
Seasoning	16½ ,,
Saltpetre	1 ,
Smoke powder	,,
Armenian Bole (No. 1)	¼ teaspoonful.

SEASONING.

Salt	...	...	..	...	...	9 lb.
White pepper	...	...	...	...	...	6 „
Ground coriander seed	...	...	...	...	...	4 oz.

METHOD OF PREPARATION.

Cut the meat and fat into small pieces, and mix the bread with it. Cut this with machine, and add slowly the sausage meal, and immediately after some water. Add the other ingredients and chop the whole very fine. Fill in wide hog casings, smoke in oven for a few hours, and cook for forty minutes at a temperature of 200° F. It is not necessary to smoke them at all, as the same brown dye that is used for German sausages will give the necessary colour. Use it in exactly the same way. The addition of some liquid from boiled pork rinds is said to be a great improvement: to be added when the mixing is nearly complete in the machine. The colour also may be heightened by the addition of a little No. 2 poloney dye to water in which they are being boiled.

Recipe No. 10.—HAM, CHICKEN, AND TONGUE SAUSAGES.

Pork	...	...	...	...	...	10 lb.
Veal	...	...	...	...	...	4 „
Ox-tongues	...	...	...	...	...	2 „
Fat	...	...	...	...	...	4 „
Granulated rice, scalded	...	...	...	...	...	4 „
Sausage meal	...	...	...	...	...	2 „
Food preservative (dry antiseptic)	...	...	...	...	...	2 oz.
Seasoning (as below)	...	...	...	...	...	12 „

The meat from a chicken may be added, as also six eggs.

SEASONING.

Salt	...	...	...	...	...	9 lb.
White pepper	...	...	...	...	...	6 „
Mace	...	...	...	...	...	$\frac{1}{2}$ „
Ground parsley	...	...	...	...	...	$\frac{1}{2}$ „
Thyme	...	...	...	...	...	$\frac{1}{4}$ „

METHOD OF PREPARATION.

Cut the pork, veal, and ox-tongues up into pieces about 2 inches square. Mix in the scalded rice, and cut altogether in the machine. Add slowly the sausage meal and then the other ingredients. Mince very fine, and fill in weasands. Boil for an hour at 200° F., and dye with either poloney dye or ham, chicken, and tongue dye. Either of these is used in the same way as in the dyeing of poloneys (*see* Recipe No. 8).

NOTES ON INGREDIENTS.

Ox-tongues used are those imported from the United States. *Chicken* is a mere name, and is but rarely added to mixture, as it is too costly. Some

makers add a small quantity of chicken in order to be truthful, but the quantity is quite inappreciable in the sausages.

Recipe No. II.—YORKSHIRE POLONEY SAUSAGES.

Lean pork	...	...	...	...	...	8 lb.
Fat pork	...	...	...	...	...	8 "
Granulated rice, scalded	...	...	...	...	...	2 "
Sausage meal	...	...	...	...	...	2 "
Food preservative (dry antiseptic)	...	...	...	...	...	2 oz.
Seasoning	...	...	...	...	...	10 "

SEASONING.

Salt	...	...	...	...	...	9 lb.
White pepper	...	...	...	...	...	6 "
Cayenne pepper	...	...	...	...	...	1 oz.
Nutmeg	...	...	...	...	...	4 "
Mace	...	...	...	...	...	4 "

METHOD OF PREPARATION.

Cut the pork into small pieces, and mix in the scalded rice. Chop this slightly, then add the sausage meal and what water is required. Add the other ingredients, and chop the whole very fine. Fill in weasands, cook for an hour at 200° F., and dye either with brown or poloney dye.

NOTES ON INGREDIENTS.

The *pork* is preferred from large pigs, as it is always firmer. *Scalded rice* is preferred to bread in many parts. In Yorkshire, however, there is no rule in the matter, bread or rice being used according to individual fancy.

NOTE ON WEASANDS.

Weasands are always bought dry, and are either *in wind* or *out of wind*. All those which come from foreign countries are out of wind. An ordinary large weasand should make three $\frac{1}{2}$ lb. poloneys, but on the average two are all that can be obtained. They must be kept very dry and have plenty of air, or otherwise they will be attacked by maggots.

POLONEY DYE (COMMON)

Is a scarlet dye, most generally used for poloney sausage dyeing, and is prepared as follows: 1 oz. is added to every gallon of water used, and should the requisite shade of colour not be obtained, it can either be intensified or reduced by the addition of either dye or water. It is always desirable to have a considerable quantity of solution of dye at hand, and for this purpose a large iron vessel, or a 36 gallon barrel with one end stove in, may be used. When the dye is required for use it should always be heated—preferably by means of a steam-pipe going down to the bottom of the barrel—and regulated with a tap. Another barrel of a similar size is necessary, and into it is put say 20 gallons of cold water. To this add 2 lb. or 3 lb. of

alum, and stir till all is dissolved. This solution is always used cold. When the poloneys are cooked, fish them out of the copper and plunge into solution of dye, and be careful to see that no blobs of fat adhere to the skins, as in that case the dye will not *strike*. When satisfied that they are sufficiently dyed, fish them out and plunge into the cold water and alum. Take them out and cool on a rack or table. If you have time to do so, turn them once or twice so as to prevent the moisture from settling in one side. When cold rub them with a towel, and they are then ready for sale.

NEW POLONEY DYE.

A new kind of dye has come into use recently, and requires different treatment altogether from the foregoing. The new dye is conveniently described as "No. 2," and will not penetrate the skins. Undernoted are the instructions for use:

Poloney Sausages.—Add from one to two teaspoonfuls of the dye to the water in the boiling copper before putting in the goods for cooking.

Ham, Chicken, and Tongue Sausages.—Dissolve at the rate of one ounce to every gallon of water by boiling. Keep this solution by itself. After the sausages are cooked in the ordinary way, dip them into the above solution, and keep them in it until they have the proper shade. Fish them out and plunge into cold water, then take them out and cool and wipe in the ordinary way.

This dye is used for poloneys, ham, chicken, and tongue sausages, Yorkshire poloneys, and all other sausages requiring a bright scarlet colour.

Recipe No. 12.—BRUNSWICK CERVELAT SAUSAGE.

Lean pork	...	...	...	...	28 lb.
Beef (with sinews out)	...	...	...	...	10 „
Bacon, cut into fine shreds	...	...	...	...	12 „
Finely ground salt	...	...	...	...	2 „
Coarsely ground white pepper	...	...	...	...	3 oz.
Ground saltpetre	...	...	...	...	1 „
Food preservative (dry antiseptic)	...	...	...	...	5 „
Cane sugar	...	...	...	...	2½ „

METHOD OF PREPARATION.

First mince the meat very fine, then add the pork, and mince the two together until the pork is all in pieces the size of peas. Add the bacon, which must be minced until it shows among the rest, in pieces of the size of lentils. Then add the spices and salt, which should first be thoroughly mixed together, afterwards mincing the whole well together. Throw the mixture once or twice on table before putting into filler, then put into filler, and adjust to the nozzle either small bladders or hogs' casings. Stuff the skins as close as they will hold. In cold weather plunge the sausages into boiling water for a few seconds, and then hang up. They must hang in a

well ventilated room, the temperature of which is about 60° F., until they begin to look somewhat red under the sausage skin, which usually takes place from fourteen to eighteen days in dry weather. Now hang the sausages up in cold, dry smoke in a high place, in a temperature of about 64° F., and smoke with oak or beech sawdust, mixing amongst this some juniper berries. It is also desirable to put in some maple or cedar sawdust, if obtainable, as these give the sausages a pleasant odour and fine flavour. Smoke the sausages until they become a fine cherry-red colour, and keep them then in a well aired room until they are required for sale.

REMARKS.

1. For their manufacture good firm meat is required. Choose pork of a dark red colour, without sinews. The beef must be bright red, and from a sound, healthy beast. Both meats must be quite cool, and well cleaned from every sinew. The bacon which is to be used must not be too fat, and should hang some days in the air so that it may be better cut into small slices, and afterwards, during the chopping, may come into more equally cut pieces.

2. The mixture must be cut up with sharp knives, otherwise the sausage will present a greasy appearance.

3. Cleanliness is very necessary, as these sausages are meant to keep a long time, and would not do so if contaminated in the least.

4. For skins or casings may be used the middle gut of bullocks (termed "bullocks' middles"); the wide end of casing in the pig's rectum, or bladders, may be used. These should be cleaned thoroughly before use from all fat, and should be perfectly odourless. Before using it is advisable to wash in hot water, and dry well inside and outside. They must then be cut into the proper size and tied up firmly. This must all be done the day previous to use, so that when they come to be used they will be quite dry.

5. In frosty weather the sausages must be made in a moderately warm room, in which, however, there must be no smell of cooking, and keep them when ready in a temperature of 58° to 60° F.

6. In summer the following precautions must be taken: work in a cool room, and see particularly that the meat is perfectly cool. In order that this may be the more perfectly accomplished, especially with a heavy piece of pork, cut out all the bones as soon as the animal is slaughtered, and hang up the meat outside in a cool place. Add 5¼ oz. more salt, and 5 oz. food preservative (dry antiseptic). This should be added to the mixture along with the spices.

The manufacture should be done as quickly as possible. The casings used should be steeped in cold water (into a gallon of which has been put one ounce of food preservative) for six hours, and then thoroughly dried previous to use. The inside of the casings must particularly have this antiseptic preservative bath.

Note.—The foregoing recipe is adapted from the "39 Receipts" of Franz Lill of Mannheim.

Recipe No. 13.—CORNISH OR DEVONSHIRE HOGS PUDDINGS.

Lean pork	...	...	...	...	16 lb.
Fat pork	...	...	...	...	6 ,,
Sausage meal	...	...	...	...	2 ,,
Scalded rice or bread	...	...	...	...	3 ,,
Corn flour	...	...	...	...	1 ,,
Water	...	...	...	...	1 ,,
Seasoning (as below)	...	...	...	...	12 oz.

Add four eggs when chopping.

SEASONING.

White pepper (No. 2 super)	...	...	...	6 lb.
Salt	...	...	...	9 ,,
Cayenne	...	...	...	1 oz.
Mace	...	...	...	$\frac{1}{2}$,,
Rubbed thyme	...	...	...	$\frac{1}{2}$,,

METHOD OF PREPARATION.

The whole mixture is chopped finely and filled out in wide pig's casings, or fat ends, or bullock's middle casings. Simmer for half-an-hour in water at 180° F., then plunge into cold water, and allow it to run over them for twenty minutes or so—until they are quite cold. For the purpose of handling them, it is advisable to have either a wire basket or a fish cooker so that they can be lifted out of copper and dropped into cold water instantly without risk of breaking. The colour ought to be pale and almost white.

Recipe No. 14.—DEVON MEAT PUDDINGS.

Pork, fairly lean	...	...	...	10 lbs.
Dry bread and crusts	...	...	...	$1\frac{1}{2}$,,
Salt	...	...	...	4 oz.
White pepper	...	...	...	2 ,,
Food preservative	...	...	...	$2\frac{1}{2}$,,

Add a dash of mace and nutmegs.

METHOD OF PREPARATION.

Chop altogether into a fine paste, adding water as may be necessary so as to soften the mixture. Fill into bullock's casings of the narrow sort and drop into a cullender or perforated cooking vessel, and place this in a bath of water at 200 F. for twenty minutes. Lift out the cullender containing the puddings, and either plunge into cold water till cold, or allow to cool gradually.

Recipe No. 15.—THE MANUFACTURE OF BLACK PUDDINGS.**CUTTING THE FAT.**

It is first of all requisite to prepare the ingredients and mix them together. According to the best recipes obtainable, it is essential to have pieces of hog fat, either leaf or back fat, cut into small squares of about $\frac{3}{8}$ or $\frac{1}{2}$ an inch either way. This is best done with the aid of a handy machine, such as is shown below.

DESCRIPTION OF FAT CUTTING MACHINE.

This ingenious machine consists of a stand upon which is fixed a box into which the fat is put and the lid fastened down.

The knives are in an independent case by themselves, such as is shown on the foreground of the illustration. These knife cases are so made that the motion of the machine causes them to cut whatever fat is pressed against them into square lengths, the one frame of knives travelling at right angles to the other and both being held together by a pivot bolt. It is manifest that for each particular size to be cut, it is necessary to have separate knife frames, and in order to suit various requirements they are made so as to produce pieces of fat of the following sizes in squares— $\frac{1}{2}$, $\frac{3}{8}$, $\frac{9}{16}$, $\frac{3}{4}$, $\frac{1}{2}$ inch. The handle of the

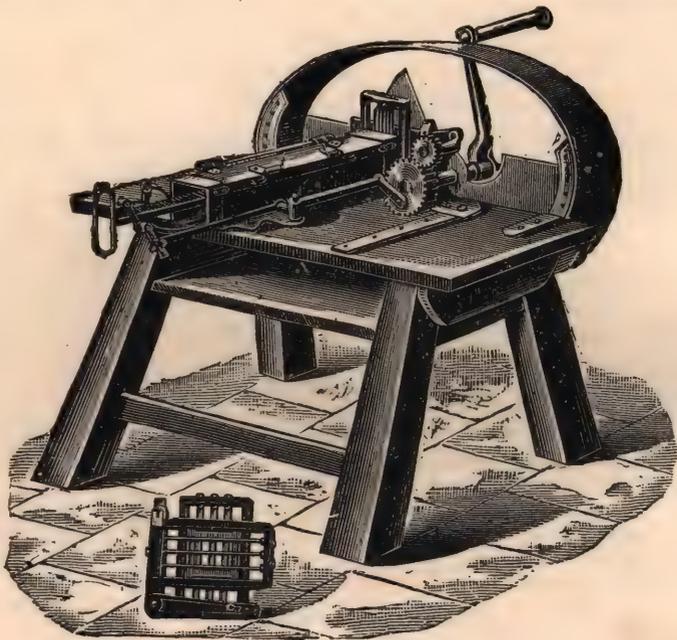


FIG. 27.—MACHINE FOR CUTTING FAT INTO SQUARES FOR BLACK PUDDINGS.

machine it will be seen has attached to its shaft a large shaver. This shaver cuts off the fat lengths into squares as they tumble through the knife frame. It will also be noticeable that the same handle works a ratchet gear, which propels forward the exact amount of fat to pass through the frames. The handle therefore works the ratchet propeller, thus carrying forward the fat, the knife frames cut it into square lengths, and the shaver cuts off the square pieces like dice.

The machine itself—including *one* set of knives to cut $\frac{1}{2}$ inch squares—costs £10, 10/, and the capacity per hour is 500 lb. to 250 lb., according to the fineness of fat required. Of course the smaller the squares of fat the smaller will be the turn out.

Particulars of the separate sets of knife frames are as follows :

KNIFE FRAMES FOR FAT CUTTER.

Set with	Cutting Pieces	Prices
12 Knives,	$\frac{1}{2}$ in. square,	33/ per set.
16 „	$\frac{3}{8}$ „	37/ „
20 „	$\frac{9}{32}$ „	40/ „
24 „	$\frac{7}{32}$ „	45/ „
28 „	$\frac{5}{16}$ „	50/ „

When the fat has been prepared, the next thing to do will be to see to the groats or barley. These should always be scalded in a linen bag before being used, until they are quite soft. This operation takes about 40 minutes.

The ingredients should then be mixed together as directed in the recipes, in a tub or handy vessel and all stirred together until they are well mixed. Now put the mixture into the black pudding filler.

DESCRIPTION OF BLACK PUDDING FILLER.

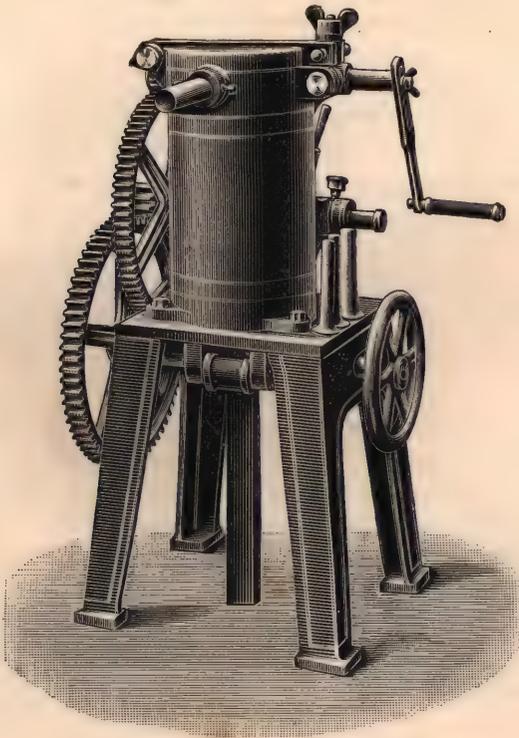


FIG. 28.—BLACK PUDDING FILLER.

The filler differs from other sausage fillers, in that, it is made to stand by itself independent of any table. The barrel is fixed to the stand and is up-

right and does not require to be moved. The funnel to which the sausage casings are attached is near the top, and the approach to the funnel inside the filler is grooved in such a way as to prevent resistance or choking. The lid or cover is fixed on the top by a hinge and is raised or lowered with great ease and rapidity. The thumb screw shown in drawing is simply unscrewed and then the lid is free to be raised. The thumb screw also is attached by a pin to the side of the filler so that there is no possibility of laying it aside. The plunger or piston acts vertically, and is raised slowly as required by turning the handle. When it is desired to lower it the handle is pushed forward after raising a catch upon its shaft, and thus the machine is instantly thrown out of gear. To prevent the piston falling too rapidly, however, as it would do if not controlled, there is a regulating wheel which is attached to the piston rod and controls its fall if caught by the hand. The raising and lowering is carried out with great rapidity. The following are particulars of the machine as to capacity and cost.

CAPACITY,	45 lbs.,	55 lbs.,	70 lbs.
PRICES	£12, 10s.,	£15,	£17, 10s.

When the mixture is put into the black pudding filler the lid is closed with the thumb screw, and bullock runners or other convenient casings are attached to the funnel and the work of filling commenced. The end of the runner or casing should first of all be tied so as to prevent any loss, and the whole length of runner or casing on the funnel is then rapidly filled and tied also at the latter end. The lengths are then tied into lengths of 18 inches (or any other convenient length) in two places so that they can be cut off without any loss, and these lengths are in turn tied in circles, the two cut ends being tied together.

The next process is to cook the puddings, and for this purpose is required a steam jacketed pan. It may so happen that in many cases steam is not available, in which case it is desirable to use an independent fire jacketed pan.

DESCRIPTION OF STEAM JACKETED PANS FOR COOKING BLACK PUDDINGS.

The cooking pan shown requires very little explanation. The essential feature about it is the total absence of rivetting, thus ensuring stability. When the pan is filled with any liquid the boiling point of water (212° F.) can be reached in eight minutes with steam pressure at from 20 lbs. per square inch and upwards.

The particulars of these pans are as follows :

Steam jacketed pans, to hold 30 gallons, price,	£10	0	0
" " " 35	"	"	11 0 0
" " " 40	"	"	12 0 0
" " " 50	"	"	13 17 6
" " " 60	"	"	14 10 0
" " " 80	"	"	18 0 0
" " " 100	"	"	24 0 0

As already indicated there may be some difficulty in obtaining steam, and in that case it is necessary to procure an independent jacketed pan, as to

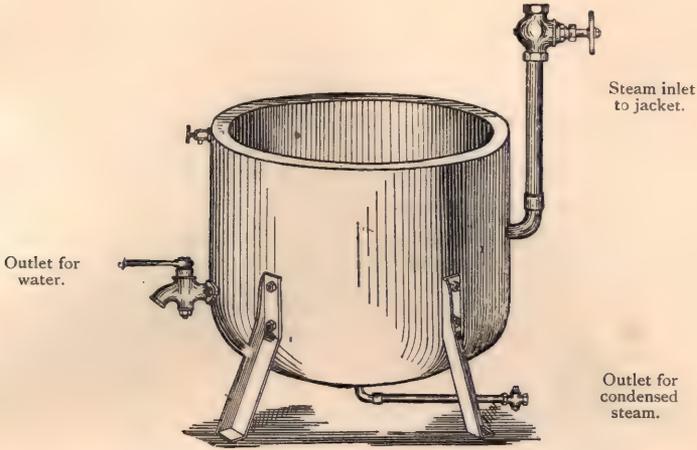


FIG. 29.—SEAMLESS JACKETED COOKING PAN—FOR STEAM.

heat black puddings in a direct fire furnace is considered very dangerous, inasmuch as it is almost impossible to regulate the temperature. The temperature is very easily controlled when the heat is derived from steam.

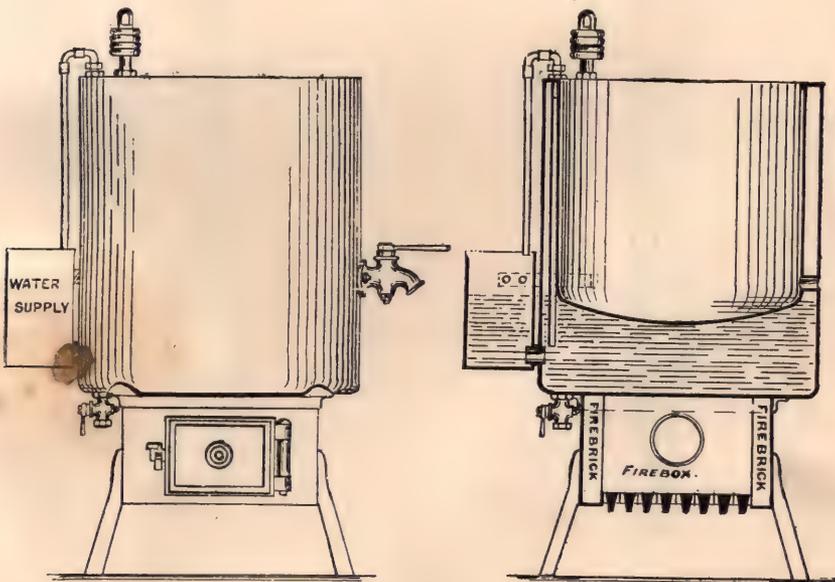


FIG. 30.

INDEPENDENT JACKETED PAN—
OUTSIDE VIEW.

INDEPENDENT JACKETED PAN—
CROSS SECTION.

The particulars of these pans are as follows :

Independent jacketed pans, to hold 20 gallons, price, £18	0	0
" " " 30 " "	22	0 0
" " " 40 " "	25	0 0
" " " 60 " "	31	0 0

SUNDRIES REQUIRED IN MAKING BLACK PUDDINGS.

A very essential instrument is the thermometer. In fact, in all operations in connection with cooking a thermometer should be constantly at hand.



FIG. 31.

THERMOMETER FOR TESTING
TEMPERATURE.

Price, - 2/6 each.

Another very useful article is a heavy fork for lifting the puddings from the pans. It must be strong and of good length, so as to be capable of lifting a considerable quantity at a time.



FIG. 32.

BLACK PUDDING FORK, FOR LIFTING
PUDDINGS FROM COOKING PANS.

Price, - 2/6 each.

RECIPES FOR MAKING BLACK PUDDINGS.

NO. 1—ENGLISH BLACK PUDDINGS.

Midlothian groats, to be first boiled before mixing	...	...	...	10 lb.
Leaf lard or back fat	...	...	...	10 „
Black pudding (herb) spice	...	...	...	1½ oz.
Douglas's food preservative	...	...	...	4 „
Black pepper	...	...	...	1½ „
Blood (bullock's or pig's)	...	..	...	1 gallon

A handful of chopped onions is sometimes added.

METHOD OF PREPARATION.

Boil the groats for about forty minutes previous to using. Cut the leaf lard into pieces $\frac{1}{2}$ in. square by fat cutter. When the blood is being drawn from the bullock or pig it should be stirred gently, and a wine-glassful of warm water added to every gallon, along with 2 oz. of salt and 2 oz. food preservative. Mix all the ingredients well together, placing them in Douglas's black pudding filler, and fill into narrow bullock runners. Tie pieces about 18. in. long into lengths, and bend them into circles, joining both ends. Boil at a very gentle temperature (180° F.), for about twenty minutes, and then withdraw from the pot or boiler and allow to cool.

During the process of boiling add to the water either 1 oz. to every 10 gall. of black pudding dye, or $\frac{1}{2}$ lb. of logwood chips, in order to dye them perfectly black. The old-fashioned way to tie black puddings is by means of dried rushes or bass strings, allowing the ends of the rushes to project about 3 in.

NO 2—ENGLISH BLACK PUDDINGS.

Prepare 1 gall. (10 lb.) of finest scotch groats by boiling for about forty minutes in a loose sack, leaving room for them to swell out; also prepare some finest leaf lard by cutting it into square pieces about $\frac{1}{2}$ in. or $\frac{3}{8}$ in. square with fat cutting machine.

Make up from following:

Scotch groats...	...	...	...	10 lb.
Leaf lard (cut in squares)	...	...	...	10 „
Blood (fresh)	...	...	...	3 gallon.
Douglas's food preservative	...	...	...	4 oz.
Seasoning	...	...	...	15 „
Rubbed Pennyroyal	...	...	...	1 teaspoonful.

Add three or four chopped onions, if that flavour is desired.

SEASONING (make from following recipe).

Salt	...	...	...	6 lb.
Douglas's black pudding spice (herb)	...	...	...	5 „
Black pepper	...	...	...	5 „
Pimento	...	...	...	1 „
Coriander seed	...	...	...	1 „

Add to this some carraway seed, if that flavour is desired.

The proportion of the seasoning used is 5 oz. to the gallon of mixture.

METHOD OF PREPARATION.

Mix the blood and other ingredients, then place them in Douglas's filling machine, fill the mixture into black pudding skins ("bullocks' runners"), seeing that the pieces of fat are equally distributed throughout. Tie into pieces, forming a circle 6 in. in diameter, and tie in circles. Boil gently at about 180° F. for about half-an-hour. To the water add in the proportion of $\frac{1}{2}$ oz. to every 20 gall. the black pudding dye powder. Or put into water, previous to boiling, 1 lb. of logwood (finely ground), to every 15 gall., and add a little powdered alum. When cooked, take out of the copper and tie with rushes with long ends at the joints. Before exposing for sale, rub them with a cloth on which has been dropped some salad oil.*

No. 3—GERMAN BLOOD SAUSAGE (NORTH GERMANY).

Boil fat bacon till not quite ready and cut into small squares with cutting machine. To every 10 lbs. boil about 2 lbs. (dry well) selected rinds, and a calf's or pig's lung, or instead of that a corresponding amount of pork trimmings. When these are boiled tender, put the rind and lungs or trimmings through the mincing machine (sausage cutting machine), scald the bacon dice, and add enough well beaten pig's blood to make the whole moderately liquid, and then get the exact weight. (Reckon about 12 lbs. to the gallon). To every gallon add :

Salt	...	...	...	...	...	6 oz.
White pepper	...	...	...	...	...	1 "
Cloves	...	...	...	...	...	$\frac{1}{4}$ "
Marjoram	...	...	...	...	...	$\frac{1}{4}$ "

Stir all well together and fill into casings ("bullocks' runners") with Douglas's filler. Boil one to two hours until no blood oozes out on the sausages being pricked. On coming out of the pan, wash in warm water and lay on a table to cool, and afterwards smoke for a few days in cold smoke, if such a flavour is desired (To every 10 lbs. sausage meat reckon about 1 $\frac{1}{2}$ lbs. of blood).

Adapted from the German of Nicholas Merges.

No. 4—FRENCH BLOOD SAUSAGES.

Take 1 lb. belly of pig, boil it with the same quantity of bacon fat till tender, then cut the fat in small dice with fat cutting machine, and the lean meat into small pieces—not fine. Meanwhile have some onions, leaks, and eschalots steamed soft, added to the above meat. The bacon is not scalded.

* In the foregoing recipes groats are given as the farinaceous stuff to be added. Some makers, however, substitute pearl barley or whole rice for them. This must, therefore, be left to the individual taste of the maker.

To every 10 lb. of this sausage meat add :

Pig's blood	...	...	...	...	...	2 lb.
Salt	...	...	...	...	...	5 oz.
White pepper	...	...	...	...	...	$\frac{1}{2}$ "
Thyme	...	...	...	...	...	$\frac{1}{10}$ "
Mace	...	...	...	...	...	$\frac{1}{10}$ "

Stir all well together and fill in narrow hog casings (loosely), with Douglas's filling machine, so making round, narrow sausages. Boil till no more blood oozes out on being pricked with a needle. On taking out of pan, wash in warm water and let them cool on a table.

Translated from the German of Nicholas Merges.

Recipe No. 16.—SCOTCH WHITE PUDDINGS.

Fine oatmeal	...	...	...	...	...	10 lb.
Beef suet	...	...	...	...	...	7 "
Ground white pepper	...	...	...	...	...	2 $\frac{1}{4}$ oz.
Fine powdered salt	...	...	...	...	...	2 "

METHOD OF PREPARATION.

Free the suet from all skins and stringy matter, and chop it into pieces about $\frac{1}{2}$ in. square, either by hand or by fat cutting machine. Mix all the ingredients together thoroughly in a basin or tub, and fill *loosely* into narrow "beast" runners, pricking them to let out the air. Tie up into circular shape, and cook in boiling water for thirty minutes. They may then be hung on poles to stiffen.

Recipe No. 17.—BRUNSWICK SAUSAGES.

Fat and lean pork	...	...	...	...	...	13 lb.
Salt (finely powdered)	...	...	...	...	...	4 oz.
Saltpetre	...	...	...	...	...	1 "
Food preservative (dry antiseptic)	...	...	...	...	...	2 "
Finest ground white pepper	...	...	...	...	...	1 "
Peppercorns (white)	...	...	...	...	...	$\frac{3}{4}$ "
Powdered lump cane sugar	...	...	...	...	...	$\frac{1}{2}$ "

METHOD OF PREPARATION.

Cut the pork up fine in the mincing machine, then add the seasoning and other ingredients, excepting the peppercorns, which add *last*, before removing from the machine. Fill into wide pork skins, and link into ordinary lengths of six to the pound. It is sometimes considered better to *tie* each division instead of linking. Hang them up for four or five days in a cold current of air, so that they become dry and shrunken. If any slackness appears in the skins, tie the loose skin tight up to the enclosed meat, and hang them high up in a cool place in the smoke house for about a month. It is usual to eat these sausages raw on the Continent, but that will not com-

mend itself to British tastes. They form an excellent dish when cooked gently.

NOTES ON INGREDIENTS.

Powdered lump cane sugar is added to impart the sweetness required. If care be taken to get cane sugar, there is no danger of fermentation setting in.

Recipe No. 18.—CAMBRIDGE SAUSAGES.

Lean pork	...	...	...	...	12 lb.
Fat pork or pure fat	...	...	...	...	6 "
Scalded rice	...	...	...	...	3 "
Sausage meal	...	...	...	...	2 "
Food preservative (dry antiseptic)	...	...	...	...	2 oz.
Seasoning	...	...	...	...	10 "

SEASONING.

Salt	...	...	...	...	9 lb.
White pepper	...	...	...	...	6 "
Rubbed sage	...	...	...	...	$\frac{1}{2}$ "
Cayenne pepper	...	...	...	...	$\frac{1}{2}$ oz.
Ground nutmeg	...	...	...	...	$\frac{1}{2}$ lb.
Ground mace	...	...	...	...	$\frac{1}{2}$ "

Recipe No. 19.—TOMATO SAUSAGES.

Lean pork	..	...	...	...	6 lb.
Fat pork	...	...	...	...	8 "
Tinned tomatoes	...	...	...	...	3 "
Sausage meal	...	...	...	...	1 $\frac{1}{2}$ "
Scalded granulated rice	...	...	...	...	1 "
Pork sausage seasoning	...	...	...	...	10 oz.
Rose pink colour, made into a paste	...	...	...	...	about 2 oz.

SEASONING.

Salt	...	...	...	...	9 lb.
White pepper	...	...	...	...	7 "
Ground nutmeg	...	...	...	...	$\frac{1}{2}$ "

METHOD OF PREPARATION.

Cut the pork up fine in the machine, then add the tomatoes, after which add the sausage meal and granulated rice, then the other ingredients. See that the proper colour is attained before withdrawing from machine. If it is not strong enough, add some more rose pink colour until the shade is correct. Fill in hog casings and link six to the pound.

NOTES ON INGREDIENTS.

Tinned tomatoes are much more economical than fresh ones, but if the fresh fruit is easily obtainable by all means let it be substituted. A less quantity of the rose pink colour is required when fresh fruit is used.

Recipe No. 20.—GALANTINE OF BOAR'S HEAD.

Take good sized pig's head and scald until the skin can easily be removed. Take out the bones and meat, sawing off the bones near the snout so as not to interfere with its shape. Lay the skin and meat in pickle for five days. At the same time lay in pickle some tongues. At the end of that time remove all from the pickle, and boil until the meat falls from the bones. Now prepare a mixture of veal pork and pig's tongues and two eggs, cutting all up into squares, and seasoning the whole with ordinary No. 1 pork sausage seasoning to which has been added some whole peppercorns. Sew up the skin of the neck, leaving only a small aperture for the insertion of the sausage filler funnel. Tie up the mouth, and stuff the nostrils with pieces of fat, and proceed to fill in the mixture until the whole skin is distended tight. Now roll the whole in a cloth, allowing the ears to stick up, and boil for about one and a half hours, never permitting the ears to get beneath the boiling water. Remove when thus boiled, and paint the whole skin over with a weak solution of saffron so as to produce a yellow colour. When sufficiently cool remove the cloth and insert in the mouth a small lemon and glass eyes in the eye-holes. Garnish with such decorations as may be at hand, such as artificial flowers or crayfish, etc. The head is then ready for serving.*

Recipe No. 21.—TRUFFLED LIVER SAUSAGES.

Take pig's liver	...	...	...	...	5 lbs.
and fat pork	...	...	...	...	3 "

Mince these two together very fine and add about quarter of a lb. good truffles cut into narrow strips. Add some pepper and salt and knead altogether. Fill into narrow pig's casings and simmer for about half an hour. Wash well in cold water and hang up to dry; and if to be kept any time, smoke for a day.†

Recipe No. 22.—SAVOURY DUCKS.

These articles sometimes named "spice balls," "spice nuts," etc., are made from the general fragments of a pork establishment. If stale bread can be obtained cheaply it is mingled with the fragments and seasoned, thus producing the savoury duck. Perhaps nothing is of so very great advantage in a pork business than this commodity, as it allows of the working up of lungs of pigs, etc., which would otherwise be wasted.

RECIPE.

Lungs	...	...	...	...	10 lb.
Scraps of meat, pork, etc.	...	...	...	...	6 "
Stale bread (ground up) or sausage meal	...	...	...	...	5 "
Food preservative (dry antiseptic)	...	...	...	...	3 oz.
Chopped onions	...	...	...	...	½ lb.
Seasoning	...	...	...	...	12 oz.

* The flavour may be improved by inserting at intervals some pistachio nuts (whole) amongst the cut up meat.

† Wine is sometimes used in which to cook the truffles. Care must be taken not to add any spices, otherwise the flavour of the truffles will be spoiled.

SEASONING.

Black pepper ...	...	...	...	...	...	1 lb.
Cayenne pepper ...	...	...	...	...	...	$\frac{1}{2}$ oz.
Rubbed sage ...	...	...	...	...	...	1 ,,
Rubbed thyme...	...	...	...	...	...	1 ,,
Salt ...	...	...	...	...	...	$\frac{3}{4}$ lb.

Keep this seasoning in tins, tightly covered up and ready for use.

Recipe No. 23.—THE CLEANING OF TRIPE.

The tripe should be cleansed as soon as possible after being removed from the bullock.

Throw the tripe into water at 180° F., to which has been added some soda (about an ounce to five gallons of water), and stir altogether until the whole of the dirt can be easily removed with a blunt knife. Lift out the tripe, and hang up on a hook and scrape (with a blunt knife) till quite clean. Place it then in cold water and rinse it well, then throw it into boiling water, made either in a copper or by a jet of steam from a boiler. Add to the water some alum at the rate of one ounce to every ten gallons of water. Boil till the tripe is nice and tender, and a white colour. Take out of the boiling water and place in plenty of cold water at once, and if possible let the water run over it until quite cold, then take the thin skin off that is inside and trim neatly. Make a cold water solution of salt (indicating about 40° on salinometer), and add to this a pint of bisulphite of lime to every five gallons. Allow the tripe to lie in this if it has to be kept. If for immediate use allow it to lie in this brine over night, and wash in cold water before exposing or offering for sale.

A tripery may be most profitably conducted with the assistance of power appliances. These consist of brushing machines driven by an engine. The engine is supplied with steam from a general boiler, which also supplies steam for scalding the tripe.

Recipe No. 24.—BRAWN MAKING.

Clean pigs' heads well and bone them out, and dust the meat so procured over with a mixture as follows:

Salt...	...	...	...	...	...	5 lb.
Saltpetre ...	...	...	...	...	...	4 oz.
Food preservative	...	...	...	...	...	8 ,,

Allow the meat to absorb this mixture for about two days, then put into jacketed pan and cover with water—not any more. Boil for about one hour. Add some ground pepper, essence of lemon, and nutmegs to season, and run off into moulds or tins.

BRAWN.

(Another recipe).

Brawn is made from salted or pickled pigs' heads, by boiling them in water until all the flesh is easily removed. It is then put through a machine

suitable for cutting the meat into square pieces, seasoned, and run into tins or moulds. The rhinds may be boiled down into jelly along with the heads, and it will be found that a firm brawn is thus produced.

SEASONING.

White pepper	...	...	..	...	...	6 lb.
Allspice	...	...	...	...	...	6 oz.
Ginger	...	...	...	...	..	3 „
Cloves	...	...	...	...	...	3 „
Salt	...	...	...	...	...	6 lb.
Cayenne pepper	...	...	...	...	...	1½ oz.

Use 5 oz. to the gallon of brawn.

The colour of the brawn is a very important matter, and for this purpose rose pink colour, made into a solution, may be advantageously used. The preserving of the manufactured article is effected by the use of 2 oz. of food preservative to every gallon of brawn.

PORK PIE MAKING.

DESCRIPTION OF MACHINES.

The manufacture of pork pies has now become comparatively easy. At one time—not very long ago—the operation was a very tedious one, owing to the want of machines. From beginning to end everything was manipulated by hand. The meat was cut by hand, in order to get it in square pieces, the paste was made by hand, rolled out with hand-rollers, raised by hand, and the ornaments and kneading all made by hand. It is still largely the custom to raise and knead by hand, but this is fast becoming obsolete. The other operations are done by machinery. It is necessary in pie making that the meat should be cut square, otherwise, when the pie is baked, it will be found that it has fallen quite solid and sodden inside the crust. To avoid using finely cut meat it is therefore necessary to have a machine capable of being so adjusted as to produce the meat exactly of the size required. The small

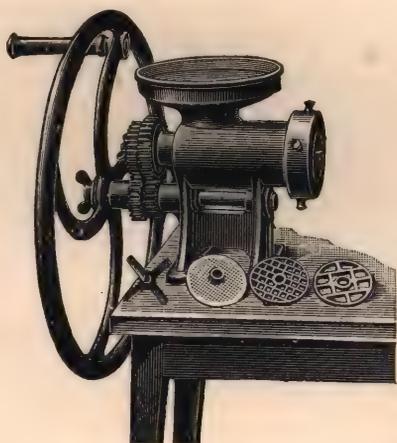


FIG. 33.—SMALL ALEXANDER PIE MEAT CUTTER.

“Alexander” is a very good machine for this purpose for small pie makers, as, by simply putting into the knife box one knife and one square-holed plate, the meat will be cut in one operation to the necessary size. On a large scale, however, this size of machine is not permissible, but the same machine, as designed for power, is the best for that purpose.

The bowls of these machines are enamelled inside and japanned outside. The principle is very simple. The meat is first cut up into portions about 2 in. square, the fat and lean equally mixed. Tins holding 20 lb. should be provided, and as the meat is cut it should be placed in these, and mixed with the requisite seasoning. These quantities should then be placed in the

bowl or receiver, and the power put on, as shown. The horizontal portion jutting out from the left contains a screw propellor, the knives and plates. The screw carries the meat to the knife box, where it is cut and pressed through the plates, falling into receivers ready to be placed in the raised crusts. An adjustment worth noticing is that of the double gearing. By this arrangement the spindle—which passes right through the screw, and has affixed to it the revolving knife only—travels at a greater speed than the screw. The consequence is that, at the point of contact between the meat and the plates



FIG. 34.—POWER PIE MEAT CUTTER.

there is no crushing or bruising of the meat. The plates are stationary. The same machine can be adapted to cutting meat any size, by simply putting in more knives and plates, according to requirements, the large screw which keeps them in their place being fixable at any distance. It is *particularly* to be noted that the screw referred to *should on no account be screwed up tight*, as that will simply impede the machine. It should always be loose, to the extent of half a thread on the screw.

MOULDING OR RAISING PIES.

Having obtained the meat in proper form, the next consideration is the raising of the crust. For those who prefer the old-fashioned hand method, all



FIG. 35.—JAGGERS FOR KNEADING AND ORNAMENTING PIE CRUST.

that is necessary for a complete moulding equipment is a series of wooden moulds the size of the pies desired, an assortment of "jiggers," and some paste cutters (pitcher lids are often used). The paste may be rolled out to the requisite thickness with an ordinary baking roller. For decorative work on large pies a crimping roller is necessary.

PASTE ROLLING

Is conducted on the large scale with the aid of power rollers. Where a large trade is done these are very economical. The decorations, consisting of flowers, the maker's name, etc., are carved out on a separate set of rollers, and these adjuncts can thus be more expeditiously made



FIG. 36.—DECORATIVE PASTE ROLLER.

PIE MOULDING.

For the production of pies, especially small pies, in quantity, it is best to have a moulding machine. For pies exceeding 1 lb. to 1½ lb. in weight these machines are not serviceable, but for all others of a smaller size (such as pies sold retail at 1d, 2d., 3d., 4d., 6d., and 1s.) they are invaluable.

For ordinary working purposes as many tins will be necessary as there are pies to bake at one time. Thus if six dozen pies are baked at one time



FIG 37.—PIE MOULDING MACHINE.

six dozen tins will be necessary. It is found from practical experience that to bake pies in tins is much preferable to the plan of baking them without any covering at all. The crust comes out much more crisp and friable, and the bottom is eatable. Usually where pies are baked without tins the bottoms are black, hard, and uneatable. The instructions for using this machine are as follow :

INSTRUCTIONS FOR USING PIE MOULDING MACHINE.

Fix the machine firmly on a table in a convenient place for using.

Screw the brass moulder in its place at the bottom of the piston, and adjust the brass guides by the thumb-screws, so that the brass moulder comes down true in the centre of the tin mould. (This is very important).

Roll out the paste to the required thickness, cut with the large paste cutter supplied, and put it on the tin mould. Place the mould on the machine close to the brass regulators, and bring down the lever with a steady pull until it is felt that the mould has pressed the paste to the bottom of the tin. When the lever is released the surplus paste will hang over the edge of the tin (this need not be cut off). When a sufficient number have thus been moulded and filled, roll and cut out the paste with the small paste cutter supplied, place on the machine as before, and pull down the lever until the piston bottom plate reaches the edge of the tin and cuts off the paste. The pie is then ready for the oven. No knife is required.

Wet the paste in the tin before the lid is put on.

The pies should be baked in the tins.

The paste should be sufficiently stiff so as not to stick to the moulds.

BAKING OVEN FOR PIES.

Having got the pies moulded, filled, lidded, and kneaded, they are now ready for the oven. Of ordinary confectioners' or bakers' ovens it is not worth while speaking, as they are not adapted for pie baking. Sometimes it is convenient to send pies out to a baker to bake in his oven, so as to save the initial cost of an oven on the premises. To send them out is the only thing possible where the pie maker cannot afford an oven of his own, but wherever possible, it is entirely to be desired that the pies should be baked under the immediate supervision of the pie maker. They require to be carefully tended, and no one can do that so well as the maker himself. Where gas is obtainable—and it is in most places—at a reasonable rate, it is best always to adopt it as the means of raising the heat in pie ovens. It is much cleaner and more convenient than coal or coke. One of the most suitable ovens is that shewn on next page.

The principal recommendation is that the gas is not permitted to pass into the oven, but is made to heat a series of tubes which surround the whole of the baking space. The heated air thus put in circulation travels round these tubes until it reaches the funnel, shown at back of the sketch, and then is carried into the chimney or through the wall into the air. None of the heat is wasted, and so the expenditure on gas is reduced to a minimum. The heat can be got up to baking temperature in about fifteen minutes, and small pies are well baked in twenty-five minutes, the other sizes taking some time longer. One of the advantages of this oven is that the heat enters from the tubes *equally* all round, so that the pies never need be "turned," and they are subjected to the same temperature at every part of the oven at once. This does away with the evil of charring the bottoms of pies when the tops are not sufficiently

baked, owing to the unequal temperature in ordinary fire ovens. Roast pork is equally well cooked, and with perfect uniformity, as are also "savory ducks" and other small goods. Bread, too, can be made, and is made very largely with their aid.

There are other ovens obtainable for heating with coal or coke, some of these, notably coke-heated air ovens, being very successful; but these are more expensive to erect, and are seldom used by pie makers in the ordinary way.

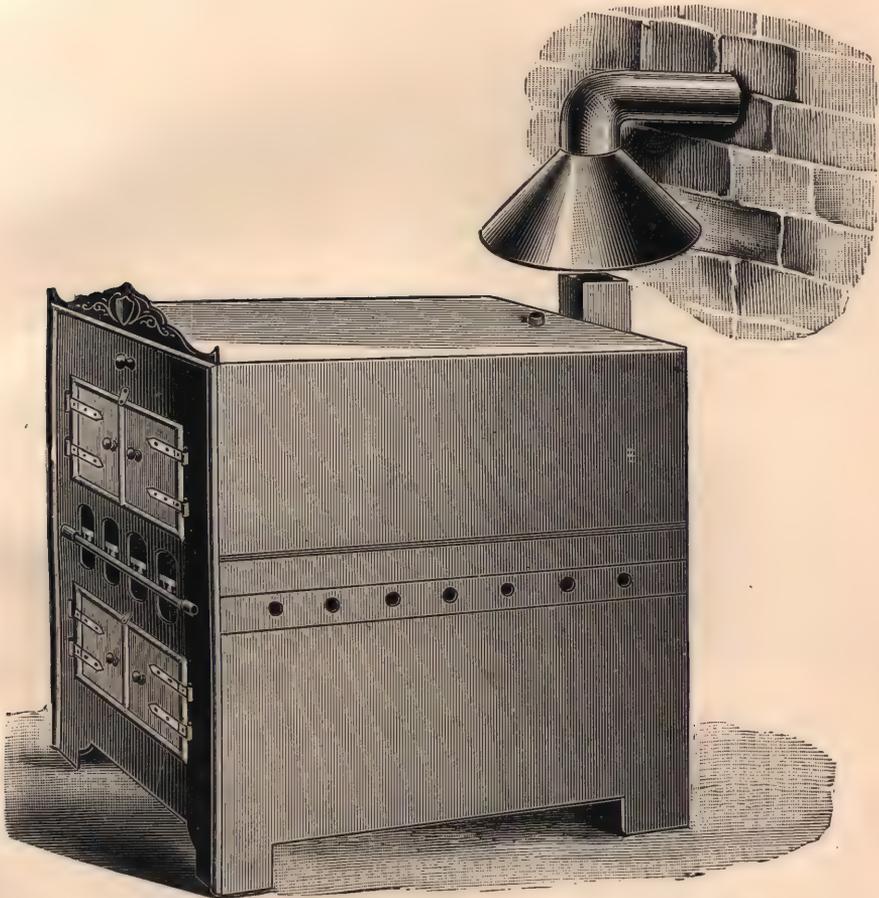


FIG. 38.—PORTABLE PIE BAKING OVEN, HEATED BY GAS.

RECIPES FOR PORK PIE PASTE.

NO. 1 RECIPE.

Flour	...	...	...	...	6 lb.
Lard	...	...	...	...	3 "
Baking Powder	..	..	...	...	2 oz.
Salt	...	...	...	...	2 ,, or to taste.

To be mixed cold, with a little water added.

This quantity is sufficient to make paste for about six dozen twopenny pies. Many prefer to add the lard hot to the flour, and on the whole this is perhaps more successful. Hungarian flour is said to be most suitable for paste.

NO. 2 RECIPE.

Flour	...	...	...	...	6 lb.
Boiling Lard	...	...	...	...	2½ "
Salt	...	...	...	...	¾ oz.
Baking Powder	...	...	...	...	2 "
Cornflour	...	...	...	...	1 "

To be mixed together, adding about a small cupful of boiling water.

PIE STOCK.

When the pies are withdrawn from the oven, they should be painted over with some egg-flip, allowed to cool in racks, in the open air if possible, and when cooling they should be punctured with a wooden skewer, and stock added through a funnel. It is well to save the rinds and bones for this purpose, boiling them for three or four hours until a jelly is extracted. In the liquid state this should then be run into the pies.

To clarify the stock it should be passed through a filter. This is made from a piece of thick woollen material, closely stitched at the seams. It is shaped as shown, and mounted on an iron tripod with a ring at the top, on



FIG. 39.—PIE STOCK OR JELLY FILTER.

which rests the ends of strong wire to which is attached the cloth. After use, the cloth should be carefully washed with a little soda, then rinsed with scalding water, wrung out and dried, so as to be nice and clean when wanted again. Another method of making jelly is to dissolve 1 lb. of gelatine in a gallon of water. When the jelly is filtered, the seasoning for it should be added, consisting of—

White Pepper	...	...	...	...	10 oz.
Salt	...	...	...	...	10 "

Add ½ oz. to every gallon, along with 1 oz. of Food Preservative (Dry Antiseptic).

MEAT FOR PIES.

The parts of the pig used for pie making are the legs, and they are usually preferred of large size, because they are cheaper and firmer.

CLEANING SINGED PIGS' HEADS.

To remove the singed skin from pigs' heads, scald for ten minutes in boiling water and the skin will then easily come off.

FEEDING OF PIGS.

The most recently published statistics of value, relating to the feeding of pigs, are those by Docent Fjord, a translation of which has been published by *The Farmers' Gazette* of Dublin; they are invaluable as reducing to figures the results of much patient observation at many stations in Denmark.

The preface of the translator (R. H. Beamish) says:

"The comparative values of separated milk and ordinary skim milk have been solved for some time past by the Danes, with the result that the former is extensively used without any fear of ultimate danger.

We may observe that the practical results derived from these trials are divided into three parts.

- A. 1 lb. of separated milk is equal to 2 lb. of whey;
- B. 1 lb. of barley can be substituted for 1 lb. of rye;
- C. 1 lb. of barley can be substituted for 6 lbs. of separated milk or 12 lbs. of whey.

That is to say that 1 gallon of separated milk is equal to $1\frac{3}{4}$ lb. of barley or rye. By other form of comparison the same facts may be rendered somewhat more intelligible.

Barley at 4/ per cwt. is equal to separated milk at $\frac{3}{4}$ d. per gallon.

"	5/5	"	"	"	"	"	1d.	"
"	8/1	"	"	"	"	"	$1\frac{1}{2}$ d.	"
"	10/10	"	"	"	"	"	2d.	"

At the same time, it must be observed that evidently the Danes do not depend upon the exclusive use of either milk or corn; but feed them in combination. During these experiments the animals were given from 1 to $1\frac{1}{2}$ gallons of separated milk combined with from $2\frac{1}{2}$ to 5 lb. of corn, according to the size of the pigs and the period of fattening.

Barley is the principal form of corn in use, though wheat, maize, and rye are also given.

The average increase of weight from the combination of separated milk and corn has varied between $\frac{3}{4}$ and 1 lb. per diem."

THE IRISH METHOD OF PIG FEEDING.

The following is a copy of a useful circular issued by the Royal Dublin Society, and fairly represents the opinions of Irish curers on feeding of pigs :

"BREEDING AND FEEDING OF SWINE.

Irish bacon has long held a high position in the English markets, and it is a matter of great importance to Irish farmers that it should continue to do so.

In these days of keen competition, when several Continental countries have turned their attention to curing bacon for the English markets, and, by careful breeding and feeding, have been able to encroach on those markets hitherto held by Irish curers, every effort should be made by owners of swine throughout Ireland to assist the curers in the struggle in which they are engaged. In doing so they will only be attending to their own interests, as it is self-evident that the price of bacon is more a farmer's question than one affecting bacon curers or provision merchants. There are two all important matters connected with the bacon trade which are entirely in the hands of farmers, and which ought to receive every attention—viz., the breeding and feeding of pigs.

BREEDING.

Different breeds suit different districts, but at present white breeds are most in favour with buyers in Ireland. While trying to impress upon farmers the necessity of fresh blood and careful attention to breeding, it may be well to warn them against attempting to introduce a new breed of pigs into a district. It is much the safer way for farmers to aim at the improvement of pigs which have been long bred in a district than to attempt to introduce new breeds. While this is so, care ought to be taken in the selection and introduction, from other districts, of high-class male animals to develop the points essential in good pigs.

Speaking generally, short, dumpy boars and sows ought to be avoided, as it will be found that extra length of body not only adds much to the weight of the carcass, but ensures a larger proportion of lean meat to the gross weight.

Every care ought to be taken to prevent consanguinity or close breeding. The evil effect of close breeding shows itself sooner in the case of pigs than in any other of our domestic animals, and, therefore, fresh blood is most essential.

In practice it will be found that a well-shaped pig can be reared, fed, and brought, in a shorter space of time, to a greater weight, upon a smaller amount of food than a mongrel bred one; while the bacon and hams cut from the carcass of a well bred pig are superior in quality and command a higher price in the market. Even in the heavily-stocked markets of the present day there

is still "room at the top," and to-day there is a very great margin in the wholesale and retail markets between the price of ordinary bacon and hams and those classed as best quality.

FEEDING.

The flesh of pigs is soft if fed on brewery and distillery grains. Turnips and mangolds are unsuitable for producing good bacon.

The following foods are suitable for producing good bacon :

Potatoes (cooked)

Milk

Barley meal

Oatmeal and crushed oats

Pollard bran

Wheat (ground)

Rye meal

Indian corn (used sparingly) ground and cooked.

SEPARATED MILK.

It is said that one of the principal reasons why Danish bacon has taken such a hold on the English market, and has been so profitable to the farmers in Denmark, is the fact that they have fed their pigs largely on separated milk. Nor is milk feeding a new idea. For generations the cottagers in Cumberland and Yorkshire have made a point of buying skimmed milk for their pigs for at least a month before they were killed for family use. Although seemingly an expensive food, the use of milk has been found to add to the flavour of the meat and also to prevent waste in cooking.

When creamery, separated milk is available it may be used fresh from the separators, but if it has to be carried, or kept over, it ought to be heated to a temperature of 180° F. at the creamery immediately after it is separated."

HOW TO MAKE PIGS PAY.

RULES BY THE IRISH PIG IMPROVEMENT ASSOCIATION.

One day with another the pig that commands the highest price is an animal which, though well finished, must not be over fat, and which turns the scale dead weight at about 12 stone. (The live weight of this animal would be about 15½ to 16 stone). This type of hog is called a "bacon" pig, and is that required for the London long-side singed bacon trade.

"Berwicks" are small plump pigs averaging about 8 stone dead weight, that is, ranging between 7 and 8½ stone. The price for these is usually the same as for bacon pigs, but at certain times of the year, through scarcity, they may fetch 2s. to 3s. per cwt. more. They are used for the ham and middle trade, and the manufactured article is almost entirely sold in Ireland.

Hogs of an intermediate class, that is, ranging between 8½ and 11 stone dead weight, are by no means so saleable and rarely command as high a

figure as either bacon pigs or Berwicks. They are called in the trade "six-sides," and at certain seasons of the year, notably the Spring, are greatly depressed in price, being often quoted at 4s. to 5s. under the other classes.

There is another type of hog—the "overweight." The highest weight generally killed at the factories is 13 stone. There are, however, a few killed some pounds heavier than this, but there is always some 2s. or 3s. per cwt. less paid for them, as the class of bacon manufactured from them is inferior, and has to be sold at considerably less money in the English markets.

All the above classes of pigs must be well fed, but not over fed. A good bacon pig of 12 stone ought to be produced in 7 months from its birth. It should not be crammed, neither should it be half-starved, but fed steadily and regularly. Pigs fed steadily and regularly will give the most satisfactory results to the feeder when weighed in the factories. A hog which has been half-starved at any period of its life, even though well fed afterwards, will not do so.

The flesh of hogs is soft and flabby if fed on brewery or distillery stuff or on turnips or mangolds, and in comparison to their size their weight in the scale is miserable. They may deceive (we doubt it) the buyer who buys by "guess," but they will not deceive the scale weight.

The best classes of food for pig feeding are: potatoes (cooked), milk barley, meal, oatmeal, crushed oats, pollard, bran, ground wheat, rye meal, Indian corn (the latter should be only used sparingly and in conjunction with other foods, such as pollard bran or milk, and should always be ground as fine as the mill can make it, and thoroughly cooked, otherwise the Indian corn passes through the animal undigested and to the loss of the feeder).

The secret of making money by pigs is not to rush into them nor out of them. Never keep too many; never keep too few. The fault in the past has been that feeders ran in to buy when hogs were dear, and stayed at home when they were cheap. Try the reverse and the result will surprise you.

You will not get well-shaped pigs from a badly shaped boar; neither will you get thrifty pigs from an unthrifty sow. If you do not keep your pigs clean and dry they will not pay you. A pig, any more than a human being, will not thrive on a foul, damp bed.

The best thriving pigs we have ever seen were those produced from an ordinary well-shaped country sow and a thoroughbred York boar. The services of this latter class of animal can easily be had nowadays. A long-legged ungainly boar will get a leggy, flat-ribbed, cat-hammed, herring-gutted miserable class of pigs, which will pay nobody and deceive nobody as to their quality except, perhaps, the man who feeds them. The tall leggy hog used ignorantly to be thought to deceive the buyer who purchased by "guess," but it will not deceive the factory weighmaster.

No matter how low prices may be, if it does not pay to feed pigs, it certainly does not pay to starve them.

The way to have cheap stores is to breed them yourself.

A good sow is easily fed, and is the best savings bank you could have.

The day you buy is the day you sell. If you pay too much for the store you will want (but will not get) too much for the bacon pig. Where a

proper sow is kept, young pigs can be produced for 1s. a week of their age—that is to say, 8 weeks 8s., 10 weeks 10s., and so on up to 12 weeks. Why should the feeder pay practically double this for them?

One great secret of pig raising is—when pigs are high in price don't lose your head and throw your money away; when pigs are low don't lose your head and throw your pigs away.

BACTERIA.

It is now an established fact that decay or putrefaction is due to the multiplication of micro-organisms or forms of life invisible to the naked eye. Many investigators have, during the present century, thrown much light on these obscure forms, and it may be confidently hoped that before many years have passed that we will be able easily to arrest their formation altogether. In meats, fresh and cured, the process of quick decay is too familiar; and while many means of modifying the process are available, it is yet, to a great extent, a field of investigation open to whoever will undertake the task. A curious calculation is made by Cohn, who was one of the earlier investigators. He says:

“Let us assume that a microbe divides into two within an hour (a fact determined by observation), these two into four in the next hour, these again into eight in the third hour, and so on. The number of microbes thus produced in twenty-four hours would exceed $16\frac{1}{2}$ millions; in two days they would increase to 47 trillions, and in a week the number expressing them would be made up of 51 figures! At the end of twenty-four hours the microbes descended from one individual would occupy $\frac{1}{16}$ of a hollow cube with edges $\frac{1}{16}$ of an inch long, but at the end of the following day would fill a space of 27 cubic inches, and in less than five days their volume would equal that of the entire ocean.

A single bacillus weighs 0,000,000,000,024,243,672 of a grain (a perfectly incomprehensible quantity), 40 thousand millions, 1 grain; 289 billions, 1 pound. After twenty-four hours the descendants from a single bacillus would weigh $\frac{1}{289}$ of a grain; after two days, over a pound; after three days $16\frac{1}{2}$ million pounds.”

Of course the calculations are made on the presumption that no obstacle will arise in the progress of development—a thing happily quite impossible.

Pasteur demonstrated that all putrefaction was due to the presence of bacteria in the air, and that blood, milk, meat, etc., is not affected when deprived of contact with the air. This process is described as *sterilizing*.

PIG AND BACON STATISTICS.

ACTUAL WEIGHINGS.

The following statistics are valuable as showing the actual turn-out of pigs of various sizes. The weighings were carried out with every care, so as to ensure accuracy:

It may be reckoned that the two sides of a pig will weigh $\frac{4}{5}$ of the actual live weight. If a pig weighs 200 lbs., then two sides fit for curing (Wiltshire style) would weigh 160 lbs. (80 lbs. each). These sides would lose $2\frac{1}{2}$ lbs. each in salting, and if smoked, another $1\frac{1}{2}$ lbs. each, or a total of 8 lbs. each in all.

Actual weighings of four pigs of different weights.

	No. 1 PIG. Sides marked 1 and 2.	No. 2 PIG. Sides marked 3 and 4.	No. 3 PIG. Sides marked 5 and 6.	No. 4 PIG. Sides marked 7 and 8.				
PAYABLE WEIGHTS.	11 sc. 19 $\frac{3}{4}$ lbs.— 239 $\frac{3}{4}$ lbs.	9 sc. 15 lbs.— 195 lbs.	7 sc. 13 lbs.— 153 lbs.	7 sc. 6 lbs.— 146 lbs.				
Bones	6 $\frac{1}{4}$ lbs.	5 $\frac{3}{4}$ lbs.	4 $\frac{3}{4}$ lbs.	4 lbs.				
Blade bones ...	2 $\frac{1}{4}$ "	2 $\frac{1}{4}$ "	1 $\frac{3}{4}$ "	1 $\frac{3}{4}$ "				
Steaks	2 $\frac{1}{4}$ "	2 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "				
Cuttings	2 "	2 "	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "				
Kidneys	$\frac{1}{2}$ "	6 oz.	$\frac{1}{2}$ "	$\frac{1}{2}$ "				
Flick lards ...	8 $\frac{3}{4}$ "	7 lbs.	5 $\frac{1}{2}$ "	4 $\frac{1}{4}$ "				
Fat	2 $\frac{1}{2}$ "	2 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2 "				
Feet	3 $\frac{3}{4}$ "	4 "	3 "	2 $\frac{1}{2}$ "				
Blade bones ...	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "				
Skulls	7 $\frac{3}{4}$ "	14 $\frac{1}{2}$ "	9 $\frac{3}{4}$ "	8 $\frac{3}{4}$ "				
Chaps and Tongues	11 $\frac{1}{4}$ "							
Tongues		2 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1 "				
TWO SIDES.	cwt. qrs. lbs. 1 2 24	cwt. qr. lbs. 1 1 12	cwt. qrs. lbs. 1 0 9	cwt. qrs. lbs. 1 0 6				
	Sides.	Sides.	Sides.	Sides.				
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
	qrs. lbs.	qrs. lbs.	qrs. lbs.	qrs. lbs.	qrs. lbs.	qrs. lbs.	qrs. lbs.	qrs. lbs.
Same day as killed	3 11	3 13	2 20	2 20	2 6	2 3	2 4	2 2
Day after killing	3 10	3 12	2 20	2 20	2 5	2 3	2 4	2 2
Weight of sides when cured (21 days old) ...	3 8	3 11	2 19	2 19	2 3	2 1	2 3	2 1
Weight of sides washed and drained	3 8	3 10	2 19	2 18	2 3	2 0	2 2	2 1
Weight of sides when smoked (28 days old) .	3 3	3 5	2 14	2 13	1 27	1 24	1 26	1 25

Actual weighings of a pig 7 score, 13 lbs ; that is, 153 lbs. payable.

Bones	4 $\frac{3}{4}$ lbs.	Two sides—121 lbs.
Backbone	1 $\frac{3}{4}$ "	
Steaks	1 $\frac{1}{2}$ "	Day after killing—going into salt, 120 lbs.
Cuttings	1 $\frac{1}{2}$ "	
Kidneys	$\frac{1}{2}$ "	Cured (twenty-one days old)—115 lbs.
Flick lards	5 $\frac{1}{2}$ "	
Fat	1 $\frac{1}{2}$ "	Smoked (twenty-eight days old)—108 lbs.
Feet	3 "	
Blade bones	$\frac{1}{2}$ "	
Head	9 $\frac{3}{4}$ "	
Tongues	1 $\frac{1}{2}$ "	

Actual weighings of a sow 16 score, 8 lbs. payable (328 lbs.).

Flick, kidneys and skirt	16 lbs.
Head	26 "
Backbones	4 $\frac{1}{2}$ "
Ribs	11 $\frac{1}{2}$ "
Spare ribs and bones	2 $\frac{1}{2}$ "
Griskin	6 $\frac{1}{2}$ "
Four knuckle bones	8 "
Four feet	7 $\frac{1}{2}$ "
Rinds	12 $\frac{1}{2}$ "
Fat for melting	23 "
Meat for sausages	210 "

Actual weighings of two sides of bacon smoked.

	No. 1 SIDE. Weighed 2 qrs. 16 $\frac{1}{2}$ lbs.		No. 2 SIDE. Weighed 2 qrs. 5 lbs.	
	qrs.	lbs.	qrs.	lbs.
$\frac{3}{4}$ side	1	26 $\frac{1}{2}$	1	16 $\frac{1}{2}$
Fore		18		16 $\frac{1}{2}$
	<u>2</u>	<u>16$\frac{1}{2}$</u>	<u>2</u>	<u>5</u>
Jacket	2	0 $\frac{1}{2}$	1	19 $\frac{1}{2}$
Gammon		16		13 $\frac{1}{2}$
	<u>2</u>	<u>16$\frac{1}{2}$</u>	<u>2</u>	<u>5</u>
Fore		18		16 $\frac{1}{2}$
Middle	1	10 $\frac{1}{2}$	1	3
Gammon		16		13 $\frac{1}{2}$
	<u>2</u>	<u>16$\frac{1}{2}$</u>	<u>2</u>	<u>5</u>

BUYING PIGS BY THICKNESS OF FAT.

This system is now adopted in the West of England by the various bacon curing houses there. It has been in operation some two years now, and has come to be recognised by the farmers as fair and equitable. The following shows the method of adjusting the prices :

WEIGHT.	THICKNESS OF FAT IN ANY PART OF THE BACK.	PRICE.
1 6 sc. 10 lbs. to 9 sc. 10 lbs.	Not exceeding 2 $\frac{1}{4}$ inches	Top price.
2 Under 10 sc. 10 lbs. ...	Not exceeding 2 $\frac{1}{2}$ inches	6d. per sc. less than 1st price.
3 Under 11 sc. 10 lbs. ...	Not exceeding 2 $\frac{3}{4}$ inches	9d. per sc. less than 2nd price.
4 Under 12 sc.	Not exceeding 3 inches	9d. per sc. less than 3rd price.

Pigs exceeding these limits, and soft, or otherwise inferior, will be paid for at their value.

DANISH BACON FACTORIES.

One of the features of the development of the agricultural industry in Denmark has been the rapid growth of an export trade in bacon and hams. Prior to the year 1887-88 the annual consignments of these products from Danish ports had never exceeded 300,000 cwts., but in that year the shipments amounted in weight to nearly 600,000 cwts., and they have since increased to over 800,000 cwts. in 1893-94. It is noteworthy that the sudden augmentation in 1887-88 was coincident with the establishment of co-operative bacon factories in Denmark. The first organisation of this kind was formed in 1887 by a number of farmers in the district of Horsens. In view of the success which had already attended the application of co-operative principles to the dairy industry, the new venture was regarded with much interest by the agricultural community, and companies were hastily formed in several districts for the erection of similar establishments. The closing of the German ports to live swine from Denmark in the winter of 1887-88 afforded a further impetus to the movement, and bacon factories sprang up rapidly in all parts of the country.

There are now thirty-four of these establishments in operation, of which number seventeen have been erected by co-operative associations of farmers. In the case of the factories established by the farmers' associations, the funds for the erection of the necessary buildings were generally derived from a loan effected on the security of the founders, each member being expected to become a guarantor for an amount not exceeding £50, the sum guaranteed by each individual determining the extent of his ownership in the concern.

The administration of the association is vested in a council elected by the members. The employes usually consist of a manager, a book-keeper, and a cashier. The regulations of the different co-operative bacon factories agree very much in their general principles. It is usually stipulated that the

members of the association shall deliver all their saleable swine to the factory for a period of seven years, except in the case of removal from the district. This stipulation, however, does not apply to boars, to sows in farrow, or to young pigs under 56 lb. (in some cases 112 lb.) live weight, nor does it extend to pigs sold by a member to his labourers, or consumed in his own house. A corresponding obligation is nearly always imposed on the association to accept all the healthy swine consigned by a member to the factory. A member may purchase any number of pigs from another member of the association, and send them to the factory, provided he has fattened them for a period varying from twenty to thirty days before delivery, but he is not allowed to send in one year more than ten pigs purchased from non-members.

The association usually defrays the expenses incurred in conveying the swine from the nearest railway station to the factory; all other charges for carriage are paid by the consignors. On removal to the factory the pigs are divided into classes according to quality, the values of the different classes being fixed weekly by the council on the advice of the manager. In some cases the prices are paid by dead weight, but in the older establishments payment by live weight is still the practice. The offal is generally sold to the members of the association, or to the general public at the current prices of the day. The regulations do not, as a rule, contain any restrictions on the methods of feeding swine intended for the factories. Sometimes, however, the employment of fish and fish cake is prohibited, as is also the use of a ration containing more than 50 per cent. of maize. Whenever it is found that the supply of swine is falling off, the manager of the factory is empowered to purchase pigs from non-members of the association at a price fixed weekly by the council, and posted up for the information of members.

At the close of the year the profits arising from the operations of the association are distributed amongst the members, after provision has been made for the payment of the working expenses, the allocation of a certain sum to the reserve fund, and the part repayment of loans. Each member receives a share of the profits in proportion to the weight of pork he has delivered during the year. The amount carried to the reserve fund is determined annually by the council. In some of the Danish co-operative bacon factories it is the practice to elect the members of the council as representatives of the members residing in different parishes. Thus, in the rules of the Esbjerg factory, it is provided that any parish in which ten members of the association reside may be represented by a delegate on the council. The president is chosen by the council from amongst themselves.

According to the latest information contained in the *Tidskrift for Landokonomi*, the managing committee of the co-operative bacon factories in Denmark have recently combined for the maintenance of their general interests. The practice of the associations to accept any number of swine consigned to the factories by their members has been found to operate prejudicially to the bacon trade by rendering the supply unsteady. In some seasons a serious fall in price has been experienced, owing to the markets being overstocked with factory bacon; while, on the other hand, it has

frequently happened that when prices were at a remunerative level the associations have derived little benefit therefrom, because their members were unable to supply a sufficient number of swine to meet the demand. Steps have already been taken by the joint committees of the factories to remedy these disadvantages, and more attention is being directed to the production of a good class of bacon pig, particularly of that type which finds most favour in the British markets.

The total number of swine in Denmark in 1893 was 829,000, and of this number nearly 400,000 were owned by farmers in Jutland. The most popular classes of pigs are descended from the large and medium white Yorkshire breed. It was formerly the custom of many Danish farmers to purchase their breeding swine from England, and the best herds are still maintained by the frequent introduction of fresh English blood. The quantities and values of Danish bacon imported into the United Kingdom during the five years 1890-94 have been as under :

		Quantities.	Values.
1890	...	470,047 cwt.	£1,346,385
1891	...	583,408 „	1,590,349
1892	...	675,882 „	1,931,396
1893	...	719,124 „	2,171,299
1894	...	766,828 „	2,189,690

The value per cwt., according to the above figures, has ranged from £2, 12s. 9d. in 1891, to £3, os. 4d. in 1893.

HOW TO CURE BACON IN SUMMER.

From *The Grocer's Gazette*.

“It is a mistake to suppose that when the warm weather sets in the ordinary curer of bacon must cease operations, and allow those of the more favoured sort who possess powerful refrigerators to rule supreme. Undoubtedly there is great difficulty in handling pork during sultry weather. The risks, however, of spoiling it during the cure can be much minimised by attending to a few simple rules. Eight score to ten score pigs are most suitable for bacon, heavier pigs for hams and broad cut sides. Before slaughtering, it will be found necessary to rest the animals for about twelve or fourteen hours, more especially so if they have come a long journey. During this period of rest no food should be given them, as otherwise the digestive organs are set in full motion, and the animal heat produced is sure to make the cure impossible. The most humane method of slaughter is to knock down with a round-faced mallet, thus producing insensibility, then string the animal up to a sliding bar and let out the blood. The state of insensibility prevents the struggling, which in hot weather is so much to be guarded against, as well as preventing the screams of the dying animal from becoming a nuisance. Amongst many appliances of use at this stage of the proceedings, none is more useful than the singeing furnace. It may be made of

bricks and heated with coke, or of a simple gas arrangement. In either case the effect to be produced is to burn the hair of the animals into a black crust, and harden the rind; at the same time to produce that delicacy of flavour which is wanting in pigs that are only scalded. When the singeing is completed, throw some buckets of cold water all over the carcass, and immediately scrape off the black crust with a flat-faced scraper. From this stage onwards to the cutting up into sections a copious supply of clean, fresh cold water should be at hand and freely used. Open the carcass and remove the intestines, cut off the head, split down the back so as to separate out the vertebral column, and divide the two sides. It is best to allow of complete setting by permitting the sides to hang in a cool draft for some hours, say all night, and proceeding thereafter to trim and prepare for the cellar. Trimming the sides is a very simple process, and is more a question of practice than anything else. The spare-rib should be cut out, the ribs cleaned, the blade-bone removed and symmetry obtained. Be careful also to remove the large vein just beneath the spare-rib, as the clotted blood, if left about, is exceedingly dangerous. The sides would now be ready for the cellar.

“A cellar such as can be cheaply used for curing during warm weather may be constructed as follows: The basement of a shop or house is made perfectly air-tight by lining the walls with cement, and the roof with feathered and grooved boarding. The floor is divided into sections, and right round the wall is erected, at a height of 2 ft. from the floor, a table of stone or brick of a width of about 3 ft. 6 in., and gently sloping *inwards*, so as to provide a channel for the brine. In the centre a table is erected of similar height (2 ft.), and with a slope from both edges to the centre, so as to provide a brine channel. These tables should all gradually *fall* in the direction of the pickling tanks, which may be as numerous as circumstances will permit. A very convenient size for these vats is 4 ft. deep by 3 ft. 6 in. square, and they can be constructed of either slabs of slate or of Caithness flagstones cemented or bolted together. Caithness flagstones are also very often used for the tops of the tables already described. In a recess, if possible, just above the pickling vats, or at any rate at the end of the cellar furthest from the doorway, a box for receiving ice should be constructed. The size will depend on the space to be cooled. Thus, for a cellar 30 ft. by 20 ft. a box holding half a ton of ice will be sufficient. It must be borne in mind, however, that the greater the quantity of ice present the proportionate loss by waste will be the less. The ice box should have a false bottom and convenience for collecting the water produced, and the sides nearest the cellar should also be constructed of lattice pattern, so that the cold air will fall outwards freely. The cold air will fall *downwards*, so that it is necessary for the ice box to be as near the roof as possible. The place for filling the ice into this receptacle may be conveniently put immediately above it, and the entrance secured so as to prevent a large influx of air. It is necessary to allow of the entrance of a little air, as will be explained below, but the air capable of being drawn through a 2 in. tube is quite sufficient for almost any ordinary cellar. Near the doorway, and at the opposite end from the ice box, a small fan of about

12 in. or 18 in. diameter should be fixed in the wall and connected with a water motor or small gas engine of about two-horse power. As the fan may have to travel constantly, it is perhaps desirable to use a water motor as the more reliable and less dangerous of the two. When these arrangements are completed, the action to be produced is as follows: The fan causes a gentle current throughout the cellar, and draws its supply of air *through* the ice box

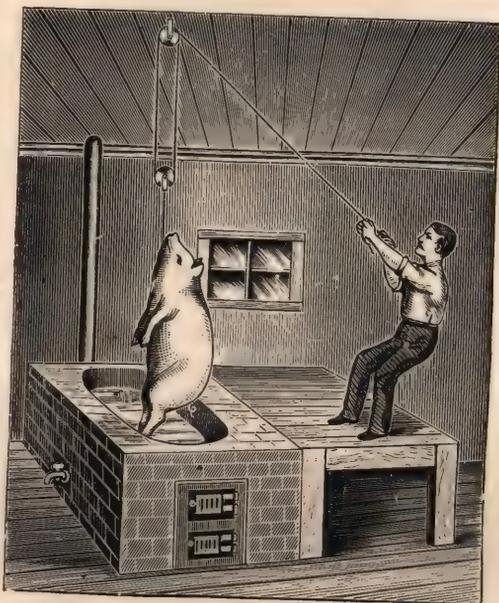


FIG. 40.—CONVENIENT HOG SCALDING PLANT FOR PORKMEN
IN A SMALL WAY.



FIG. 41.—PAN SHOWN IN ABOVE ILLUSTRATION.

5 ft. 4 in. × 2 ft. 6 in. × 2 ft.
Capacity about 150 gallons.

which must be very cold, and thus disseminates over all the space an equal temperature of about 50° F. It may be easily reduced to 45° by carefully proportioning the fan and the ice box to the cubic capacity of the cellar. From 45° to 50° F. are the temperatures between which curing may be conducted successfully.

FIG. 42.—CONVENIENT PICKLING TUBS FOR PORK AND MEAT.



Capacity from 20 to 55 gallons.



Capacity about 90 gallons.

“Having thus obtained the convenience required at a very moderate outlay, the fresh sides should be taken and laid on the table near the doorway and *pumped*—that is to say, brine of following composition should be injected into all the lean or solid parts and along the sides of the bones of the hams :

BRINE FOR PUMPING BACON.

Salt	...	...	...	...	...	45 lbs.
Food preservative (dry antiseptic)	...	...	...	...	...	4 ”
Egyptian or Barbadoes sugar	...	...	...	...	...	3 ”
Saltpetre	...	...	...	...	...	$\frac{1}{2}$ ”
Salprunella	...	...	...	...	...	$\frac{1}{2}$ ”

Make this up to twenty gallons with fresh cold water, and stir till all is dissolved. Should it prove to be thick and muddy, boil and skim till clear. Pump this brine by means of a brine pump or hand brine syringe into the bacon, as described, and thereafter dust the side with a little food preservative (dry antiseptic), and rub the inside well with fine salt to which has been added 5 per cent. of saltpetre. Lay a bed of salt on the table and cover up the side with it. The same process is gone through with all the sides, and if there be not space enough to lay them out singly, pile one on the top of the other, always taking care to have plenty of salt between. At the end of the third day remove the salt and turn the sides, if piled, so that those at first on the bottom will be on the top, and add fresh salt with a little rubbing. At the end of eight or ten days the cure will be complete, and the sides may then be removed altogether from salt, washed in cold water, and hung up to dry. Dust some food preservative into the ‘pockets,’ and sprinkle a little corn sharps, finely ground, over all the inside. If the bacon is required smoked, dust them all over with fine ground Canadian pea meal, and hang up in the smoke house for about thirty-six hours. A much less time (about twelve hours), will do if there is a full volume of smoke. Oak sawdust is the best medium for smoking, producing the richest flavour. By the foregoing simple and economical plan prime bacon, finely flavoured and commanding high prices, can be produced. There are details in the construction which of course cannot be dealt with here, but the main idea will be easily grasped by our readers.”

REFRIGERATION.

The whole modern tendency in curing or preserving meats and provisions of all kinds is to take advantage of the appliances devised by engineers for the production of cold artificially. Such a large field for development has naturally led to many devices. The main refrigerants used hitherto have been anhydrous ammonia and carbon dioxide or carbonic acid. The latter seems to answer the purposes of curing and preserving meat better than any other medium, inasmuch as the spaces available in these industries are usually of a very contracted character. Under these circumstances the inevitable course is to select a machine in which the refrigerant is free from obnoxious odour or



FIG. 43.—PATENT BRINE WALL.

danger to life and property. Carbonic acid machines, as distinguished from ammonia machines, seem to answer that purpose, inasmuch as the gas is quite odourless, and may be allowed to escape into the engine-room without any serious effect. What is more to the point is that in many businesses the machine requires to be set down amongst the meats or in shops or buildings forming parts of the curing or storing premises. As all machines worked at high pressure are bound to be subject to escapes sometimes, it is clear that the machine where such escape is least injurious suits the curing and food preserving trades best.

These machines can also be applied to the bacon curing industry in such a way as to enable the storage cellars and chill rooms to be worked independently. The cellars are fitted with the patent brine walls and kept steadily at a low temperature—the brine walls acting as cold accumulators and thus ob-

viating night work. The chill rooms (which are fitted either with overhead brine pipes, grids, or with brine walls at the sides, or a combination of both) are on an independent circuit, so that as much of the refrigerating power of the machine as may be required can be applied to it.

The following description of Hall's Patent Carbonic Acid Refrigerating Machines is extracted from a paper read before the British Association by Mr E. Hesketh, M.Inst. C.E., M.I. Mech. E. :

The essential parts of a machine, as illustrated below, are—

An evaporator, consisting of lengths of pipe, inside which the carbonic acid evaporates, absorbing heat from the material to be cooled which surrounds these pipes.

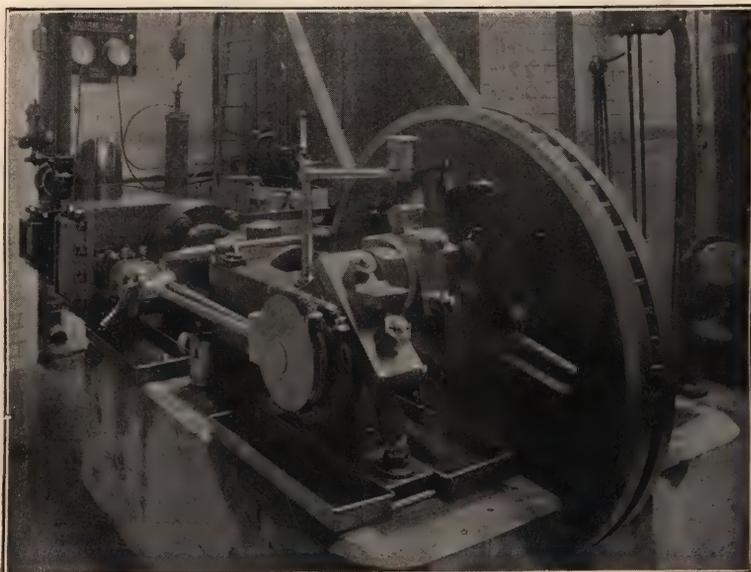


FIG. 44.—HORIZONTAL TYPE OF PATENT CARBONIC ANHYDRIDE REFRIGERATING MACHINE.

(The property of Messrs Lowell & Christmas, London).

A compressor, in which the carbonic acid vapour is recompressed to such pressure as may be required to liquefy it at the temperature of the cooling water available ; and

A condenser, consisting, like the evaporator, of lengths of pipe containing the carbonic acid, and outside which circulates the cooling water which carries off the latent heat given out during liquefaction.

Some details of the machines are as follows :

Compressor.—The compressors for the large machines are bored out of solid steel forgings, partly to secure strength, but principally on account of greater certainty of soundness of the material, and to provide a perfect bore in which may work the cup leathers with which the pistons are provided.

Compressors of smaller machines are cast in a special bronze which secures the two essentials of soundness and hardness. The suction and delivery valves are identical for facilities of interchange.

Gland.—The gland is made gas-tight by means of two cupped leathers on the compressor rod. Glycerine is forced into the space between these leathers at a pressure superior to the greatest pressure in the compressor, so that whatever leakage takes place at the gland is a leakage of glycerine either into the compressor or out into the atmosphere, and not a leakage of gas. What little leakage of glycerine takes place into the compressor is advantageous, inasmuch as it in the first place lubricates the compressor, and in the second place it fills up all clearances, thereby increasing the efficiency of the compressor.

The method of obtaining this superior pressure consists of the following device: A bored cylinder is fitted with a piston, and connected with one end

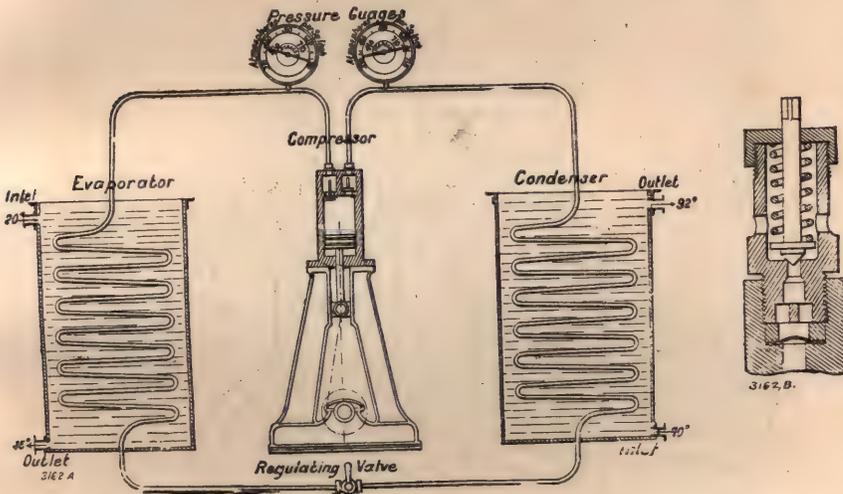


FIG. 45.

FIG. 45A.

45.—HALL'S PATENT CARBONIC ACID REFRIGERATING MACHINE.

45A.—SECTION OF SAFETY VALVE.

of this piston is a rod which passes through a gland in one end of the cylinder. From the other end of the cylinder a connection is made to the CO_2 condenser, whereby the condenser pressure is exerted on the plain end of the piston. Into the cylinder on the gland side is forced glycerine. Owing to the difference in area of the two sides of the piston, a greater pressure per square inch of glycerine is required to keep the piston in equilibrium. A connection is made from the glycerine space to the space between the leathers in the compressor gland.

In order to replace the glycerine which leaks out of the glycerine lubricator, there is a small hand hydraulic pump, a few strokes of which are required to be made every four or five hours, as may be indicated by the

position of the glycerine piston rod. This form of gland is now in constant use on nearly 500 machines.

Separator.—Any glycerine which passes into the compressor, beyond what is necessary to fill the clearance spaces, is discharged with the gas through the delivery valves. In order to prevent this passing into the condenser coils, all the gas is delivered into a separator and made to impinge against the sides of this vessel. The glycerine adheres to the sides and drains to the bottom of the vessel, whence it is drawn off from time to time; meanwhile the compressed gas passes off by an opening at the top on its way to the condenser.

It may here be remarked that glycerine has no affinity for $C O_2$; hence it undergoes no change in the machine, and there is therefore no fear of the

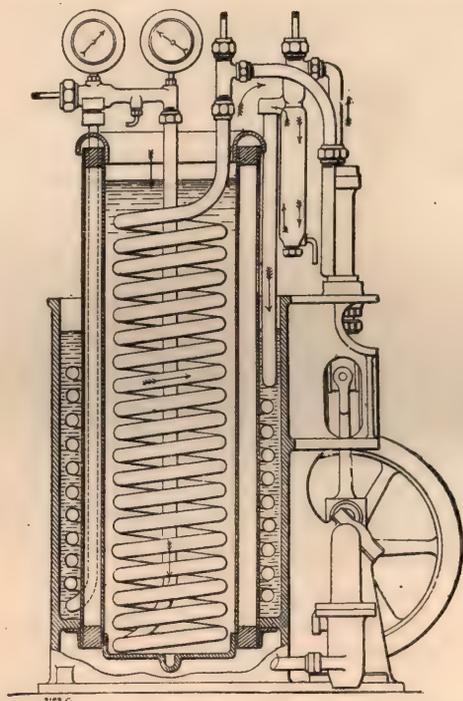


FIG. 46.—SECTION OF PATENT NOS. 2 TO 8 BELT-DRIVEN MACHINES.

coils becoming clogged by any small amount of glycerine which might be carried over in spite of the separator.

Condenser.—This consists of coils of wrought-iron hydraulic pipe, usually of $1\frac{1}{8}$ -in. bore, which are either placed in a tank and surrounded by water, or are arranged so that water trickles over them, forming the well-known atmospheric condenser. These coils are welded together into such length as to avoid altogether any joints inside the tank, where they would be inaccessible. The welding of these pipes is, by the way, performed by the electrical method, which gives very good and reliable results.

In connection with the condenser one very important advantage of $C O_2$ machines is apparent, for as $C O_2$ has no chemical action on copper, in the numerous cases where sea water only is available for condensing purposes, that metal is used in the construction of the coils.

Evaporator.—This also consists of nests of wrought-iron hydraulic pipes welded up into long lengths, inside which the $C O_2$ evaporates. The heat required for evaporation is usually obtained either from brine surrounding the

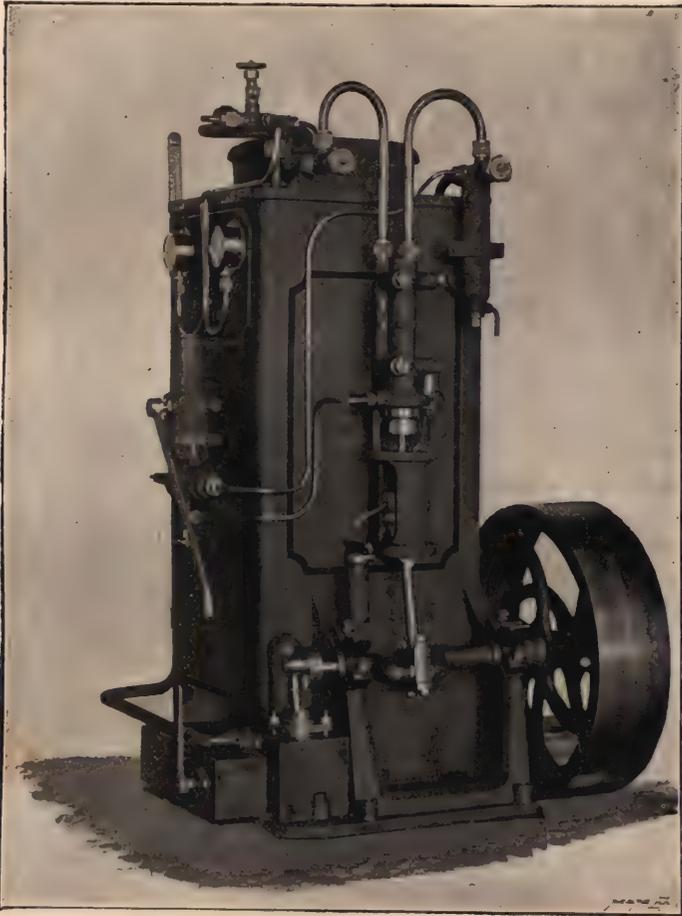


FIG. 47.—No. 4 PATENT CARBONIC ANHYDRIDE REFRIGERATING MACHINE.

pipes, as in cases where brine is used as the cooling medium, or else from air surrounding the pipes, as in cases where air is required to be cooled direct.

Between the condenser and evaporator there is a regulating valve for adjusting the quantity of the liquid $C O_2$ passing from the condenser.

Patent Safety Valve.—In order to enable the compressor to be opened up for examination of valves and piston without loss of $C O_2$ it is necessary

to fit a stop valve on the suction and delivery sides, so as to confine the carbonic anhydride to the condenser and evaporator. It is, of course, possible for a careless attendant to start the machine again without opening the delivery valve, and in such case an excessive pressure would be created in the delivery pipe, from which there would be no outlet. To provide against this danger a patented safety device is adopted, consisting of an ordinary spring safety valve, at the base of which is a thin copper disc, which is designed to burst at a pressure considerably below that to which the machines are tested. This disc is made perfectly gas-tight, an object which could not be obtained by the spring safety valve alone, and the latter only comes into play when the disc is ruptured. Great care is necessarily exercised in making the discs to provide against variation in strength, due to any variation either in the thickness or hardness of the copper sheets out of which the discs are made.

Joints.—With regard to the joints to withstand the pressures, those which are not subject to a high temperature can be made absolutely tight with any suitable material, such as leather, but for the hot joints, jointing rings turned out of a copper alloy are used, which withstand the heat and still have the necessary elasticity to ensure the joint being perfectly tight when either hot or cold. The absolute tightness of all joints is effectually tested by brushing them over with soap and water, the slightest leak being thereby detected.

Testing Parts.—Very careful tests are carried out to ensure perfect soundness of all parts subject to the gas pressure. The working pressure varies from about 750 lbs. per square inch in temperate climates, with water at 50° F., to about 1,125 lbs. with water at 84°, as is usual in the tropics. This is, of course, sometimes exceeded in exceptionally hot localities. Owing to the very small diameter of all parts, even in large machines, there is no difficulty in securing a very ample margin of strength. All parts of machines subject to the pressure of the carbonic anhydride are, in the first place, tested for strength by hydraulic pressure to 3,000 lbs. per square inch, and they are then again tested while immersed in warm water by air to 1,350 lbs. per square inch, whereby the slightest porosity which might exist in any of the materials is at once detected by air bubbles ascending through the water.

Extract from paper read before the Institute of Brewing by Mr. Alex. Marcet, A.M. Inst. C.E. :

Refrigeration.—As a refrigerating agent liquefied carbonic acid is second to none. Under atmospheric pressure it evaporates from the solid state at the particularly low temperature of 120° F. below zero, or 152° below the freezing point of water. In the refrigerating machine, however, it is caused to evaporate at only a few degrees below the temperature of the material which it is proposed to cool, the principle of the machine being exactly the same as that of machines using anhydrous ammonia on the compression system—viz., as water boils at 212° F. under atmospheric pressure, and about 250° F. at, say, 15 lbs. pressure, fire being usually the source of heat, so liquid carbonic acid boils at 30° F. at 35 atmospheres' pressure, and thus permits cold water to be the source from which the necessary heat to boil it

is absorbed, exactly in the same manner as the heat of the fire is absorbed in boiling water.

The compressor draws the gas from the evaporator and compresses it to the liquefying pressure, which is controlled within certain limits by the temperature of the cooling water. The heat due to compression is absorbed by the cooling water in the condenser, the gas circulating within the condenser coils, and becoming liquefied by the time it reaches the lower extremity of these coils.

We are able by regulating the pressure in the evaporator to cause the liquid to boil throughout the coils of the evaporator, which act in the same manner as the heating surface in a steam boiler, and the temperature or boiling point of the liquid carbonic acid adjusts itself to that of the source of heat which is causing it to boil, whether it be water at 70° to be reduced to 40° , or brine to be maintained at $+10^{\circ}$ F. or -10° F.

The surfaces of the evaporator coils are so proportioned that all the liquid which enters at the lower end of the coil is evaporated by the time it

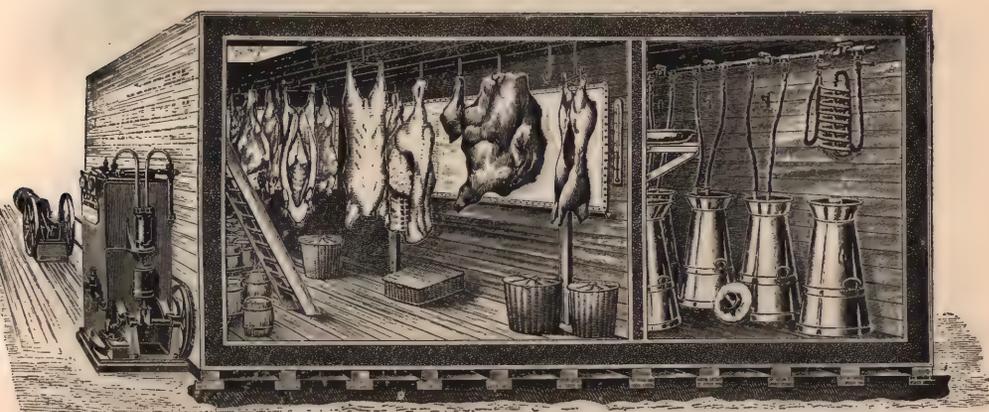


FIG. 48.—MODEL INSTALLATION SHOWING HOW CHAMBERS MAY BE ARRANGED IN CONJUNCTION WITH A CARBONIC ANHYDRIDE MACHINE.

reaches the top end, and thus the maximum efficiency is obtained. The compressor then draws in only gas, and compresses it up again to the pressure necessary to liquefy it, and delivers it warm to the condensing coils to continue the cycle of operation.

INSULATING MATERIALS FOR REFRIGERATING PURPOSES.

The following table shows the relative value of non-conducting materials of various kinds, and is compiled by J. E. Siebel. (Compend of mechanical refrigeration).

Non-conducting material is absolutely essential in the construction of cold stores for any purpose whatever.

“The table shows the retentive power of various substances, together



FIG. 49.—PATENT CARBONIC ANHYDRIDE REFRIGERATING MACHINE.

COLD ROOMS.



FIG. 50.—INTERIOR VIEW OF CHAMBER.
ILLUSTRATING THE PRESERVATION OF POULTRY, GAME, ETC
(The property of Mr Charles Barnett, Cheltenham).

with the percentage of solid matter in a given space (in first column). The figures in second column are for a covering one inch thick, and a difference of 100° F. on each side of the covering."

Table showing the relative value of various non-conducting materials :

NON-CONDUCTORS ONE INCH THICK.	NET CUBIC INCH OF SOLID MATTER IN 100.	HEAT UNITS TRANSMITTED PER SQ. FOOT PER HOUR.
Still air ... ..	...	43
Confined air ... ..	...	108
" " = 310° ... ..	...	203
Wool = 310°	4.3	36
Absorbent cotton	2.8	36
Raw cotton	2	44
" "	1	48
Live geese feathers = 310°	5	41
" "	2	50
Cat-tail seeds and hairs	2.1	50
Scoured hair, not felted	9.6	52
Hair felt	8.5	56
Lampblack = 310°	5.6	41
Cork, ground ... ..	...	45
Cork, solid ... ..	...	49
Cork charcoal = 310°	5.3	50
White pine charcoal = 310°	11.9	58
Rice chaff	14.6	78
Cypress (<i>Taxodium</i>) shavings	7	60
" " sawdust	20.1	84
" " board	31.3	83
" " cross-section	31.8	145
Yellow poplar (<i>Liriodendron</i>) sawdust	16.2	75
" " board	36.4	76
" " cross-section	30.4	141
" Tunera" wood, board	79.4	156
Slag wool, best	5.7	50
Carbonate of magnesium	6	50
Calcined magnesia = 310°	2.3	52
" Magnesia covering," light	8.5	58
" " heavy	13.6	78
Fossil meal = 310°	6	60
Zinc white = 310°	8.8	72
Ground chalk = 310°	25.3	80
Asbestos in still air	3	56
" " movable air	3.6	99
" " " = 310°	8.1	210
Dry plaster of Paris = 310°	36.8	131
Plumbago in still air	30.6	134
" " movable air = 310°	26.1	296
Coarse sand = 310°	52.9	264
Water, still ... ..	...	335
Starch jelly, very firm, ... ..	...	345
Gum-Arabic mucilage, ... ..	...	290
Solution sugar, 70 per cent., ... ..	...	251
Glycerine, ... ..	...	197
Caster oil, ... ..	...	136
Cotton seed oil, ... ..	...	129
Lard oil, ... ..	...	125
Aniline, ... ..	...	122
Mineral sperm oil, ... ..	...	115
Oil of turpentine ... ..	...	95

COLD ROOMS.

Many pork and meat purveyors cannot afford to lay down expensive refrigerating machinery, and they must perforce be content with a chamber cooled with natural or artificial ice. These chambers, if properly constructed and insulated, do the work very well, although the atmosphere produced by



FIG. 51.—GENERAL VIEW OF THE "DOUGLAS"
REFRIGERATING CHAMBER.

melting ice can never be so dry as that produced by the refrigerating machine. It is a matter of common remark, however, that it is a difficult thing to get a really good cold chamber, as a very large proportion of those in use have been built by incompetent persons who know nothing of the laws of refrigeration.

A good cold chamber should have a dry atmosphere, and moisture given

off by the meat, etc., should not condense on any of the surfaces but should be taken up entirely by the ice. The inside should also be lined with zinc and the whole of the fittings should be of metal, because wood being porous is apt to absorb the bad gases given off by the meat, and when the meat rubs against it, as it frequently does, it is contaminated with blood and meat juices which form the best possible food for the bacteria which produce decay.

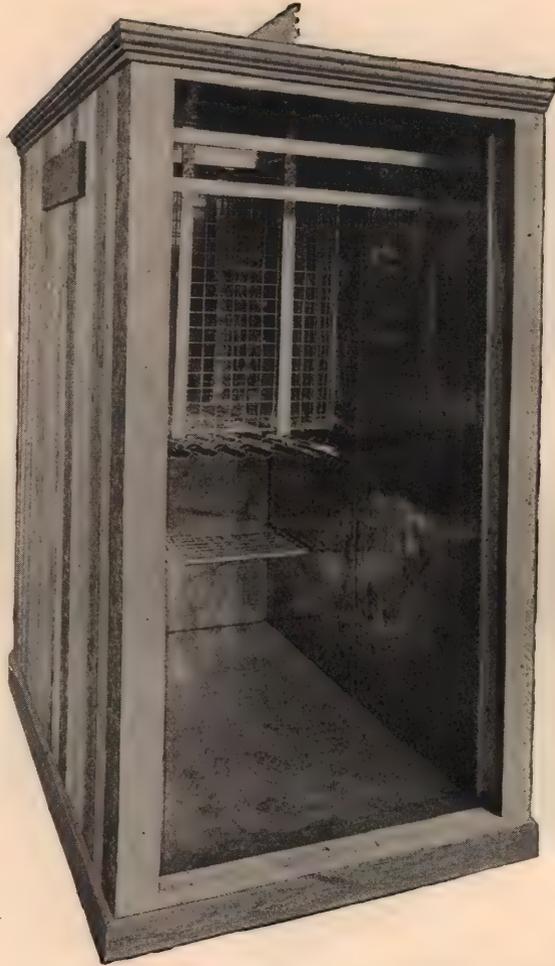


FIG. 52.—INTERNAL VIEW OF POULTERER'S AND PROVISIONER'S CHAMBER,
WITH END AND DOOR REMOVED.

Hence a wood-lined room can never be so clean and effective as one lined with zinc. Some people think that zinc lining is objectionable because they say it collects and condenses moisture. This may be so in a bad safe, but it is certainly not the case in one properly constructed.

The insulating material should be at least three to four inches in thickness and of the best quality.

Ventilation is also a point which is neglected or misunderstood. What is required is very delicate automatic ventilators, which respond to the faintest movement of air from the inside, but which allow no air to pass into the chamber from the outside. The advantage of this arrangement is, that when from any cause the air inside the refrigerator becomes heated (say from putting in hot meat, etc.), it becomes expanded, and lifts the ventilators and escapes without consuming ice; besides, as hot air in a refrigerator is generally loaded with impurities, these are carried outside. After the hot, impure air has escaped, the ventilators shut tight, and no outside air can pass in to consume ice.

The supply of ice is frequently put in through the side of the cold room. The objection to this is, that it leaves an open gap in the side of the ice box, and as the ice melts the blocks are apt to tilt forward against the door, with the result that some of the water produced runs down the side and makes the chamber damp. Although in some cases not so convenient, it is much better to have the ice door on the top of the cold room.

The ice cage can then be made perfect without any gap in the side, and the ice confined exactly in the space where it is wanted.

A CONVENIENT SERIES OF TABLES OF WEIGHTS AND MEASURES, AND A READY RECKONER.

ECCENTRICITIES OF ENGLISH WEIGHTS AND MEASURES.

We sell pickled cod by the barrel, trawled cod at so much each, hooked cod by the score, crimped cod by the pound, shrimps by the stone, soles by the pair, Dutch smelts by the basket, and English smelts by the hundred. Butter in Ireland is sold by cask and the firkin, in England by the pound of 16 oz., by the roll of 24 oz., the stone and the hundredweight, which is not 100 lbs. (as in Canada and the United States) but 112 lbs. A load of straw is 1,296 lbs., of old hay 2,016 lbs., and of new hay 2,160 lbs. A firkin of butter is 56 lbs., a firkin of soap 64 lbs., and a firkin of raisins 112 lbs. A hogshead of beer is 54 gallons, but a hogshead of wine is 63 gallons. A pipe of Marsala is 93 gallons, of Madeira 92 gallons, of Bucellas 117 gallons, of port 103 gallons, and of Teneriffe 100 gallons. A stone weight of a living man is 14 lbs., but a stone weight of a dead ox is 8 lbs.; a stone of cheese is 16 lbs., of glass 5 lbs., of hemp 32 lbs. A barrel of beef is 200 lbs., butter 224 lbs., flour 196 lbs., gunpowder 100 lbs., soft soap 256 lbs., beer 36 gallons, tar 26½ gallons, while a barrel of herrings is 500 fish.

WEIGHTS AND MEASURES.

AVOIRDUPOIS WEIGHT.

16 drams	..	..	= 1 ounce (oz.)
16 ounces	..	..	= 1 pound (lb.)
14 pounds	..	..	= 1 stone.
28 "	..	..	= 1 quarter (qr.)
4 qrs. or 112 lbs.	..	..	= 1 cwt.
20 cwts.	..	..	= 1 ton.

WEIGHTS OF THE STONE, ETC.

Imperial	..	..	14 lbs.
Dutch or Troyes	..	..	17½ "
Edinburgh (Trone)	..	..	22 "
Glasgow (Trone)	..	..	22½ "
Ayrshire (Trone)	..	..	24 "
Smithfield	..	..	8 "
The score	..	..	20 "
The central	..	..	100 "
The cwt.	..	..	112 "

In some parts of England the stone consists of 12 lbs., in others, 14 lbs., and in some, 16 lbs. The Imperial stone of 14 lbs. is of course the only legal one.

MEASURES OF CAPACITY.

5 ounces of water	..	..	= 1 gill.
4 gills	..	..	= 1 pint.
2 pints	..	..	= 1 quart.
4 quarts	..	..	= 1 gallon.
2 gallons	..	..	= 1 peck.
4 pecks	..	..	= 1 bushel.
8 bushels	..	..	= 1 quarter.

This table is used up to the gallon for liquids, and from the peck upwards for dry goods.

SCOTCH TRONE WEIGHT.

For Butter, Cheese, Hay, Butcher Meat,
etc.

16 drops	..	= 1 oz.	Imperial.
16 oz.	..	= 1 lb.	= 22½ oz.
16 lbs	..	= 1 stone	= 22½ lbs.

The lb. varies from 20 to 28 oz. in different parts of Scotland; 22½ oz. is the old Glasgow lb.; 22 Imperial oz. was the number fixed by an Edinburgh jury in 1826.

PERIODS OF GESTATION.

	Shortest Period.	Usual Period.	Longest Period.
	Days.	Days.	Days.
Mare	322	347	419
Ass	365	380	391
Cow	240	283	321
Ewe	146	154	161
Sow	109	115	143
Goat	150	156	163
Bitch	55	60	63
Cat	48	50	56
Rabbit	20	28	35
Turkey sitting on the eggs	17	24	28
{ Hen	24	27	30
{ Duck	24	26	30
Hens sitting on the eggs	26	30	34
{ Duck	19	21	24
{ Hen	28	30	32
Duck	27	30	33
Goose	16	18	20
Pigeon			

TABLE FOR CONVERTING FEET INTO LINKS AND LINKS INTO FEET.

1 link =	.66 foot.	1 foot =	1.515 links.
2 links =	1.32 feet.	2 feet =	3.030 "
3 " =	1.98 "	3 " =	4.545 "
4 " =	2.64 "	4 " =	6.060 "
5 " =	3.3 "	5 " =	7.575 "
6 " =	3.96 "	6 " =	9.090 "
7 " =	4.62 "	7 " =	10.606 "
8 " =	5.28 "	8 " =	12.1212 "
9 " =	5.94 "	9 " =	13.6363 "
10 " =	6.6 "	10 " =	14.1515 "

RULE FOR MEASURING STANDING GRAIN.

2 ounces per square yard =	10.08 bushels per acre.
2½ " " =	12.60 " "
2¾ " " =	13.86 " "
3 " " =	15.12 " "
3½ " " =	17.65 " "
4 " " =	20.17 " "
5 " " =	25.21 " "
5½ " " =	29.00 " "
6 " " =	30.25 " "
7 " " =	35.29 " "
8 " " =	40.33 " "

TABLE FOR CONVERTING SCOTTISH ACRES INTO IMPERIAL.

Scottish.	Imperial.	Scottish.	Imperial.	Scottish.	Imperial.	Price per Scot. acre.	Equivalent per Imperial acre.
acres.	ac. ro. p. yds.	acres.	ac. ro. p. yds.	acres.	ac. ro. p. yds.	£	£ s. d.
1	1 1 1 24	10	12 2 17 27	100	126 0 18 28	1	0 15 10½
2	2 2 3 18	20	25 0 35 24	200	252 0 37 26	2	1 11 8½
3	3 3 5 11	30	37 3 13 21	300	378 1 16 24	3	2 7 6½
4	5 0 7 5	40	50 1 31 17	400	504 1 35 22	4	3 3 5
5	6 1 8 29	50	63 0 9 14	500	630 2 14 20	5	3 19 3½
6	7 2 10 21	60	75 2 27 11	600	756 2 33 18	6	4 15 1½
7	8 3 12 16	70	88 1 5 8	700	882 3 12 16	7	5 11 0
8	10 0 14 10	80	100 3 23 4	800	1008 3 31 15	8	6 6 10½
9	11 1 16 3	90	113 2 1 1	900	1135 0 10 13	9	7 2 8½

760 sq. ells. = 160 falls = 4 roods = 1 Scottish acre = 1.261183 Imperial acre.

LAND OR SQUARE MEASURE.

144 square inches ..	=	1 square foot.
9 square feet ..	=	1 square yard.
30¼ square yards ..	=	1 rod, pole, or perch.
40 rods or poles ..	=	1 rood.
4 rods or 4840 sq. yards	=	1 acre.
640 acres ..	=	1 square mile.

LONG MEASURE.

12 inches ..	=	1 foot.
3 feet ..	=	1 yard.
5½ yards ..	=	1 rod, pole, or perch.
40 poles ..	=	1 furlong.
8 furlongs or 1760 yards	=	1 mile.
3 miles ..	=	1 league.

TIMBER MEASURING.

To find the area of a board or plank.—RULE.—Multiply the length by the mean breadth of the area. NOTE.—When the board tapers, add the breadth at the two ends together, and take half the sum for the mean breadth.

To find the solid contents of squared timber.—RULE.—Multiply the mean breadth by the mean thickness, and the product by the length, for the contents.

To find the solidity of round, or unsquared timber.—RULE I.—Multiply the square of one-fourth of the mean circumference, or of the mean quarter girth, by the length, for the contents. RULE II.—Find the area corresponding to the mean quarter girth in inches, and multiply it by the length of the tree or piece of timber in feet, then will the product be the solidity in feet, and decimal parts of a foot, according to Rule I.

FOREIGN MONIES AND THEIR ENGLISH EQUIVALENTS.

Country.	Chief Coin.	English Value.	s.	d.
Austria & Hungary	Florin (silver) ..	..	2	0
Belgium ..	Franc ..	..	0	9½
Brazil ..	Milrei ..	..	2	1½
Buenos Ayres ..	Dollar ..	..	3	6
Canada ..	Dollar ..	..	4	2
China ..	Tael of Silver ..	..	6	8
" ..	Dollar (varies) ..	..	4	6
Cuba ..	Dollar ..	..	4	2
Denmark ..	Crown ..	..	1	1½
" ..	20-Crown piece (gold) ..	22	6	
Egypt ..	Piastre ..	..	0	3½
" ..	50-Piastre piece (gold) ..	10	2½	
France ..	Franc ..	..	0	9½
Germany ..	Mark ..	..	1	0
" ..	20-Mark (gold) ..	19	7	
Greece ..	Drachma ..	..	0	8½
Holland ..	Florin ..	..	1	8
" ..	10-Florin (gold) ..	19	8	
India ..	Ruppee ..	..	1	7
" ..	Mohur, 15 do. (gold) ..	29	2	
Italy ..	Lira ..	..	0	9½
Java ..	Florin ..	..	1	8
Mexico, Chili, Peru	Dollar (about) ..	4	2	
Monte Video	Dollar ..	3	5	
Norway ..	Rixdollar ..	4	6	
Persia ..	Toman ..	10	6	
Portugal ..	Milrei (about) ..	4	10	
Russia ..	Rouble (silver) ..	3	2	
Spain ..	Real Vellon (about) ..	0	2½	
" ..	Escudo ..	2	0	
Sweden ..	Rixdollar ..	1	1½	
Switzerland ..	Franc ..	0	9½	
Turkey ..	Piastre (nearly) ..	0	2½	
" ..	Medjidie (gold) ..	18	1	
United States	Dollar ..	4	2	
Uruguay ..	Dollar ..	4	2	
West Indies*	Dollar ..	4	2	

* In these, as in all British Colonial Possessions, English money is current of each denomination.

In the above table the equivalent values are

given as nearly as possible, but generally foreign moneys are not exactly commensurate with English, as the course of exchange continually varies, affecting consequently the relative values.

PROPORTION OF BEEF TO THE LIVE WEIGHT OF OXEN.

Live Weight in stones of 14 lbs. Avoirdupois.	Per cent. of Beef.		
	Class 1.	Class 2.	Class 3.
Under 180	Heifers 70 to 72	66 to 69	— —
" 180	Steers 69 " 71	66 " 69	— —
From			
120 to 150	Steers 66 " 68	63 " 65	63 to 66
100 " 120	Heifers 66 " 68	63 " 65	63 " 66
100 " 120	Steers 62 " 65	60 " 62	57 " 62
90 " 100	Heifers 62 " 65	60 " 62	57 " 62
90 " 100	Steers 57 " 61	54 " 59	51 " 56
80 " 90	Heifers 57 " 61	54 " 59	51 " 56
80 " 90	Steers 53 " 56	53 " 56	48 " 50
70 " 80	Heifers 53 " 56	50 " 53	48 " 50
Under 70	— —	— —	45 " 47

PROPORTION OF MUTTON TO LIVE WEIGHT OF SHEEP.

Live Weight in Lbs.	Per cent. of Mutton.	
	In Wool.	Newly Shorn.
280 to 300	71 to 72	74 to 75
260 " 280	69 " 70	73 " 74
240 " 260	67 " 68	71 " 73
220 " 240	65 " 66	69 " 70
200 " 220	63 " 64	67 " 68
180 " 200	61 " 62	65 " 66
160 " 180	59 " 60	64 " 65
140 " 160	58 " 59	63 " 64
120 " 140	56 " 57	62 " 63
100 " 120	55 " 56	60 " 61
80 " 100	53 " 54	58 " 59
60 " 80	50 " 52	56 " 57

TO ASCERTAIN THE WEIGHT OF CATTLE.

Take the measurement of the girth where it is smallest (close behind the shoulder), and the length of the animal from the front of the shoulder to the juncture of the tail. Multiply the square of the girth in feet and inches by the length in feet, and multiply the product by '23, '24, '26, '28, or '30, according to the fatness of the animal, and the result will give the weight in imperial stones.

For instance, if the girth of an animal in moderate condition be 6 ft., the length as above 5 ft. 4 in., then 6 × 6 = 36 × 5½ = 192 × '24 = 46'08 stones.

The above is the *Carcass Weight* of the animal. The weight of the carcass would be about ¾ths of the live weight for cattle; for sheep, from ½ to ¾ths; and for a pig, from ½ to ¾ths of the live weight.

SEED REQUIRED TO SOW AN IMPERIAL

ACRE.

Barley	2½ to 2¾ bus.
Beans	2 ,, 2½ ,,
Buckwheat or brank	2 ,,
Cabbage, Drumhead, to transplant	4 lbs.
Canary	8 pks.
Carrot in drills	8 to 10 lbs.
Clover	14 ,, 17 ,,
Furze or gorse, for feed	20 ,, 24 ,,
Kohl Rabi	1 lb.
,, drilled	4 lbs.
,, for seed	1½ bus.
Lucerne, broadcast	20 lbs.
Mustard, white	1 pk.
Mangold wurtzel	5 lbs.
Oats	3 to 4 bus.
Parsnip	10 lbs.
Rape or cole	1 pk.
Rye	2½ to 3 bus.
Rye grass	2½ ,, 3 ,,
Sainfoin, giant	5 ,,
Tares, winter	2½ ,,
,, spring	2 to 2½ ,,
Trifolium incarnatum	24 lbs.
Turnip	3 ,,
Wheat	2½ to 2¾ bus.

WOOL WEIGHT.

7 lbs.	= 1 clove.
2 cloves or 14 lbs.	= 1 stone.
2 stones or 28 lbs.	= 1 tod.
6½ tods	= 1 wey.
2 weys	= 1 sack.
12 sacks	= 1 last.
20 lbs.	= 1 score.
12 score or 240 lbs.	= 1 pack.

In different counties the stone of wool varies from 12 lbs. to 16 lbs.; but the statutory value is 14 lbs.

Wool is frequently sold in Scotland by the stone of 24 lbs.

BREAD AND FLOUR WEIGHT.

4 lbs. 5½ oz. Imp.	= 1 quartern loaf.
8 ,, 11 ,,	= 1 half-peck ,,
17 ,, 6 ,,	= 1 peck ,,

A peck or stone of flour is 14 lbs., a bushel of flour is 56 lbs., a boll is 140 lbs., and a sack or 5 bushels is 280 lbs., or 2½ cwt.

TO ESTIMATE THE WEIGHT OF A STACK OF HAY.

To the height in feet of the stack to the eaves add one-half of the height from the eaves to the ridge. Multiply the result first by the length in feet, then by the width in feet, and divide the result by 27, which will give the contents of the stack in cubic feet.

A yard of new hay averages about 132 lbs. in weight, and old hay from 176 lbs. to 193 lbs.; therefore, to get the weight of the stack, the number of cubic yards must be multiplied by from 132 to 193, according to the age of the hay.

HAY AND STRAW.

36 lbs.	= 1 truss of straw.
60 ,,	= 1 ,, new hay.
56 ,,	= 1 ,, old hay.
36 trusses	= 1 load.

Weighing for old hay 18 cwt., for new hay 19 cwt. 32 lbs., and for straw 11 cwt. 64 lbs.

Hay sold between 1st June and 31st August is reckoned new hay; between 31st August and the succeeding 1st June, old hay.

A CONVENIENT LAND MEASURE.

The following Table will be found useful in estimating the quantity of land in fields of various sizes:

60 ft. by 726 ft. = 1 ac.	5 yds. by 968 yds. = 1 ac.
110 ,, 396 ,, = ,,	10 ,, 484 ,, = ,,
120 ,, 363 ,, = ,,	20 ,, 242 ,, = ,,
220 ,, 198 ,, = ,,	40 ,, 121 ,, = ,,
240 ,, 181½ ,, = ,,	70 ,, 69½ ,, = ,,
440 ,, 99 ,, = ,,	80 ,, 60½ ,, = ,,

APPENDIX.

LIST OF COMMODITIES required in the Manufacture of Sausages, Pork Pies, and Small Goods generally; as also in the Curing of Hams and Bacon.

**Commodities required in the Manufacture of Sausages, Pork Pies, and Small Goods generally ;
as also in the Curing of Hams and Bacon.**

These goods are all supplied by WILLIAM DOUGLAS AND SONS, 29 Farringdon Road, London, and many of the special articles are of their invention.

All the machinery and utensils are also supplied by the same firm. They send out Catalogues and Price Lists free on application to any part of the world.

PEPPERS.

PEPPERCORNS (white), of the various kinds—Coriander, Singapore, Siam, and Penang.

GROUND PEPPERS (white). The following are trade descriptions :

White, No. 6, Fair.

“ “ 5, Good.

“ “ 4, Fine.

“ “ 3, Best Fine.

“ “ 2, Extra Fine.

“ “ 1, Finest Coriander.

PEPPERCORNS (black). The best are those from Tilicherry.

GROUND BLACK PEPPERS :

Black, No. 3, Good.

“ “ 2, Fine.

“ “ 1, Finest.

CAVENNE (or ground chillies).

GROUND SPICES.

Allspice.

Carraways.

Cassia.

Cinnamon.

Cloves.

Corianders.

Curry Powder.

Ginger.

Jamaica Pepper.

Mace, No. 1.

“ No. 2.

Mixed Spice.

Nutmegs, No. 1.

“ No. 2.

Pimento.

LIQUID PRESERVATIVES.

Bi-sulphite of Lime, Ordinary.

“ “ Refined.

Brine Preserving Solution.

Mould Preventing Solution.

Formol.

POWDER PRESERVATIVES.

Douglas's Dry Antiseptic.

A powerful, odourless, and tasteless Powder, for preserving all kinds of Meat, Sausages, Melton-Mowbray Pies, Gravy, Pork, etc., and for stiffening and preserving Brawn.

Rose Extract (Coloured Preservative).

Bacon Curing Powder.

Brine Preserving Powder

Mould Preventative Powder (for German Sausage).

Fly Powder, put up in 1 lb. perforated tins.

Brown Fly Powder " "

Gravy and Jelly Preserving Powder "

Boracic Acid.

Borax.

Salicylic Acid, in 1 lb. boxes.

SAUSAGE SEASONINGS.

No. 1 for Beef Sausages ($\frac{1}{2}$ oz. to 1 lb. meat), plain or coloured.

„ 1 for Pork Sausages ($\frac{1}{2}$ oz. to 1 lb. meat).

„ 2 for Beef Sausages (1 oz. to 1 lb. meat), plain or coloured.

„ 3 for Cambridge Sausages (1 oz. to 1 lb. meat).

„ 4 for Yorkshire Poloney Sausages ($\frac{1}{2}$ oz. to 1 lb. meat).

„ 5 for German or Bologna Sausages ($\frac{1}{2}$ oz. to 1 lb. meat).

„ 6 for Ham, Chicken, and Tongue Sausages ($\frac{1}{2}$ oz. to 1 lb. meat).

„ 7 for Black Puddings (Black Pudding Spice) (1 oz. to 14 lb. Pudding Material).

„ 8 Special Plain Seasoning, without Spices ($\frac{1}{2}$ oz. to 1 lb. meat).

„ 9 for Pork Pies ($\frac{1}{2}$ oz. to 1 lb. meat).

HERBS (RUBBED AND GROUND.)

Basil.

Celery Seed.

Lemon Thyme.

Marjoram.

Mint.

Mixed Sweet.

Parsley.

Pennyroyal.

Rosemary.

Sage.

Savoury.

Thyme.

Cardamoms.

Cummin Seed.

Laurel Leaves.

HERBS (RUBBED AND GROUND)—Continued.

Bay Leaves.
 Juniper Berries.
 Juniper Berry Extract, for Brines.
 Black Pudding Spice.

COLOURS, ETC.

Armenian Bole (Refined).
 Bismarck Brown.
 Black Pudding Dye (Logwood substitute).
 Camwood.
 Cochineal Extract (for Brawn Colouring).
 Crystal Roseine.
 Ham, Chicken, and Tongue.
 Ham Dressing.
 Indian Red.
 Logwood Chips.
 Majenta.
 Poloney Dye (Camwood substitute).
 „ No. 2.
 Rose Pink (for Brawn and Sausages).
 Rose Pink Solution.
 Smoke Dye (for Germans).
 Smoke Compound—for flavouring Germans, and dyeing the skins
 smoke colour.
 Smoke Flavouring Powder.
 Saster.

ESSENCES.

Lemon.
 Sage.
 Pennyroyal.
 Marjoram.

SUNDRIES.

Douglas's Sausage Meal.
 Oatmeal (finest Midlothian).
 Oat Flour „
 Groats „
 Barley (Pearl) „
 Biscuit Powder.
 Baking Powder.
 Rice Flour.

SUNDRIES—*Continued.*

Corn Flour.
Farina (Potato Flour).
Granulated Rice.
Split Pease (Canadian).
Ground Pea Meal (for Bacon Dusting).
Gelatine.
Saltpetre.
Salt prunella.
Sugar (Egyptian—for Curing).
Alum.
Pearl Ashes.
Lard Bleacher and Refiner.
Glaze (Boiled or Braised Beef Dressing) Colouring.
Bi-Carbonate of Soda.

SAUSAGE CASINGS, ETC.

Sheep Casings.
Hog Casings.
Weasands.
Bleached Hog Bladders.
Bullock Bungs (Cup-ends).
Bullock Runners.
Middle Gut (Wide Bullock Runners).

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After much study of the subject we have proved, beyond a doubt, that the defects found in most Chambers are due to their not being kept cold enough. This arises from the ice space given being much too limited. You cannot keep a Chamber cool with a small quantity of ice in a corner. You must have a good ice space, or the Chamber is worse than useless. This is besides, in the end, the most economical plan, because a good stock of ice in a Refrigerator does not mean a large consumption, but rather the reverse. The temperature in the Chamber is much lower, and the air being colder, is consequently very much drier and purer than in a Chamber with only a small stock of ice. Indeed, we have little difficulty in getting our Chambers down to near the freezing point, while it will be found that most of the Chambers in use can only obtain temperatures of 46° to 50° Fahr.

Ventilation is also a point which is neglected or misunderstood. What is required is very delicate automatic ventilators, which respond to the faintest movement of air from the inside, but which allow no air to pass into the Chamber from the outside. The advantage of this arrangement is, that when from any cause the air inside the Refrigerator becomes heated (say from putting in hot meat, etc.), it becomes expanded, and lifts the ventilators and escapes, without consuming ice; besides, as hot air in a Refrigerator is generally loaded with impurities, these are carried outside. After the hot, impure air has escaped, the ventilators shut tight, and no outside air can pass in to consume ice.

Our Refrigerators are lined throughout with zinc, and there is not a single square inch of wood exposed anywhere. A good many people object to the use of zinc lining, but this is a mistake. Certainly if an excess of moisture is present in the Chamber, it will condense on the zinc surfaces; but our point is, that in a properly constructed Chamber, there should be no moisture to condense. Wood inside a Cold Chamber absorbs and then gives out again any bad gases that may be about, and forms a convenient lodging place for the germs of the bacteria which produce putrefaction.

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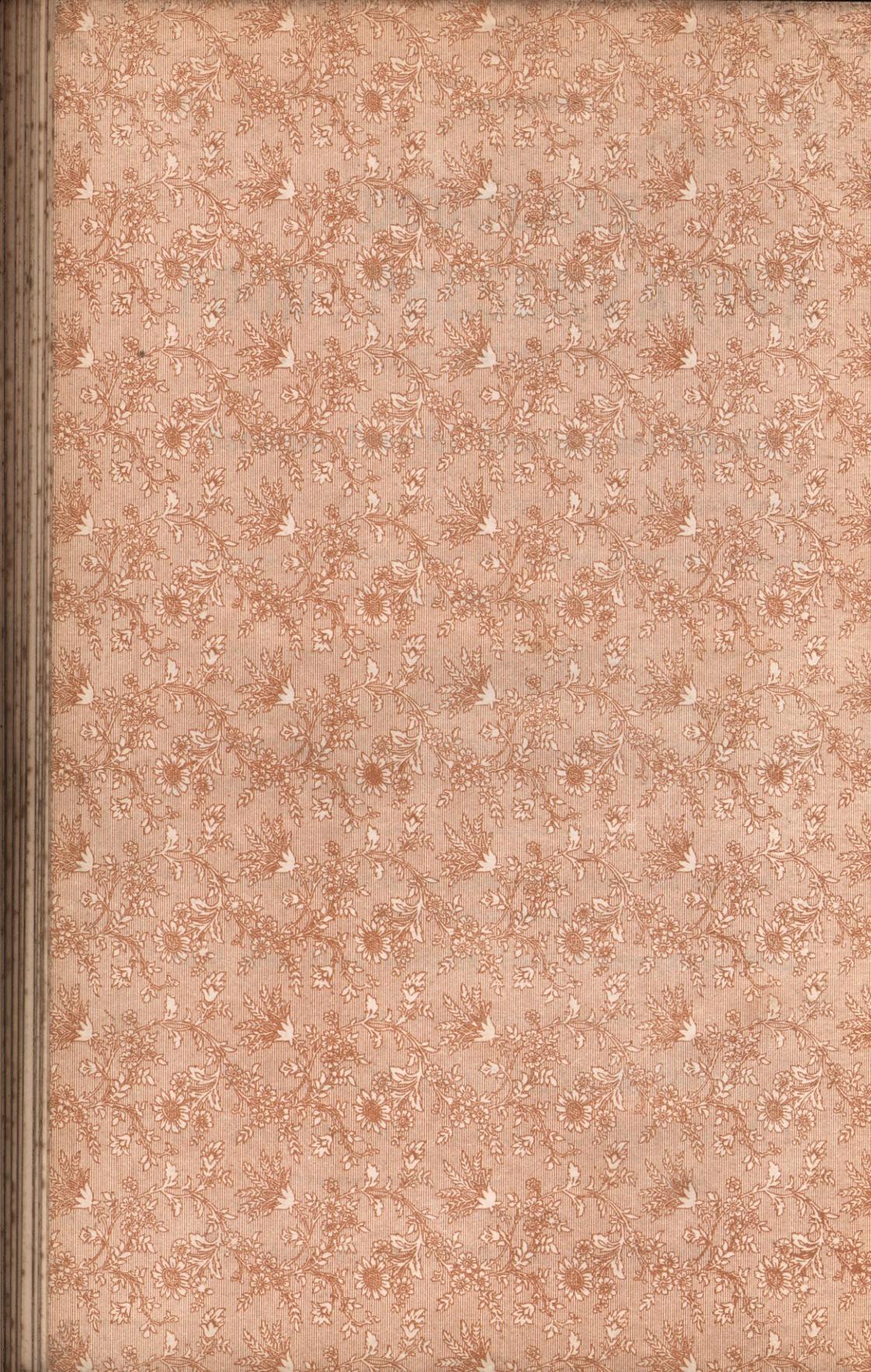
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