No. 708,868. Patented Sept. 9, 1902.

J. R. CROFT.

HERMETIC SEALING OF TINS OR LIKE RECEPTACLES.

(Application filed June 4, 1901.)

(No Model.)

Fig. 1.

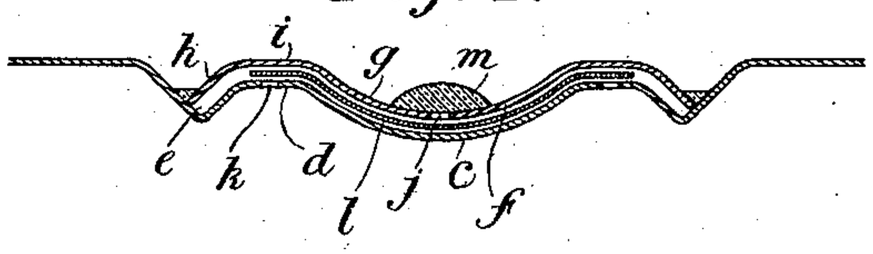


Fig. 2.

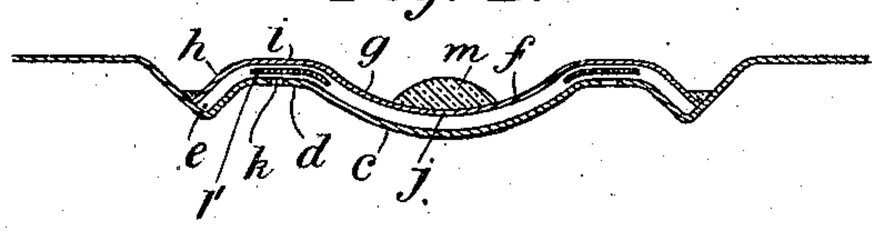


Fig. 3.

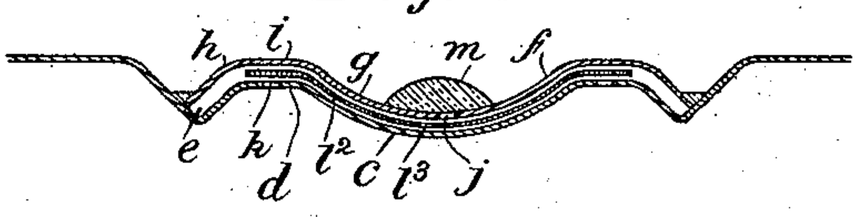


Fig. 4.

Fig. 6.

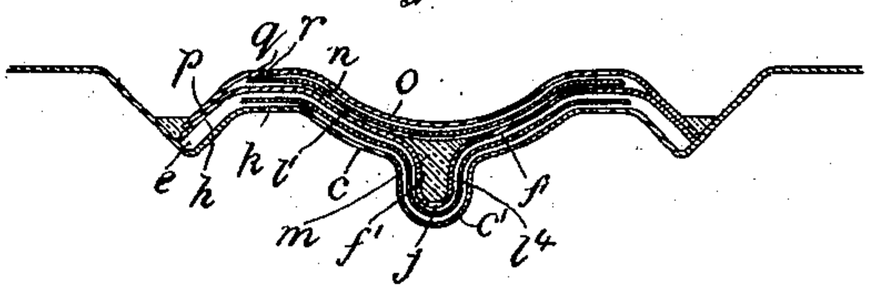
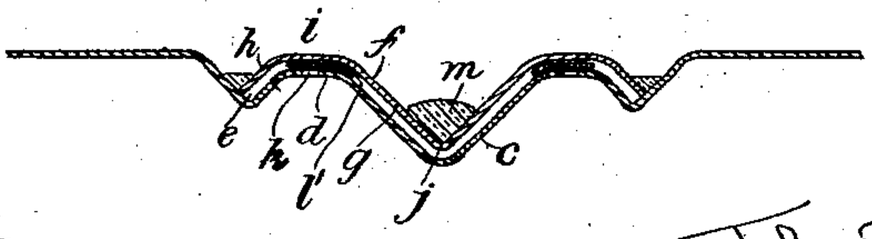


Fig. 7.

Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

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HERMETIC SEALING OF TINS OR LIKE RECEPTACLES.

SPECIFICATION forming part of Letters Patent No. 708,868, dated September 9, 1902.

Application filed June 4, 1901. Serial No. 63,140. (No model.)

To all whom it may concern:

Be it known that I, JOHN RADCLIFFE CROFT, a subject of the King of Great Britain and Ireland, and a resident of 20 Mark Lane, in the city of London, England, have invented certain new and useful Improvements in the Hermetic Sealing of Tins or Like Receptacles, (for which I have made application for patent in Great Britain, dated November 16, 1900,) of which the following is a specification.

My invention relates to the hermetic sealing of tins and other receptacles for the preservation of alimentary and other substances.

Great difficulty has hitherto been experienced in effecting a satisfactory hermetic closure of receptacles containing alimentary substances for preservation; and the object of my invention is to provide improved means by which an effective and reliable hermetic closure may be obtained.

Without going through the various details of the well-known hot-bath and retort processes for the preservation of alimentary and other substances in receptacles hitherto in use it may be stated that the principal defects and causes of failure are due to the fact that during the processes a difference of pressure exists except for an instant between the inside and outside of the receptacles and that the application of the solder or other sealing material is only effected in an atmosphere not sterile and after the pressure has become greater outside than inside the receptacle, and the consequence is that prior to the closing of the tins or receptacles a certain quantity of air has found access to the receptacle before the seal is effected. To provide against the bad results of this readmission of air the receptacles are subjected to a second application of heat, which has a very detrimental effect upon the contents when of a certain class, the said contents being in most cases overcooked. Now according to my invention I cause the sealing material to act and effect a closure automatically and without removal of the receptacles from the sterile chamber, whether it be a bath, retort, or vacuum-chamber. The solder or sealing material which I employ and the position in which it is placed, together with the construction of the venting-aperture of the tins or receptacles, is such that all air in the receptacles or steam and vapor generated from the contents by a cooking process can pass freely out through the vent, either before or after the sealing material has been melted; but the construction of the valve prevents the passage of even the smallest quantity of air or external matter into the receptacle. The setting and melting temperatures of the sealing materials and the temperature at which the same will flow are or may be so arranged or determined as to require a variation of but a few degrees from that required to sterilize or cook the contents of the receptacle, as the case may be. What are known as "fusible metals," which melt at low temperatures, are especially suitable as a solder for use with the sealing device hereinafter described. I am also by my invention enabled to employ a cold vacuum or sterile chamber for exhausting the air from the receptacles, and in such a process it is convenient to use paraffin-wax or like sealing material having a low melting-point, although metal solder may be employed, if required. The improved receptacle I employ is provided with a venting-aperture situated in or connected to a recess, pipe, chamber, or other part adapted to receive the sealing material. The said recess, pipe, or chamber is provided with a cap or valve adapted to be stopped by the sealing material when melted and is also provided with a plug or stop made of porous material or fabric adapted to pass air, but to deter the passage of the sealing material.

In the accompanying drawings, Figure 1 is a cross-section of an arrangement of valve or venting-aperture, hereinafter referred to as "the venting and sealing device," which I find most suitable. Figs. 2, 3, and 4 are similar views to Fig. 1, showing varied arrangements of the sealing material and plugging material. Fig. 5 is a similar view to Fig. 1, showing a modified shape of the venting and sealing device. Fig. 6 is a similar view showing a modified construction of venting and sealing device which I find suitable for the retort process. Fig. 7 shows a modified construction of Fig. 6.

The venting and sealing device now described is formed by stamping for conven-

ience and cheapness of manufacture and comprises a well *c*, stamped in the top of the tin and having formed around its edge a ledge *d* and outside the ledge a gutter *e*. The well *c* is capped by a cover *f*, formed with dished part *g*, adapted to depend into the well *c*, and a beveled edge *h* to depend into the gutter *e*, the intervening flat part *i* corresponding to ledge *d*. The cover *f* has a venting-aperture *j* at the base of the depending part *g* and opening into the well *c*, and the ledge *d* has one or a number of holes *k* formed therein and opening into the tin. In use a plug formed by a disk of porous material or fabric—such as filtering-paper in the form of a disk *l*, Fig. 1, or annulus *l'*, Figs. 2 and 4, or disk l^2 with hole l^3, as in Fig. 3—is placed in the well *c*, so as to cover the holes *k* in the ledge *d*. The cover *f* is then placed in position, and its beveled edge *h* is soldered to the tin in the gutter *e*. A sufficient quantity of solder or sealing material is placed in the dished part *g*, and for convenience it may be melted thereonto, as indicated at *m*, or it may be granular or other suitable form.

In Fig. 4 the venting and sealing device is constructed in a similar manner to that shown in Fig. 1; but the solder, in the form of a disk of foil or sheet metal, is placed in the well *c* between same and the cover *f*, as at *m'*. In this case the paper plug is in the form of an annulus *l'*, covering the holes *k*.

In the modified form of the venting and sealing device shown in Figs. 6 and 7 an additional cover *n* is provided, formed with a dish part *o*, beveled edge *p*, and flat part *q*, corresponding to the similar parts *g h i* of the cover *f*, and in this arrangement the part *q* is perforated with one or more venting-holes *r*, and in this case the bottom of the well *c* and cover *f* are recessed, as at *c'* and *f'*, respectively, and the solder or sealing material is put into the top recess *f'*. One plug of paper or porous material l^4 in the form of a disk is laid between well *c* and cover *f*, and another porous plug *l'* is placed between the covers *f* and *n*, and the edges *h p* are soldered together and to the tin in the gutter *e*. In the form shown in Fig. 7 the recesses *f'* and *c'* are dispensed with and the outer cover *n* is stamped with an annular kink *n'*, adapted to press upon and clamp the porous plugs tightly between the covers. In this arrangement the sealing material is arranged below the kink and will be stamped out of thin sheets, so as to lie tightly between the two covers *f* and *n*, as at *m'*.

The well *c* instead of being of dish shape, as shown in Figs. 1 to 4, may be made of conical form, as shown in Fig. 5, so that the part where the solder is received will approach as near as possible to the globular form the molten solder tends to assume.

I will now describe one method carried out in accordance with my invention where a hot-bath process is employed and the tins are entirely covered with water.

The tins to be sealed being fitted and prepared as described, say, in Fig. 1 are placed in the hot bath, where they are covered with water or, as in some processes at present in use, a solution of calcium chlorid. Further heat is now applied, as by means of steam introduced to the bath, by which means the contents of the tins are cooked or sterilized and the sealing material is melted, while the air contained in the tins is driven out by and together with the vapor generated therein. The air and vapors pass out through the hole or holes *k*, past or through the plug *l*, and out through the hole *j* and will pass or bubble through the melted solder. As soon as the contents of the tins have been treated for a sufficient period and the air has been driven out of the tins then the sealing is automatically effected by cooling the bath below the setting temperature of the solder or sealing material. Should the solder be forced through the hole *j* by the outside pressure, the plug *l* deters its passage, and the solder sets in the space between the well *c* and dished part *g* and effectually closes the venting device. I find that with a venting device such as shown in Fig. 1 and with the bath process described a suitable melting-point for the solder would be from 200° to 212° Fahrenheit.

Tins or other receptacles with vents, such as herein described, may also be employed for hermetic sealing by the hot-bath processes where the tops of the tins and venting-apertures are exposed to the air, the action of the venting and sealing device being similar. Where a retort is employed, the tins are placed in the retort, which is now closed, except for an outlet-pipe, and heat is applied—say by steam introduced by a suitable pipe—and the tins are subjected to a temperature of 212°. The solder is thus melted, and the air and vapors from the contents of the tins pass out through the venting and sealing device, as before described in reference to the bath process, and the introduced steam passes out with the air and vapors from the tins through the outlet. The retort may now be allowed to cool to seal the tins, as described, or before allowing the tins to be sealed the retort may be closed for the purpose of raising the temperature to any suitable degree.

Referring now to the application of my invention so as to enable a vacuum or cold process to be used, as in cases where it is not required to cook the articles to be preserved, the receptacles to be sealed are fitted with venting and sealing devices, such as herein described, and with a sealing material having a low melting-point. For very low temperature I may employ paraffin-wax, ceresin, animal fats, or the like. The tins are placed in the vacuum-chamber and the air is exhausted therefrom by suitable means, such as a vacuum-pump, then gases—such as carbonic-acid gas, nitric oxid, or innocuous gases, or gases calculated to prevent the growth of the microbes of decomposition, and therefore the

formation of poisonous products—are introduced and withdrawn one or more times to further insure the extraction and neutralization of the air in the chamber and the tins. Then the vacuum-chamber is brought to a temperature sufficient to melt the sealing material, which on cooling sets and covers and seals the venting device. The tins can now be safely removed from the vacuum-chamber, and in order to provide a permanent seal not so liable to destruction as the wax ordinary solder may, if required, be applied to the venting aperture or apertures. I find that paraffin-wax melting at a temperature of 115° Fahrenheit is suitable for the vacuum process, and if a fusible metal solder is employed its melting-point may be about 125° Fahrenheit.

I am aware that prior to the date of my patent attempts have been made to provide for the automatic sealing of cans for preserved food and other substances by the use of fusible sealing materials; but so far as I am aware all such attempts have been unsuccessful, owing to the difficulty of so constructing the seal that the air and vapors could freely pass out of the vessel while cooking was going on, and yet the fusible sealing material could not pass into the vessel upon cooling. This difficulty I have met by my combination of parts, as hereinbefore described. It is of course apparent that the arrangement of internal and external venting-holes with an interposed porous material which permits the passage of the air and vapor out of the tin, but which prevents the inflow of the molten sealing material into the tin, can be differently arranged without departing from the spirit of my invention.

It will be evident from the foregoing description, taken in connection with the drawings, that my invention embraces a can-closing device consisting of a plurality of superposed parts having outlets and the outlets being out of line, means for separating said parts, and a fusible seal for one of the outlets.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A can-closing device consisting of a plurality of superposed parts having outlets, the outlets being out of line, an intermediate porous section, and a fusible seal for one of the outlets.

2. A can-closing device consisting of a plurality of superposed parts having outlets, the outlets being out of line, an intermediate porous section, and a seal of fusible metal solder for one of said outlets.

3. A can-closing device including a plurality of superposed metallic and substantially similarly concaved parts, the concavity of an upper part lying in the concavity of a lower part and the latter directly supporting the former, and said parts having outlets and the outlets being out of line whereby fusible material applied to an outlet of said upper part will be arrested from downflow by said lower part.

4. A can-closing device including a plurality of superposed metallic and substantially similarly concaved parts, the concavity of an upper part lying in the concavity of a lower part and the latter directly supporting the former, and said parts having outlets and the outlets being out of line whereby fusible material applied to an outlet of said upper part will be arrested from downflow by said lower part, and a piece of porous material held in place by and between said metallic parts.

5. A can-closing device including a part having a concaved portion a second part having an opening located over said concaved portion, a piece of porous material between said parts, and a fusible seal for said opening.

6. A can-closing device consisting of a plurality of superposed parts the lower one being concaved and the upper one having an opening over said concaved portion and a fusible seal for said opening.

7. A can-closing device including a part having inner and outer concaved portions and an intermediate raised portion said inner concaved portion having a hole provided with a fusible seal and a second part having a concaved portion located over the inner concaved portion and a beveled portion arranged to fit into the concaved portion of the first-mentioned part.

8. A can-closing device including a part having inner and outer concaved portions and an intermediate raised portion, a second part said parts being superposed and the upper one having a hole provided with a fusible seal having a concaved portion located over the inner concaved portion and a beveled portion arranged to fit into the concaved portion of the first-mentioned part, and a piece of porous material between said parts.

9. A can-closing device including a part having inner and outer concaved portions and an intermediate raised portion, a second part having a concaved portion located over the inner concaved portion and a beveled portion arranged to fit into the concaved portion of the first-mentioned part, a piece of porous material between the parts, the latter having non-registering openings, and a fusible seal for one of the openings.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN RADCLIFFE CROFT.

Witnesses:
HENRY ALLEN PRYOR,
ALFRED B. CAMPBELL.