

Sept. 1, 1931.

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1,821,726

CLOSURE FOR PRESSURE VESSELS

Filed Nov. 22, 1929

2 Sheets-Sheet 1

Fig. 1

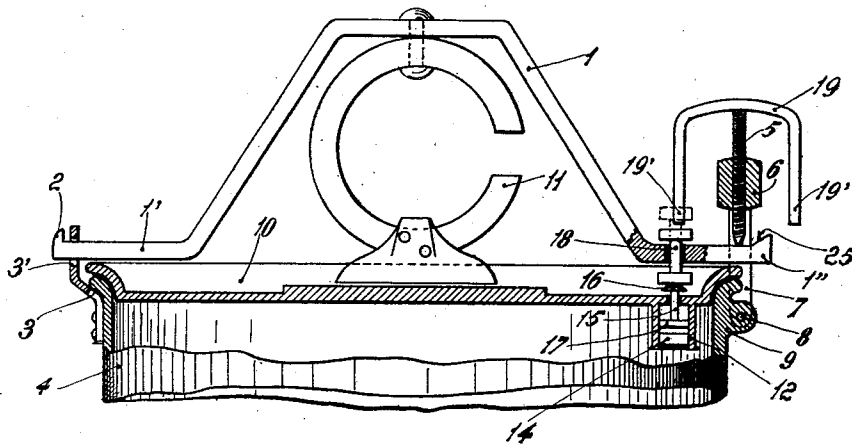
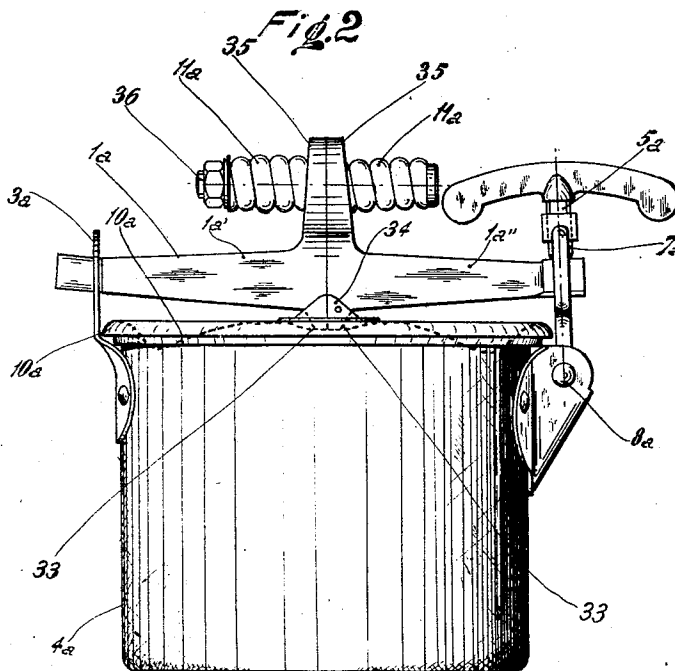


Fig. 2



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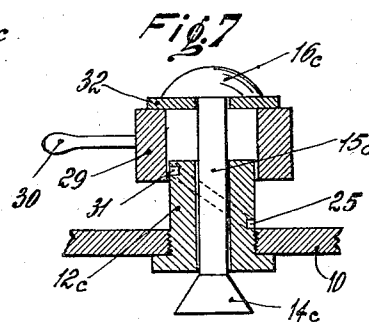
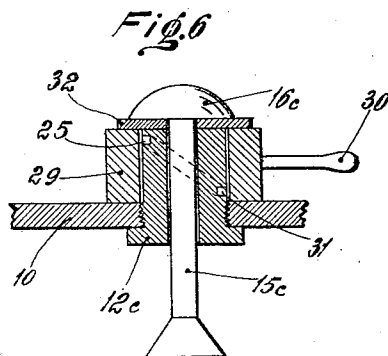
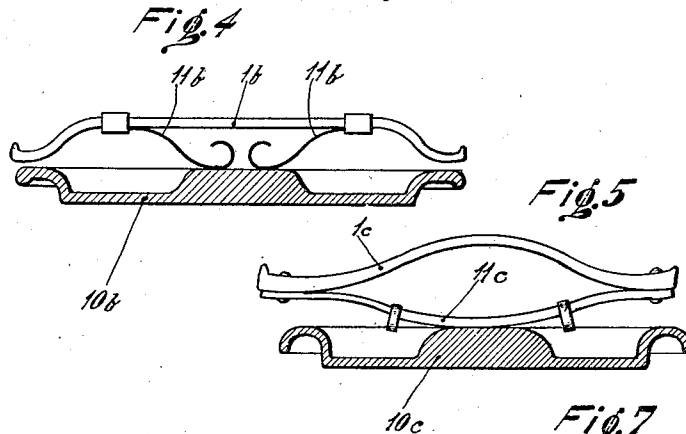
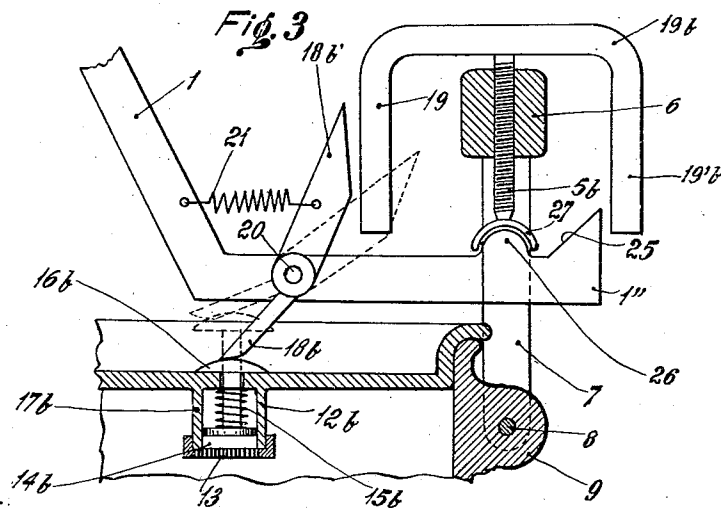
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UNITED STATES PATENT OFFICE

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CLOSURE FOR PRESSURE VESSELS

Application filed November 22, 1929, Serial No. 409,178, and in Italy November 23, 1928.

The present invention relates to a safety and guarantee closing arrangement for vessels in which a pressure exists or is generated, and especially for quick cooking pressure pots.

The novel closing arrangement removes the danger of explosions due to the safety valve failing to operate and prevents the vessel from being opened if the pressure of the fluid has not first sunk down to a value which is no longer dangerous for the attendant.

The arrangement according to the invention is essentially distinguished by the fact that it comprises at least one, preferably spiral, conveniently calibrated spring counteracting, through suitable intermediate parts, the inner pressure that tends to raise the vessel cover, so that when this pressure overcomes the reaction of the spring the cover is raised and lets the steam escape.

A further characteristic feature of the invention is that the member securing the closure of the vessel is combined with a device which, in consequence of the pressure existing inside the vessel, prevents the cover from being operated by the attendant as long as the pressure is too high, whereas when the pressure has sunk down to a convenient value the said device releases the lock and allows the cover to be opened.

The accompanying drawings illustrate an embodiment and some modifications of the device according to the invention by way of example only.

Fig. 1 is a part vertical center section through the upper portion of a pressure pot fitted with a first embodiment of the closing arrangement applied between the lid and the usual crossbar, and of a device intended to prevent the pot from being opened as long as the pressure prevailing therein is still dangerous for the attendant.

Fig. 2 is a similar projection of a very advantageous modified construction.

Fig. 3 shows a modified construction of the device preventing the untimely opening of the pot, with means for optically indicating that the prevailing pressure is still dangerous.

Figs. 4 and 5 schematically show further

modified constructions of the resilient closing device.

Figs. 6 and 7 show further modifications of the device controlling the opening of the pot.

With reference to Fig. 1, the usual cross or diametral rigid bar for closing or locking the pot lid 10 is replaced by a bridge-like crossbar 1 having, as in all pressure pots, an end portion 1' adapted to be engaged in the aperture 3' of a lug 3 fixed to the pot 4 and to be retained therein by a nose 2. The opposite end portion 1'' of the crossbar 1 is acted upon by a screw 5 screwed in a block 6 invariably secured to the shanks 7 depending therefrom and adapted to swing about a pivot 8 inserted in a lug 9 secured to the pot.

Underneath the raised center portion of the bridge-like crossbar 1, a split steel ring 11 is arranged, the ring being secured (for instance in the manner shown in Fig. 1) to the center portion of the crossbar at the top, while at the bottom the ring is secured to the center of the lid 10, the lid center portion being preferably thickened or otherwise strengthened. The ring resistance to contraction should be tested in advance, in order to make sure that the ends of the split ring can move nearer to each other when the pot pressure has reached a value still below the exploding value.

Owing to this, as the crossbar end portions 1' and 1'' are not in touch with the lid 10, the lid is capable to be raised as much as is required to let the excess steam escape, after which the ring 11 will resume its former position and automatically restore the closed conditions of the pot.

The device controlling the opening of the pot, signalling the presence of a pot pressure that would make an immediate opening dangerous, and opposing itself in such a case to the screw 5 being turned in pot opening direction, comprises a member which traverses the pot lid and which the pot pressure tends to force outwardly. The outer end of this member acts upon a further (sliding on the like) member normally held in rest position, in order to bring it into a position in which it prevents the screw 5 from turning in a

direction that would release the lid 10. The screw 5 has attached to it the wings 19, yet with a certain clearance in respect to its revolving movement for the purpose that will be indicated below. The member in question may constitute the optical signalling apparatus, or it may be connected up to the latter and be actuated along with it.

To the underside of the lid 10, a hollow cylinder 12 is secured in any convenient manner, the bottom end of the cylinder being closed by a perforated plug 13 or by a ring supporting a wire net with fine meshes in order to prevent the pot contents from entering the cylinder. In the cylinder 12 plays a piston 14, the spindle 15 of which extends to the outside through a hole pierced in the lid 10 and terminates with an expanded head 16 at the top. A packing 17 is interposed between the piston 14 and the lid 10 in order to prevent leakage.

In the end portion 1" of the crossbar 1 a hole is pierced for reception of a sliding pin 18; this pin slightly exceeds in length the thickness of the crossbar and is preferably provided with expanded ends working as stops. When the lid 10 is applied, the expanded head 16 of the piston spindle 15 lies on the extension of the axis of the pin 18, and when a pressure obtains in the pot this pressure raises the piston 14 and therewith also the pin 18 resting on the head 16 of the piston spindle 15. The top expansion of the pin 18 will thus be brought in the path of the wings 19' of the screw 5 so as to prevent the latter from being turned in opening direction, viz. in the direction of releasing the pressure it exerted on the crossbar end portion 1".

When the pot pressure ceases, the piston 14 drops to the bottom either through its own weight or through the action of a spring eventually provided for this purpose; the pin 18 will then drop too, thus releasing the wings 19' and allowing the screw 5 to be turned in pot opening direction.

It will readily be seen that the movement of the pin 18 may be utilized to actuate a swinging member adapted to supply an optical indication of the pressure existing in the pot, the said swinging member resuming its former position as soon as the pin 18 is free to drop.

With reference to Fig. 2, the lid 10a is locked on the pot 4a by a crossbar 1a, one end of which is inserted in a hole formed in the lug 3a, while its other end is inserted in a hole formed in an arm 7a pivoting about 8a and combined with a locking device consisting in a pressure screw 5a. The crossbar is made in two halves 1a' and 1a'', each of which has a projection 33; the two projections 33 are conjugated and bear against a corresponding seat 34 provided on the lid.

Opposite the projections 33, each crossbar

half has a surface 35, and the two surfaces 35 are traversed by a bolt 36, the bolt being surrounded by two pressure springs 11a which force the two surfaces 35 against one another and thus stiffen the crossbar.

When a pressure develops in the pot 4a tending to raise the lid, the crossbar prevents the lid from rising because the pressure of the springs 11a prevails over the pot pressure and maintains the deformable system 1a—1a'' in undeformed conditions. When, however, the pot pressure attains a determined value, the upward pressure exerted by the lid on the projections 33 causes the crossbar halves 1a and 1a' to swing through a certain angle about the lug 3a and arm 7a as swinging centers and moves the surfaces 35 away from each other against the action of the springs 11a. The lid will therefore be lifted and act like a safety valve.

Of course in practice, instead of springs arranged (as in the example shown) with their axis parallel to the lid, differently orientated springs might be used. Instead of being divided into two halves, the crossbar might consist of a single piece or of more than two pieces. The crossbar might also be replaced by an equivalent constructive member. The locking member might act upon the lid through the intermediate of one or more springs arranged in the center or at the periphery of the lid, with their ends acting directly or otherwise between the locking member and the lid. Further the locking device may be made resilient by means of springs of different type or by means of parts loaded by pressure or tension springs, or by means of pistons working in any desired manner etc. For instance the modified construction illustrated in Fig. 4 comprises two springs 11b with one end fixed to the crossbar and with their other end bearing on the center of the lid 10b.

In the modified construction illustrated in Fig. 5 the crossbar 1c is fast with a blade spring 11c, the center of which bears against the lid 10a.

The screw 5 shall be fitted with a stop limiting the stroke of the screw in such a manner that the springs shall come into action only after the pot pressure has attained a predetermined value.

Also for the device controlling the opening of the pot several convenient modifications may be thought out, for instance the one illustrated in Fig. 3. Here the piston 14b, through the intermediate of its spindles and spindle head 16b, acts upon the arm 18b of a lever pivotally connected to the crossbar 1 at 20 (the pivot 20 is carried by the end portion 1" of the crossbar in this figure). The other arm 18b' of the said lever is very strong and, when the piston 14b rises, the spindle head 16b causes the lever 18b—18b' to swing and thus brings the lever arm 18b'

into a position where it prevents the turning of the screw 5b in the same manner as in the case already explained in connection with Fig. 1.

According to a further modification illustrated in Figs. 6 and 7, a hollow block 12c is fitted in a hole provided in the lid and extends past the lid to the outside. In the projecting portion of the block, an inclined groove 25 is formed for engagement by a pin 35 projecting from a ring 29 threaded upon the said projecting portion, the ring being provided with a handle 30.

The cylindrical bore of the block 12c is traversed by a stem 15c somewhat exceeding the length of the said bore; the stem carries at its top a head 16c with plane underface, and at its bottom it carries a truncated cone 14c. Between the plane underface of the head 16c and the top face of the ring 29 a washer 32 is interposed.

The object of the cone 14c is to secure tightness when either the pot pressure acting on the underface of the cone or the rotation imparted to the ring 29 so as to bring it from the position shown in Fig. 6 to the position shown in Fig. 7, causes the stem to occupy its highest position.

In order to close the pot, the stem 15c should be brought from the position shown in Fig. 6 to the position shown in Fig. 7 (by turning the ring 29 in the manner already stated). After removing the pot from the fire, if it be desired to check whether a dangerous pressure still prevails inside, the ring 29 should be restored into the position indicated in Fig. 6. If a dangerous pressure is still present, this pressure acting on the underface of the cone will maintain the stem 15c in raised position, whereby the stem head 16c will maintain the abovesaid locking parts in locking position and prevent the turning of the screw 5 in pot opening direction. According as the pot pressure sinks, the stem 15c will sink into the position indicated in Fig. 6, thus releasing the locking parts. The sinking of the stem 15c may be assisted by a spring or by weights.

Eventually the bottom end of the stem 15c and cone 14c may be enclosed in a chamber similar to the chamber 12 of Figs. 1 and 3, the chamber bottom end being closed by a perforated spring or by wire net with fine meshes.

In Fig. 3 means are shown intended to secure that the screw 5 shall exert its pressure on the end portion 1" of the crossbar 1.

Such means essentially consist in a convex spherical projection 26 provided on the top face of 1" and cooperating with a corresponding concavity 27 formed in or secured to the end of the screw 5b. Alternatively the bottom end of the screw 5b may be spherically shaped, and a spherical recess to suit be formed in the top face of 1". This arrange-

ment also serves to oblige the screw 5b to make a certain number of tours before it can completely disengage itself from 1", thus letting the steam escape gradually.

As already stated, the connection between the wings 19 and the screw 5 is designed with a certain clearance in the direction of rotation in order to avoid that the end position of the wings 19 should never accurately coincide with the member intended to prevent the turning of the screw in opening direction.

Of course the pot according to the invention is equipped with a whistle safety valve and with other fixtures.

What I claim and desire to secure by United States Letters Patent is:

1. In a pressure cooking or like vessel including a closure member, a retaining member normally holding said closure member in closed position said retaining member comprising a plurality of relatively movable parts and spring means normally maintaining said parts from relative movement until the pressure in the vessel overcomes that of the spring means.

2. In a pressure cooking or like vessel including a closure member, a closure retaining member formed of two juxtaposed relatively movable parts and spring means holding said parts against relative movement until the pressure within the vessel acting through the closure member overcomes the action of the spring means.

3. In a pressure cooking or like vessel including a closure member, a closure retaining device consisting of a cross member in two parts each provided with a flange, a bolt joining said flanges and opposed springs surrounding said bolt and acting on said flanges to hold the said two parts together until the pressure in the vessel overcomes the action of said springs and permits relative movement of said two parts of the retaining device.

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