Nov. 6, 1923. 1,473,408

H. C. RICHARDSON ET AL

CLOSURE

Filed March 9, 1922 2 Sheets-Sheet 1

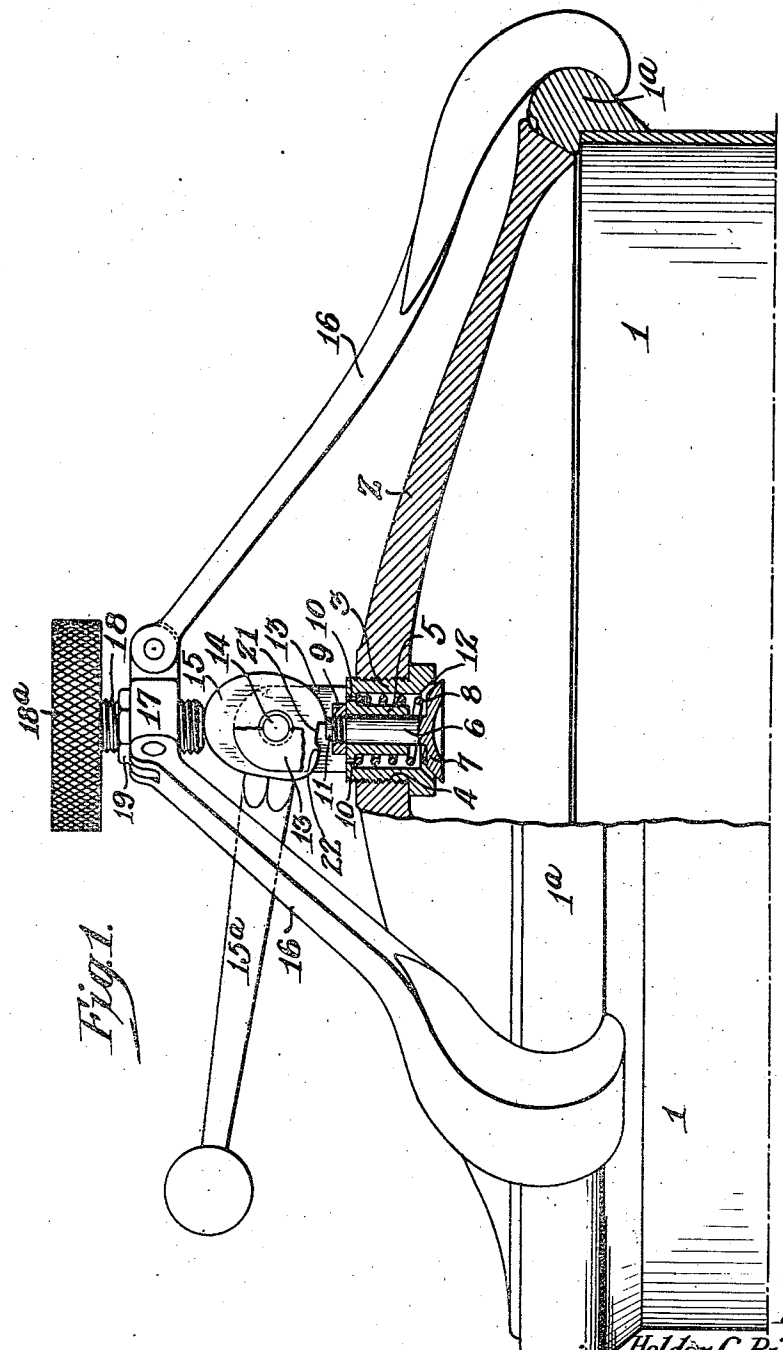

Fig. 1.

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Fig. 2.

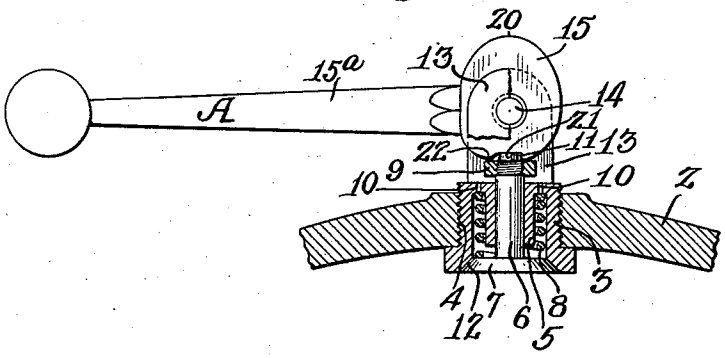


Fig. 3.

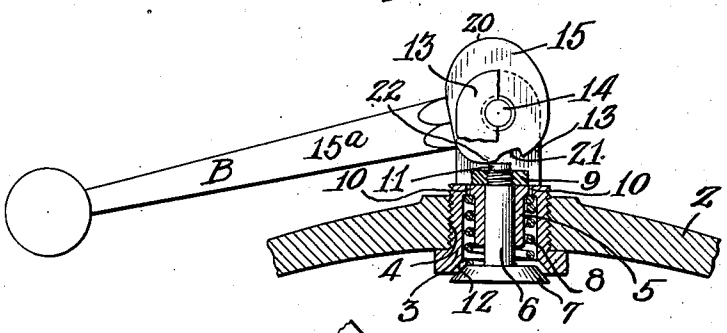
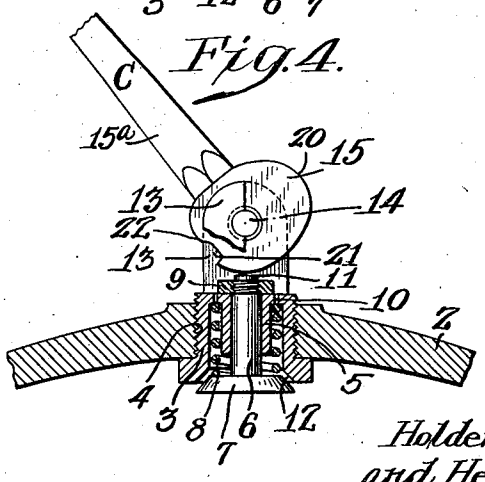


Fig. 4.



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Patented Nov. 6, 1923. 1,473,408

UNITED STATES PATENT OFFICE.

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CLOSURE.

Application filed March 9, 1922. Serial No. 542,229.

To all whom it may concern:

Be it known that we, HOLDEN C. RICHARDSON and HENRY F. VACHÉ, citizens of the United States, and residents of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Closures, of which the following is a specification.

Our invention relates generally to closures for pressure containers, and more particularly to an improved form of closure device having means for securing and releasing the same, with which we have incorporated a safety venting device; such venting device also providing a pressure seal lock. The relation of the parts is such that we have combined in a simple form of mechanism, means for securing and releasing the cover, means for regulating and adjusting the cover joint, means for quickly and easily applying, or releasing, the force necessary to secure the cover in place, which means may include a cam, and means for locking the operating cam when the pressure in the container is greater than should exist if the cover is to be removed with safety.

The main object of our invention is to insure safety in the operation of our improved closure by providing a simple locking device for the closure mechanism, which locking device is controlled by the contained pressure in such manner that it cannot be released until the pressure has been relieved to a safe degree.

Another object of our invention is to provide a simple form of spring-controlled valve, normally open, and adapted to close a venting passage or opening in communication with the atmosphere; such valve being so disposed and arranged that it will not seat itself until the internal pressure reaches such a point as to overcome the resistance of the spring, or until the flow entrains the valve, and conversely, so that it will not unseat itself until the pressure on the face of the valve is less than that exerted by the spring.

A further object of our invention is to provide simple and effective means for mechanically operating the valve for the purpose of deliberately releasing the pressure; the valve being moved to an open position when desired, and held in such position until the pressure falls to such a degree that the spring will retain the valve in the open position; thereby releasing the seal lock.

These and other features of our invention are more fully described hereinafter; reference being had to the accompanying drawings in which:

Figure 1, is a sectional elevation of sufficient of a pressure container to illustrate the improvements forming the subject of our invention.

Fig. 2, is a sectional view of a portion of the structure shown in Figure 1, in the same plane, and

Figs. 3 and 4, are views similar to Fig. 2, showing certain of the parts in different positions.

In the drawings, 1 may represent any usual form of a pressure containing vessel, which may have any suitable form of rim 1^a, affording an internal seat for a cover 2, and providing an external shoulder for engagement by the hooked ends of claw retaining means, hereinafter described.

Carried by the cover 2, which may fit into the rim 1^a of the vessel, preferably with a ground joint, is a special form of sleeve 3, which may be screwed into an opening 4, preferably formed at the center of the cover, and usually at the highest point of the same.

The sleeve 3, may carry an inner sleeve 5, integral therewith if desired; such inner sleeve serving as a guide for the stem 6, of a valve 7. In the space between the sleeves 3 and 4, a spring 8, may be located which spring is intended to aid gravity in holding such valve normally open; and the stem 6 may carry a lock nut 9, externally of the sleeve 3, to limit the extent to which said valve may open.

Vent passages 10, which may be formed in the web connecting the sleeves 3 and 5, provide communication with the atmosphere for the flow of air, gas or vapor when the valve is open. The end of the valve stem 6, may be reduced, as indicated at 11, for a purpose hereinafter described. The sleeve 3 is provided with a seat 12, which may be ground with which the valve 7 may engage, and it may be provided with a pair of ears 13, extending above same, in which may be journaled trunnions, or a pivot pin 14, supporting a cam 15.

The cover may be secured in place by a

series of claw arms 16, three being indicated in the present case, which may be carried by a suitable head 17, overlying the cam 15; such head being provided with an adjusting and regulating screw 18, which may bear directly on the surface of the cam 15, as shown in Fig. 1. The adjusting screw 18, is provided with a suitable head 18a to permit ready manipulation for adjustment, and a lock nut 19, may be provided to hold such screw in its adjusted positions.

The cam 15, is provided with an operating handle 15a, affording means for setting the cam in the desired positions and for applying or removing the cover. If desired this handle may be provided with a wire cover to insure a cool grip. The portion 20, of the cam 15, is eccentric to its axis of movement, thereby affording means for taking up the slack of the claw arms 16, and applying pressure to the cover after said claws have been seated by operating the regulating screw 18. The cam 15, is recessed at 21, at a point substantially opposite the portion 20, to accommodate the end 11, of the valve stem 6, and when the parts are in the position indicated in Fig. 2, rotation of the cam in one direction is prevented.

When the cover is first set in place, the cam may be disposed with its handle in position "C", as indicated in Fig. 4. In this position, the adjusting screw 18, being in contact with the top of the cam, the ends of the claw arms 16 will overlie the rim 1a and can be readily positioned. The operating handle 15a may now be moved to the position indicated at "A" in Fig. 2, and the effect of this movement is to first raise the head 17 and bring the claws into engagement with the rim, and then, by the intervention of the cam and its housing, the elastic tension of the claws applies the required pressure against rim seat of the cover. This pressure may be regulated by setting the adjusting screw 18 against the cam when the handle is in position "C" Fig. 4. After the required pressure is secured by the adjusting screw the latter may be locked against movement by the nut 19. When once regulated, the adjusting screw acts as a fixed member until wear or deformation, or adjustment for internal pressures, requires re-adjustment.

As the handle 15a, approaches position "A", the recess 21, of the cam is brought into registry with the end 11 of the valve stem. If pressure is now introduced or produced in the pressure container, the contained air escapes past the valve and through the vents 10, and continues to escape until the rush of air or the pressure developed, overcomes the weight of the valve and the force of the spring (if used) at which time the end 11 of said valve stem enters the recess 21. When in this position, the handle 15a cannot be lifted until the pressure within the container falls to an extent that will permit the valve to open and remain open.

It will be noted that when the cam is in the positions indicated in Figs. 1, 3 and 4, the valve cannot seat, and the full force of the claws cannot be exerted against the rim of the container, hence if pressure is formed in the container or admitted thereto, the cover itself will function as a valve, and it will be manifest to the operator that the cover is not functioning properly.

When the container is operating under pressure, the handle will be in position "A", Fig. 2. Should it be desired to open the container, the pressure must be reduced before the handle can be raised sufficiently to release the claws. This may be done by moving the handle to position "B" indicated in Fig. 3, or to a position intermediate "A" and "B"; depending upon the rapidity with which it is desired to reduce the pressure. As the handle is depressed, the rounded shoulder 22 of the cam depresses the valve stem; unseating the valve and permitting the pressure to escape through the vents 10. This continues until the pressure reduces to a degree that will permit the valve to remain unseated, after which the handle may be raised, and the claws unhooked to release the cover. At any intermediate stage of this last described operation, the cover may become unseated before the claws can be unhooked; thus all pressure will escape without danger of the cover being blown off.

An important feature of our invention lies in the fact that the cover cannot be opened until the pressure within the vessel has been reduced to a safe degree, since movement of the cam in one direction is prevented by the shoulder of the recess 21, and movement of the cam in the opposite direction effects opening of the valve which permits the escape of the pressure, and it is only by holding the valve open until the pressure reduces to an extent that will permit the spring to react and hold the valve open, that the cam can be turned to the position illustrated in Fig. 4, which will permit release of the claw arms from the rim.

If desirable or necessary, the pressure container may be provided with a pet cock; safety valve; liquid and pressure gauges, thermometer, and any other devices common to pressure containers, and which will insure efficient and economic operation of the structure.

We claim:

1. The combination, in a pressure containing vessel, of a cover therefor, a cam journaled on said cover, means cooperating with said cam for holding the cover in place, a valve carried by the cover; said

valve being arranged to be held to its seat by pressure within the vessel, means for normally holding said valve open, and a stem carried by said valve for cooperative engagement with the cam whereby said valve may be opened by moving the cam with respect to said stem.

2. In a pressure containing vessel, the combination of a cover, a cam journaled on said cover, means cooperating with said cam for holding the cover in place, a valve carried by the cover, a stem carried by said valve in line with the cam; said valve being arranged to be held to its seat by pressure within the vessel, and means for normally holding said valve open; the stem carried by said valve being in operative engagement with the cam whereby said valve may be opened by rotative movement of the cam.

3. In a pressure containing vessel, the combination of a cover therefor, a cam journaled on said cover, claw arms for holding the cover in place, a block to which said arms are pivotally connected, an adjusting screw carried by said block and movable into engagement with said cam to hold the claw arms in operative engagement with the cover, a valve seat carried by the cover, a valve adapted to said seat, a stem carried by said valve and projecting into the path of the cam; the latter having a recess to receive the end of the valve stem when the valve is closed by pressure, and a spring for holding said valve normally open.

4. In a pressure containing vessel, the combination of a cover therefor, a cam journaled on said cover, claw arms for holding the cover in place, a block to which said arms are pivotally connected, an adjusting screw carried by said block and movable into engagement with said cam to hold the claw arms in operative engagement with the cover, a valve seat carried by the cover in axial alignment with the cam, a valve adapted to said seat, a stem carried by said valve and projecting into the path of the cam; the latter having a recess to receive the end of the valve stem when the valve is closed by pressure, and a spring for holding said valve normally open; said valve closing against the force of said spring and being opened by the cam when the latter is moved in one direction.

5. In a pressure containing vessel, the combination of a removable cover therefor, means for holding the cover in place including an adjustable screw, a shell or sleeve threaded into the cover, a valve carried by said shell or sleeve and having a stem projecting through the latter, ears carried by said shell or sleeve, a cam journaled in said ears and arranged to engage said valve stem, means limiting the opening of said valve with respect to said shell, a spring for holding the valve in the open position; and vent openings in said shell or sleeve for the escape of air and steam when the valve is open.

6. In a pressure containing vessel, the combination of a removable cover therefor, means for holding the cover in place including an adjustable screw, a shell or sleeve threaded into the cover in axial alignment with said screw, a valve carried by said shell or sleeve and having a stem projecting through the same, ears carried by said shell, a cam journaled in said ears and arranged to engage said valve stem, means limiting the opening of said valve with respect to said shell, a spring for holding the valve in the open position, and vent openings in said shell for the escape of air and steam; said cam having a recess receiving the end of the valve stem when the valve is closed and locking said cam against movement in one direction.

7. The combination with a vessel in which pressure may build up, of a cover therefor, operating mechanism for quickly securing and releasing said cover including a plurality of claw arms, a rim carried by the end of said vessel; said rim forming a seat for the cover and providing a surface for engagement by said claw arms, a head connecting the inner ends of said claw arms, an adjusting screw mounted in said head; the cover being operatively engaged by said adjusting screw, and an automatically closing venting device for said cover; said venting device being under the control of said cover-operating mechanism.

8. The combination of a vessel in which pressure may build up, a cover therefor, securing and releasing means for said cover, an adjusting screw carried by said securing and releasing means, a cam mounted on the lid and interposed between the latter and said adjusting screw; said cam cooperating with said securing and releasing means and affording rapid means for securing and releasing the cover, and pressure venting means controlled by said cam.

9. The combination of a vessel in which pressure may build up, a cover therefor, securing and releasing means for said cover, an adjusting screw, a recessed cam, a pressure operated valve, a valve seat therefor; the cover having venting ports closed by said valve, and a stem for said valve; said stem being arranged to engage the recess in the cam and lock the latter against releasing movement until the pressure within the vessel is reduced.

10. The combination of a vessel in which pressure may build up, a cover therefor, securing and releasing means for said cover, an adjusting screw, a valve, a stem therefor projecting through the cover, and a double acting cam in operative engagement with said valve stem; the latter being movable by

the cam upon rotating the latter in one direction, and the cam being held against movement in the opposite direction to release the cover until the pressure within said vessel has been reduced.

11. The combination of a vessel in which pressure may build up, a cover therefor, securing and releasing means for said cover, an adjustable screw, a valve, a double acting cam in engagement with said screw and valve and providing a pressure-operated cam lock, and a spring normally adjusted to prevent the valve seating until the flow of air, gas or vapor entrains same, or until the contained pressure reaches a certain degree, and to unseat the valve when the contained pressure has been reduced to release the cam and permit removal of the lid; said valve having a stem engaged by the cam and movable thereby to unseat the valve and release the contained pressure.

12. The combination with a vessel in which pressure may build up, of a cover therefor, a combination unit insertable in said cover comprising a sleeve or housing having a valve seat, a valve adapted to said seat; said housing having vent openings and a spring for normally holding said valve open, a manually operable double-acting cam; one portion serving to apply mechanical pressure to seat the cover, while another portion is formed with a recess to receive the valve stem and be locked thereby; said cam being beveled adjacent the recess so as to ride up on the valve stem and unseat the valve against the pressure within the vessel, and means carried by said sleeve or housing for supporting said cam and in which it is pivotally mounted.

In witnesses whereof we have signed this specification.

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HENRY F. VACHÉ.