March 10, 1936. R. B. ROY 2,033,305

DOOR LOCKING MECHANISM FOR STERILIZERS AND THE LIKE

Filed July 2, 1935

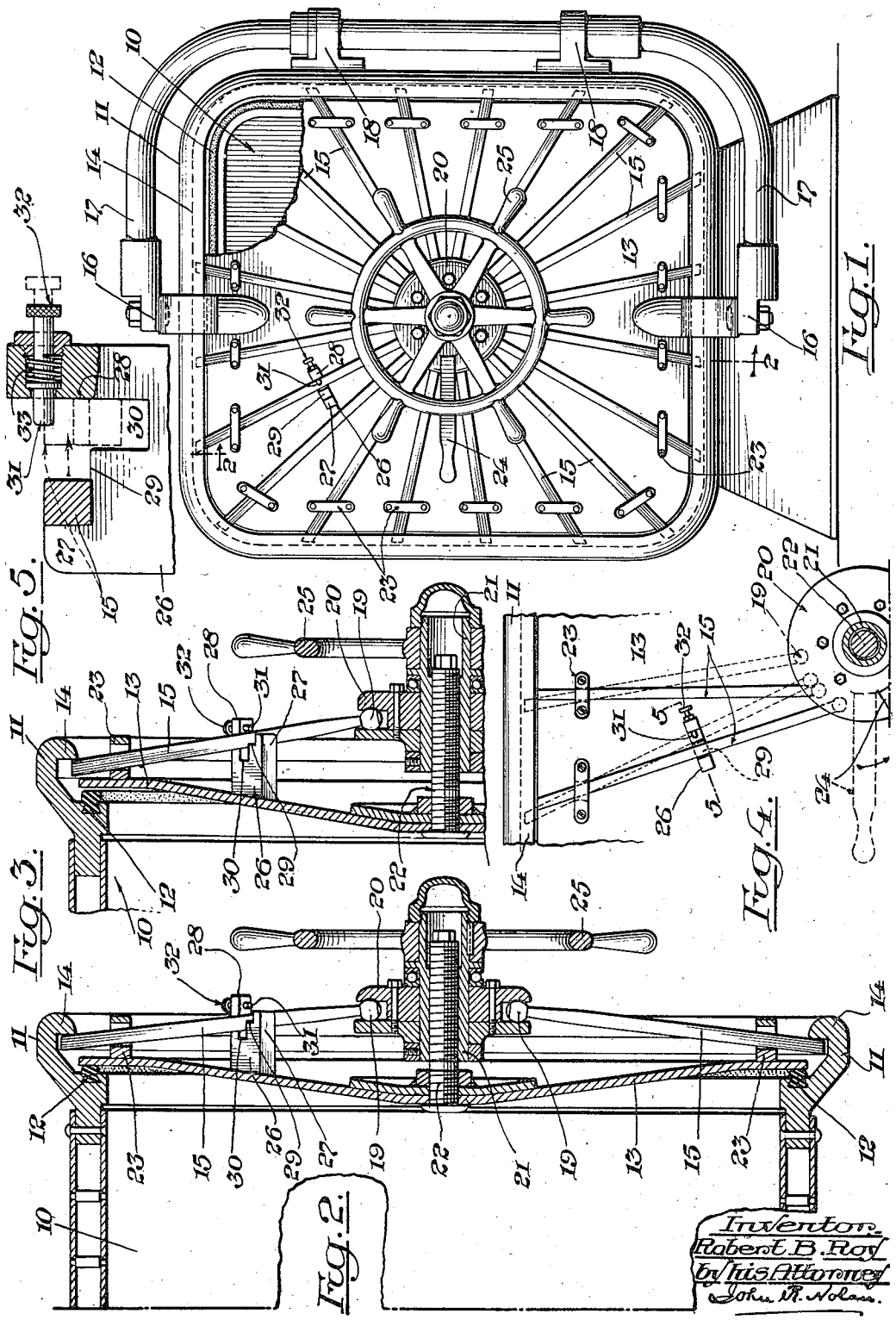


Fig. 1.

Fig. 5.

Fig. 4.

Fig. 3.

Fig. 2.

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Patented Mar. 10, 1936 2,033,305

UNITED STATES PATENT OFFICE

2,033,305

DOOR LOCKING MECHANISM FOR STERILIZERS AND THE LIKE

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Application July 2, 1935, Serial No. 29,574

4 Claims. (Cl. 220—57)

This invention relates to door closing mechanism for the steam chambers of sterilizing apparatus and the like, having reference more particularly to the type of door closing mechanism having exteriorly arranged screw-actuated locking bars which are mounted on the door in cooperative relation to a flanged rim, or keeper, on the body of the apparatus.

The object of my invention is to provide for the said mechanism a manually releasable safety device which is automatically positioned in locking relation to one of the bars while the bars are engaged with the rim or keeper before the final sealing operation is effected. This device positively restricts the initial opening operation of the closing mechanism, thus permitting the escape of confined steam around the sides of the partially open door, in order that, if necessary, the door can be promptly closed and the chamber re-sealed until the steam pressure has been reduced. If, however, upon such initial opening operation there be little or no escape of steam from the chamber, the operator can, with safety, manually unlock the closing mechanism and open the door to the full extent.

My invention comprises features of novelty which, in a preferred form of embodiment, will be hereinafter described; the scope of the invention being expressed in the appended claims.

In the drawing—

Figure 1 is a partial front elevation of a sterilizer equipped with door locking mechanism embodying the principle of my invention, the door being closed and sealed.

Fig. 2 is a vertical section through the front of the sterilizer, including the door and its locking mechanism, as on the line 2—2 of Fig. 1.

Fig. 3 is a similar section, but showing the upper part of the door and the associated locking mechanisms therefor as they are restricted in the initial releasing or unsealing of the door.

Fig. 4 is a front elevation, partly in section, of a portion of the sterilizer body and its door, showing two adjacent bars and the actuating head therefor in their relative unlocking positions, the dotted lines indicating the parts in their respective locking positions relative to the rim flange.

Fig. 5 is a section through one of the screw-actuated bars and the safety device therefor, as on the line 5—5 of Fig. 4.

Referring to the drawing, 10 designates a receptacle of any usual or approved construction constituting a spacious steam chamber. This receptacle is provided at its forward end with a rim 11 having a suitably-disposed sealing gasket 12 for the door 13, and also having a keeper flange 14 with or from which the free ends of a series of radial bars 15 can be engaged or disengaged in order to lock or release the door, as desired. The door is hinged medially at its top and bottom, as indicated at 16, to the respective arms of a yoke 17 which, in turn, is hinged to one side of the flanged rim, as at 18, thus permitting the door to be swung open on the side hinges and also moved about its medial axis.

The bars 15 are jointed at their inner ends 19 to a head 20 which is mounted on and rotatable relatively to a nut element 21 threaded on a post 22 projecting centrally from the door. The bars 15 are movably supported adjacent their outer ends by suitably-disposed guide brackets 23 fast on the door, and the head 20 is provided with a handle 24 by actuation of which, when the door is closed, the head can be turned in either direction in order correspondingly to move the jointed ends of the bars and thus project their outer ends partially into or retract them from engagement with the inner face of the flange 14.

The nut element 21 has a suitable hand wheel 25 by means of which, when the door is closed and partially locked by manipulation of the handle 24, such element can be screwed toward the door in a manner to force the bars 15 farther outward and against the opposed face of the flange, thus locking the door against the gasket 12 and in sealing relation to the sterilizer chamber.

The limit of the arcuate path of the head 20 when the handle 24 is actuated is determined by a fixture 26 on the outer side of the door adjacent one of the bars. This fixture comprises a block having a step-like formation which affords two spaced parallel side walls 27 and 28 between which the bar extends, the walls providing positive stops to limit the respective lateral movements of the bar; that is to say, when the handle 24 is swung down to unlock the door the opposing wall 27 against which the bar abuts limits the releasing movement, and when the handle is next raised to lock the door the wall 28 limits the locking movement, as seen in Figs. 4 and 5. The step formation of the block provides adjacent the wall 27 a supporting surface 29 for the bar when it is against such wall, and also provides adjacent to and in conjunction with the wall 28 a guide-slot 30 for the bar when it is swung against the latter wall, thus permitting the movement of the head and associated bar toward the door when the nut member 21 is turned clockwise, with the result

that the body of the bar is caused to enter the slot **30** and the outer end of the said bar **15** together with the other bars **15** are advanced radially fully to engage the rim flange, as seen in Figs. 1 and 2, thereby ensuring the locking and sealing of the door.

In order to unlock the door the hand wheel **25** is turned counterclockwise, thus retracting the head **20** and the inner ends of the bars **15** pivoted thereto, thereby partially withdrawing the outer ends of the bars from the rim flange **14** in a manner to break the seal at the gasket **12**, as seen in Fig. 3, and also, in the absence of restraining means, (hereinafter described) withdrawing the bar from registry with the slot **30** of the block **26** and into the space between the side walls **27** and **28** of such fixture. Thereupon the handle **24** is swung down and the bars are thus completely disengaged from the flange, as seen in Fig. 4.

In accordance with my invention I provide the block **26** with a safety device which is automatically positioned behind the associated locking bar when the bar, by actuation of the hand wheel **25**, is initially entered in the slot **30** preparatory to the sealing of the door, and which device must be manually retracted in order to clear the forward path of the bar and permit the full withdrawal of the bar from the slot before the door can be unlocked and completely opened. As the opening movement of the bars when the door seal is broken is positively restricted by the opposing safety device, the operator is protected against danger from escaping steam because its presence is revealed by its leakage at the edges of the door and thus he is enabled to govern himself as the necessity of resealing the door or the propriety of releasing the safety device and completely opening the door.

The safety device in the form illustrated comprises a bolt **31** which is slidably mounted in a horizontal opening in the wall **28** of the block **26**, so as to be movable longitudinally into and from the lateral path of movement of the bar toward such wall. The bolt is conveniently provided at its outer end with an operating head **32** and is normally held in its inwardly projecting position, as seen in Fig. 5, by means of a suitably-disposed spring, as **33**, within the opening of the wall **28**. Hence when the bar is forcibly swung toward the wall **28**, such bar impinges against the opposing end of the bolt and forces it back against the action of the spring **33**. Then, when the hand wheel **25** is properly turned so as to move the head **20** and the bars **15** relatively to each other to effect the locking and sealing of the door, the body of the bar, entering the slot **30**, clears the opposing end of the bolt, which bolt thereupon is projected behind the bar by the action of the spring, thus effectually preventing the disengagement of the series of bars from the rim flange **14** by the operation of the nut element, until the bolt has been manually withdrawn from the path of the bar, as previously indicated.

It is to be noted that the relative positions of the bolt and the elements co-operating therewith are such that when the locking bar initially enters the slot and the bolt **31** moves into position behind the bar the door seal is still unmade, and the bars can then be screwed up tighter by actuation of the hand wheel **25** in order to seal the door. Also, that when the hand wheel is reversely actuated and the bars are thereby retracted the opposing bolt efficiently checks the outward movement of the proximate bar (and the remaining bars) in such position in respect to the rim flange that the door seal is broken, thus permitting steam, if any, to leak from the sterilizer as for the purpose hereinbefore mentioned.

I claim—

1. In an apparatus of the character described having a pressure chamber, a door for said chamber, and door operating mechanism comprising movable locking members, a fixed keeper for said members, means for manually operating said members to engage them with and disengage them from the keeper as desired, the engaging relation restricting the opening movement of the door, and means for manually actuating said members to seal or unseal the door when its opening movement is restricted, a safety device including a restraining element normally projected in the path of one of said members, said element being retracted by the impingement thereagainst of the bar in its keeper-engaging movement, and then in the movement of the bar preparatory to the sealing of the door being automatically projected clear of the bar and in position to prevent the withdrawal of the locking members from the keeper until the manual retraction of said element.

2. In an apparatus of the character described having a pressure chamber, a door for said chamber, and door operating mechanism comprising means for restricting the opening of the door and also for sealing and unsealing the door, said means including locking bars carried by the door, a fixed keeper for said bars, and a guide fixture for one of said bars having spaced stops to limit the locking and unlocking movements of the bar and also having a slot positioned to receive the bar when the bar is actuated to effect the sealing of the door, a safety device comprising a spring-pressed sliding bolt mounted in said guide fixture and arranged to be normally projected in and longitudinally of the path of said bar, said bolt being forced back by the impingement thereagainst of the bar during its keeper engaging movement, and then in the movement of the bar into the slot preparatory to the sealing of the door being automatically projected across and behind the bar, thus preventing the withdrawal of the bars from the keeper until the manual retraction of the bolt against the action of its spring.

3. In an apparatus of the character described having a pressure chamber, a door for said chamber, and door operating mechanism comprising a plurality of radial locking bars carried by the door and operative to secure the door in unsealing and sealing relations to the chamber, the unsealing relation restricting the opening movement of the door, a fixed keeper for said bars, an oscillatory device for actuating the said bars to lock or release the door in unsealing relation to the chamber, screw means for actuating said bars to seal or unseal the door when its opening movement is restricted, and a guide fixture on the door for one of said bars comprising an element on the door having spaced stops to limit the lateral movements of the bar in the operations of locking and unlocking the unsealed door, and also having adjacent the lock-determining stop a slot adapted to receive the bar preparatory to the sealing operation, a safety device comprising a manually retractible spring-pressed restraining element mounted in said fixture in spaced relation to the slot and normally projected in the lateral path of movement of the bar, whereby when the said oscillatory device is actuated said element is forced

back by the impingement of the bar thereagainst, and whereby when the said screw means is actuated the bar associated with the fixture is caused to enter the slot and clear the path of said restraining element, which latter element then being automatically projected behind the bar prevents the unlocking of the door until the manual retraction of the restraining element.

4. In an apparatus of the character described having a pressure chamber, a door therefor, and door operating mechanism comprising a plurality of radial locking bars carried by the door and operative to secure the door in unsealing and sealing relations to the chamber, the unsealing relation restricting the opening movement of the door, a fixed keeper for the outer ends of said bars, a partially rotatable head to which the inner ends of the bars are jointed and which head is operative to move the bars into and from engagement with the keeper, screw means for actuating the said head and the bars to seal and unseal the door when its opening movement is restricted, a guide fixture on the door for one of said bars comprising an element on the door having spaced stops to limit the lateral movements of the bar in the operations of locking and unlocking the unsealed door, and having a bar receiving slot adjacent that stop against which the bar abuts when it engages the keeper, a safety device comprising a manually-retractible spring-pressed bolt mounted in said fixture in spaced relation to the slot and normally projected in the lateral path of movement of the bar, whereby when the said head is actuated the bolt is positively forced outward by the impingement of the bar thereagainst, and whereby when said screw means is actuated the bar is caused to enter the slot and clear the path of the bolt, which bolt then being automatically projected behind the bolt prevents the unlocking of the door until the manual retraction of the bolt.

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