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3,511,593

DOOR CLOSING AND LOCKING MEANS FOR AUTOCLAVES AND THE LIKE

Filed May 15, 1967

2 Sheets-Sheet 1

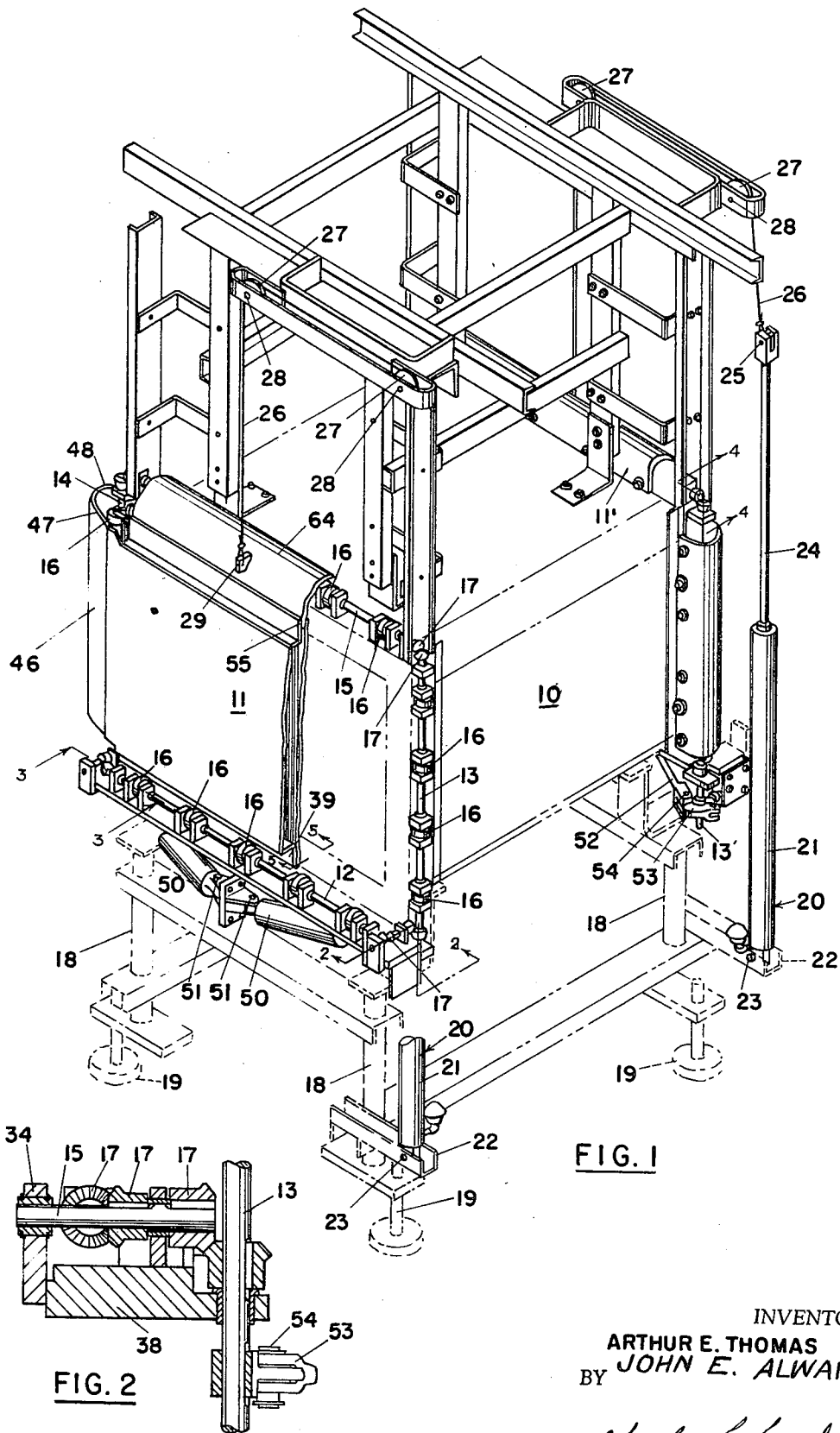


FIG. 1

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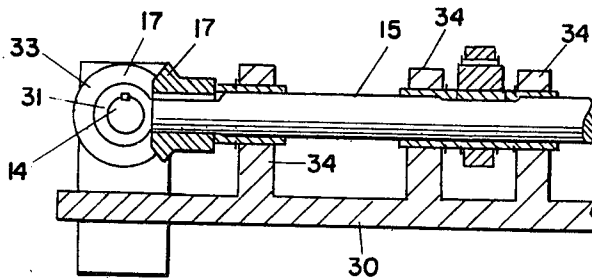


FIG. 3

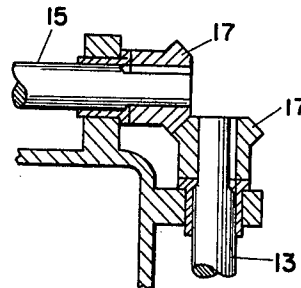


FIG. 4

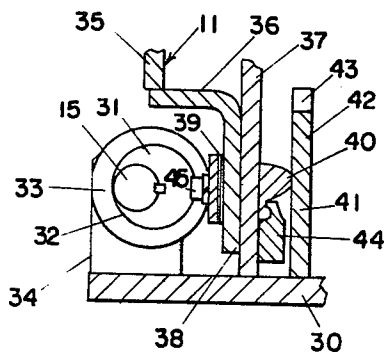


FIG. 5

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DOOR CLOSING AND LOCKING MEANS FOR AUTOCLAVES AND THE LIKE

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11 Claims

ABSTRACT OF THE DISCLOSURE

Door control and locking means in combination with a pressure vessel or sterilizer having a vertically slidable door movably attached thereto. The pressure vessel includes cam means mounted thereon to force the door into seating engagement with said pressure vessel when the door is in the closed position.

Previous doors adapted for use with sterilizers have been either of a manual type or power operated type. The power operated type have been complex and expensive in construction. Manually operated sterilizer door present certain inherent disadvantages, which are well known to those skilled in the art.

The door and sterilizer disclosed herein utilizes a simple, positive, and convenient power operated sliding door with sealing and locking mechanism. The locking mechanism incorporates a top edge and two side flanges on the door which curve around and form forwardly facing cam engaging surfaces. The sterilizer has four shafts disposed along four sides of the door, and each of these shafts has a set of cams to engage the flanges. These cams may be made up, for example, of a circular disk having a keyed hole drilled off center to form an eccentric in the driving member. A steel rim is provided concentric with the disk to take the loads imposed by the followers on the doors. An anti-friction bearing is provided between the rim and the disk. When the cam shafts rotate, the eccentric rotates and the bearings and rim are brought closer to the follower. When the rim contacts the follower, it will stop rotating and transfer the force of the cam to the follower moving it away from the cam shaft. The sliding action then takes place between the rim and bearing or the bearing and the eccentric and, therefore, does not wear out the periphery of the rim or the face of the follower.

The doors are equipped with adjustable seals, which make it possible to distribute the sealing force on the door to form an efficient seal.

It is, accordingly, an object of the invention to provide an improved combination sterilizer chamber and sealing means.

Another object of the invention is to provide an improved locking arrangement for a sterilizer door.

Another object of that invention is to provide an improved closure, operating mechanism, and sealing mechanism.

Another object of the invention is to provide a door and locking mechanism, which is simple in construction, economical to manufacture, and simple and efficient to use.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

FIG. 1 is an isometric view, partly broken away, to better illustrate the invention;

FIGS. 2, 3, 4, and 5 are cross sectional views taken on cross section lines numbered with corresponding numbers in FIG. 1.

Now with more particular reference to the drawings, the autoclave or sterilizer is generally indicated at 10 with the door locking mechanism and sealing arrangement shown by way of example. The sterilizer 10 has doors 11 and 11' at opposite ends, and each of these doors has four shafts 12, 13, 14, and 15 connected together by pinions 17, so that each shaft is connected by the pinion to the shaft adjacent it. Therefore, the four shafts form what is called in the trade, a four square shaft arrangement.

The cams are each made up of a disk 31, which is fixed to the cam shaft 15 and an anti-friction bearing indicated at 32 connects the cam member 33 to the shafts. The shafts 15 are journaled in brackets 34, which are fixed to the sterilizer chamber indicated at 30. The door 11 has a front panel 35 that is spaced from and generally parallel to rear panel 37. Panel 35 is formed inwardly at 36 and attached to the rear panel 37 of the door, and the lower end of the panel 37 and the downwardly extending portion 38 form a support member for the cam follower plate 39. The cam members 33 bear against the follower plate 39 and urge the lower edge of the door inward. The rear plate of the door has the resilient seal 40 attached to its periphery, and this seal engages the front surface 41 of the rim 42, which extends around the door opening 43. The seal 40 is clamped to the rear plate 37 by means of a clamping ring 44. The plate 39 can be adjusted toward and away from the door member 38 by means of the set screws 45. Thus, the follower plates can be adjusted to cause the cams to transmit a uniform pressure to the door seal and thereby obtain an optimum seal.

The door 11 has plates 46 at the sides which form channels and extend outwardly at 47, rearwardly at 48, and then extend inwardly behind the cam. The channels receive the cams at the sides of the door when the door slides up and down urged by the cylinder 21 which is a part of the lifting mechanism 20. A piston rod 24 is pivoted to the cable 26 at 25 and to the frame 22 at 23. The cable 26 passes over the pulleys 27, which are pivoted to the frame at axle 28, and the cables 26 are attached to the door at 29. Thus, when the piston in the cylinder 21 is actuated, it exerts a force on the cable 26 to lift the doors, and when the force on the piston is released, the gravity will cause the door to lower.

The cylinders 50 are each pivoted to the frame by pins 51. Each cylinder 50 has a piston rod 52, which is connected to a bellcrank 53 at 54. The bellcranks are fixed to the shafts 13 and 13'. Thus, when the piston in cylinders 50 are caused to extend, they rotate the bellcrank 53, and thereby rotate the shafts 13 and 13', which each in turn rotate the shafts connected to them by and through beveled pinions 17. The pinions 17 rotate the cams 16 to either a locking position when they exert a force on the plates 46 and 54 or to a released position when the cams are moved away from the plate 46.

It will be noted that the plate 64 is fastened to the upper edge of the door at 55 and it extends upwardly, then rearwardly, then downwardly so that when closed, the plate extends behind the cams 16. Thus, it will be seen that when the door is in the closed position shown, the cams will engage the forwardly facing edge of the plate 64. The cams will likewise engage the forwardly facing inturned edge of the plates 46. The cams at the lower edge of the door will engage the forwardly facing lower cam follower plate 39.

The foregoing specification sets forth the invention in its preferred practical forms but it is understood that the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination, a door, an autoclave, and a sealing and locking mechanism,
 - said autoclave comprising a pressure vessel having an opening,
 - said door being supported on said autoclave,
 - means to move said door from a closed position to an open position,
 - said locking mechanism comprising cams supported on said autoclave,
 - said door being movable generally in a plane from an open position relative to said door to a closed position,
 - said door having cam means supported on the outer periphery of said door,
 - said cam means having camming surfaces thereon,
 - said cams being disposed on the camming surface of said cam means remote from the outside surface of said door when said door is in closed position,
 - and means to move said cams to force said door into seating engagement with said autoclave.
2. The combination recited in claim 1 wherein said cam means comprise a first follower member, a second follower member, a third follower member and a fourth follower member,
 - said first follower member being attached to said door and extending outwardly, then rearwardly, then inwardly and having a first forwardly facing surface comprising a said camming surface adapted to be engaged by said cams,
 - said second follower member being attached to said door on a side thereof opposite said first follower member and extending outwardly, then rearwardly, then inwardly and having a second forwardly facing surface adapted to be engaged by said cams,
 - said third follower member being attached to the lower side of said door between said first follower member and said second follower member,
 - said third follower member being attached to said door and extending rearwardly, then outwardly, and having a forwardly third facing surface adapted to be engaged by said cams.
3. The combination recited in claim 2 wherein said cams are disposed on a first shaft, a second shaft, a third shaft and a fourth shaft,
 - said first shaft being disposed in front of said first forwardly facing surface,
 - said second shaft being disposed in front of said second forwardly facing surface,

- said shafts being rotatably connected together to form a square.
4. The combination recited in claim 3 wherein said door moves up and down,
 - a bell crank is connected to one said shaft,
 - and a hydraulic cylinder is attached to said autoclave and a piston in said cylinder having a piston rod connected to said door.
5. The autoclave recited in claim 2 wherein said follower members comprise plates extending from in front of said cams around said cams to a position behind said cams.
6. The autoclave recited in claim 5 wherein a follower plate is attached to each said member,
 - and means to adjust said follower plate toward and away from said cams.
7. An autoclave having a door opening at one side, a door slidable up and down from an open position to a closed position movably mounted on said autoclave,
 - four shafts disposed generally in the form of a square around said door,
 - gear means connecting the ends of said shafts together, cams on said shafts,
 - follower means on said door on the edges thereof extending between said cams and said autoclave,
 - and means to rotate said shafts whereby said cams can be moved to force said door into seating engagement with sealing means on said autoclave.
8. The autoclave recited in claim 7 wherein said means to rotate said shafts comprises a hydraulic cylinder having one end attached to said autoclave and a piston rod connected to one said shaft.
9. The autoclave recited in claim 8 wherein a second cylinder is connected to said autoclave with a piston thereon connected to a said shaft spaced from said shaft connected to said first mentioned piston rod.
10. The autoclave recited in claim 9 wherein said piston rods are connected to said shafts by means of bellcranks.
11. The autoclave recited in claim 10 wherein said autoclave has a second door opening on the end thereof opposite said first mentioned door opening and a second door is supported on said autoclave to open and close said second opening.

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