March 17, 1970 R. M. CLERY ET AL 3,500,584

PNEUMATICALLY OPERATED SEALING DEVICE, MORE PARTICULARLY FOR TANNERY DRUMS

Filed April 2, 1968 2 Sheets-Sheet 1

Fig. 2

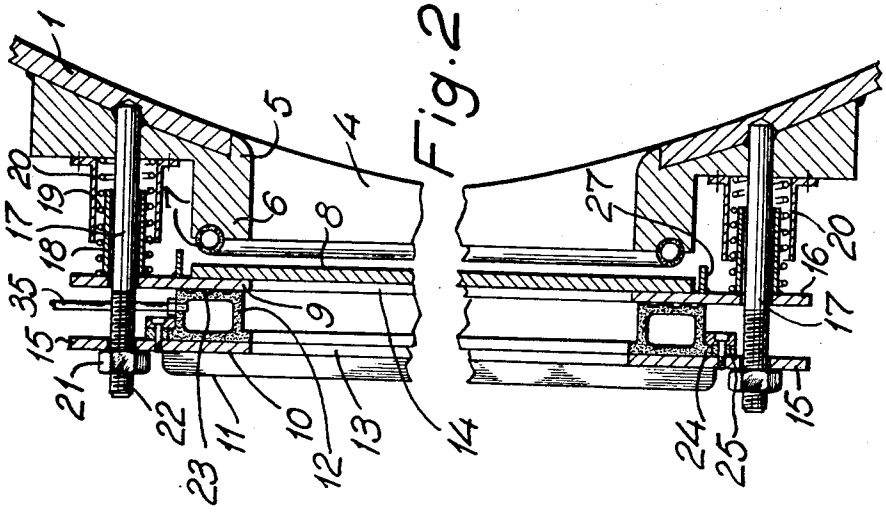


Fig. 1

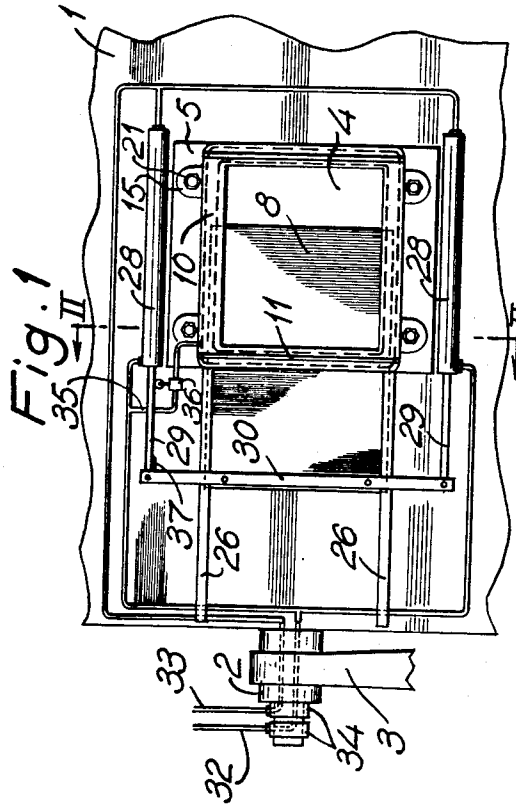
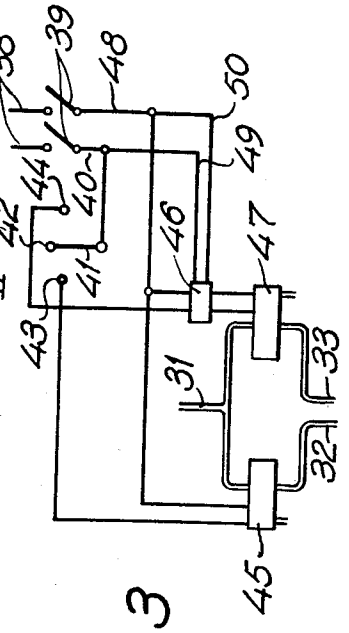


Fig. 3



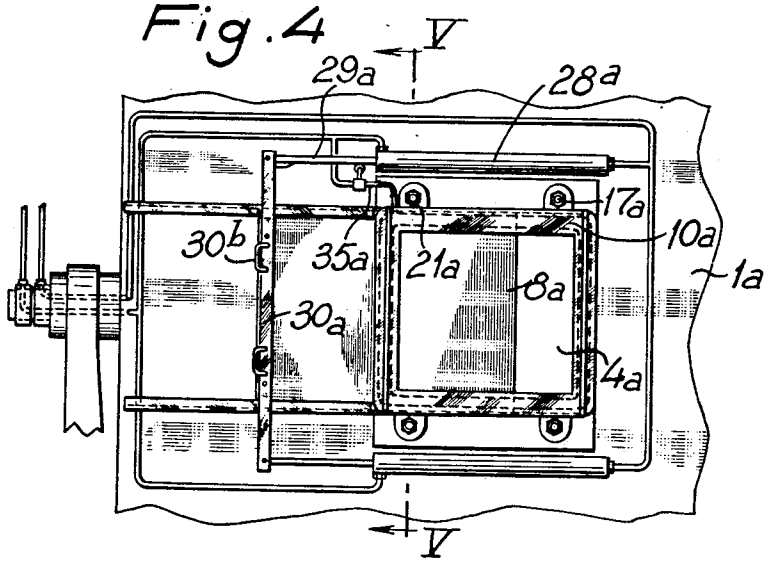
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March 17, 1970 R. M. CLERY ET AL 3,500,584

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Filed April 2, 1968 2 Sheets-Sheet 2

Fig. 4



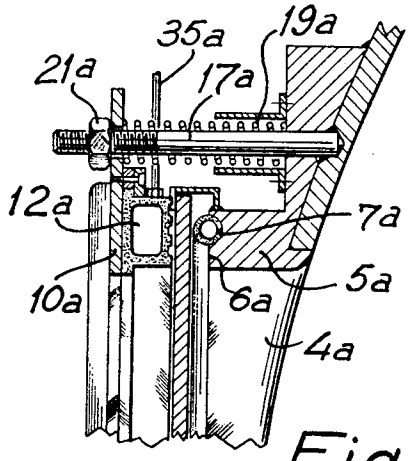
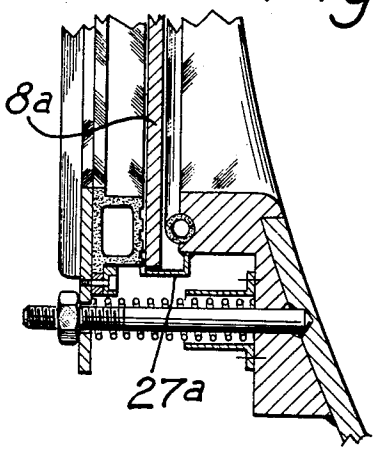


Fig. 5



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3,500,584

PNEUMATICALLY OPERATED SEALING DEVICE, MORE PARTICULARLY FOR TANNERY DRUMS

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U.S. Cl. 49—209 12 Claims

ABSTRACT OF THE DISCLOSURE

A device for sealing off an opening, comprises a door slidably mounted before the opening and operated by a set of double-acting pneumatic jacks. An inflatable seal is positioned facing the framing of the opening in such manner that the door be capable of sliding between the seal and the framing.

The present invention relates to a device for sealing off an opening, such as the opening in a tannery drum, and more particularly to a device of this kind in which the door is mounted slidably before the opening and is operated by a set of double-acting pneumatic jacks.

This invention has for its object to permit leaktight closure of the door against the framing of the opening and to accordingly provide a device of the kind referred to, comprising an inflatable seal positioned opposite the framing of the opening and carried on a fixed frame fast with the framing, the door being capable of sliding between the seal and the framing.

In a first specific form of embodiment of the invention, the device additionally includes a pressure distribution frame intermediate the inflatable seal and the door itself. Preferably, this frame is movable in a direction perpendicular to the framing. Thus, in the inflated position, the seal applies the door against the framing through the medium of the movable frame, against which it comes into pressure contact, thereby ensuring proper distribution of the door pressure against the framing.

In a second specific form of embodiment, the inflatable seal is positioned directly opposite the sliding door, without an intermediate movable frame.

In accordance with the present invention, the device can moreover include slideways for the door. In the first embodiment referred to, these slideways are carried by the movable frame, and in the second embodiment by the framing of the opening to be obturated. Such slideways ensure correct positioning of the door before the opening.

In accordance with the present invention, likewise, the device can include studs which support the frame fixedly, the latter being mounted abuttingly against nuts screwed on to said studs, the contact pressure being exerted by springs working in compression and reacting against the framing. Such an arrangement ensures reliable operation even in the event of the inflatable seal becoming inoperative owing to a leak therein or protracted failure of the compressed air supply, through maintenance of the leaktightness by tightening said nut and compressing the springs.

In the first embodiment referred to hereinabove the movable frame can slide on the studs and the springs can bear against said frame, the action of the springs thereby also facilitating deflation of the seal. In the second form of embodiment, the springs bear directly against the seal-carrying frame. In the case of the door of a rotating tannery drum, either embodiment facilitates opening thereof regardless of whether it is in the top or bottom position.

Likewise in accordance with the present invention, the device includes an electropneumatic control circuit comprising a distributor which feeds the jacks alternately for retraction or extension thereof. Preferably, the supply to the seal is controlled by a valve operating at the end of the closing movement of the door, and the device preferably includes in addition a time-delayed relay on the jack-extending feed line to permit deflation of the seal prior to opening of the door.

The device can lastly include, in accordance with the present invention, handles for manual actuation of the door, such handles being notably used in the event referred to of failure of the jack-operating compressed air.

Further particulars of the invention will emerge from the description which follows with reference to the accompanying non-limitative exemplary drawings, in which:

FIGURE 1 is a side view of a first embodiment of a sealing device according to the invention equipping a partly illustrated tannery drum.

FIGURE 2 is a left-hand view on an enlarged scale, on a section through the line II—II of FIGURE 1, with cutaway of the centre portion.

FIGURE 3 is a diagram showing the distributor system in the electro-pneumatic control circuit of FIGURE 1.

FIGURE 4 shows an alternative embodiment of the subject device of the invention.

FIGURE 5 is a left-hand view on an enlarged scale, on a section through the line V—V of FIGURE 4, with cutaway of the middle portion.

The sealing device shown in FIGURES 1 to 3 is mounted on a tannery drum **1** supported by journals **2** rotating in bearing housings **3**. The drum **1** is formed with an opening to be obturated **4**, bounded by a framing **5** which is fitted on to the drum body and formed with a flat face **6** receiving a conventional extruded seal **7** of round section.

The device includes a door **8** movable parallel with the plane of the framing **5**, a guide-frame **9** for the door **8** movable perpendicularly to framing **5**, and a fixed thrust frame **10** having external stiffeners **11** and an internal inflatable seal **12** adapted to contact movable frame **9**. The door is a solid rectangular plate and the fixed and movable frames are plates embodying, opposite the opening, recesses **13** and **14** of the same diameter as that of the opening and carrying, at their peripheries, drilled lugs **15** and **16** which are threaded over rods **17** fast with framing **5** and perpendicular thereto. The moving frame lugs **16** have guide bushes **18** thereon sliding along the rods **17** and springs **19** working in compression coiled round the bushes **18** and butting against the lugs **15** and the framing **5**, and these springs are in turn guided within sockets **20** rigid with framing **5**. The fixed frame is restrained on the rods **17** by nuts **21** screwed over the threaded ends **22** thereof. The inflatable seal is disposed along the perimeter of the central recess in the fixed frame and its free face **23** contacts movable frame **9**. This inflatable seal is of rectangular section and, on its side adjacent the fixed frame **10**, is formed with a peripheral projection **24** which is restrained by a double ring **25** against fixed frame **10**.

The drum structure further carries two horizontal slideways **26** for guiding the door movement, which movement is likewise guided by two horizontal guiding irons **27** projecting from movable frame **9** on its side remote from seal **12**. The drum structure further carries two double-acting pneumatic jacks whose cylinders **28** are fixed horizontally, respectively above and below the framing **5**, and whose piston rods **29** are fast with a vertical member **30** fixed to the outer end of the door, that is to say on the same side as slideways **26**.

The electropneumatic control circuit includes a pneumatic circuit which comprises, extending from a com-

pressed air supply line **31**, two control lines **32** and **33** which pass through one of the drum journals **2** via conventional rotary seals **34**, the line **32** being connected to the two front chambers of the jacks, to wit those on the slideway side, and the line **33** to their two rear chambers. The line **32** is further connected through a branch line **35** to inflatable seal **12**. Connected into branch line **35** is a follower-wheel-carrying microvalve **36** adapted to cooperate with a ramp **37** fast with the member **30** and positioned at the point where ramp **37** is located when door **8** is closed (see FIGURE 1).

The electric control circuit comprises a power supply input means **38** and a switch **39** one of whose terminals **40** is connected to the arm **41** of a selector switch having a resting contact **42** and two working contacts **43** and **44**, the former being connected to a closing solenoid **45** connected into pneumatic line **32** and the latter via a time-delayed relay **46** to an opening-solenoid **47** connected into pneumatic line **33**. The other terminal **48** of switch **39** is connected directly to opening-solenoid **45** and, via time-delayed relay **46**, to closing-solenoid **47**. Time-delayed relay **46** is controlled in addition directly off the electric power input means **38** via lines **49** and **50**.

The theory of operation of the device hereinbefore disclosed is as follows.

When the door is in the open position, that is to say fully engaged into slideways **26**, switch **39** is closed and selector switch arm **41** moved to closing contact **43**. Operation then becomes automatic: closing-solenoid **45** opens and pneumatic feed line **32** supplies the front jack chambers, thus causing the door to close, being guided by slideways **27**. When the door is fully home in its closed position, ramp **37** opens microvalve **36** by coacting with the follower wheel thereof, thereby causing seal **12** to be deflated.

Through agency of movable frame **9**, seal **12** applies the door **8** leaktightly against the seal **7** of framing **5**, thus ensuring perfect distribution of the pressure exerted by the door against the countering springs **19**.

A safeguard is provided in the closed position by virtue of the fact that in the event of an air failure in the line **31** or a power failure at **38**, solenoid **45** performs the function of a sealing valve and maintains the pressure in the jack and inflatable seal circuit.

In order to open the door, selector switch arm **41** is moved opening contact **44** and operation becomes automatic once more: closing-solenoid **45** closes, causing closing circuit **32** to be drained. By virtue of the presence of time-delayed relay **46**, opening-solenoid **47** does not open immediately, so that opening circuit **33** remains unpressurized and the jack pistons do not move; on the other hand, microvalve **36**, which remains open, allows the seal to deflate via the exhaust duct of solenoid valve **45**. Once the seal has deflated and the door has been relieved of its pressure, then because the lag in the opening of the time-delayed relay corresponds to the time required to deflate the seal, solenoid valve **47** opens and sets the rear jack chambers under pressure, thus causing the door to open.

In the description which follows of an alternative constructional form, shown in FIGURES 4 and 5, like parts to those in FIGURES 1 and 2 are designated by like reference numerals followed by the suffix *a*.

In this alternative embodiment, the drum **1***a* has an opening **4***a* bounded by a framing **5***a*, and the flat face **6***a* formed on the latter carries a seal **7***a*. Slideways **27***a* fast with said flat face are provided on either side thereof and the movable door **8***a* slides therethrough.

Opposite framing **5***a* is a fixed frame **10***a* restrained against studs **17***a* between restoring springs **19***a* and nuts **21***a*. The frame **10***a* comprises an inflatable seal **12***a*.

The theory of operation of the alternative constructional form just disclosed is such that when door **8***a* is slid into the obturating position facing seal **7***a*, the subsequent inflating of seal **12***a* causes it to be leaktightly applied against seal **7***a*.

This simplified constructional form, which dispenses with the movable frame intermediate the door and the inflatable seal, nevertheless enables the door to be satisfactorily cleared from contact with seals **7***a* and **12***a* by the springs **19***a*. Leaktightness is also satisfactorily maintained, whether in the event of leakage from seal **12***a* or protracted failure of the compressed air supply to the seal via the line **35***a*, by virtue of the tightening possibilities offered by the nuts **21***a* on the studs **17***a*.

In order to provide for manual operation in the event of failure of the compressed air supply, the door **8***a* has associated thereto handles **30***b* which are preferably mounted on the member **30***a* used for interconnecting the door **8***a* and the rods **29***a* of jacks **28***a*.

It goes without saying that many changes and substitutions of parts may be made in the specific embodiments of the present invention hereinbefore disclosed and described, without departing from the scope of the invention.

We claim:

1. In a device for sealingly obturating an opening, comprising a framing around said opening, a sliding door movable transversely of said opening, door moving means mechanically connected to said door, an inflatable seal positionable facing said framing and a frame carrying said inflatable seal, the improvement wherein said frame is mechanically connected to said framing so as to being not movable transversely of said opening, said frame being formed with a recess therein opposite said opening.

2. In a device as claimed in claim **1**, rods fixed perpendicularly to said framing and slidingly supporting said frame, nuts screwed on to said rods and having said frame in pressure contact therewith, and compression springs intermediate said framing and said frame.

3. In a device as claimed in claim **2**, a pressure distributing frame embodying a recess facing said opening, positioned between said framing and said inflatable seal and slidably mounted on said rods, said compression springs being positioned between said pressure distributing frame and said framing.

4. In a device as claimed in claim **1**, a pressure distributing frame embodying a recess facing said opening, positioned between said framing and said inflatable seal and movable perpendicularly to said framing.

5. In a device for sealingly obturating an opening, comprising a framing around said opening, a sliding door movable transversely of said opening, a guiding door slideway coextensive with said framing and extending beyond the same, door moving means mechanically connected to said door, an inflatable seal positionable facing said framing and on that side of said slideway which is remote therefrom and a frame carrying said inflatable seal, the improvement wherein said frame is mechanically connected to said framing so as to being not movable transversely of said opening, said frame being formed with a recess therein opposite said opening, said seal being positioned intermediate said frame and said slideway.

6. In a device as claimed in claim **5**, the fact that said sliding door is supported in said slideway.

7. In a device as claimed in claim **5**, a pressure distributing frame embodying a recess facing said opening, positioned between said framing and said inflatable seal and movable perpendicularly to said framing.

8. In a device as claimed in claim **7**, the fact that, opposite said framing, said slideway is supported by said pressure distributing frame.

9. In a device for sealingly obturating and opening, comprising a framing around said opening, a sliding door movable transversely of said opening, a pressure fluid supply, a set of double acting pneumatic jacks mechanically connected to said door and each having a jack rod, a door-opening chamber and a door-closing chamber, an inflatable seal positionable facing said framing and a frame carrying said inflatable seal, the improvement

wherein said frame is mechanically connected to said framing so as to being not movable transversely of said opening, said frame being formed with a recess therein opposite said opening.

10. In a device as claimed in claim **9**, an electrically operated door-closing valve, an electrically operated door-opening valve, an electric selector switch for placing said electrically operated valves in circuit alternately, an electrical connection between said electric switch and said electrically operated door-closing valve, an electrical connection between said selector switch and said electrically operated door-opening valve, pneumatic interconnecting conduits between said door-closing valve and said door-closing chambers and pneumatic interconnecting conduits between said door-opening valve and said door-opening chambers.

11. In a device as claimed in claim **10**, a branch line extending between said inflatable seal and said interconnecting conduits to said door-closing chambers, and a limit-travel valve connected into said branch line and operatively actuated at the end of the door-closing motion by a

ramp member carried on an associated end of one of said jack rods.

12. In a device as claimed in claim **10**, a time-delayed relay connected into said second electrical connection of said electrically operated door-opening valve, the time-lag in said relay being equal to the time required to deflate said inflatable seal.

References Cited

UNITED STATES PATENTS

2,330,220	9/1943	Kemper	49—477 X
3,157,307	11/1964	Sullivan et al.	220—46

FOREIGN PATENTS

448,070	4/1948	Canada.

J. KARL BELL, Primary Examiner

U.S. Cl. X.R.

49—360, 477; 220—46