ABSTRACT OF THE DISCLOSURE

A device for sealing off an opening, comprises a door slidablely 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 slidable 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 between 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 leak-tightness by tightening of 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 on or 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-operated 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 4 to be obturated 5, 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 guides 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 edge 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 con-
ventional rotary seals 34, the line 32 being connected to the two front chambers of the jacks, to wit those on the
sideway 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 re-straining key carrying member 36 adapted to coop-
erate 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 one set of contacts 41 and 42 of the
restraining key 36 so that when the key is removed the
key carrying member 36 is 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 theory of operation of the device hereinbefore dis-
closed 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. Op-
eration 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
sideways 27. When the door is fully home in its closed
position, ramp 37 opens microvalve 36 by connecting with
the follower wheel thereof, thereby causing seal 12 to be
deflated.

Through agency of movable frame 9, seal 12 applies
door 8 leaktightly against the seal 7 of framing 5, thus
ensuring perfect distribution of the pressure exerted by
the door against the counteracting 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 func-
tion 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 auto-
matic once more: closing-solenoid 45 closes, causing clos-
ing 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 unpres-
surized and the jack pistons 44 of the door, with 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 con-
structional form, shown in FIGURES 4 and 5, like parts to
those in FIGURES 1 and 2 are designated by like reference numbers followed by the suffix a.

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

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

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

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

In order to provide for manual operation in the event
of failure of the compressed air supply, the door 8a has
associated thereto handles 36b which are preferably
mounted on the member 30a used for interconnecting the
door 8a and the rods 29a of jacks 28a.

It goes without saying that many changes and substi-
tutions of parts may be made in the specific embodiments
of the present invention hereinbefore disclosed and de-
scribed, without departing from the scope of the invention.

We claim:

1. 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, 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 be not
movable transversely of said opening, said frame be-
ing formed with a recess therein opposite said opening.

2. A device as claimed in claim 1, rods fixed per-
pendicularly 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. A device as claimed in claim 2, a pressure distrib-
uting 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 distribut-
 ing frame and said framing.

4. A device as claimed in claim 1, a pressure distrib-
uting frame embodying a recess facing said opening,
positioned between said framing and said inflatable seal
and movable perpendicularly to said framing.

5. A device for sealingly obturating an opening,
comprising a framing around said opening, a sliding door
movable transversely of said opening, a guiding door slide-
way 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 con-
 nected to said framing so as to be not movable transver-
sely of said opening, said frame being formed with a
recess therein opposite said opening, said seal being posi-
tioned 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 distrib-
uting 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, op-
posite 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 mechan-
ically 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

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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.

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