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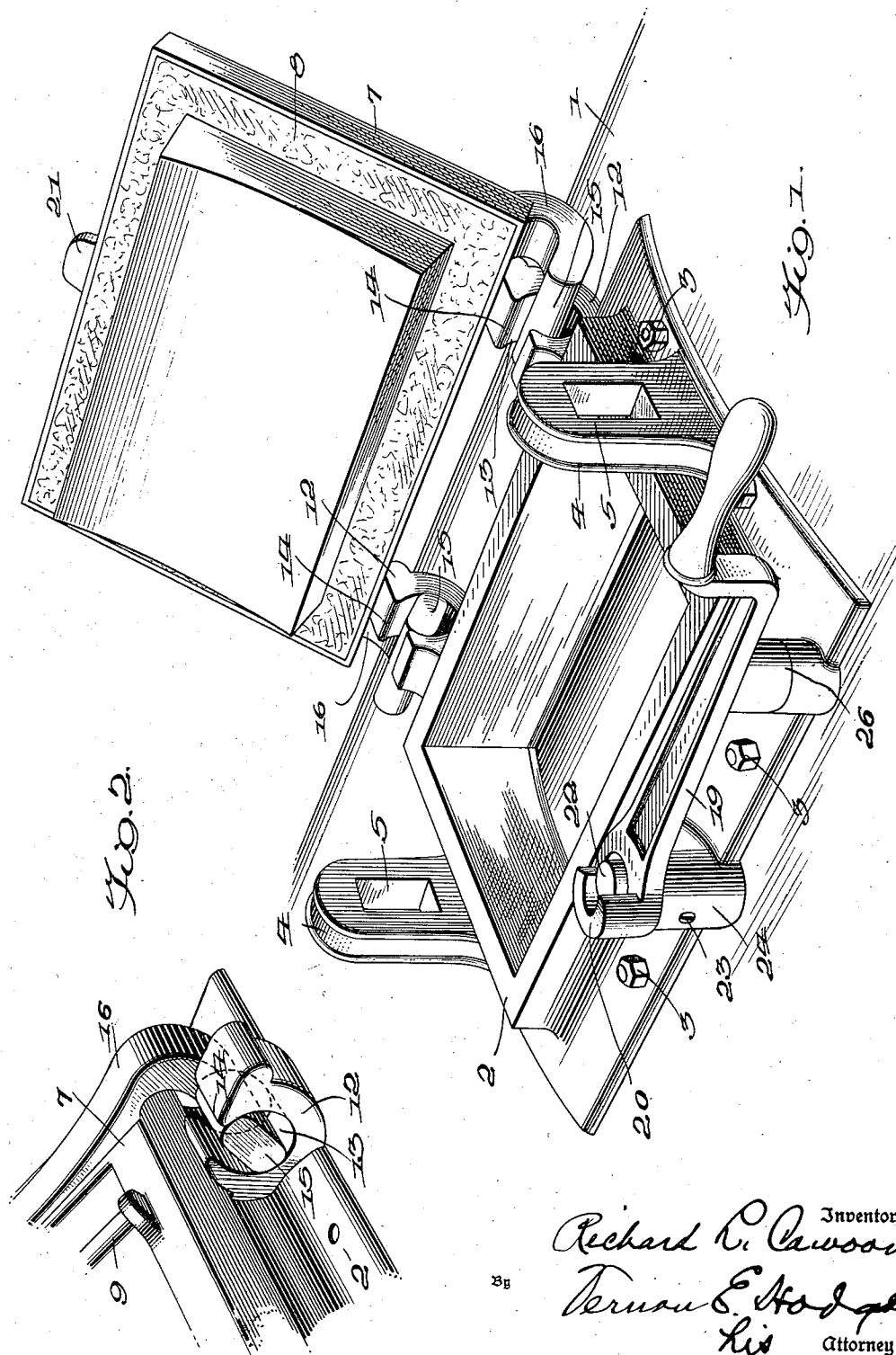
R. L. CAWOOD

2,011,675

GRINDING MILL DOOR

Filed Oct. 13, 1933

3 Sheets-Sheet 1



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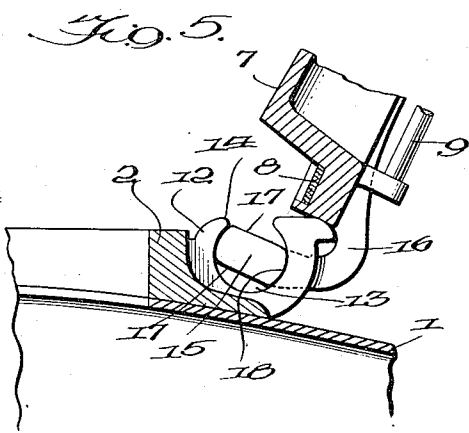
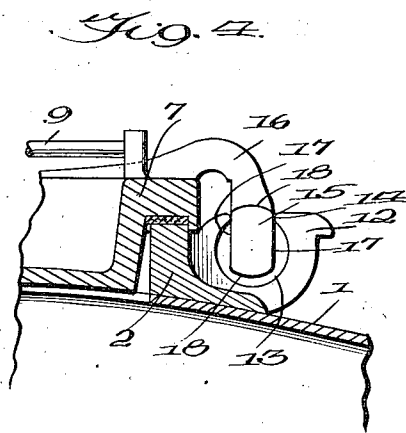
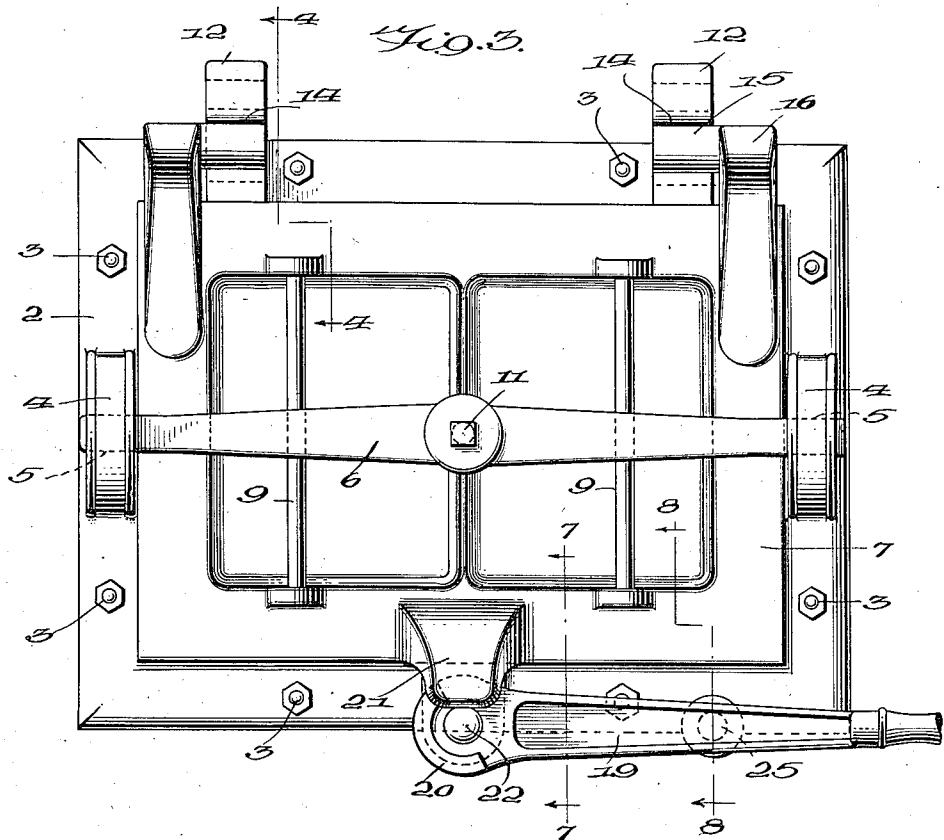
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GRINDING MILL DOOR

Filed Oct. 13, 1933

3 Sheets-Sheet 2



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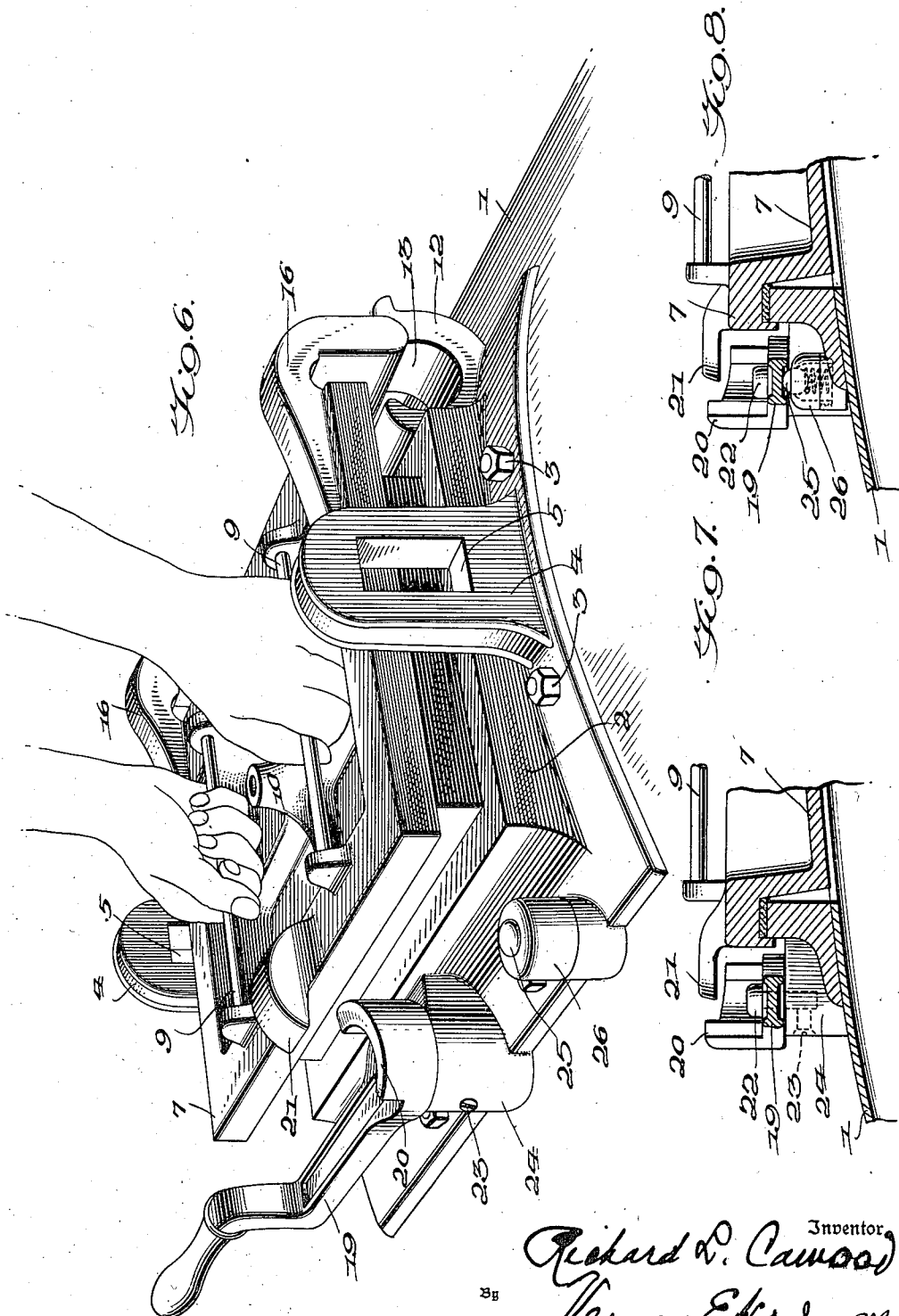
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GRINDING MILL DOOR

Filed Oct. 13, 1933

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,011,675

GRINDING MILL DOOR

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Application October 13, 1933, Serial No. 693,495

13 Claims. (Cl. 220—31)

This invention relates to an improvement in doors for pebble ball or tube mills, of a character such that the door may be either lifted out or swung back on its hinges. Heretofore pebble mills would ordinarily be built with doors which may be either lifted out or thrown back on their hinges but any door used was not capable of both movements. This invention makes possible for use the same door for either movement, that is to say, capable of being lifted directly off of the pebble mill or swung back on its hinges and held rigidly to the pebble mill. This is made possible by the character of hinges used for the door.

Another feature of the invention relates to the breaking of the seal of the door from its frame which is made possible by a lever hinged to the frame and having a cam surface which engaged a lug on the door for lifting the door and breaking its seal. Primarily, it was necessary to break the seal with a crow-bar as pebble mill doors stick very tightly after the pebble mill has been used, the gasket adhering to the frame. By swinging the lever, its cam breaks the seal very easily and raises the door permitting it to be opened.

In the accompanying drawings:—

Fig. 1 is a perspective view of the door in its open position;

Fig. 2 is a detail perspective view of one of the hinges;

Fig. 3 is a top plan view of the door closed;

Fig. 4 is a vertical sectional view on the line 4—4, of Fig. 3;

Fig. 5 is a similar view showing the door open;

Fig. 6 is a perspective view showing the door being lifted off;

Fig. 7 is a vertical sectional view on the line, 7—7 of Fig. 3; and

Fig. 8 is a similar view on the line, 8—8, of Fig. 3.

The invention is shown as applied to a pebble mill of a usual or well-known construction and designated generally by the numeral 1. The door opening of the pebble mill has an upstanding frame 2, secured thereto as by rivets or bolts 3. The frame 2 has upstanding lugs 4 with openings 5 therein to receive the usual locking bar 6, for the door.

The door is designated generally 7, and carries a gasket 8, in position to fit onto the top edges of the frame 2 for sealing the door to the frame when the door is closed and locked tightly in place, so that when the pebble mill 1 rotates in operation, the contents will not leak out through the door. The door 7 is provided with the usual handles 9 for lifting it off, as shown in Fig. 6, and has the

usual boss 10 to receive the inner end of a set screw 11 threaded through the locking bar 6 in order to effectively seal and lock the door in a closed position. The opposite ends of the bar 6, engage in the openings 5, so that when the screw 11 is turned to raise the bar 6 relative to the door, the bar being held against raising by the openings 5, the screw forces the door downward into a tightly sealed relation with the upper edge of the frame 2.

The frame 2 has a pair of stationary hinge brackets 12, on one side thereof, which brackets are provided with openings 13 therein, each of which is greater than a semi-circle, but which has a constricted slot 14 in the upper side thereof, communicating with the opening 13. Each of the openings 13 is adapted to receive a hinge pin 15 carried by and extending inwardly from a bracket 16, attached to the door 7. The brackets 16 extend rearwardly from the back edge of the door and are curved downward, as shown in Figs. 4 and 5, having the hinge pins 15 projecting inwardly toward each other.

Each of the hinge pins 15 has flattened sides 17 spaced apart a distance substantially equal or slightly less than the width of the slot 14, so as to slip into or out of the opening 13, through the slot 14 when the door is in a closed position as represented in Fig. 4. However, by raising the forward edge of the door as in breaking the seal, the hinge pins 15 drop down into the openings 13, and having curved opposite sides 18, they turn within the openings 13 permitting the door to swing from the position shown in Fig. 4 to the position shown in Fig. 5, where the door is held against further backward movement by engagement with the extreme edges of the stationary brackets 12.

However, when the door is in the position shown in Fig. 4, with the sides 17 vertical and approximately registering with the sides of the slots 14, the door may be lifted completely off of the frame as shown in Fig. 6.

In that manner, the hinges of the door permit swinging of the door on its hinges to the position shown in Figs. 1 and 5, or they permit complete removal of the door by being lifted out of the frame as represented in Fig. 6, thereby providing a universal door capable of either use, but when the door is swung back on its hinges, it cannot be accidentally displaced.

When the forward edge of the door is lifted so as to start the hinging action, that turns the hinge pins 15 sufficiently as represented in Fig. 2, to lock said hinge pins in the openings 13, and thereby preventing accidental displacement of

the door in the course of its being swung back on its hinges.

The gasket 8 is ordinarily of cork or other material which will form an effective seal with the upper edge of the frame 2, and after the pebble mill has been used, the seal is not easily broken so as to permit the opening of the door. To facilitate the breaking of the seal, this invention utilizes a lever 19, having a cam surface 20 thereon in position to engage under a lug 21, carried by the door 7, in order to raise the door and thereby break its seal so as to permit the door to be opened. The lever 19 is journaled on a pivot pin 22, held in place by a set screw 23 in a boss 24 carried by the frame 2.

In order to hold the lever 19 in its normally inoperative position, a spring-pressed ball 25 is adapted to engage the groove in the underside of the handle to restrain its turning movement. The ball is carried by a small housing 26 attached to a side of the frame.

When it is desired to break the seal and open the door, the lever is swung from the position shown in Fig. 1, around to the position shown in Fig. 6, which causes the cam surface 20 to bear up against the lug 21 and raise the forward edge of the door, thereby breaking the seal and permitting removal of the door and swinging of it back on its hinges.

I claim:

1. In a mill, the combination with a cylinder having a doorway and frame therefor, of a door for closing said doorway and having a hinge pin thereon of greater width than thickness, the plane of the width of the pin extending approximately at a right angle relative to the plane of the door and a bracket for receiving the pin having a slot through the upper side thereof permitting bodily removal of the door when the width of the pin is in alignment with the slot.

2. In a mill, the combination with a cylinder having a doorway and frame therefor, of a door for said doorway with means for sealing said door to the frame, and means pivoted to the frame for movement in a plane approximately parallel with the frame and having a top cam surface in position to be operated relative thereto for breaking the seal of the door.

3. In a mill, the combination with a cylinder having a doorway and frame therefor, of a door for said doorway having means for sealing said door to the frame when closed, and a lever pivoted to the frame for movement in a plane approximately parallel with the frame for swinging movement relative thereto and having cam means at the top side thereof in position to bear upwardly against the door and break the seal thereof when the lever is swung relative to the frame.

4. In a mill, the combination with a cylinder having a doorway and frame therefor, of a door for said doorway having means for sealing the same to the frame, said door having a forwardly projecting lug carried thereby, a lever pivoted to the frame for movement in a plane approximately parallel with the frame and having a cam bearing surface underlying the lug when the door is closed for bearing up on the lug and breaking the seal of the door when the lever is turned in one direction.

5. In a mill, the combination of a frame having a projecting bracket, said bracket having an opening therein provided with a slot through one side thereof, a door carrying a hinge pin of greater width than thickness in cross section, the width

of the hinge pin being turned approximately at right angles relative to the plane of the door, the slot in the bracket being in registry with the hinge pin when the door is in an approximately closed position.

6. In a mill, the combination of a frame having a bracket, said bracket having an opening therein with a slot through the upper side of said opening of less width than the width of the opening, and a door for said frame carrying a hinge pin extending into the opening, said hinge pin being of greater width in cross section than the thickness thereof, the thickness of the hinge pin approximately corresponding with the width of the slot for removal of the hinge pin through the slot, the greater width of the hinge pin extending in a plane approximately at right angles to the plane of the door.

7. In a mill, the combination of a frame having brackets with openings therein, said openings having slots in the upper sides thereof of less width than the diameter of the openings, a door for the frame carrying inwardly extending hinge pins normally received within the openings, each of said hinge pins having flattened sides extending approximately at right angles to the plane of the door and spaced apart a distance approximately equal to the width of the opening to permit removal of the door from the frame when the door is in an approximately closed position.

8. In a mill, the combination of a frame having brackets at a side thereof each with a hinge opening therein having a slot to the top of the bracket, a door carrying hinge pins normally received in the openings and each being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot only when the door is approximately closed and preventing removal from the opening when the door is open.

9. In a mill, the combination of a frame having brackets at a side thereof each with a hinge opening therein having a slot to the top of the bracket, a door carrying hinge pins normally received in the openings and each being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot only when the door is approximately closed and preventing removal from the opening when the door is open, and means for clamping the door to the frame in closed position preventing removal of the pins from the openings.

10. In a container, a door frame having a hinge opening therein with a slot extending from said opening to the top of the frame, a door having a hinge pin normally received in the opening and being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot when the door is approximately closed and to prevent removal when the door is open.

11. In a container, a door frame having hinge openings in a side thereof, each having a slot extending from the opening to the top of the frame, a door having hinge pins normally received in the openings and each being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot when the door is approximately closed and to prevent removal when the door is open.

12. In a container, a door frame having hinge openings in a side thereof, each having a slot extending from the opening to the top of the frame, a door having hinge pins normally received

in the openings and each being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot when the door is approximately closed and to prevent removal when the door is open, and means extending across said door and acting on opposite sides thereof for clamping the door closed.

13. In a mill, the combination of a frame having brackets at a side thereof each with a hinge opening therein having a slot to the top of the bracket,

a door carrying hinge pins normally received in the openings and each being of elongated cross-section with the greater width approximately at right-angles to the plane of the door to pass through the slot only when the door is approximately closed and preventing removal from the opening when the door is open, and means extending across said door and acting on opposite sides thereof for clamping the door closed.

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