

Feb. 13, 1934.

H. E. McCrery

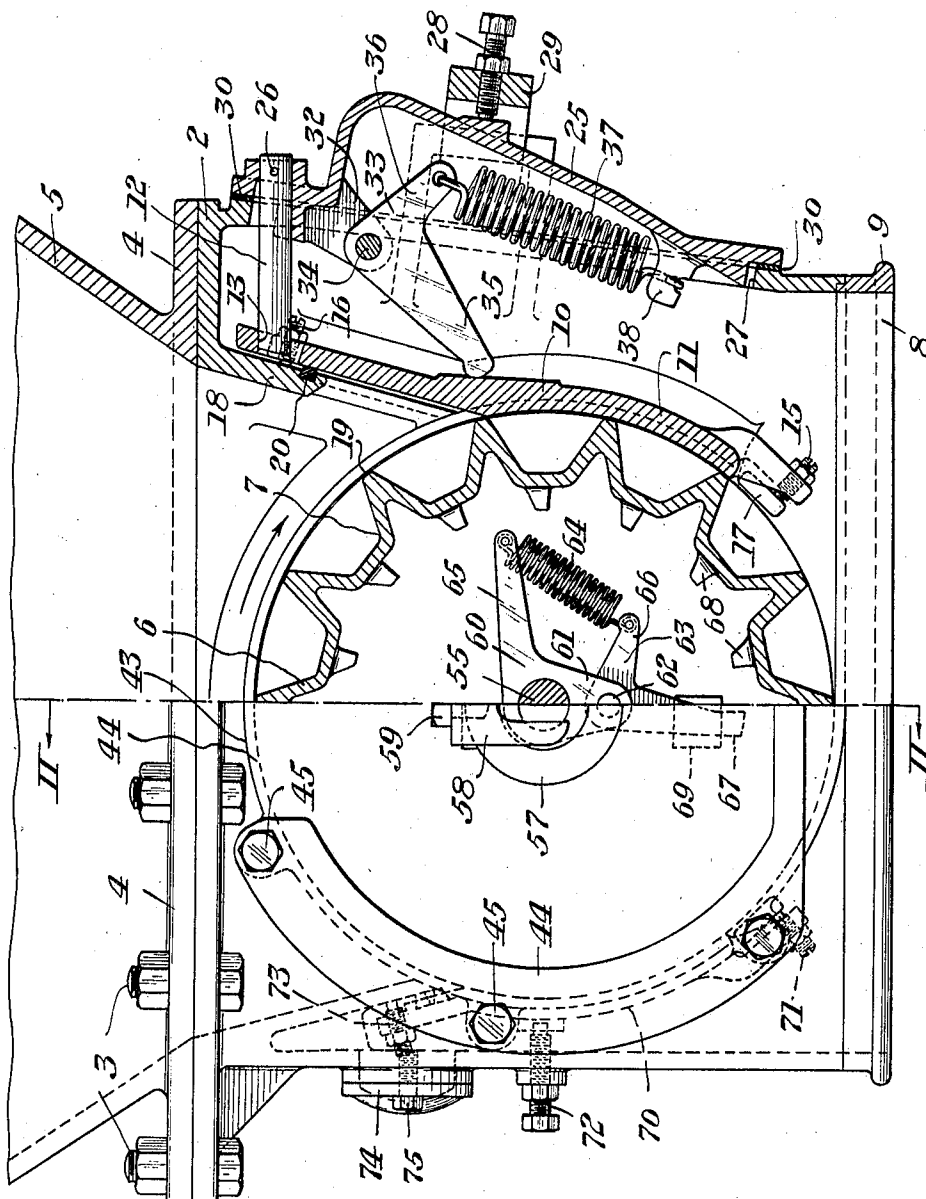
1,947,210

ROTARY VALVE

Filed Jan. 23, 1932

2 Sheets-Sheet 1

Fig. 1.



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2 Sheets-Sheet 2

Fig. 2.

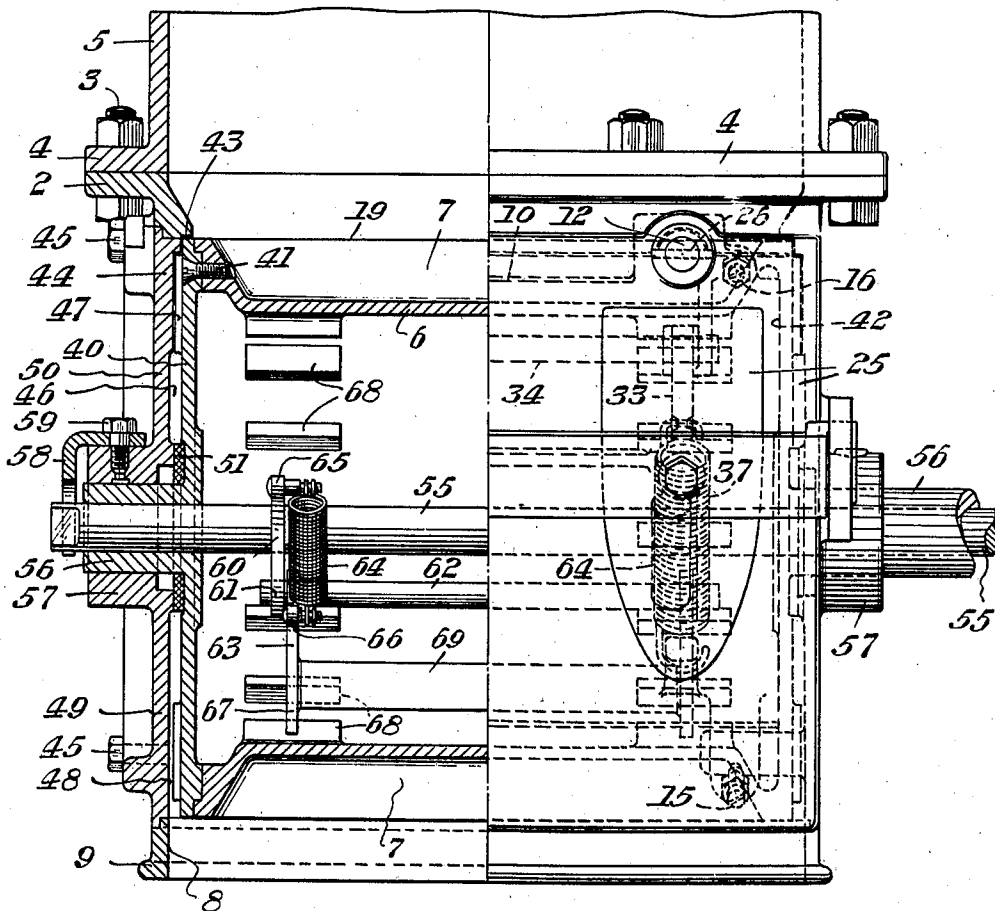
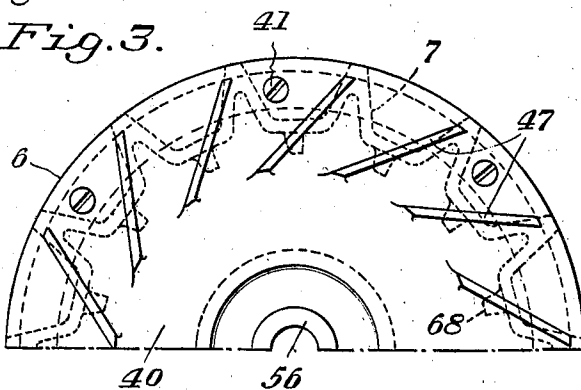


Fig. 3.



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UNITED STATES PATENT OFFICE

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ROTARY VALVE

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5 Claims. (Cl. 221-130)

This invention relates generally to rotary valves for measuring and feeding powdered material from the bottom of a bin or storage hopper. Although the valve is adapted to feed other powdered materials, it is described herein particularly as applied to the feeding of cement, for which it is particularly adapted.

Cement contained in a bin or other receptacle from the bottom of which it is to be removed for measurement or use has a decided tendency to pack and bridge over the opening from which it is to be discharged if it is permitted to stand for some time without being drawn off. In addition to this tendency, it has a tendency to flow with very great freedom when once started and especially when it becomes mixed with air by breaking loose from the pile or by the crushing of the pile above it. For this reason, it has not been generally satisfactory to draw off cement from the bottom of the bin through an opening controlled by an ordinary gate. If an ordinary gate is used, it is necessary to make the gate very large and to open it wide to overcome bridging and if the gate is opened wide and the arch of cement breaks, it is impossible to close the gate rapidly enough to prevent the escape of very large quantities of cement before the gate can be closed.

Rotary valves have been employed for this purpose since they permit a large area of connection to the bin in order to prevent bridging of the material, but prevent the cement from falling down because the opening through the valve is not continuous, the feed taking place with the rotation of the valve rotor and stopping when the rotor stops. The present invention provides certain improvements in rotary valves as hereinafter pointed out.

In the accompanying drawings, which illustrate the present preferred embodiment of my invention,

Figure 1 is a partial end view and partial transverse section of the rotary valve;

Figure 2 is a partial side elevation and partial longitudinal section of the valve shown in Figure 1, the section being taken on the line II-II of Figure 1, and

Figure 3 is a partial end view of the valve rotor showing the scraper blades for preventing packing of the material between the end of the rotor and the casing.

Referring more particularly to the accompanying drawings, a valve casing 2 is secured by bolts 3 to a flange 4 of a cement bin or hopper 5. A rotor 6 which rotates in the direction indicated

by the arrow in Figure 1, is disposed beneath the opening in the bin and is provided with pockets 7 which receive cement from the bin and carry it downwardly and discharge it through an opening 8 in the bottom of the casing. The bottom of the casing is provided with a bead 9 so that a sack may be connected to the casing in order to prevent cement dust from flying about.

In feeding cement or other powdered material by the use of a rotary valve, it is necessary to provide some means for allowing obstructions such as pebbles, nails, etc., to pass through the valve without breaking any of the parts, and yet provide a means for leveling off the cement in the pockets and maintaining it in the pockets until the pockets are over the delivery opening. These objects are accomplished according to the present invention by providing a yieldable side plate which is bodily movable toward and away from the rotor.

A side plate 10, the lower portion 11 of which is curved, is supported by two pins 12 which fit into openings 13 provided adjacent the top of the side plate near the ends thereof. Adjusting screws 15 and 16 are provided at the bottom and top of the plate, respectively, at each end thereof these screws working against projections 17 and neck portions 18 of the casing 2 in order to adjust the side plate so that there will be a slight space between the inside of the curved portion 11 and the tops 19 of the pockets in the rotor. Packing 20 is inserted between the neck 18 and the upper portion of the side plate in order to prevent escape of cement.

Each of the pins 12 which support the side plate 10 is secured to a cover 25 by a pin 26 passing through an opening in the pin 12 and a corresponding opening in the cover. Each cover fits over an opening 27 in the side of casing 2 and is secured to the casing by a set screw 28 threaded in a yoke 29 secured to the casing. A packing ring 30 is provided between the cover and the casing to prevent loss of cement.

Extending from the upper part of the inside of each cover 25 is a bracket 32 to each of which is pivoted a bell crank lever 33 at the point indicated by the reference numeral 34. The inner arms 35 of the bell cranks press against the side plate 10 to maintain it in adjusted position. To each of the other arms 36 is secured one end of a spring 37, the opposite ends of which are secured to brackets 38 extending from the inside of the cover. The bell cranks 33 and spring 37 maintain the side plate in the position indicated in Figure 1 during normal operation of the

valve, but if an obstruction such as a pebble is fed with the cement and tends to become lodged between the rotor and the side plate, the side plate will move away from the rotor so as to allow the obstruction to pass and will thereafter be returned to normal position by the action of the springs 37. The pins 12 which support the side plate at the upper ends thereof, have a sliding fit with the side plate, so that the side plate may move bodily away from the rotor in order to allow an obstruction to pass through the valve. The pins also have a limited tipping movement due to their manner of connection to the cover 25, thus allowing the side plate 10 to tip to accommodate itself to free the obstruction. The adjusting screws 15 and 16 enable the plate to be adjusted independently at the top and the bottom thereof in order to space it the required distance from the rotor.

The ends of the rotor are closed, the left-hand end, as viewed in Figure 2, being closed by a removable end plate 40 secured to the body of the rotor by screws 41, while the opposite end 42 is preferably cast integrally with the body portion. The provision of the removable end plate 40 enables ready access to the inside of the rotor in order to remove the striking mechanism which prevents cement from sticking in the pockets of the rotor and which will be referred to in detail hereinafter.

In devices for handling cement, great difficulty is sometimes experienced owing to the cement packing in between moving parts, for example, between the end plates of the rotor and the casing. This difficulty is overcome, according to the present invention, by the construction now to be described, which provides a space between these parts and also means for loosening or dislodging any cement which may get into this space. As shown in Figure 2, the end plate 40 fits in a circular opening 43 formed in the end of the casing 2. The opening 43 is closed by a removable casing end plate 44 which is secured to the casing by bolts 45. The casing end plate 44 also fits into the opening 43, but is spaced away from the rotor end plate 40 so as to provide an annular space 46 between the casing and rotor. Scraper blades 47, as shown in Figure 3, are formed on the outside of the end plate 40 and act to cut and dislodge any cement which may have passed through the joint between the plates 40 and 44 at the edge of the opening 43. The cement dislodged by the scraper blades 47 passes from the annular space or chamber 46 through an opening 48 which is provided by making the lower part 49 of the end plate thinner than the upper part 50, and so is returned to the inside of the casing below the rotor. Packing 51 is inserted between the plates 40 and 44 near the axis of the rotor to prevent dust fouling the bearing.

Cement has a tendency to adhere to metal surfaces, and in order to prevent it from sticking to the bottoms of the pockets in the rotor, I provide strikers inside of the rotor which contact successively with lugs extending from the inner surface of the rotor. A non-rotatable shaft 55 extends through the rotor and passes through journals 56 which are formed on the ends of the rotor. The journals 56 rotate in bearings 57 formed on the ends of the casing and the rotor is rotated by some driving means, not shown, which may be connected to one of the journals 56. The shaft 55 is kept from rotating by means of a keeper 58 secured by a screw 59

to the bearing 57. Two brackets 60 are secured to the shaft 55 adjacent opposite ends thereof, and by this means a fixed support is provided inside of the rotor which does not rotate even upon rotation of the rotor. Each of the brackets 60 has an arm 61 carrying a pin 62 which acts as a pivot for a bell crank striker 63. A spring 64 is connected at one end to an arm 65 of the bracket 60 and at the other end to an arm 66 of the bell crank 63 so as to normally raise the arm 66 and move the arm 67 of the striker into the path of lugs 68 which extend from the inside of the rotor. The arms 67 of the two strikers 63 are connected by a rod 69. As the rotor rotates, one of the lugs strikes the lower end of arm 67 and the arm is moved to the left of the position shown in Figure 1. The lug passes under the arm and the striker is returned to the position shown in Figure 1 by the action of spring 64. By this means, the rotor is struck a blow each time one of the lugs contacts with the arm 67, which blows prevent the cement from sticking in the rotor pockets.

On the side of the rotor opposite the yieldable side plate 10 there is a somewhat similar side plate 70 which, however, is not yieldable, since any obstructions which may be in the cement will be delivered when the pockets reach the bottom of their descent and will not be carried up on the left-hand side of the rotor. Means is provided, however, for adjusting the plate 70 relative to the rotor. Six screws are employed for this purpose, three at each end, the three screws 71, 72 and 73 at one end being shown in Figure 1. The screws 71 and 73 at the bottom and top of the plate 70 are used to move the plate away from the rotor, whereas the screw 72 may be operated to move the plate toward the rotor. The screws 73 are operated through windows provided in the casing 2, which windows are normally closed by covers 74 held in place by screws 75. The covers prevent the escape of cement dust from the casing.

The pockets or troughs formed in the rotor for feeding the material are relatively deep and have relatively steep sides, as compared with those now in use. The feed opening from the bin 5 to the troughs is relatively wide, so that the troughs will have ample opportunity to be filled by the material as they move under the opening in the bin. This enables a high speed of rotation to be used, which means that the valve has a high capacity. Material is prevented from sticking in the troughs even though they are deeper than those ordinarily employed, because the striker acts to dislodge material which might tend to stick therein.

I have illustrated and described the present preferred embodiment of my invention. It is to be understood, however, that the invention may be otherwise embodied within the scope of the following claims.

I claim:

1. A rotary valve for feeding powdered material, comprising a casing open at the top and bottom, a rotor provided with pockets inside the casing, and a sliding side plate for maintaining the material in the pockets, the side plate being yieldably held in position adjacent the rotor but bodily movable therefrom in order to pass obstructions through the valve.

2. A rotary valve for feeding powdered material, comprising a casing open at the top and bottom, a rotor provided with pockets inside the casing, a side plate for maintaining the material

in the pockets, the side plate being slidably supported on a pin disposed adjacent the top of the plate so as to be bodily movable relative to the rotor, means for adjusting the top and bottom of the plate relative to the rotor, and means for yieldably forcing the side plate toward the rotor.

3. A rotary valve for feeding powdered material, comprising a hollow rotor having pockets in its periphery, lugs spaced around the inside of the rotor, a pivoted striker positioned to contact with a lug as the rotor is rotated, and a spring secured to the striker for returning it to proper position for striking another lug upon further rotation of the rotor.

4. A rotary valve for feeding powdered material, comprising a hollow rotor having pockets

in its periphery, lugs spaced around the inside of the rotor, a pivoted striker inside of the rotor, and a spring secured adjacent one end to the striker and urging it into the path of the lugs and adjacent the other end to a fixed support.

5. A rotary valve for feeding powdered material, comprising a hollow rotor having pockets in its periphery, lugs spaced around the inside of the rotor, a pivoted striker inside of the rotor, a spring secured adjacent one end to the striker and urging it into the path of the lugs and adjacent the other end to a support, and a non-rotatable shaft inside the rotor, said support being secured to said shaft.

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25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150