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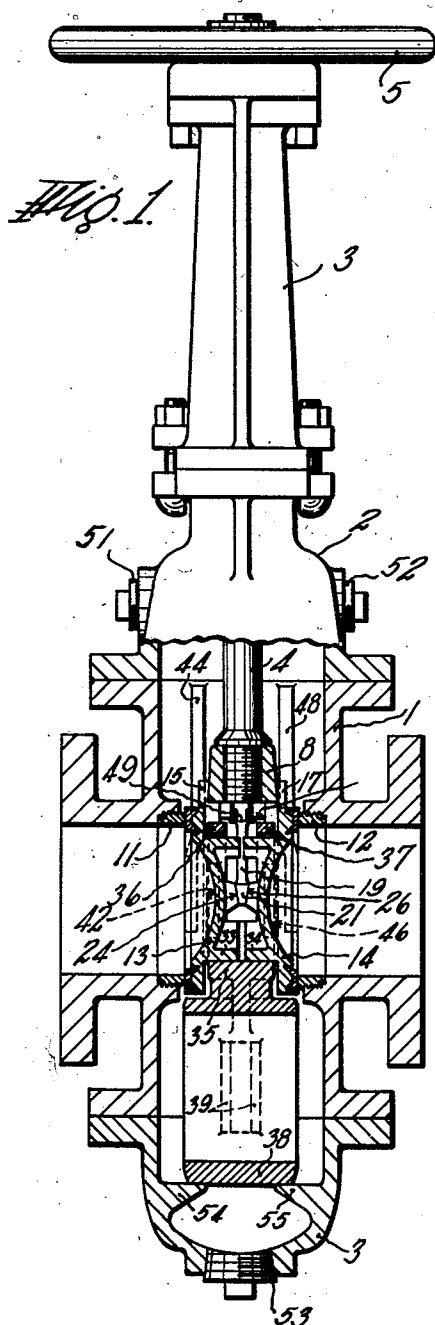
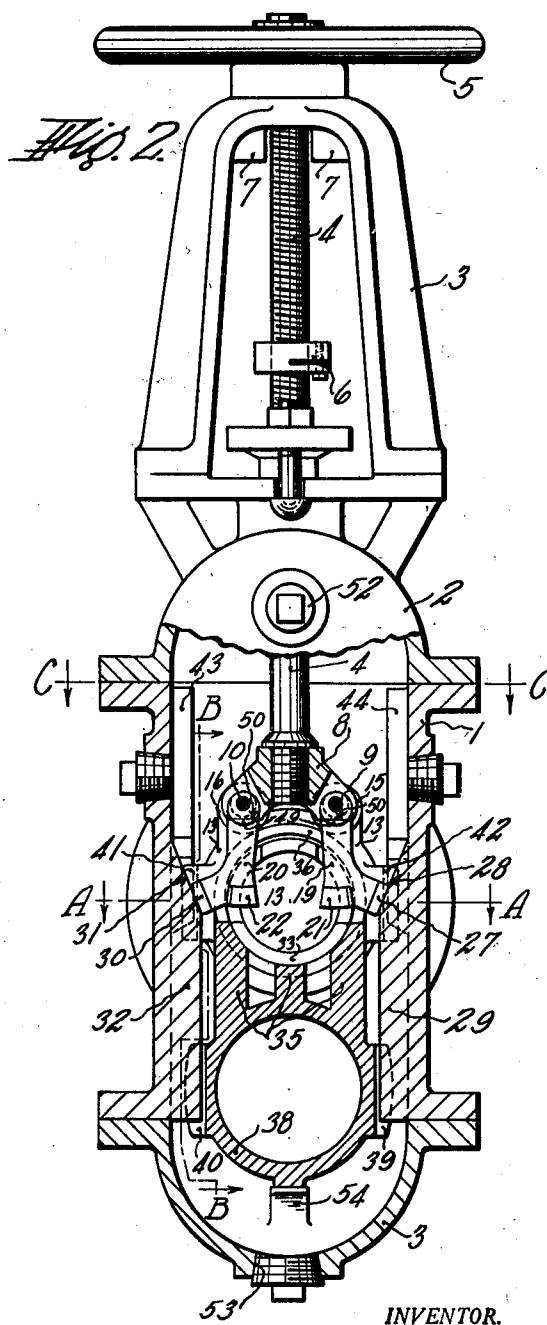
G. E. FOX

1,844,246

VALVE

Filed Dec. 11, 1929

2 Sheets-Sheet 1



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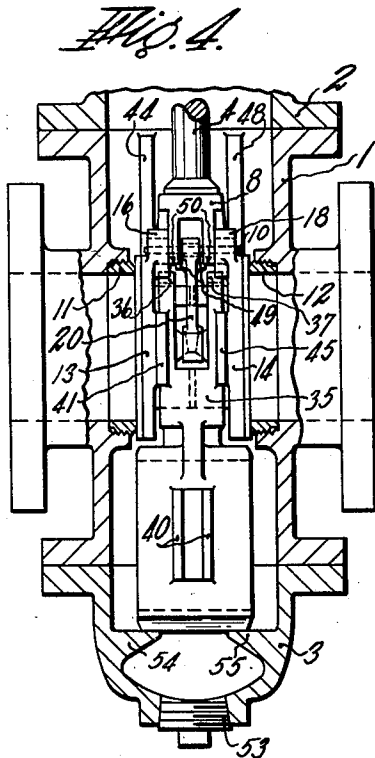
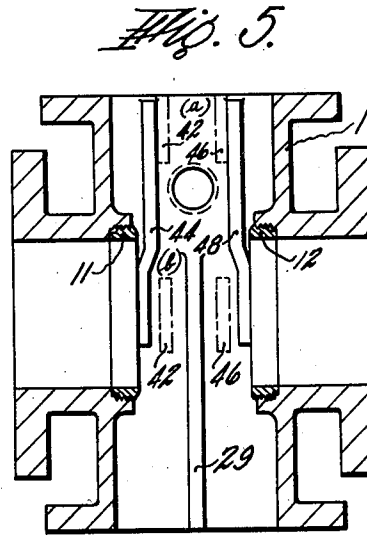
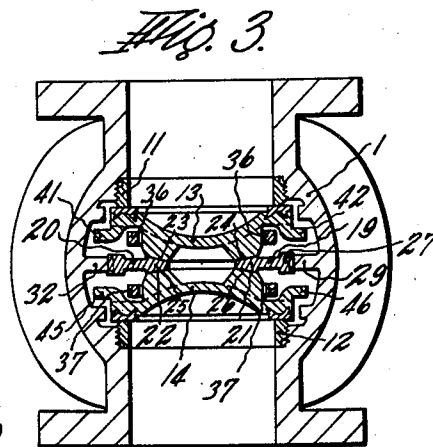
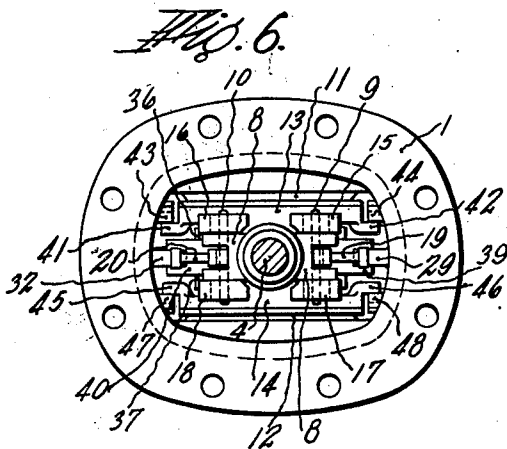
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VALVE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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VALVE

Application filed December 11, 1929. Serial No. 413,295.

This invention relates to valves for use in pipe lines and has for its object more particularly the provision of a structure that will give satisfactory and continued service in the handling of dirty and gritty fluids.

As an illustration of the character of use for which the present valve is particularly adapted may be mentioned the handling of water having a large amount of sand in suspension employed in the flotation process for cleaning anthracite coal. The known forms of valve are found unsatisfactory for such use because of the rapid destruction of the valve seats from the abrasive action of the material handled, and because of the uncertainty of operation when sand accumulates in the valve, which is an inevitable accompaniment of such use.

An object of the present invention, therefore, is to provide a valve of simple, rugged and durable construction which will be satisfactory under all conditions of use and will have a certainty of operation at all times.

A further object is to provide means for protecting the operating parts of the valve, including the valve seats, from the wearing action of sand or grit contained in the material passing through the valve when open, and at the same time secure an unimpeded flow of such material through the valve.

Further objects and advantages of the present invention will become apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side view of the valve with the upper part in elevation and the body part in section through the vertical axis;

Fig. 2 is an end view of similar character to Fig. 1, the body section being taken at right angles to that of Fig. 1;

Fig. 3 is a horizontal section along line A—A of Fig. 2;

Fig. 4 is a vertical section along line B—B of Fig. 2 showing in side elevation the interior working parts of the valve;

Fig. 5 is a vertical section of the body similar to that of Fig. 4 with the interior working parts of the valve removed to show the inside of the body wall; and

Fig. 6 is a horizontal section along line

C—C of Fig. 2 showing a top view of the interior working parts.

Referring more particularly to the drawings, 1 is the valve body having the bonnet 2 at its upper end and lower cover 3 at its lower end, said bonnet and cover being secured to the valve body in the usual way.

Above the body is located the yoke 3 through which is guided the usual spindle or valve stem 4 having at its upper end a hand wheel 5 for operating the same. A stop collar 6 is fixed to the spindle 4 and adapted to abut against the shoulders 7 at the upper end of the yoke for limiting the upward travel of the spindle or stem 4.

The lower end of the stem 4 carries fixed thereto a double sided yoke 8, each side of said yoke being bifurcated and carrying therein cross pin 9 extending through the spaced arms at one side and cross pin 10 extending through the spaced arms at the other side of said yoke.

The present valve is preferably of the type known as a parallel seat, double gate valve. 11 indicates the seat ring mounted in the valve body at one opening, and 12 the seat ring mounted in the body at the other opening of said valve, the inner edges of said seat rings being adapted to provide the usual seating faces for the valve. The two valve gates adapted to close against said seats are indicated at 13 and 14 and it will be understood that these valve gates are to be brought by vertical travel into an aligned position with respect to the valve seats and then given an axial movement horizontally for closing upon said seats. When the valve is opened, the gates are first moved horizontally to withdraw from the valve seats, and then moved vertically entirely away from said seats.

The valve gates 13 and 14 are alike, and gate 13 is formed at its upper end with a pair of perforated ears 15 and 16 by which it is hung on the cross pins 9 and 10; and gate 14 has similar ears 17 and 18 for being hung on said cross pins at the opposite ends thereof from gate 13. The perforations in said ears 15, 16, 17 and 18 are elongated or larger in size than the diameter of the cross

pins 9 and 10, whereby a relative lost motion may occur between said cross pins and gates for a purpose as will hereinafter appear. Pivotally hung upon the cross pins 9 and 10 are swinging wedge levers 19 and 20, one upon each cross pin as shown, said levers being located between the bifurcated arms at each side of said yoke 8. Each wedge lever carries at its lower inner end a wedging surface, indicated at 21 for lever 19, and 22 for lever 20. Each of the valve gates also carries on its rear side a pair of wedging surfaces indicated at 23 and 24 for the gate 13, and 25 and 26 for the gate 14. As shown in Fig. 3, the wedging surface 23 of the gate 13 is opposed to wedging surface 25 of the gate 14, and said pair of wedging surfaces is adapted to receive therebetween the wedging surface 22 of the wedging lever 20 for coaction therewith; and similarly, wedging surface 24 of gate 13 is opposed to wedging surface 26 of gate 14 and is adapted to receive therebetween the wedging surface 21 of wedge lever 19 for coaction therewith.

By comparing the showing in Figs. 1 and 3, it will be observed that each set of wedging surfaces above described is shaped to be double acting. In other words, the coacting surfaces are such that the gates 13 and 14 are spread apart and moved axially by both the inward and the slightly downward swinging movement of the wedge levers 19 and 20. The outer end of wedge lever 19 has a bearing surface 27 for working against an inclined face 28 of rib 29 on the valve body. Similarly the outer end of wedge lever 20 has a bearing surface 30 working against the inclined face 31 of rib 32 of said valve body. Thus when said wedge levers 19 and 20 are carried downwardly by the spindle 4, they are caused to be thrust inwardly at the proper time for closing the gates 13 and 14 by a laterally acting wedging movement thereon.

The inner facing sides of the valve gates 13 and 14 are each formed with a cylindrical shoulder 33 and 34 around which fits for a mutually supporting relation a carrier member or ring 35. The upper portion of said carrier ring is slotted, forming two parts thereof 36 and 37 to provide therebetween space for the working of the wedge levers 19 and 20. The lower part of the carrier ring 35 is extended to form integral therewith a depending guard ring 38 of the shape shown so as to have an opening therethrough of approximately the same size as the pipe opening through the valve. The lower end of the guard ring 38 is adapted to abut against shoulders 54 and 55 in the body cover of the valve to serve as a stop for limiting the downward travel of the guard ring, carrier member, gates and spindle. Upon opposite sides of the guard ring 38 are provided grooved flanges such as 39 and 40 for straddling the ribs 29 and 32 formed at each side of the

valve body, whereby said guard ring and carrier are guided for a straight vertical travel in said body.

As shown in Fig. 6, each of the valve gates is also provided at opposite edges thereof with wing portions or flanges such as 41 and 42 for gate 13 adapted to run in contact with spaced guide rails or ribs 43 and 44 at one side of the valve body, and 45, 46 for gate 14 adapted to run on guide rails 47, 48 at the other side of the valve body; whereby said valve gates are guided in their vertical travel in a path which will insure a clearance between the faces of said valve gates and said valve seats. The lower ends of the several guide rails 43, 44, 47 and 48 are inclined gradually toward their adjacent valve seats, as shown more particularly in Fig. 6, in such a manner that when the valve gates are in aligned position with the valve seats the wings of each valve gate will be cleared of said guide rails and thus permit the axial movement of said valve gates for the closure of the valve. In Fig. 5 there is shown by dotted lines in position (a) the wing 42 of gate 13 and wing 46 of gate 14 when the gates are at the upper end of their travel, and in position (b) said wings when the gates are in alignment with the valve seats for closing.

The operation of the valve will be understood from the foregoing description and may be briefly described as follows. When the spindle 4 is turned to its uppermost position, the stop collar 6 will bear against the shoulder 7 and the valve gates and carrier member assembled therewith will lie in the upper part of the valve body and bonnet. The guard ring 38 will be in alignment with the valve seats and is of such form that it closely fits the space between the same for closing the aperture around the valve seats and at the same time provides an opening straight way through the valve of full size serving as a continuation of the pipe line. The close fit of the guard ring between the valve seats adequately protects said seats from the action of the passing fluid although it should be understood that this fit is not close enough to actually rub across the valve seats. The smallest possible clearance is here provided and the guiding flanges 39 and 40 of the guard ring with the ribs 29 and 32 of the body serve to prevent any such injurious rubbing action between the guard ring and the valve seats when the former is moving in and out of its upper position.

When the valve is to be closed, the spindle is turned down until the guard ring abuts the shoulders 54 and 55 whereupon the valve gates are aligned in their proper position for closing. During the downward travel of said gates, they are guided by the rails such as 43, 44, 47 and 48 and prevented from coming into sliding contact with the valve seats. When the guard ring 38 has been stopped in

its lowermost position, the spindle may be turned for a slight further travel downwardly due to the loose connection between the cross pins 9 and 10 of the yoke 8 and the ears 15, 16, 17 and 18 of the valve gates heretofore mentioned. This further downward travel of the spindle and its pins 9 and 10 causes the wedge levers 19 and 20 to work against their cam surfaces 28, 31 and be thrust inwardly for spreading the valve gates and moving them axially against the valve seats to close the valve. It will be understood that the axial travel of said valve gates will be guided in true alignment with the valve seats by their mutually engaging relation with the carrier ring 35. When the valve is to be opened from its tightly closed position, the initial upward movement of the spindle 4 first withdraws the wedging levers 19, 20 and relieves the closing pressure on the valve gates and the latter are subsequently picked up by the cross pins 9, 10 for being shifted vertically. Immediately upon being lifted, the valve gates engage by their wings upon the inclined portions of the rails 43, 44, 47 and 48 and thus withdraw from any rubbing contact with the valve seats.

In order to avoid imposing a heavy strain upon the cross pins 9 and 10 in forcing the wedge levers 19 and 20 into position, I have preferably formed shoulders such as 49 on each wedge lever adapted to be engaged by a flattened portion 50 on each arm of the yoke 8 (see Fig. 4). This permits making the connection between each wedge lever and its pin somewhat loose so as to have the thrusting action upon said wedge lever take place between the shoulders 49 and 50.

Screw threaded and plugged openings such as 51, 52 and 53 are provided at desirable points in the valve body for facilitating the flushing out of the same in cleaning and removing accumulated sand therein. The lower cover 3 provides a space for the collection of sand and dirt deposits in a manner not to interfere with the working of the valve.

It will be observed that in the construction of valve described the valve seats are at all times protected from an abrasive action of the passing fluid or any gritty material such as sand in suspension. Furthermore, should any sand become lodged upon the valve seats, it will not be dragged across the same by a sliding action of the gates or guard ring across the seats and thus cause their rapid destruction. The laterally acting wedging devices combined with the straight line axial movement of the valve gates insures a tight closing of the valve at the proper time without possible interference by accumulated sand within the valve nor will such accumulated sand cause any premature closing of the valve during its downward movement.

What I claim is:

1. In a valve, in combination, a valve body

having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member, said assembly being supported for vertical movement with said stem, interengaging means between said carrier member and gates whereby said carrier member acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates, said guide means permitting an axial travel of said gates to closed position when aligned with said seats, and laterally acting wedging means for closing said gates on said seats when in aligned position therewith.

2. In a valve, in combination, a valve body having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member, said assembly being supported for vertical movement with said stem, interengaging means between said carrier member and gates whereby said carrier member acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates, said guide means permitting an axial travel of said gates to closed position when aligned with said seats, laterally acting wedging means for closing said gates on said seats when in aligned position therewith, a guard ring depending from and supported from gate and carrier assembly, said guard ring adapted to fit between said valve seats and close the aperture around the seats and provide a straight way passage through the valve, when the gate and carrier assembly is moved to its upper position.

3. In a valve, in combination, a valve body having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member, said assembly being supported for vertical movement with said stem, interengaging means between said carrier member and gates whereby said carrier member acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates to closed position when aligned with said seats, laterally acting wedging means for closing said gates on said seats when in aligned position therewith, a guard ring depending from and supported from said gate and carrier assembly, said guard ring adapted to fit between said valve seats and close the

aperture around the seats and provide a straight way passage through the valve, when the gate and carrier assembly is moved to its upper position, and a stop for limiting the upward travel of said gate and carrier assembly to align the guard ring with said seats.

4. In a valve, in combination, a valve body having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member, said assembly being supported for vertical movement with said stem, interengaging means between said carrier member and gates whereby said carrier member acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates, said guide means permitting an axial travel of said gates to closed position when aligned with said seats, laterally acting wedging means for closing said gates on said seats when in aligned position therewith, a guard ring depending as an extension of said carrier member, said guard ring adapted to fit between said valve seats and close the aperture around the seats and provide a straight way passage through the valve when the gate and carrier assembly is moved to its upper position, and guiding means providing for a straight vertical travel of said guard ring.

5. In a valve, in combination, a valve body having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member, said assembly being supported for vertical movement with said stem, interengaging means between said carrier member and gates whereby said carrier member acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates, said guide means permitting an axial travel of said gates to closed position when aligned with said seats, laterally acting wedging means for closing said gates on said seats when in aligned position therewith, comprising wedge levers pivotally supported from said stem, a guard ring depending from and supported from said gate and carrier assembly, said guard ring adapted to fit between said valve seats and close the aperture around the seats and provide a straight way passage through the valve when the gate and carrier assembly is moved to its upper position, and guiding means providing for a straight vertical travel of said guard ring, said guiding means comprising ribs on said

valve body having inclined surfaces at their upper ends for coacting with said wedge levers.

6. In a valve, in combination, a valve body having two parallel oppositely facing seats, a vertically movable valve stem, a pair of gates assembled with a carrier member for a vertical movement with said stem, said gates being hung from said stem and mutually supporting shoulders between said gates and said carrier member whereby the carrier acts as a guide for an axial movement of said gates, a stop for limiting the downward travel of said gate and carrier assembly to align said gates with said seats, guide means for said gates to insure a clearance between said gates and said seats during the vertical travel of said gates, said guide means permitting an axial travel of said gates to closed position when aligned with said seats, wedge levers pivotally supported from said stem adapted to coact with wedge members on said gates for acting laterally thereof in closing said gates on said seats, a guard ring depending as an integral extension of said carrier member, said guard ring adapted to fit between said valve seats and close the aperture around the seats and provide a straight way passage through the valve when the gate and carrier assembly is moved to its upper position, guiding means for a straight vertical travel of said guard ring, said guiding means comprising ribs on said valve body having inclined surfaces at their upper ends for coacting with said wedge levers, and a stop for limiting the upward travel of said gate and carrier assembly to align the guard ring with said seats.

In testimony whereof I have affixed my signature.

GEORGE E. FOX.