March 30, 1926. 1,578,429

A. J. GRINDLE

SWITCHING VALVE

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Fig. 1.

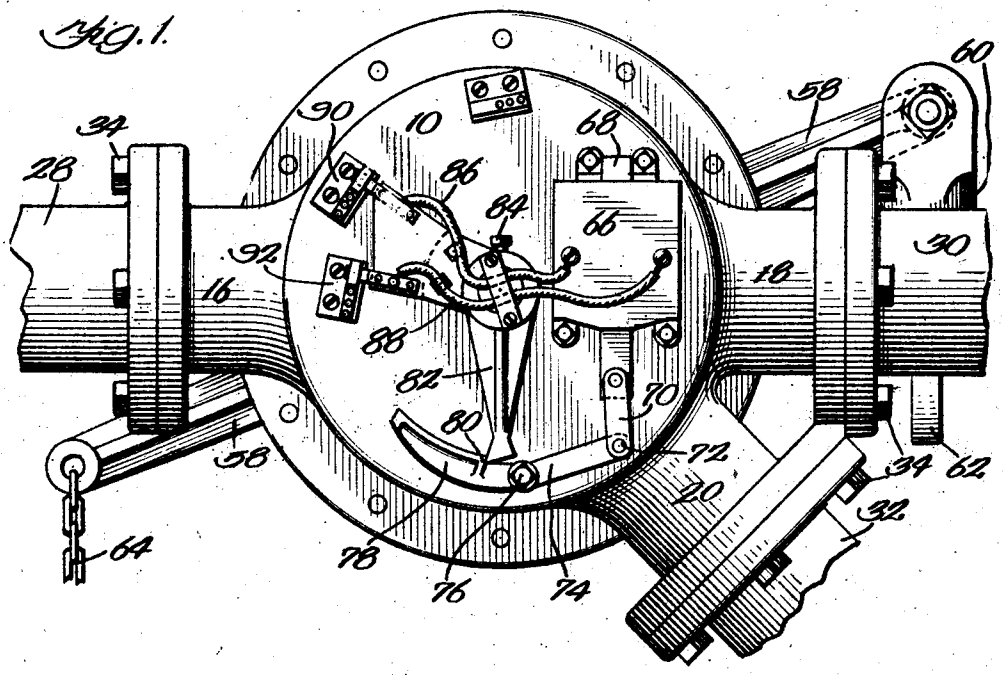
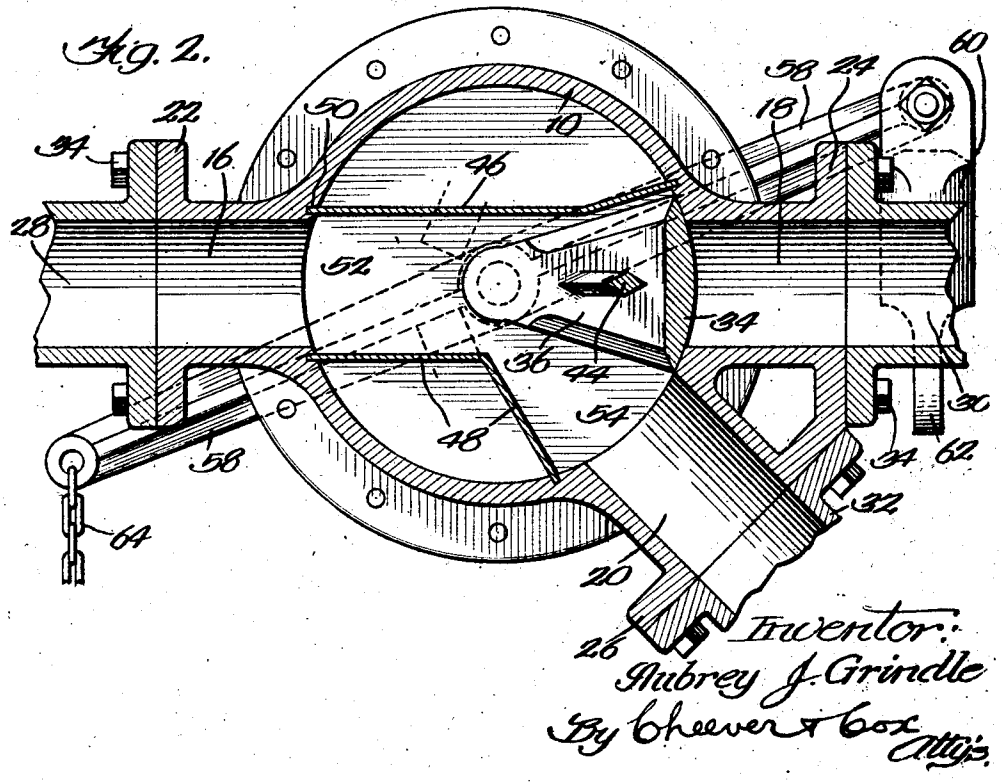


Fig. 2.



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Fig. 3

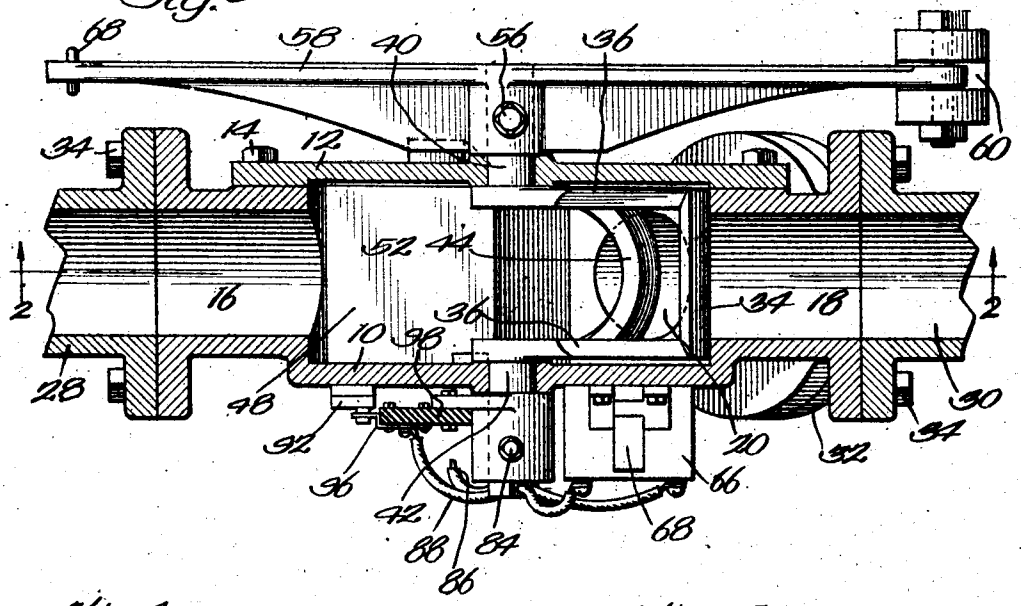


Fig. 4.

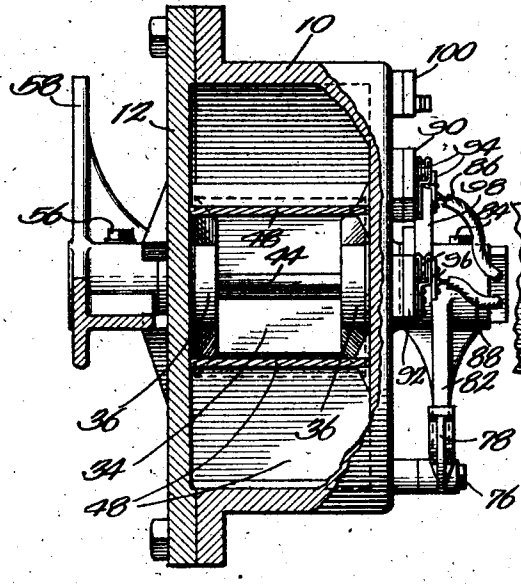
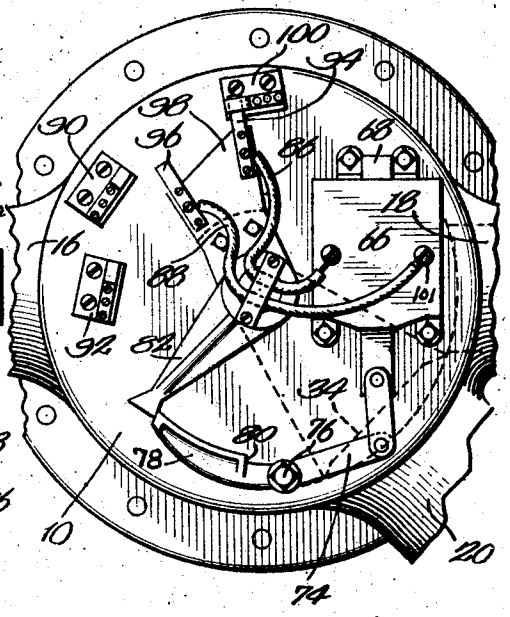


Fig. 5.



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UNITED STATES PATENT OFFICE.

AUBREY J. GRINDLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO GRINDLE FUEL EQUIPMENT COMPANY, OF HARVEY, ILLINOIS, A CORPORATION OF ILLINOIS.

SWITCHING VALVE.

Application filed February 15, 1923. Serial No. 619,313.

To all whom it may concern:

Be it known that I, AUBREY J. GRINDLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switching Valves, of which the following is a specification.

This invention relates to valves, particularly to one especially designed for use in controlling the delivery of powdered material—such as coal—from a central station to various sub-stations, as fully set forth for instance in my prior application, Serial Number 440,007, of which application this invention is in certain particulars a continuation.

The object of the invention is to provide a valve for this purpose which handles the powdered material without clogging; which is self-sealing so that air used to force the powdered material through the valve does not readily escape, and which is provided with automatic electrically controlled locking mechanism for holding the valve device in each of two desired positions.

The invention consists in a mechanism capable of attaining the foregoing objects, which can be easily and cheaply made, which is satisfactory in use and is not readily liable to get out of order.

More particularly, the invention consists in the many features and details of construction which will be hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals designate the same parts throughout the several views:

Figure 1 is an exterior face view of a valve mechanism and its piping connections illustrating this invention in its preferred form.

Figure 2 is a vertical, central, sectional detail view through the device of Figure 1, taken on the line 2—2 of Figure 3.

Figure 3 is a sectional plan view of the mechanism of this invention.

Figure 4 is an end view largely in section, taken from the left of Figure 1.

Figure 5 is a changed position view of the valve locking mechanism of Figure 1.

In the particular form of the mechanism shown in the drawings, the central circular hollow case 10, adapted to be closed by a rear cover 12, secured in place by any suitable means, such as bolts 14, is provided, the same having on one side an intake port or passage 16 and at another convenient point, preferably on the opposite side, two discharge ports or passages 18 and 20. In the particular device of the drawings, these passages terminate in flanges 22—24 and 26, respectively, to which connecting pipes 28—30 and 32 may be attached by any suitable means, as, for instance, the bolts or screws 34.

The casing 10—usually a casting—is made of such a width that the valve mechanism hereafter described may be contained and operate inside the case without, when the valve mechanism is open to a given pipe, obstructing or reducing the effective area provided through the device for the passage of powdered material.

The particular valve of this invention is a curved closure segment 34 of sufficient width to, when properly positioned, somewhat more than cover and close the inner end of passages 18 or 20, as the case may be. Rigidly connected to and at right angles to opposite ends of this segment 34 are triangular arms 36, placed radially of the case 10 and terminating in aligned stub shafts 40 and 42, journaled, respectively, in the cover 12 and the front wall of the case 10, as clearly appears in Figure 3. These triangular members 36 may, if desired, but not necessarily, be held rigidly apart by the brace member 44 connecting their opposite inner walls.

In order to prevent powdered material handled by the valve mechanism from filling and caking in case 10, angular partition walls 46 and 48 are preferably inserted inside the case in suitable notches 50 as shown, or otherwise, so as to form at the left of the central axis of the shafts 40 and 42 the passage 52 registering with passage 16 and on the other side of said pivotal axis, a larger triangular passage 54 registering with both the passages 18 and 20, heretofore referred to.

The portions of wall members 46 and 48 which border this last mentioned passage 54 act as stops to the angular movement of the valve member 34 in the manner entirely obvious on inspecting Figure 2.

Stub shaft 40 has rigidly secured to it by any suitable means, as, for instance, the bolt 56, a lever 58 carrying at one end a weight 60 of sufficient size so that when the parts are left otherwise uncontrolled, they will automatically move from the position of Figure 2 to that shown in dotted lines of

Figure 5, in which the valve member 34 closes passage 20. Weight 60 may, if desired, be provided at its bottom with a perforation 62 to which a pull chain, not shown, may be attached, if desired for any useful purpose. The opposite end of lever 58 from weight 60 is provided with a pull chain 64 or other convenient device by which a more or less distant operator can, by pulling upon the chain, move the parts from any previously assumed position to that shown in the full lines of Figures 1 and 2.

The front face of case member 10 carries an electric solenoid 66 of conventional form not shown in detail, having reciprocable vertically through it a conventional core 68, terminating at its lower end in a link 70, pivoted at 72 to one arm 74 of lever pivoted on the case at 76, whose opposite arm 78 contains a lock notch 80 engageable by the end of a swinging lever 82 carried by stub shaft 42, being secured thereto by any suitable means as, for instance, the nut 84. The core 68 and attached lever parts are heavier than lever arm 78 with the result that when the parts are in the position of Figure 1 with no current on the solenoid 66, the said lever arm 78 is always urged upward and therefore retained in the described locking position of Figure 1, thereby holding valve member 34 in the full line position of Figure 2 so that fuel material delivered from the left through passage 16 can travel through passages 52—54 and 20 to pipe 32 and that none of this material can pass through ports 18 to pipe 30.

Lever arm 78 is also so shaped that when it has been released from the position of Figure 1 and moved downward for a sufficient length of time so that weight 60 can act in the manner described to rotate valve 34 to the dotted line position of Figure 5, the left hand end of arm 78 will swing up behind the end of lever 82, as shown in Figure 5, and thus lock the parts in the dotted line position of Figure 5, in which case material delivered from the left through passage 16 of Figure 2 is prevented from entering passage 20 and pipe 32, but has free access to flow through passage 18 to pipe 30. From the foregoing, it will be seen that lever 82 and lever arm 78 cooperating together positively lock the valve in one or the other, as the case may be, of its positions in which it controls access from the passage 16 to pipe 30 or 32, as the case may be, and that it is the weight of core 68 and attached parts which holds these lever members in this locked position.

From the foregoing, it is clearly apparent that it is only necessary to send electric current through conventional solenoid 66 to elevate member 68 and thus move lever arm 78 in a counter-clockwise direction about pivot 76 to destroy this locking action so that in one case the weight 60 may move the parts to dotted line position of Figure 5 and in the other case, the operator may, by pulling on chain 64, move the parts to the full line position of Figures 1 and 2. Means for sending current through the solenoid 66 is no part of the present invention. Such means, more fully shown, described and claimed in another application, is more or less diagrammatically indicated in the figures, the same consisting of two electric wires 86 and 88, each connected at one end in conventional manner to the solenoid 66 and at the other end to electric switch blades 94 and 96, respectively. When the valve is in the position shown in Figure 1, switch blade 96 makes contact with terminal 92 and switch blade 94 makes contact with terminal 90; the terminals 90 and 92 being periodically energized by means not shown, current flows through the solenoid to lift core 68 and thus moves lever 78 out of the way of lever 82.

When the valve is in position of Figure 5, switch blade 94 makes contact with terminal 100, energized by means not shown, and under this condition, terminal 101 on the solenoid is also electrically energizable through switch mechanism not entering into this invention and therefore not shown. Therefore, in this position, when said not shown switch is automatically or manually operated, the solenoid is again energized with the result that lever 78 is again withdrawn from locking relation against lever 82.

While the parts are in the position of Figure 1 and current is supplied to terminals 90 and 92, the solenoid is operated thereby releasing locking lever 78 and allowing weight 60 to act, thus moving the valve to the position of Figure 5, thus automatically breaking current flowing via terminals 90 and 92 to solenoid and at the same time causing lever 78 to lock lever 82.

In order to return the valve to the position of Figures 1 and 2, the solenoid must again be energized through the switch, not shown, heretofore referred to, thereby disengaging lever arm 78 from lever 82 of Figure 5, thus enabling the operator to pull chain 64 and restore the parts to the position of Figure 1. This operation breaks contact at switch blade 94 and terminal 100 thus again de-energizing solenoid.

By the construction heretofore fully described, a valve mechanism is provided for switching fuel material from pipe 28 and passage 16 to either pipe 32 or 30, as the case may be. It automatically locks itself in each of those positions and can only be released by the operator's sending electric current through solenoid 66.

The use of the segmental valve 34 carried by the arms 36 instead of a complete circular or cylindrical valve is of considerable im-

portance in that it can be made of looser fit against the inner circumference of the valve case 10 and the packing of the coal or other powdered material around it, particularly when in the position of Figure 5, relied upon to insure complete sealing of the valve in operation.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In mechanism of the class described, a valve case having a port, a pivotal valve in the case swingable over and off from said port, automatic means for so swinging it in one direction, means for selectively moving it in the opposite direction, an arm outside the case swinging in unison with the valve, a latch device, an electric solenoid adjacent to said arm, a core for said solenoid acting by gravity to force said latch device to lock said arm in each extreme position of the valve and means selectively applying current to said solenoid to lift the core.

2. A rotary valve member having the segment (34), two parallel radial members 36 attached thereto, stub shafts on said radail members, a weighted lever on one stub shaft, an electrically releasable automatic lock on the other stub shaft, a casing enclosing the valve, journalling the stub shafts, provided with a port selectively closed and opened by movement of the valve, another port in the case and interior partitions 46 and 48 forming a passage between the ports and limiting stops for the valve.

3. In mechanism of the class described, a valve casing having a port, a valve in said casing rotatable to two positions in one of which it covers and in the other of which it uncovers said port, an arm affixed with respect to said valve, a member pivoted intermediate its ends and including means carried by the portion thereof to one side of its pivot cooperating with said arm to lock said valve in each of its aforesaid rotated positions, and a solenoid connected with the portion of said member to the other side of its pivot operable when energized to rotate said member out of locking engagement with said arm, said solenoid being so arranged that the weight of the core thereof operates normally to rotate said member to a position in locking engagement with said arm.

In witness whereof, I have hereunto subscribed my name.

AUBREY J. GRINDLE.