Aug. 18, 1925. 1,549,969

A. J. GRINDLE

SMOOTH PASSAGE THREE-WAY VALVE FOR POWDERED MATERIAL

Filed Aug. 1, 1924 2 Sheets-Sheet 1

Fig. 1.

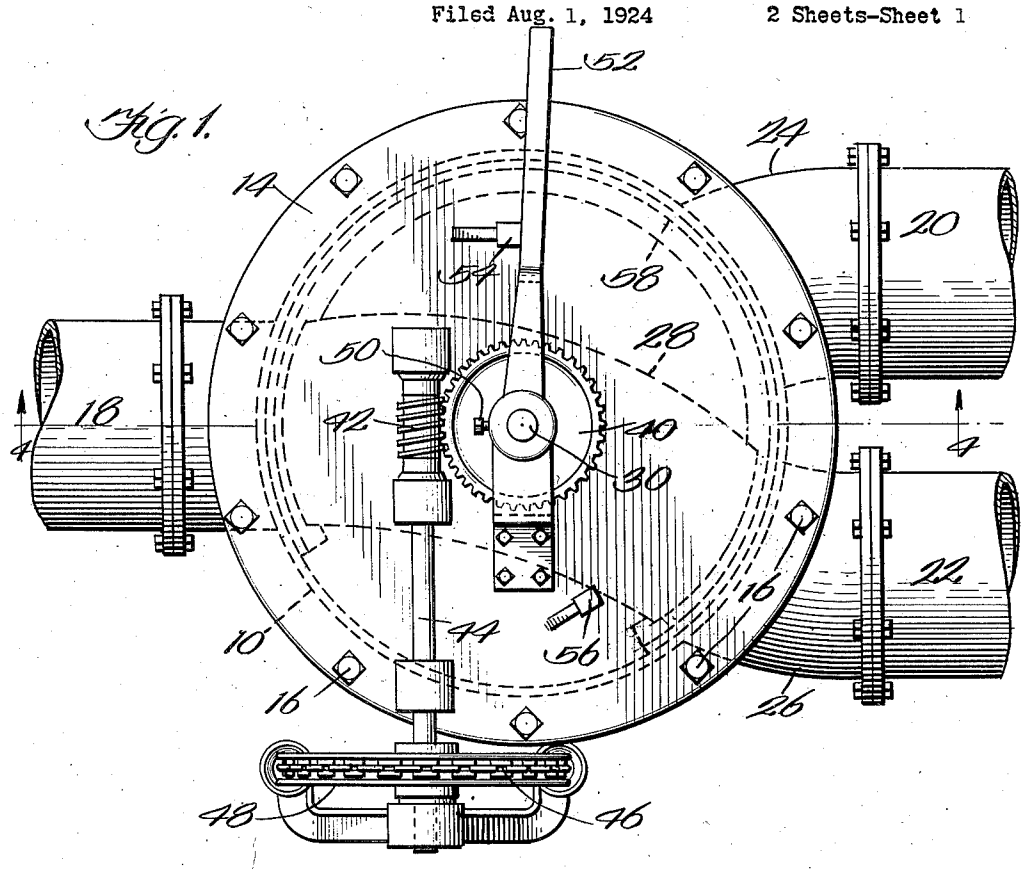
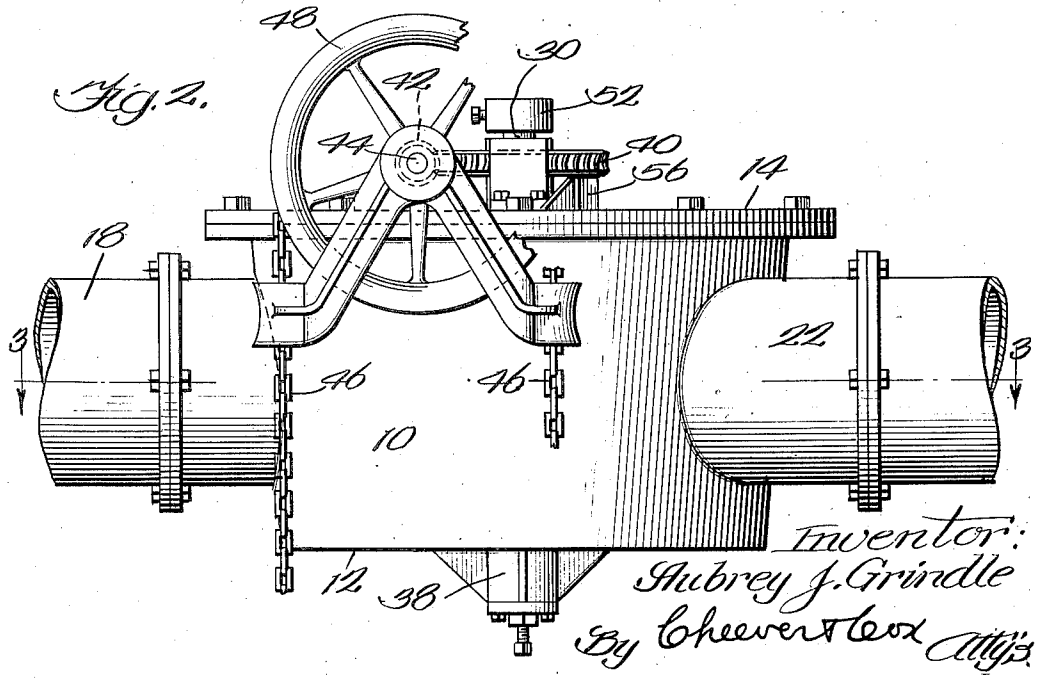


Fig. 2.



Inventor:
Aubrey J. Grindle
By Cheever & Cox Attys.

Aug. 18, 1925. 1,549,969

A. J. GRINDLE

SMOOTH PASSAGE THREE-WAY VALVE FOR POWDERED MATERIAL

Filed Aug. 1, 1924 2 Sheets-Sheet 2

Fig. 3.

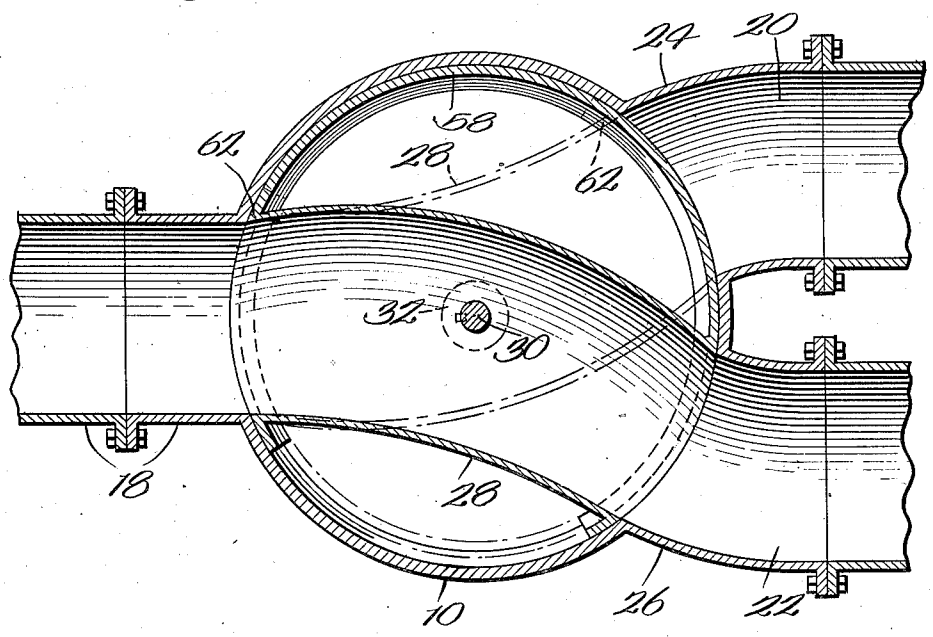
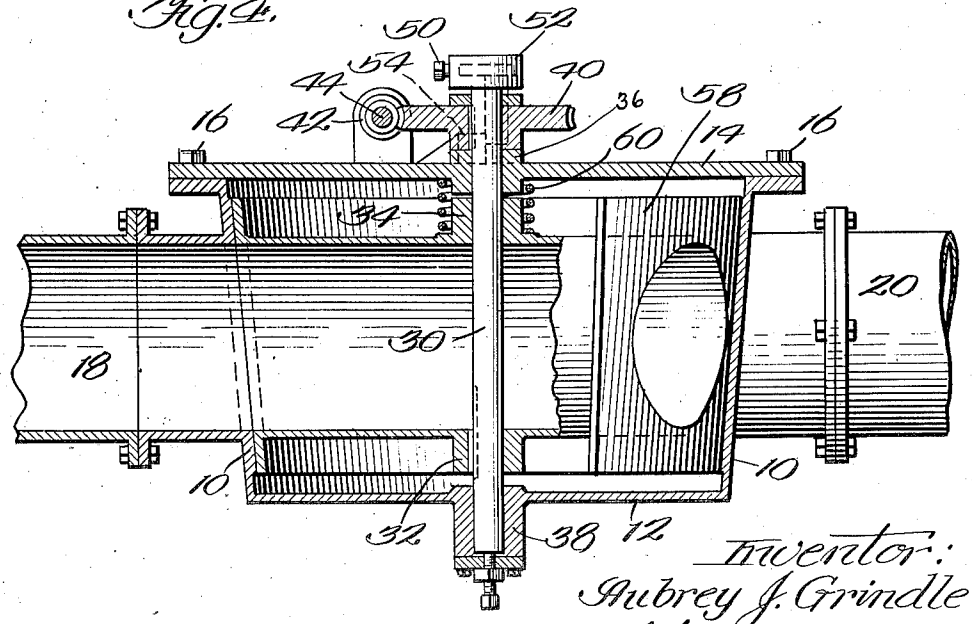


Fig. 4.



Inventor:
Aubrey J. Grindle
By Cheever & Cox Attys.

Patented Aug. 18, 1925. 1,549,969

UNITED STATES PATENT OFFICE.

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

SMOOTH-PASSAGE THREE-WAY VALVE FOR POWDERED MATERIAL.

Application filed August 1, 1924. Serial No. 729,565.

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 Smooth-Passage Three-Way Valves for Powdered Material, of which the following is a specification.

Modern industrial development requires the use of powdered coal taken from a central source of supply and selectively delivered to different ones of a group of furnaces requiring the use of such coal in its operation. The material used is very finely powdered and not always as dry as it might be with the result that any valve used in switching the coal supply from a main supply pipe to different furnace supply pipes must present a practically smooth, continuous surface for the passage of coal, regardless of how the valve may be turned from one furnace to another. Great difficulty has heretofore been experienced in supplying valves which will fulfill this requirement. The object of this invention is to provide a valve which in practical operation does meet the requirements above enumerated; which is economical in construction; satisfactory in use and not liable to get out of order.

The invention consists in mechanism attaining the foregoing and other objects and numerous 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 through the several views:

Figure 1 is a side elevation and Figure 2 a plan view of mechanism illustrating this invention in its preferred form.

Figure 3 is a vertical, sectional, detail view along the line 3—3 of Figure 2.

Figure 4 is an inverted, plan view on the line 4—4 of Figure 1.

In the preferred embodiment of the invention illustrated in the drawings, the cylindrical valve case 10 is provided, being specifically, but not necessarily, of truncated conical form having one integral end 12 and a removable end 14 detachably secured in place by any suitable means, as for instance, bolts 16. The case 10 is made with an integral intake pipe or passage 18 on one side and two distinct discharge passages 20 and 22 located close together and approximately diametrically opposite the passage 18, said passages 20 and 22 being preferably slightly inwardly curved toward each other in the curves 24 and 26, clearly appearing in Figures 1 and 3.

In the particular case here illustrated, the passages 18—20 and 22 take the form of cylindrical pipes but the cross-sections of these passages may be varied without departing from the invention so long as they are all of the same cross-section where they enter the case 10 so that gently curved valve pipe 28, rotatably mounted inside case 10, can be moved between the dotted line and full line positions of Figure 3 to selectively connect in the first instance passages 18 and 22 and in the second instance passages 18 and 20. The valve pipe 28 is journaled in case 10 through the agency of a shaft 30 passing through the pipe 28 and the hubs 32 and 34 thereof and journaled in hubs 36 and 38 carried by the flat walls of the case 10. Rigidly attached to an end of shaft 30 outside of case end 14 is a gear 40 in mesh with a worm 42 carried on a shaft 44 and driven by any suitable means, as, for instance, the manually operable chain 46 passing over a sprocket wheel 48 on the end of shaft 44; also detachably rigidly secured to the same end of shaft 30, by any suitable means, as for instance, set screw 50, is a stop lever 52 adapted to engage a fixed stop 54 on the outside of end plate 14 when the valve 28 is in the full line position of Figure 3 and to engage a corresponding stop 56 when the valve is in the dotted line position of Figure 3. When and if, for any reason, the worm 42 is wholly removed from the mechanism described, stop lever 52 may be manually used for swinging the valve from one of the just described positions to the other.

Integral with the pipe 28 is a cylindrical valve barrel 58 rotatable against the inner surface of the valve case 10, said barrel being so designed and shaped as to always close the one of the passages 20 and 22 with which the pipe 28 is not in register. In other words, in Fig. 3, in the full line position, the barrel 58 closes off passage 20 and will, when the parts are moved to dotted line position of that figure, close off passage 22.

The pipe 28 is made of very gentle curve, as shown in Figure 3, between the passages

18 and 22, or 18 and 20, which it has to connect so that in either position powdered coal or other material flowing from passage 18 through the valve mechanism will pass substantially without obstruction through the valve and into passage 20 or 22, as the case may be.

In order to make a proper fit between the barrel 58 and the interior wall of case 10, these parts are both made of conical form, as shown, and the barrel is pressed into the case 10 by spring 60 surrounding shaft 30 as clearly shown in Figure 4.

In the operation of the mechanism, the parts are first placed in the full line position of Figure 3 in which position coal in passage 18 flows freely through pipe 28 into passage 22, passage 20 being closed off by the barrel 58. When now it is desired to switch material from pipe 10 to pipe 20, the chain 46 is manipulated in obvious conventional manner to carry stop lever 52 from the position shown in Figure 1 to the position where it engages stop 56. In so doing, end 62 of pipe 28 is transferred from register of pipe 18 to register with pipe 20, or, in other words, the pipe 28 is moved from full line to dotted line position and under this combination of parts, the material in pipe 18 passes free from pipe 28 into pipe 20, while the barrel 58 closes off pipe 22. To restore the parts to normal position, it is only necessary to reverse the direction of operation of chain 46.

The well known locking action between the worm 42 and gear 40, except as moved by chain 46, serves to lock and hold the valve pipe 28 in each operative position.

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 casing having an intake port and two discharge ports, a member in the form of a pipe within said casing selectively rotatable about a transverse axis intermediate its ends to two positions in one of which it connects the intake port and one discharge port and in the other of which it connects the intake port and the other discharge port, and a hollow sleeve-like member connecting the ends of said pipe to strengthen the same, said sleeve-like member fitting the inside of said casing and acting to support said pipe therein and acting also to close off the discharge port not in communication with the intake port.

2. In mechanism of the class described, a valve casing having an intake port and two discharge ports, a member within said casing provided with a passage, selectively rotatable to two positions in one of which it connects the intake port with one discharge port and in the other of which it connects the intake port with the other discharge port, a shaft extending through said member and journaled at its ends in said casing, operating and locking means for said member consisting of a worm wheel on said shaft and a worm meshing therewith, a handle on said shaft providing an additional means of rotating said member, and a pair of stops on said casing engageable by said handle to prevent rotation of said member beyond its two predetermined positions aforementioned.

3. In mechanism of the class described, a valve casing having a tapered bore, an intake port and two discharge ports, a shaft journaled in said casing and extending therethrough, a pipe within said casing affixed to said shaft and selectively rotatable to two positions in one of which it connects said intake port with one discharge port and in the other of which it connects the intake port with the other discharge port, a hollow tapered sleeve-like member connecting the ends of said pipe, fitting the inside of said casing and acting to close off the discharge port not connected with said intake port, and a coil spring surrounding said shaft and reacting from said casing against said pipe to maintain said sleeve-like member in engagement with the wall of the bore of said casing, for the purpose set forth.

In witness whereof, I have hereunto subscribed my name.

AUBREY J. GRINDLE.