April 21, 1925. 1,534,866

G. M. PAGE

VALVE

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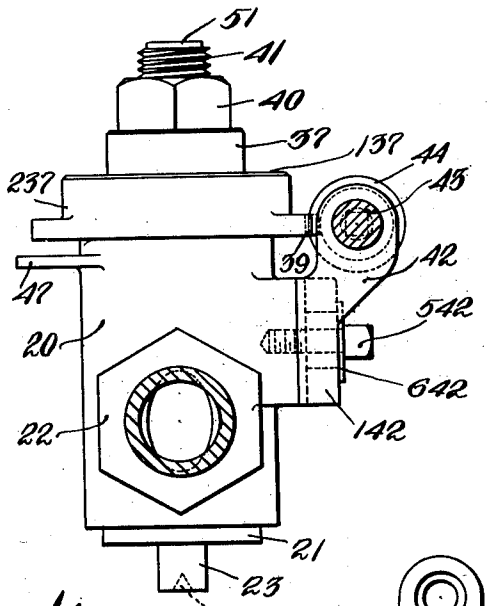


Fig. 2.

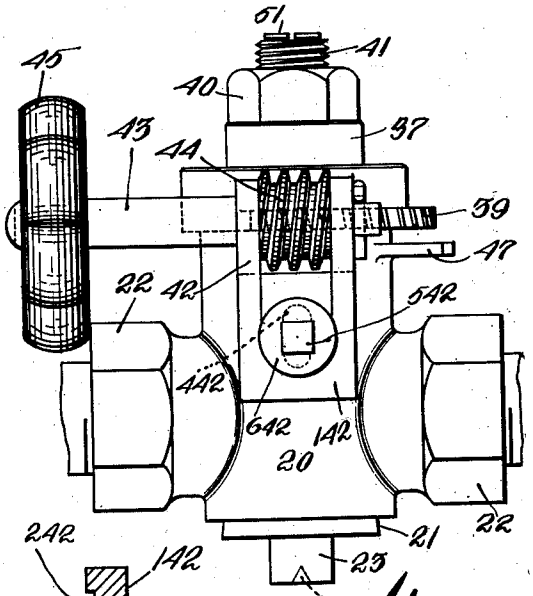


Fig. 1.

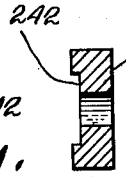


Fig. 14.

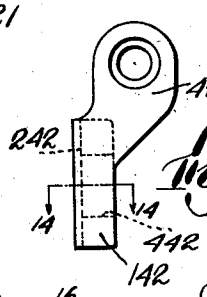


Fig. 13.

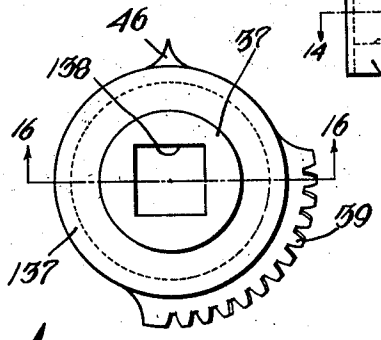


Fig. 15.

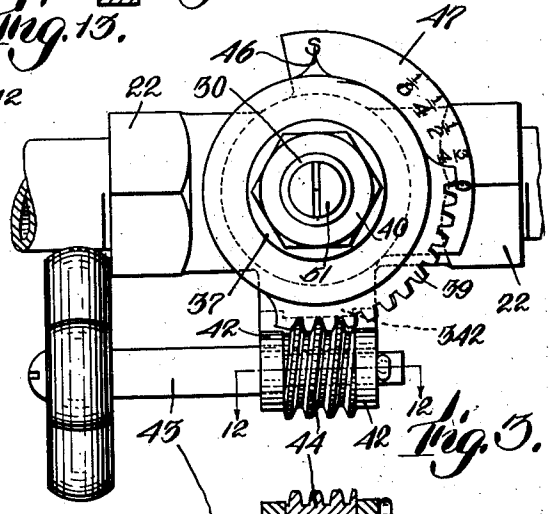


Fig. 3.

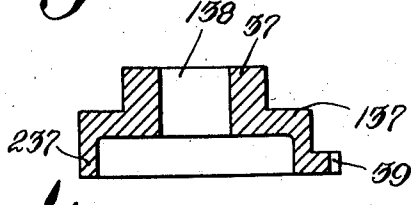


Fig. 16.

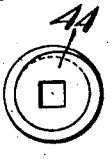


Fig. 17.

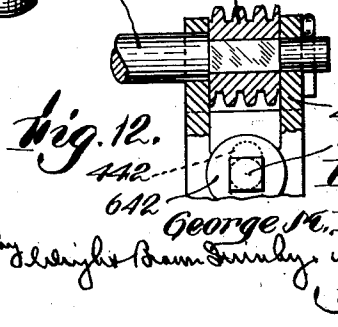


Fig. 12.

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G. M. PAGE

VALVE

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Fig. 4.

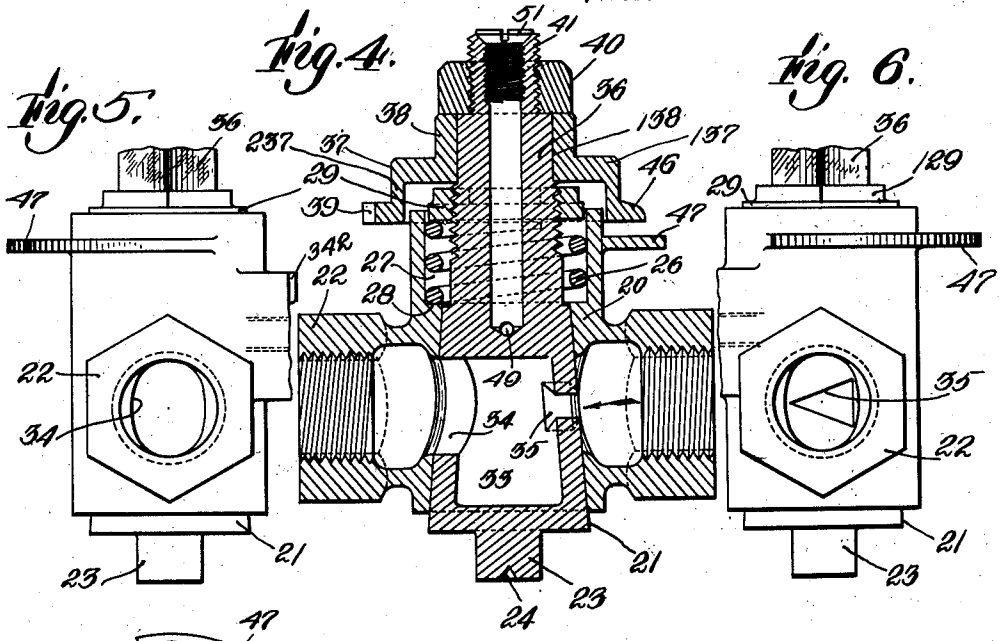


Fig. 5.

Fig. 6.

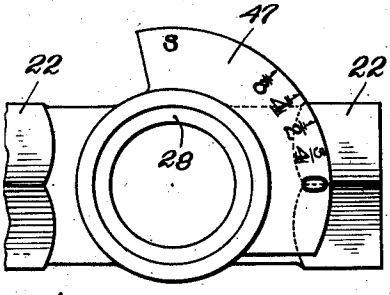


Fig. 8.

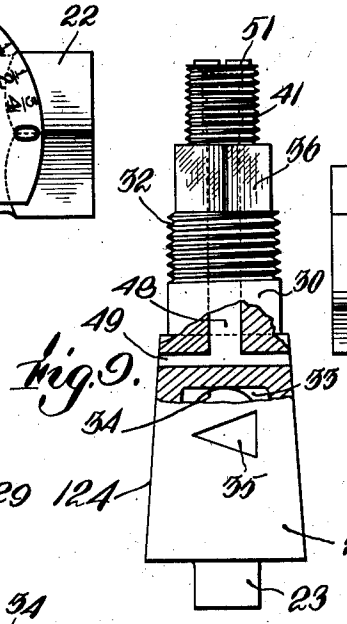


Fig. 9.

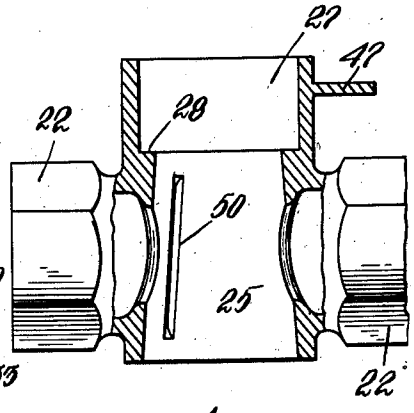


Fig. 7.

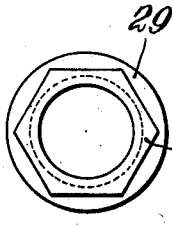


Fig. 11.

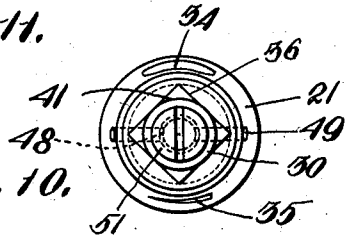


Fig. 10.

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G. M. PAGE

VALVE

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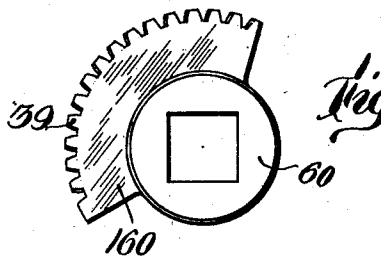


Fig. 22.

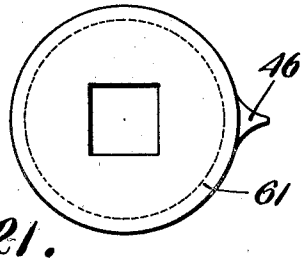


Fig. 21.

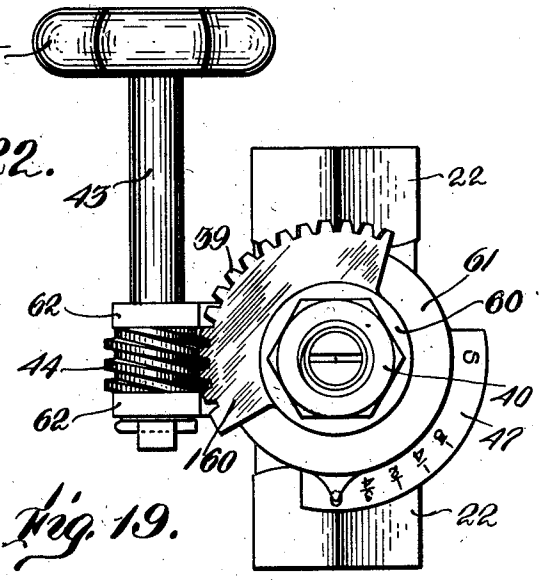


Fig. 19.

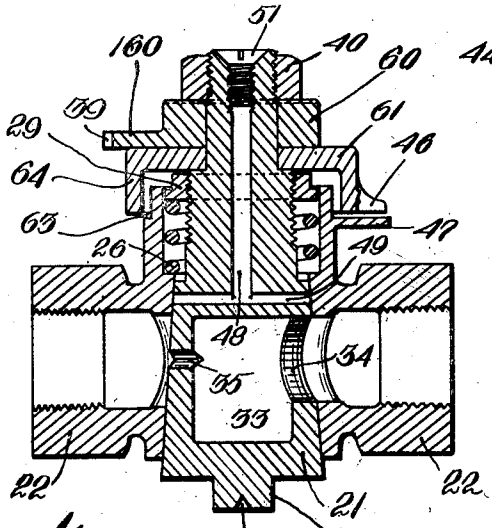


Fig. 20.

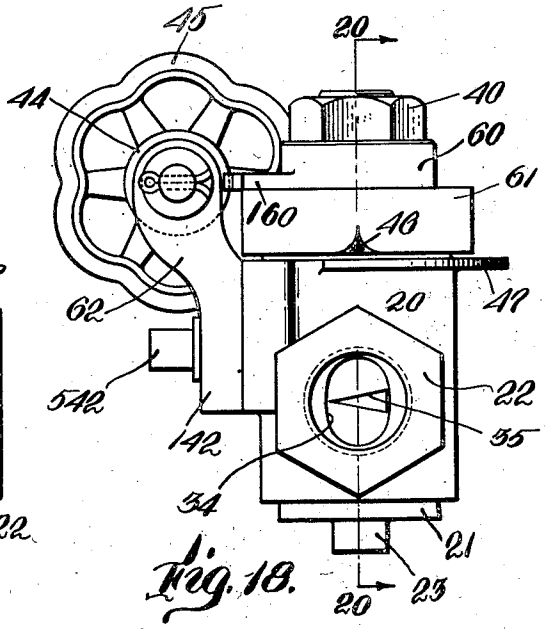


Fig. 18.

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UNITED STATES PATENT OFFICE.

GEORGE M. PAGE, OF HAYDENVILLE, MASSACHUSETTS, ASSIGNOR TO VICTORY EQUIPMENT CORPORATION, OF HAYDENVILLE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

VALVE.

Application filed December 22, 1919. Serial No. 346,467.

To all whom it may concern:

Be it known that I, GEORGE M. PAGE, a citizen of the United States, residing at Haydenville, in the county of Hampshire and State of Massachusetts, have invented new and useful Improvements in Valves, of which the following is a specification.

The object of my invention is to provide an improved valve for use in all kinds of systems. More specifically the object of the invention is to provide a plug having a large oval vent therein and a smaller triangular vent opposite thereto, whereby very fine adjustment of the quantity of the fluid flowing through the system may be obtained. Another object of the invention is to provide an indicator of special adaptation to this kind of device, whereby the degree of adjustment may be readily read from a dial plate, and a means for effecting a fine adjustment of the openings in the plug relative to those in the casing. Another object of the invention is to provide spring tensioning means whereby the spring which holds the valve plug in place may be properly tensioned. A further object is to so mount the parts that compensating adjustment for wear and grinding on the valve plug may be made so as to keep certain parts in proper relation one to another.

In the accompanying drawings, I illustrate one embodiment of the invention which is the best known to me but which is capable of various modifications and changes in the details of its construction and arrangement of parts without departure from the spirit of the invention as outlined in the appended claims.

Referring to the drawings,—

Figure 1 is a front elevation of my valve casing.

Figure 2 is a view at right angles to Figure 1 showing parts in section.

Figure 3 is a top plan view showing the dial and indicator.

Figure 4 is a longitudinal section through the valve seat.

Figure 5 is a side elevation of the valve casing viewed from the left of Figure 4, and showing the large oval opening in the plug, while

Figure 6 is a similar elevation viewed from the right of Figure 4 and showing the smaller triangular opening.

Figure 7 is a sectional view of the valve seat showing the coupling members in elevation.

Figure 8 is a view illustrating the dial plate in its proper relation to the valve casing.

Figure 9 shows the valve plug and the stem extending therefrom, parts being in section.

Figure 10 is a top plan view of said plug.

Figures 11 to 17 inclusive show details of construction of various elements of my device.

Figure 18 shows in elevation a modification of the device.

Figure 19 a plan view of the same.

Figure 20 is a section on line 20—20 of Figure 18.

Figure 21 is a detail view of the modified cap showing the pointer.

Figure 22 is a detailed view of the arcuate rack located on a separate member.

In the manufacture of valves of the type to which my invention relates the parts are made of soft metal, such as brass and the valve plug is ground to proper relation with its seat by turning the initially formed plug in its seat until the irregularities are worn off and the fit is as perfect as desired, or possible under the circumstances. The amount of grinding which may be necessary to obtain such a fit, varies with the structure of the metal. For instance, should there be imperfections in the surface of the plug or seat, the grinding must be continued until these are removed and the surface is made perfect. Further, a certain amount of wear between the surfaces taken place in the ordinary use of the valve and in order to insure a tight fit between the parts, a wear-compensating or wear-take-up device is utilized. To accomplish the objects of my invention as hereinbefore set forth, I make my valve in a fashion as follows:

Referring in detail to the drawings, I seat a valve plug 21 in a valve casing 20 having the usual coupling nipples 22 for attaching the valve casing to pipes, and grind the plug to a fit by the process referred to above. To facilitate this grinding the plug has on its lower end a boss or extension 23, having a reentrant center point 24 whereby the plug may be grasped and ground in place.

The plug has a frusto-conical portion 124 and is located in a similarly shaped seat 25 in the casing and is held in a snug fit therewith by means of a compression spring 26, seated in a spring-chamber 27, which is mounted on the upper end of the valve casing. The spring has its lower end seated on the shoulder 28 and its upper end abuts against an adjusting nut 29. This nut is movable longitudinally of the stem 30 of the plug by means of a screw-threaded connection therewith to adjust the tension of spring 26. The nut 29 has a hexagonal portion 129 whereby the plate may be grasped by a tool for adjusting it.

The frusto-conical seat has two large openings therein forming passages through the nipples while the frusto-conical plug is hollowed out at 33 and has a small triangular entrance opening 35 and a large oval exit opening 34. The oval opening has its greatest axis longitudinally of the plug and the triangular opening is located crosswise of the plug. The purpose of having a small triangular entrance opening is to permit of fine adjustment of the amount of oil permitted to flow through the valve. It will be readily seen that commencing with the apex of the triangle that the portion of the triangular aperture brought into alinement with the opening in the pipe connection may be regulated at will. The size of the exit opening 34 is made large on purpose, so the fluid pressure on the exit side of the opening 35 may be as small as possible.

The upper open end of the spring-chamber 27 is covered and the nut and spring therein protected against being tampered with and against dust and other foreign matter by a cap 37. This cap 37 consists of an upstanding cylindrical portion 38 having a squared aperture 138 therethrough fitting upon a similarly squared portion 36 of the stem 30 to insure a common rotary movement of the stem and cap. An outstanding flange 137 on the outer edge of which is a downwardly extending cylindrical portion or skirt 237, overhanging and surrounding the upper end of the spring-chamber, prevents the adjustment of nut 29 without first removing the cap 37. The cap is held in place on the stem by means of nut 40 screw-threaded to the reduced extension 41 of the stem.

In order that the openings in the valve plug may be rotated to and from alinement with the apertures through the pipe connection, there is located on the lower edge of the skirt 237 an arcuate rack 39. Mounted on the valve casing and adjustable vertically relative thereto are bracket arms 42 connected at their lower ends by a web 142. A spindle 43 is journaled in the upper ends of said arms and has a squared or rectangular portion and carries a worm 44 rigidly attached thereon by means of a correspondingly formed aperture, said worm meshes with the teeth of the arcuate rack 39 for actuating the same. On the outer end of the spindle is a handwheel 45 whereby the valve may be turned and a very fine adjustment obtained.

The amount of adjustment of the valve opening is indicated on a dial 47 integrally cast to the valve seat by a pointer 46 located on the cap 37.

In order to compensate for wear of the plug and seat and for grinding and fitting of these parts together as above set forth, and in order that the worm may be adjusted so as to be brought into mesh with the teeth of the rack, the bracket 42 is mounted on the casing for vertical adjustment relatively thereto. This is accomplished by having the rear face of the web 142 grooved at 242 to fit and slide on an outstanding vertical slideway 342 on the casing. Located in the web 142 is an elongated slot 442 through which the screw 542 passes. By this construction the bracket is adapted to be vertically adjusted relatively to the valve casing and to be held in its adjusted position by means of the head of screw 542 pressing the washer 642 against the side of the bracket.

For the purpose of lubricating my valve plug in its seat, I have arranged a bore or chamber 48 to extend through the stem of the plug and tranversely arranged conduits 49 leading therefrom to the upper surface of the frusto-conical plug. In the walls of the plug seat 25 is a longitudinal groove 50 adapted to receive a small portion of oil from the apertures of conduits 49 as they are rotated across its upper end and to distribute the same along the bearing surface. The upper end of the bore 48 is screw-threaded to receive a closure plug 51.

In Figures 18 to 21 inclusive, I illustrate another form of my improved valve. This valve differs very little from the form shown in Figures 1 to 17 inclusive except that arcuate rack 39 is formed on a member 60 separate from the cap 61 and is adapted to be located on top of the cap instead of its being placed at the lower edge of the skirt. There is a further correlated difference in that the supporting arms 62 are longer in order to extend to a point above the rack plate 160 on top of the cap 61; so as to bring the worm into mesh with the teeth of the rack and with the advantage that this arrangement effectively locates the hand-wheel away from the nipple 22, which is of obvious practical importance in operating the valve.

There is a further difference in that the upper edge of the spring-chamber is shouldered at 63 and reduced in external diameter whereby the cap, fitting thereabout more perfectly, guards the interior of the chamber against foreign matter more completely

in that the lower edge of the skirt may in this construction be located almost vertically above said shoulder. These differences, though slight, are of quite considerable importance in the practical operation of the device and save much in annoyance and expense and contribute to the efficient working of my valve.

It will appear from the foregoing description that I have provided an oil cock whereby a very fine valve adjustment may be obtained and the fluid volume regulated. It is of importance in this connection that where a fine adjustment is to be obtained and indicated on a dial plate that that dial plate should remain stationary relative to one of the members between which adjustment is to be obtained, hence the importance of having the dial plate integrally cast to the casing.

It is also of importance in this connection to have means whereby such adjustment may be readily obtained and for this purpose I have utilized the worm and rack construction described above.

I have also improved the construction of similar valves by placing at the upper end of my compression spring a suitable adjusting plate for properly adjusting the spring tension and have made this device independent of the cap which covers the spring-chamber so that the adjustment may be effected independently of said cap, and have arranged for adjustment of the parts to compensate for wear between the valve plug and valve seat.

Having thus explained the nature of my said invention and described a way of making and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. A valve comprising a casing, a frusto-conical seat in said casing surmounted at its smaller end by a spring-chamber, and a frusto-conical plug in said seat, having an oval and a triangular opening in the walls thereof, a stem extending from the smaller end of the plug, through said spring-chamber, a spring seated in the lower end of said chamber and adjustable means attached to the stem bearing on the upper end of the spring to regulate the tension thereof, a cap mounted on said stem, a graduated dial on said casing, a pointer extending beyond the periphery of said cap for indicating the amount of rotation of said plug on said dial; outstanding arms on said casing and a worm gear mounted therebetween and on a spindle journaled in said arms, and an arcuate rack on said cap, said rack cooperating with said worm gear whereby adjustment of the openings in the plug may be obtained.

2. In a valve, a casing, a frusto-conical seat, a frusto-conical plug seated therein, means located at the smaller end of said seat to draw the plug upward to compensate for wear and hold the plug in tight fit with said seat, means on said casing for causing rotation of said plug in said seat, and means to adjust said means on the casing when the plug is drawn upward.

3. A valve casing having a frusto-conical seat, a frusto-conical plug seated therein, a stem extending from the smaller end of said plug and having a nut thereon, a spring-chamber on the casing surrounding said stem, a spring seated in said chamber abutting at one end against said nut to draw the plug upward to compensate for wear, a rack attached to said plug, toothed means attached to said casing and coacting with said rack for rotating the plug, and means whereby the last mentioned means may be adjusted to cooperate with the rack when the plug is drawn upward by the spring.

4. In a valve, a casing having a frusto-conical seat therein, a frusto-conical plug in said seat, a spring-chamber surmounting the smaller end of said seat and a stem on said plug extending through said spring-chamber, a spring seated at its lower end in said chamber and abutting at one end against a nut on said stem, whereby said plug is drawn upwardly in said seat to compensate for wear, an arcuate rack on said stem, a worm meshing with said rack to rotate the plug, said worm being adjustably mounted on said casing whereby when the plug and rack are drawn upwardly, the worm may be adjusted thereto.

5. In a valve, a casing, a valve seat in the casing, a plug in the seat having a stem extending therefrom, a socket in said casing, a spring in said socket surrounding said stem, a cap enclosing said socket and fixed to said stem, an arcuate rack on said cap, a worm mounted in a bracket on the side of the casing, and engaging with said rack, a spindle extending from said worm and a hand-wheel on said spindle whereby the plug may be rotated.

6. In a valve, a casing, a valve seat in said casing, a plug in said seat, a stem extending from said plug and having an angular portion, a cap having an angular opening fitting said angular portion, a rack extending beyond said cap, a spindle mounted on the side of the casing, said spindle having an angular portion thereon, a worm having an angular opening fitting said angular portion on the spindle, said gear meshing with said rack, and a hand-wheel on said spindle for rotating it and thereby rotating the plug.

In testimony whereof I have affixed my signature.

GEORGE M. PAGE.