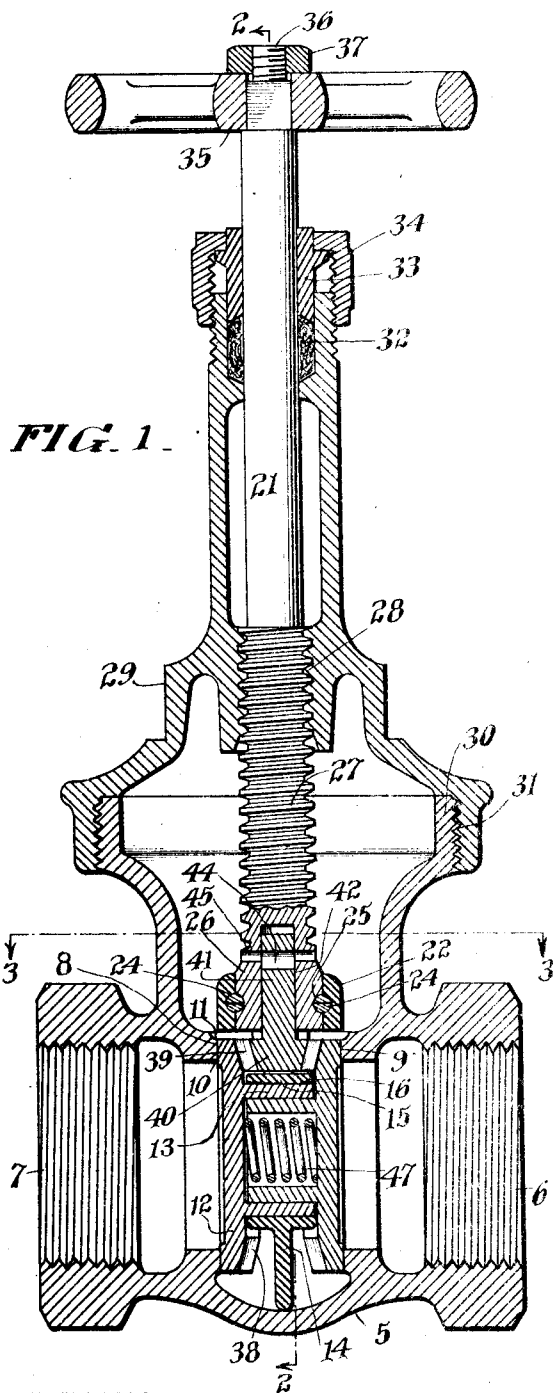


T. M. EYNON.
GATE VALVE.
APPLICATION FILED JUNE 1, 1912

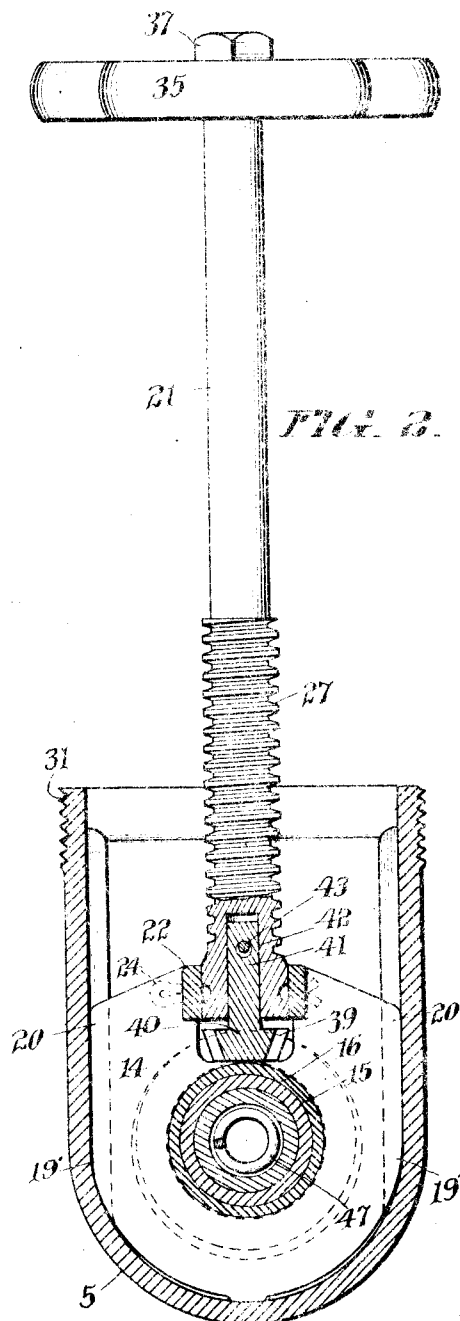
1,091,918.

Patented Mar. 31, 1914.

2 SHEETS-SHEET 1.



WITNESSES
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1,091,918.

Patented Mar. 31, 1914.

2 SHEETS—SHEET 2.

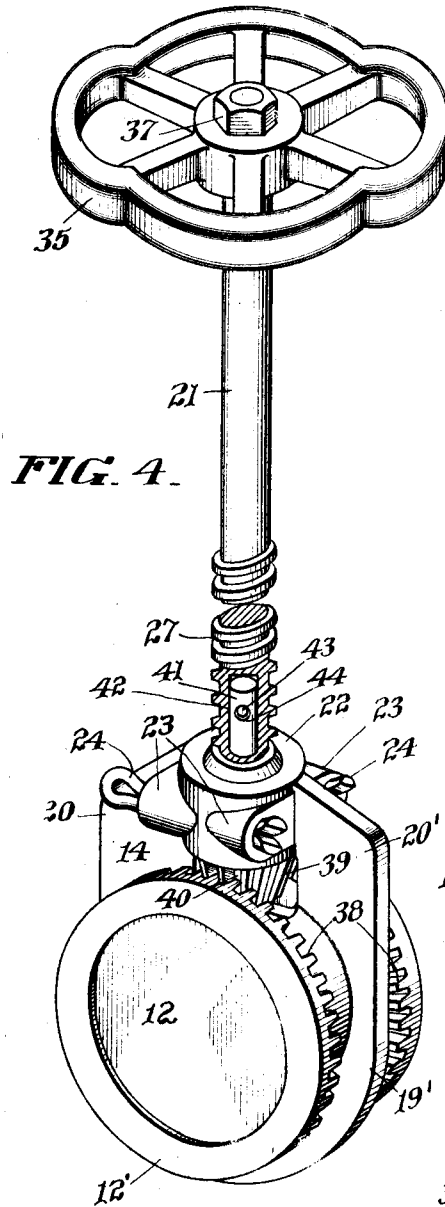


FIG. 4.

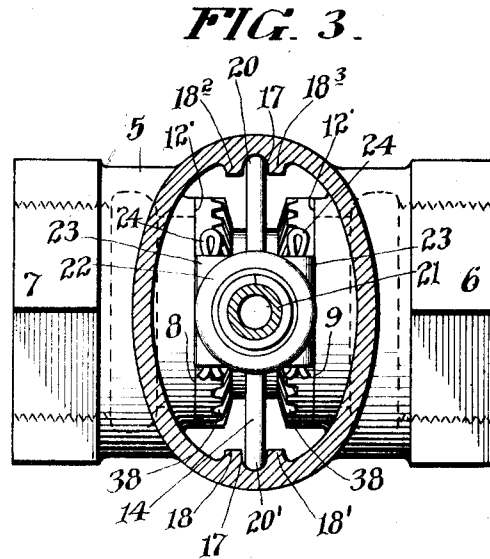


FIG. 3.

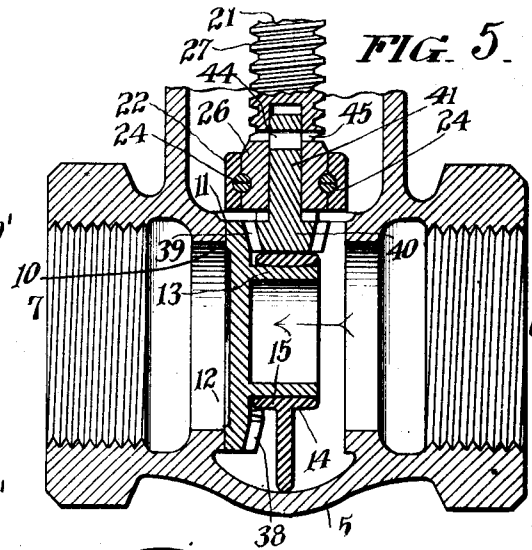


FIG. 5.

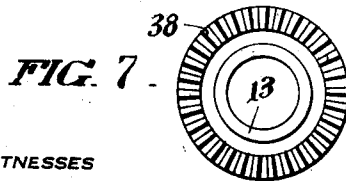


FIG. 7.

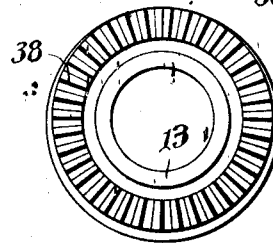


FIG. 6.

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GATE-VALVE.

1,091,918.

Specification of Letters Patent.

Patented Mar. 31, 1914.

Application filed June 1, 1912. Serial No. 700,943.

To all whom it may concern:

Be it known that I, THOMAS M. EYNON, a citizen of the United States, residing at 1426 Allegheny avenue, Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Gate-Valve, of which the following is a specification.

The purpose of my invention is to grind a gate valve seat by the valve itself, preferably by rotary movement of the valve.

A further purpose of my invention is to provide a rotary valve closure or closures for a gate valve seat or seats, which can be positively rotated, revolved or oscillated in place, and which can be positively rotated or not during the opening movement, as desired.

A further purpose of my invention is to provide an eccentrically mounted annular valve face or faces, adapted to close a circular gate valve seat or seats.

A further purpose of my invention is to mount a rotatable gate valve closure upon a carrier, guided to prevent lateral play, and provided with concentric means for rotation of the closure.

A further purpose of my invention is to provide a gate valve with means for positive angular movement against its seat without axial movement of the stem and operable by the stem, without additional supplementary supporting parts, by mere removal of the bonnet.

A further purpose of my invention is to form a carrier for a disk gate valve closure with a laterally supported and guided web, and to connect it with the stem rotarily, connecting the disks rotarily with the stem or not at will, for disk rotation.

Further purposes of my invention will appear in the specification and claims thereof.

I have preferred to illustrate my invention by a form thereof, which I have found simple, relatively inexpensive and highly efficient, and which at the same time well illustrates the principles thereof.

Figure 1 is a longitudinal vertical section of my preferred double valve structure. Fig. 2 is a transverse section of the structure of Fig. 1, taken upon line 2—2 thereof. Fig. 3 is a horizontal section of the struc-

ture shown in Fig. 1, taken upon line 3—3 thereof. Fig. 4 is a perspective view of the movable elements of the form shown in Fig. 1. Fig. 5 is a partial vertical section showing but one valve closure in place. Figs. 6 and 7 are face elevations of several forms of valve closure, among the many variations thereof which might be made to suit the views of the designer.

Similar numerals of reference indicate like parts in the drawings.

While I prefer to use the double valve closure having facing annular seats and oppositely facing, cooperating, rotatable, annular closures therefor, and have shown this form in Fig. 1, it will be evident that a single seat and closure, as seen in Fig. 5 will be fully effective for many forms of valve.

The valve body 5, of any suitable material, provides for flow of fluid in either direction, but for convenience, the end at 6 will be considered as the inlet end, and the end 7 as the outlet. I provide facing seats 8 and 9, which are here shown as parallel and annular, but which may evidently vary in both particulars without departing from the spirit of my invention. I prefer not to dish them at all since this would require more axial play in the closures than is ordinarily desirable. I have shown the simplest form, with plane, coaxial, annular, facing seats. A single closure may be turned either way to cooperate with either seat. Whatever the contour of the inner and outer edges 10 and 11 of the single valve seat, now considered, I prefer to make the cooperating face 12 of the valve 12 itself, which I will for clearness, refer to as the valve closure, in the form of an annulus, because this closure is to be rotated, oscillated or revolved against the seat.

While I show my valve closures as of circular contour, with annular sealing faces, I prefer to mount them eccentrically. I therefore form the tubular extension 13 eccentric to the annular sealing face and give it support and bearing from the carrier 14 by fitting it within the tubular part 15 of said carrier, having opening 16. I have illustrated one form in Fig. 7, in which the axis of rotation passes through the center of the disk. I provide for vertical move-

ment of the carrier 14, without other movement thereof in any direction, by a guide groove 17, in the body of the valve, between guides 18 and 18', 18², and 18³, and by the extension of the sides of the carrier 19' and 19² to cooperate with the walls of the groove. The sides of the carrier thus form fins or webs 20, 20' parallel to the walls of the grooves 17. Obviously various other means of guiding and supporting this carrier or another suitable carrier will occur to those skilled in the art.

Since the carrier is not rotatable, the stem 21 must be connected with it to permit rotation therebetween, and I have shown a convenient form of this connection in the boss 22, secured to or forming part of the upper end of the carrier, and having ears 23 through which are passed cotter pins 24, so that the bodies of the pins lie partly within the groove 25 upon the part 26 of the end of the stem. The stem is threaded at 27 in the usual way to engage with threads 28 upon a bonnet or stuffing box 29, which is screwed upon the top 30 of the valve body, as at 31. At the top of the bonnet or stuffing box, the stem passes through any suitable packing 32, compressed by gland 33 and cap 34, all well known in prior constructions. The handle 35, and the thread and nut constructions 36 and 37 by which it is held in place, are also well known.

So far as outlined, the closure at 13 can be raised and lowered past and in scraping contact with the seat 8, and past the valve opening. It is also, thus far, free to turn within the bore of the carrier and, as best seen in Fig. 5, is pressed tightly against the seat 8 by the pressure of the fluid entering at 6, and moving toward the opening 7, the direction shown by the arrow.

In its upward travel the valve is not moved far enough for the lower end of the closure to lose contact with the upper end of the seat, avoiding the necessity for any tapering or other protection against "striking."

My invention provides for the positive rotation, oscillation or revolution of the closure, with upward or downward movement of the stem, if preferred, and without vertical movement of the stem when grinding. I illustrate one construction by which these may be accomplished, while recognizing that other structures for carrying out my invention will occur to skilled designers in this art in view of my disclosure herein.

The construction by which I prefer to turn the closure, under any conditions requiring that it be turned, and which I have illustrated, consists in placing annularly arranged gear teeth, as at 38, upon the back of the closure, and turning the closure through them by means of teeth 39, upon gear 40, which may be connected to rotate

with the stem 21, or be free from it, at will. The gear 40 is concentric with the spindle and is mounted, in the form shown, by a stub 41, having bearing at 42 within the end at 26 of the stem. As will be seen my construction makes it possible to maintain the gearing constantly in mesh.

The face about the valve opening, in which form I have preferred to illustrate the valve seat, may be ground by moving the valve closure against it, constantly in one direction or rocking it back and forward, and whether the closure turn about its own center or not. I turn it by the stem, first removing the bonnet so that there may be no vertical movement of the stem, and securing the stub 41 against rotation with respect to the stem by means of a pin 43, passed within the opening 44 of the stub and the opening 45 of the spindle or stem.

Since the carrier 14 is guided against rocking within the plane of the section in Fig. 2 by the webs 20 and 20' which bear at their edges against adjoining walls of the valve body, and against movement at right angles thereto, by engagement of the sides of these webs with the guides 18-18³, this carrier can have no lateral movement in any direction other than such as it may be deemed desirable to permit in order to prevent jamming. The stem may therefore be freely turned to provide for grinding of the valve surface without necessity for support from the bonnet, and without the addition of any stay or strut or other brace for the stem.

The means for connecting the gear 40 with the stem, where disconnection is at times desired, may obviously be greatly varied within the discretion of the designer.

In some sizes of valves, and for some uses, the connection between the stub and the stem may be maintained at all times, where the user prefers to have the disk 13 rotate or revolve during the lifting and lowering of the valve, *i. e.*, when the thread upon the stem turns within the thread of the bonnet. This has the advantage of scraping and cleaning the valve seat with each bodily movement of the closure, a feature highly desirable where the fluid passing through the valve has a tendency to attack or coat the seat.

Where the gear 40, and the stub 41 are intended to be connected permanently or any considerable part of the time, it may often prove desirable to allow a little play between the gear and the teeth on the back of the closure, so that there may be some yielding between the two in case of obstruction. I have illustrated the opening in the stub as larger than the opening in the stem, to allow some longitudinal play for the gear where some slight yielding movement is desired. This structure may be greatly varied

for the purpose intended and may be omitted where this function is not desired.

The closure 12 may be made in various forms, and I have shown it in Fig. 6 with its annulus 12' eccentric with the flange 13 in which form the grinding of the valve face will be by oscillatory movement of one annulus turned about another annulus eccentric thereto. Oil and abrasive material may be placed upon the exposed part of the face of the closure as the "heavy" side of the eccentric comes up.

In the form shown in Fig. 7, the closure face or annulus is mounted concentrically with respect to the bearing 13 with the result that this valve face moves over the valve seat evenly, without oscillation.

The relation of the teeth to the closure may be varied but I have preferred to arrange them concentrically about the bearing 15, whether the face of the closure be eccentric to this bearing collar or extension or not, as I thus obtain more uniform meshing of the teeth upon the closure with those upon gear 40. With this arrangement upon an eccentric closure the heavy end of the eccentric shows beyond the teeth at 46. It will be evident that many changes in regard to the detail of all these parts may be made.

Where but a single closure is used, as in the description thus far given, the pressure of the fluid tending to pass through the valve should be brought against the back of the valve closure, and presses the valve face effectively against the valve opening.

Obviously in a structure such as that shown, having two valve openings and similar seats about them, the closure 13 may be used with either seat by mere withdrawal of the stem and carrier and reversal of the direction in which the closure is inserted within the carrier or of the direction in which the carrier is turned. The valve is effective, therefore, with either direction of flow.

I prefer to use two closures of the form seen in Fig. 1, mounting them similarly and having both engage the same gear 40. I illustrate a flange 13' upon the second gear here shown as fitting within the flange 13, in order that each flange may have bearing substantially the entire width of the carrier.

For grinding purposes, I use any suitable means, here shown as spring 47, to press the closures against the valve seats, and any such means may be used continuously where it is desired, though my own experience has been that it is not necessary.

The operation is substantially the same whether one closure or two be used, though with one, the pressure of the fluid is usually relied upon to keep the valve closure against the seat while the spring is often used for this purpose in the case where two closures are used. Where the closure is eccentrically mounted, the annular faces, by which I pre-

fer to have them engage the valve seats, move with an oscillatory swing about the seats.

If the user desire to have the closures turn at the same time that they move across the valve seats, the connection between the gear and the stem is left in all the time. Otherwise, it is omitted or disconnected until the seat is to be ground. The handle is then removed, and the bonnet disconnected from the stem and the connection between the stem and gearing made. The handle is then replaced, when the closure or closures may be rotated by the handle to the desired extent to grind the valve.

Where I have referred to rotation of the closure, or similar language in the claims, I have intended to include angular movement of the closure, whether it be oscillatory or continued in one direction and whether the face be turned about an eccentric axis or about its true axis.

It will be evident that other forms of connection to rotate the closures and other forms of closure, closure mount, carrier, etc., may be used, and, in general, that many changes from the disclosed structure by which I prefer to carry out my invention, will occur to those skilled in this and allied arts and may be made without departing from the spirit and the scope of my invention set forth in the claims appended hereto.

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

1. The process of grinding a disk closure gate valve which consists in disconnecting the operative stem for drawing the regular valve disks across the face of the seats so as to maintain the disks in fixed position and subsequently rotating the stem to rotate the disks positively in opposite directions with required grinding material while they are maintained in axially correct position with respect to the valve openings.

2. The process of grinding a valve having movement transverse to the valve opening, which consists in separating the stem from its connections for causing the travel across the opening, supporting a valve closure from a relatively fixed member in axial coincidence with the position of the valve when fully closed, supplying any necessary abrasive and in positively rotating the closure by means of the stem while maintaining its axial position.

3. The process of grinding a double closure valve having the closure movable across the valve openings, which consists in disconnecting the means for moving the valve across the opening from its cooperating member, supporting both closures in position axially coincident with their positions when fully closed, supplying any required abrasive and rotating the valve closures by

the rotation of said means while maintaining their axial positions.

4. In a gate valve, in combination, a valve body having an opening and a seat transverse to the opening, a valve closure movable across the opening and also angularly about it and engaging the valve seat, a carrier for the closure, guides for the edges of the carrier in the valve body and means having a common element with its axis parallel to the direction of movement of the carrier for giving the valve closure movement across the opening and about it selectively.

5. In a gate valve, a valve body having openings in line and opposite annular faces surrounding the openings, guides in the valve body, a carrier engaging said guides, a bearing upon said carrier, a valve closure adapted to engage and turn in said bearing and having an annular face with the annulus eccentric to the axis of the bearing, annularly arranged gear teeth upon the closure, a stem and a gear capable of rotation by the stem and engaging the gear teeth.

6. In a gate valve, in combination, a valve body having an opening and a valve seat transverse to the opening, a valve closure movable across the opening and also angularly about it, a carrier for the closure guided to permit movement of the carrier across the opening and prevent movement of the carrier in other directions and rotatably supporting the closure, a stem engaging the carrier and rotatable with respect to it, a removable bonnet engaging the stem to provide movement of the carrier across the valve opening, gearing between the valve closure and the stem and a removable connection between the stem and the gearing to render it controllable by the stem or free therefrom.

7. In a gate valve, in combination, a valve body having an opening and a valve seat transverse to the opening, a valve closure movable across the opening, and also independently angularly about it, a closure operating spindle, teeth on the back of the valve closure, a carrier for the closure, guides in the body permitting movement in one direction, and supporting against movement in the other directions, an extension of the closure, having bearing in the carrier, a gear meshing with the teeth on the closure, having its axis parallel to the direction of movement across the opening, and operated from the same side of the valve as the spindle, and means for rotating the gear.

8. In a gate valve, in combination, a valve body having an opening and a valve seat transverse to the opening, a valve closure movable across the opening, and also independently angularly about it upon a fixed center, a closure operating spindle, a support for the closure, providing bearing

for the angular movement of the closure, guides for the support, permitting movement in one direction and supporting against movement in other directions, teeth on the back of the closure and a gear having its axis parallel to the direction of movement across the opening, and operated from the same side of the valve as the spindle, for rotating the closure by engagement with the teeth.

9. In a gate valve, in combination, a valve body having a plane annular valve seat, a circular closure therefor, a stem and cooperating casing parts for moving the closure parallel to the plane of the seat, adapted to be disconnected when the grinding is taking place and means coaxial with the stem and cooperating with the stem for separately positively rotating the closure in place against the seat to grind the same while the stem is maintained longitudinally in the same position.

10. In a gate valve, in combination, a valve body, having an opening and a valve seat transverse to the opening, a valve closure movable across the opening, and also angularly about it, a spindle engaging the closure to move it across the opening, guides at the sides of the body, forming grooves between, a carrier provided with fins engaging the grooves and supported laterally by the guides, a cylindrical bearing within the carrier, a cooperating cylindrical bearing secured to the closure, and gearing, including one gear rotated by the spindle connected with the closure to turn it.

11. In a gate valve, in combination, a valve body having an opening and an annular seat about the opening, a closure having an annular face engaging the annular seat adapted to move bodily in the plane of the face, a carrier for the closure, adapted to support it against the seat, bearing members upon the carrier and closure, having an axis eccentric to the annular face of the closure and means for positively turning the closure from outside the valve body.

12. In a gate valve, in combination, a valve body having an opening and an annular seat about the opening, an annular closure engaging said seat, eccentric mounting for said closure and means for positively turning the closure eccentrically to its annulus from outside the valve body.

13. In a gate valve, in combination, a valve body having an opening and an annular seat about the opening, a closure having an annular seat on one side thereof, teeth upon the back thereof and a tubular extension between the teeth and the center of the closure, a carrier for the closure having fitted sides and a cylindrical bearing fitting the extension of the closure, guides for the carrier, a stem movably connected with the carrier to permit free angular

movement therebetween, a gear removably connected with the stem and coaxial therewith and a removable bonnet connected with the stem to cause axial movement therebetween with rotation of the stem.

14. In a gate valve, in combination, a valve body having valve openings and facing annular valve seats thereabout, a carrier, guides for the carrier in the valve body, a valve closure rotatably supported within the carrier, movable angularly therein and adapted to enter from either side of the carrier to cooperate with either seat and means having common operating parts for giving the valve closure movement across or about the seat with which it engages selectively at will.

15. In a gate valve, a valve body having a valve opening and a surrounding plane valve seat, an eccentrically mounted closure for said seat, capable of rotation thereabout, a spindle and connections for giving bodily movement of the closure across the seat and means carried by the spindle for moving the closure angularly.

16. In a gate valve, in combination, a valve body having valve openings and facing valve seats, oppositely facing rotary valve closures cooperating with the seats, and having gear teeth thereon, a support for the closures maintaining them in relatively fixed axial relation and a gear constantly in mesh with the teeth on the closures for positively rotating both closures about centers fixed with respect to the seats and against the seats.

17. In a gate valve, in combination, a valve body having valve openings and facing valve seats, oppositely facing rotary valve closures cooperating with the seats, a support for the closures maintaining them in relatively fixed axial relation, continuously operative means for pressing the closures away from each other in all angular positions of the closures, and a gear constantly in mesh with the teeth on the closures for positively rotating both closures against the seats.

18. In a gate valve, in combination, a valve body having valve openings and facing valve seats, oppositely facing valve closures for the two seats, having gear teeth upon the backs of the closures, a support for the closures maintaining them in relatively fixed axial relation and a gear constantly in mesh with said teeth upon both closures for positively rotating both closures about centers fixed with respect to the seats and to each other.

19. In a gate valve, in combination, a valve body having valve openings and facing valve seats, oppositely facing eccentric valve closures for two seats, facing gearing upon the closures, an intermediate gear engaging with the teeth upon both closures, a

spindle for turning this gear to rotate the closures and a bonnet cooperating with the spindle to give the spindle longitudinal movement.

20. In a gate valve, in combination, a valve body having valve openings and facing valve seats, oppositely facing rotary valve closures cooperating with the seats, a closure operating spindle, a carrier common to the two closures, maintaining their axes of rotation in fixed relation to each other, a spindle adapted to operate the carrier across the seats, means for pressing the closures away from each other, and means coaxial with the spindle and operated from the same side of the valve as the spindle for positively rotating both closures about centers fixed with respect to the seats and against the seats.

21. In a gate valve, in combination, a valve body having valve openings and oppositely placed, facing, annular seats about the openings, a stem, a carrier, guides for said carrier rigid with the valve body and restricting it to straight line movement, a rotatable valve closure supported in said carrier and adapted to engage with either seat, an axially movable stem connected with said carrier to move it across the openings, means coaxial with the stem, and operated from the same side of the valve as the stem, for rotating the closure and means for engaging the stem to move the carrier across the valve openings.

22. In a gate valve, a valve body having valve openings and annular, axially coincident, facing seats about the openings, rotatable valve closures for said seats, a spindle and connections for moving the closures across the openings, resilient means for pressing the valve closures against the seats and means coaxial with the spindle, and operated from the same side of the valve as the spindle, for rotating the closures about a fixed axis passing through the valve openings.

23. In a gate valve, in combination, a valve body having an opening and an annular seat about the opening, an annular closure engaging said seat, eccentric mounting for said closure, a stem for inserting and withdrawing the closure across the seat and means upon the stem and closure for positively turning the closure eccentrically to its annulus.

24. A valve body having two parallel annular seats at right angles to the line of flow of the fluid through the valve, a carrier having a guide on its edge and adapted to move across the seats, a guide in the body of the valve for said carrier, a pair of valve closures for said openings retained in fixed axial relation to each other within said carrier, a screw-threaded spindle rotatably connected with said carrier, a bon-

net threaded for engagement with the spindle to move the carrier longitudinally with rotation of the spindle when the bonnet is in place and removable for rotation of the spindle without axial movement thereof, 5 teeth on said valve closures, a gear adapted to engage with the teeth of both closures and means for removably connecting the gear to rotate with said spindle.

10 25. A valve body having two parallel annular seats at right angles to the line of flow of the fluid through the valve, a carrier having a guide on its edge and adapted to move across the seats, a guide in the body of 15 the valve for said carrier, a pair of valve closures for said openings retained in fixed axial relation to each other within said car-

rier, a screw threaded spindle rotatably connected with said carrier, a bonnet threaded for engagement with the spindle 20 to move the carrier longitudinally with rotation of the spindle when the bonnet is in place and removable for rotation of the spindle without axial movement thereof, teeth on said valve closures, a gear adapted 25 to engage with the teeth of both closures, means for removably connecting the gear to rotate with said spindle and seats upon the valve closures eccentric to the support of said closures in the carrier.

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Witnesses:

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F. E. SCHULTE.