

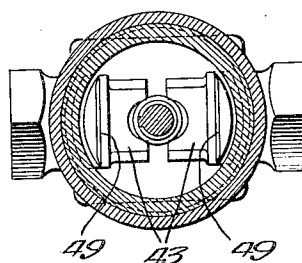
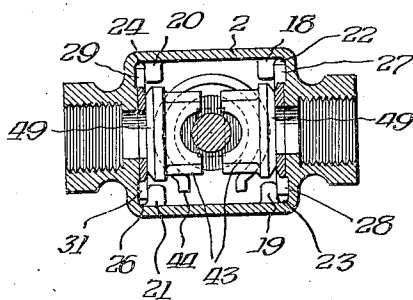
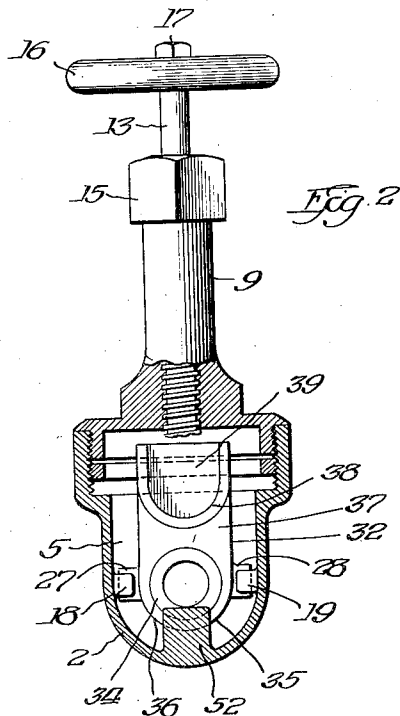
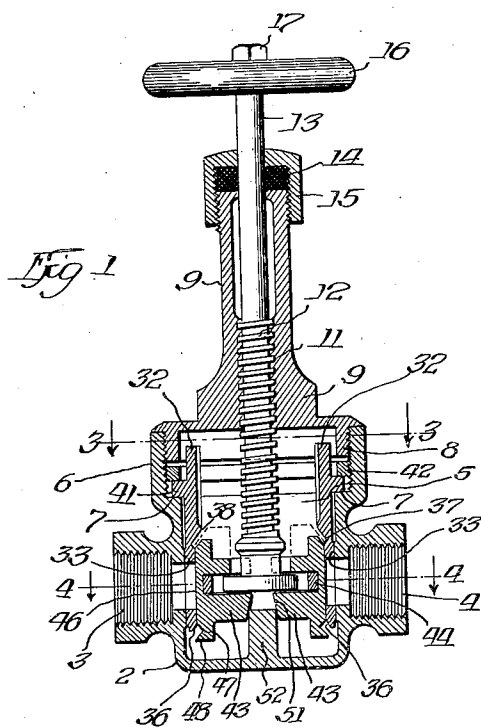
Nov. 1, 1927.

1,647,734

G. M. KELLY

SELF CLEANING VALVE

Filed May 14, 1925



Witness:

Ed. Collins

Inventor

George M. Kelly

By *Irish Wilson* Atty

UNITED STATES PATENT OFFICE.

GEORGE M. KELLY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, OF SIXTY PER CENT TO PATRICK J. KELLY AND THIRTY PER CENT TO JOHN F. KELLY, BOTH OF MUSKEGON, MICHIGAN, AND TEN PER CENT TO FRANK H. T. POTTER, OF CHICAGO, ILLINOIS.

SELF-CLEANING VALVE.

Application filed May 14, 1925. Serial No. 30,146.

This invention pertains to valves for fluids and the like and more particularly relates to gate valves of either a rising or non-rising stem type.

5 Gate and other valves have been constructed in different ways and with attachments solely for the purpose of collecting debris or sediment from fluids passing there-
10 through, but few if any provide any method or apparatus by which deposits upon the seat or seats of the valve or deposits upon any other working part may be prevented or removed. A few valves of the gate type have
15 been designed with removable bushings or seats for the purpose of removal of the seat and the substitution of a new seat when the old one is worn or damaged. A valve constructed in this manner is illustrated on page 162 of Crane catalogue No. 51, June, 1923.
20 Valve seats of this character may be cleaned or renewed by removing an opening or by dismantling the valve for access to the worn or damaged parts, but cleaning and renewing such part or parts is a very costly procedure. This cost is involved not alone be-
25 cause of the labor involved, but also because it may be necessary to shut down the whole line served by the valve during its repair. It is apparent that serious consequences
30 could easily develop from such procedure. The invention hereinafter more particularly disclosed entirely obviates such requirements and occurrences while providing a uniquely efficient construction at compar-
35 atively low cost of manufacture and operation.

Another object is to provide a valve mechanism in which the valve (in this instance, the valve gate) seat faces may be
40 maintained free from sedimentary deposits and other debris when the valve is open and regardless of the time during which the valve may remain open.

One object of my invention, therefore, is
45 to provide a valve mechanism which in its operation will be self-cleaning, preferably including for its purpose combination self-cleaning seat and self-cleaning gate or valve head members.

50 Another object is to provide a valve constructed in such a manner that wear on the valve face sometimes known as cutting or channeling caused by fluid and abrasive debris passing thereacross when the valve is

partially opened will be minimized or en- 55 tirely obviated.

Still another object includes the provision of a valve from which the valve seat and gate members may be easily and quickly re-
60 moved and the parts thereof may be readily accessible for removal.

A further object is to provide a valve construction which will be unusually tight and substantially leakproof.

Still further objects including means 65 whereby expansion and contraction of the valve body or its operating parts may be compensated, a construction which will increase its normal useful life and a construction wherein the parts may be easily and
70 readily replaced by like parts formed from materials better adapted for other usages such as when the valve is used in an acid fluid line, should become apparent from the details of the description and from the 75
claims, and from the drawings in which

Fig. 1 is a diametral sectional elevation of one type of valve construction made in ac-
cordance with my invention.

Fig. 2 is a part section taken at right an- 80 gles to the view of Fig. 1, certain of the valve parts being removed.

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1, and

Fig. 4 is a similar section taken on the line 85 4—4 of Fig. 1.

The invention is shown applied to a valve of the rising stem gate type. A body portion 2 provided with inlet and outlet openings 3 and 4 of which there may be any suitable
90 number, is formed to provide an interior chamber 5 and an outwardly flanged portion 6 forming a shoulder 7 for a purpose to be hereinafter described. The flanged portion 6 is interiorly threaded to receive a corre-
95 spondingly threaded flanged portion 8 of a bonnet 9 interiorly threaded as at 11 to receive threads 12 formed on a rising stem 13 passing centrally therethrough. The bonnet 9 may be provided with the usual packing
100 gland 14 and packing gland cap 15, while the stem 13 is provided with a hand wheel 16 secured thereto as by nut 17 for operation of the valve.

The valve body 2 is provided with lugs 18, 19, 20 and 21, which project from the walls thereof to provide recesses 22, 23, 24 and 26 gradually decreasing in width downwardly

in a direction from the top to the bottom of the valve body. These tapered recesses are adapted to receive similarly tapered lug members 27, 28, 29 and 31 formed upon opposite sides of the valve seat members generally designated 32 having a plane face 33 adapted to lie in intimate contact with a like face formed on the interior of the valve body adjacent the inlet and outlet ports and likewise with a plane face or seat 34 upon which the gates or valve heads to be hereinafter described will seat. The lower edge 35 is arcuate as will be clearly seen from Fig. 2 and is tapered as at 36 for a purpose also to be hereinafter described. The seat members are also formed with a recessed portion 37 and arcuately shaped, outwardly tapering portions 38 providing a recess 39 open at its upper end and with lug portions 41 extending behind and adapted to rest upon the shoulder 7 formed on the interior of the body 2 of the valve. A screw washer or gasket 42 which may be of other construction if preferred, is preferably interposed between the threaded portion 8 of the bonnet 9 and the top face of the lug or projecting portion 41 of the valve seat member 32.

Suitably positioned upon the end of the stem 13 for upward and downward movements therewith are gate valve members 43 interiorly recessed to receive a ring spring member 44 adapted to urge these gate members outwardly so that their plane faces 46 will tightly contact with the similar plane faces of the valve seat members 32. These gate members are preferably formed with an arcuate recess 47 and a parallel projecting edge 48, the outermost point of which is preferably constructed to project slightly beyond the plane of the surface 46, while at their upper sides these members are tapered off as shown at 49 in Figs. 3 and 4.

It has sometimes been found preferable to aid the spring 44 in urging the respective gate members 43 outwardly into contact with the valve seat members 32 by supplementing their action. For this purpose the inner portions of the gate members are tapered as shown at 51 for wedging engagement with a wedge lug 52 formed integrally with the bottom of the interior of the body 2. However, the lug 52 may be omitted or constructed in two parts placed on either side of the valve body as will be readily understood.

In operation, assuming the valve to be in closed position as shown in Fig. 1, rotation of the stem by means of the hand wheel or other hand operating device, will raise the gates 43 and the arcuate projecting portions 48 will contact with the bevelled surfaces 36 of the valve seat member and tend to urge the gates toward one another or toward the stem against the action of the spring ring 44, and at the same time the bevelled sur-

faces 49 of the gates will contact with the correspondingly bevelled portions of the upper portion of the seat member. As the gates are raised further the edge 48 will scrape resiliently across the interior face 34 of the seat member and the edge 38 of the seat member will scrape resiliently across the face 46 of the gate member, removing any deposits or debris carried thereby, and upon its further upward movement the faces 46 will ride into the depressed portions 39 of the valve seats, while the portions 48 of the gates will drop into the recesses 37 of the seats. As will be apparent from the drawings, when the gates are fully raised their seat surfaces 46 will drop into the depressed portions 39 and since the surfaces 46 and 39 conform with one another, they will contact with one another over their entire areas and prevent accumulation of debris on either surface. The reverse movement of the stem will reverse the operations just enumerated and a cleaning action is afforded on the downward movement of the gates also. The spring 44 will at all movements of the valve gates tend to urge them outwardly into tight contact with the valve seats, and when the gates are in their lowermost position insure a tight engagement with the seat and a tight engagement of the seat with the valve body. While in this position the wedge or wedge lugs 52 form an additional sealing means.

As will be clearly apparent from the construction of the valve gates or closure members 43 their arcuate lower edges when raised will almost instantaneously uncover a relatively large portion of the inlet and outlet openings in the valve seats, allowing any debris which may have accumulated in the fluid at the points of opening of these passageways to be dispersed over a relatively wide area with the first inrush of fluid there-through and also permitting the water to flow in and out of the ports in a relatively large volume substantially instantaneously. This will prevent cutting or channeling action in the bottom edges of the valve gates so frequently an objection to other types of valves. This advantage of having a fluid flow over practically the full surface area of the valve seat and valve gate when the valve is partially open is but one of many features and advantages to be had with its operation. It is quick opening, self-cleansing, practically the whole interior operating portions can be replaced without removal of the shell or body, a longer valve life with low cost of maintenance, contraction and expansion of the various members of the valve are adequately compensated, there are no primary parts with pockets in which sediment may collect where it is not desired and the valve body and parts may be so constructed that they can be used for acid fluids or any other unusual condition or requirement.

Many additional advantages should be readily perceived, and since various changes may be made in the construction and operation without departure from the spirit of my invention or the scope of the appended claims I do not wish to be limited to the general or specific construction shown and described.

I claim:

1. In a valve, a body having inlet and outlet ports, a valve seat for each of said ports, a valve stem, port closure members on said stem, and a U-shaped spring partially embracing said stem and engaging one of said closure members for urging such member into contact with its seat.

2. In a valve, a body having inlet and outlet ports, a removable valve seat for one of said ports, a valve stem, a port closure member on said stem, and a U-shaped spring partially embracing said stem and between said stem and said closure member for normally urging said member into contact with said seat.

3. In a valve, inlet and outlet ports therein, a valve seat member for one of said ports, a port closure member adapted to cover said seat, means for moving one of said members to cover and uncover said port, and means projecting from one of said members at all times toward the other for scraping contact across the face of the other said member during movement of either.

4. In a valve, inlet and outlet ports, a valve seat member for one of said ports, and a port closure for covering said seat, said members having cooperative seating surfaces, means for moving one of said members to cover and uncover said support, and a rib on the seat face of each of said members for scraping the cooperative seating surface of the other during the movement of either.

5. In a valve, having inlet and outlet ports, a valve seat member for one of said ports, a port closure member for covering said seat, said members having cooperative seating surfaces, means for moving one of said members to cover and uncover said port, means projecting transversely of the seating surface of each of said members toward the other for scraping the cooperative seating surface of the other upon movement of either, and means for urging one of said members toward the other.

6. In a valve, having inlet and outlet ports, a valve seat member for one of said ports, a port closure member for covering said seat, said members having cooperative seating surfaces, means for moving one of said members to cover and uncover said port, means secured to and projecting transversely of the seating surface of each of said members toward the other for scraping the cooperative surface of the other upon move-

ment of either, and resilient means for urging one of said members toward the other.

7. In a valve having a port, a removable valve seat member for said port, a port closure member for covering said seat, said members having cooperative seating surfaces, means for moving one of said members to cover and uncover said port, means on each of said members and projecting toward the other for scraping the cooperative surface of the other upon either movement of either, and resilient means for urging one of said members toward the other.

8. In a valve in combination, a valve seat member, a valve head member, said members having cooperative contact surfaces and one of said members being movable transversely across the contact surfaces of the other member, and means operatively interposed between said members upon movement of said movable member for scraping across one of said contact surfaces to clean it.

9. In a valve in combination, a valve seat member, a valve head member, said members having cooperative contact surfaces and one of said members being movable back and forth across the other member transversely of the contact surface of the other, and means integral with the contact surface of one of said members and adapted to be interposed between said members for scraping across the contact surface of the other of said members when said members are moved relatively to one another in either direction.

10. In a valve in combination, a valve body, a valve seat in said body, a valve head adapted to engage said seat, means for respectively raising and lowering said head into and out of contact with said seat, means operatively interposed between said members upon movement of said movable member for scraping across one of said contact surfaces to clean it, means for resiliently urging said head and seat relatively together during raising and lowering movements of said head, and means integral with said body for positively urging said head when lowered under pressure against said seat.

11. In a valve, a body provided with a port and a bonnet connection, a valve seat having an integral elongated portion extending between said seat and said bonnet connection, and means including a transverse shoulder integral with the elongated portion of the seat for removably securing the seat to the body adjacent said bonnet connection.

12. In a valve, a body having a port, a removable seat for said port and provided with an integral projection thereon at a portion spaced from the seat surface, a shoulder on said body, and means for releasably securing said projection against said body shoulder.

13. In a valve, a body provided with a port, a removable seat member for said port,

said body having a transverse shoulder, said member having an integral transverse shoulder cooperatively engageable with said body shoulder, and means removably securable to said body for removably securing said shoulders together.

14. In a valve, a body having a port opening and a bonnet connection, a removable valve seat for said port movable transversely of said port into and out of position with respect thereto, said seat having a portion extending away from the port toward said bonnet connection, a flange projecting laterally from said portion remote from said port, a shoulder in said bonnet connection cooperative with said flange, means for securing said flange and shoulder together, and means in said body for receiving and positioning said seat with respect to said port and for wedging said seat against the body adjacent said port when said seat is moved transversely of said port into position.

15. In a valve, a body having an inlet port and an outlet port and a valve seat for each of said ports, a valve for simultaneously engaging both of said seats to close said ports, means for moving said valve transversely of said ports into and out of alignment with said seats, and a U-shaped spring between said valve and moving means normally tending to urge said valve toward said seats transversely of its opening and closing line of movement.

16. In a valve, a valve gate, a valve seat having a port opening and an integral portion extending away from said opening in the direction and for substantially the full distance of travel of said gate toward or from port closing position, means for moving said valve toward and from port closing position, said portion having a surface adapted to conform to the whole surface of the seat face of the gate whereby to protect the seat face of the gate from deposits and the like when in port open position, and means for holding said seat face of the gate against said surface when said gate is in port open position.

17. In a valve, a valve gate, a valve seat having a port opening and a portion extending away from said opening in the direction and for substantially the full distance of travel of said gate toward or from port closing position, means for moving said valve toward and from port closing position, said portion having a surface adapted to conform to the marginal edge surface of the seat face of the gate whereby to protect the seat surface of the gate from deposits and the like when in a port open position, and resilient means for holding said seat face of the gate against said surface when said gate is in a port open position.

18. In a valve, a valve body having a port, a valve gate having a seat face, a seat for said port and cooperative with said gate, a protective seat for said gate seat face adjacent said port and cooperative with the entire marginal portion of said seat face when said gate is in full port open position whereby to protect said gate seat face, and means for holding said gate seat face in cooperative engagement with said protective seat when in said position.

19. In a valve, a valve body having a port, a valve gate having a seat face, a seat for said port and cooperative with said gate for closing said port, a protective seat for said gate seat face adjacent said port and cooperative with said seat face when said gate is in a port opening position whereby to protect said gate seat face, and means for resiliently pressing said gate seat face into cooperative engagement with said protective seat when in said position.

20. In a valve, a body having inlet and outlet ports therein, a valve seat member for one of said ports, a port closure member adapted to cover said seat, and means on said closure member cooperative with said seat and adjacent said seat cooperative with said closure member for moving said closure member from said seat to space the same apart equally about their contact surfaces.

GEORGE M. KELLY.