

J. M. BARRETT.

VALVE.

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1,275,831.

Patented Aug. 13, 1918.

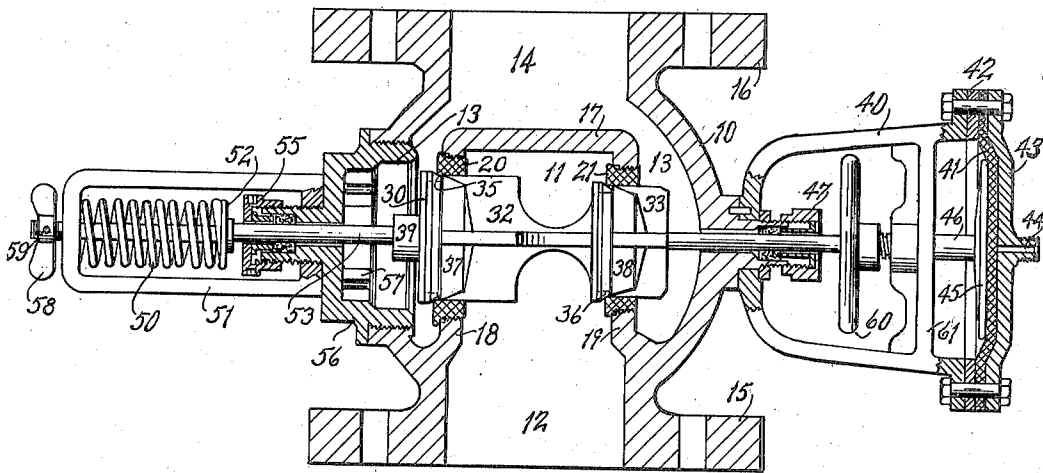


FIG. 1.

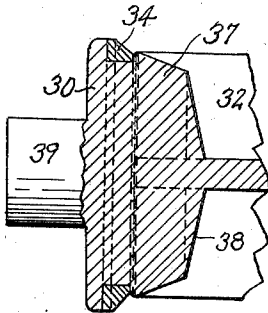


FIG. 3.

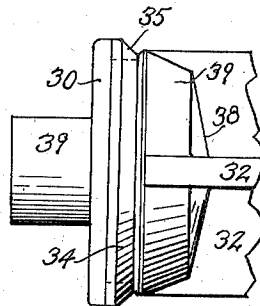


FIG. 2.

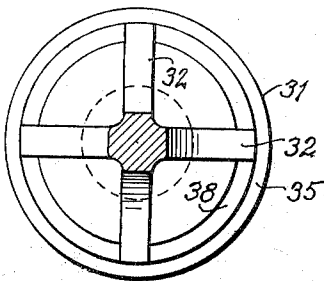


FIG. 4.



FIG. 5.

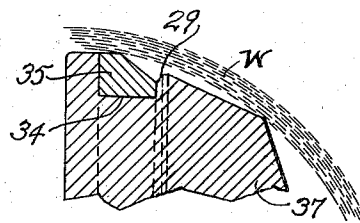


FIG. 6.

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VALVE.

1,275,831.

Specification of Letters Patent. Patented Aug. 13, 1918.

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To all whom it may concern:

Be it known that I, JOSEPH M. BARRETT, a citizen of the United States, residing at Fostoria, in the county of Seneca and State of Ohio, have invented a certain new and useful Improvement in Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention is concerned primarily with double seating conical valves. Valves of this general type have been found well adapted for regulating the flow of feed water to boilers, for example, both by reason of being substantially balanced and because a more even regulation may be obtained than with a single seating valve. However, with a double-seating valve it has been difficult to maintain both seats tight where the valve is subjected to changes in temperature. If the valve member on which the conical plugs or disks are formed is made of a different material from that part of the casing which carries the seats it will have a different rate of expansion and hence tight seating is liable to be prevented. On the other hand, if made of the same material it is thus restricted to a material suitable for the casing, which is usually not the most desirable material for valve seats.

I have discovered that the desired result may be obtained, and the disadvantages of making the casing and plug of the same or different materials avoided, by making the principal portion of the plug of the same material as the casing, and thus expanding and contracting commensurately therewith, and providing in the casing valve seats of a different material and providing on the plug seating rings of a material similar to the seats. This seating material I have found may well be of the alloy known as Monel metal, which has the characteristics of being soft and at the same time very tough, and while not suited for the entire plug is very satisfactory for the seating surfaces of both the plug and casing.

Another disadvantage of valves of the general type described is that the small annular passageway frequently has a tendency to cause "wire-drawing" of the fluid passing through the valve openings, which causes rapid wear of the seats. To avoid this wire-drawing and also to enable a more regular flow, I provide the plug of such form that

it will restrict the effective opening as the valves and valve seats separate, thus requiring a considerable movement of the valve plug to effect the required opening. I prefer to provide this restriction by means of a conical filler on the valve plug which extends into the seating ring and is of such pitch that it reduces the area of the annular opening for the passage of fluid from the area provided by the space between the seating portion of the valve and the valve seat ring. Moreover by making the filling cone at a different angle from the seating cone, I divert the passing fluid from the seating surface and thus save it from this attritive wear.

My invention comprises a valve having the characteristics above referred to, or some of them, as hereinafter more fully explained and as summarized in the claims.

In the drawings, Figure 1 is a sectional elevation through a regulating valve embodying my invention; Fig. 2 is a fragmentary enlarged side elevation of a portion of the valve plug; Fig. 3 is a fragmentary axial section through a portion of the valve plug; Fig. 4 is an end view of the valve plug, looking from the right hand end in Fig. 1; Fig. 5 is a diametric cross section through one of the Monel metal rings carried by the valve plug; Fig. 6 is a fragmentary radial section through the valve plug, illustrating the course of the passing fluid.

As shown in Fig. 1, 10 indicates the valve casing having an inner chamber 11 communicating with a passageway 12 and having an outer chamber 13 communicating with a passageway 14. The casing is shown as terminating in suitable flanges 15 and 16 to enable the usual flange coupling with the intake and discharge pipes. The two chambers 12 and 13 are separated by a box-like partition 17 which has a partial cylindrical wall and parallel flat portions 18 and 19. In these flat portions are axially aligned threaded openings which are occupied by externally threaded rings 20 and 21, preferably of Monel metal, which form the valve seats. On the sides of their seats these rings are provided with outwardly flaring flanges seating against cutaway shoulders in the flat portions 18 and 19.

The valve plug shown comprises heads 30 and 31, wings 32 connecting such heads,

guiding wings 33 beyond the head 31, and rings of seating material, preferably Monel metal, 35 and 36 carried on the heads 30 and 31. To insure the Monel metal ring 5 being held on the valve plug I mount it in an annular groove 34 made about the head of the plug, as shown clearly in Figs. 2 and 3. To mount the Monel metal ring in this groove I prefer to first form the ring and 10 place it in the mold in which the valve plug is to be cast and cast the plug within the ring. As the Monel metal is of a considerable higher melting point than brass, it is readily feasible to first cast the Monel metal 15 ring in the proper shape, then place it in the mold and cast the brass body within it.

In order to make the flow through the valve regular and to secure a more even graduation of the water flowing through 20 the valve, and prevent wear on the valve seats, as heretofore explained, I prefer to restrict the space between the wings adjacent to the seating sides of the respective heads by conical filling portions 37 and 38. These 25 fillers are an integral portion of the body of the plug. They overhang the annular groove 34 and thus cooperate with the corresponding head to effectively retain the Monel metal ring 35 or 36 in place.

30 The conical fillers have the effect of restricting the passageway for fluid so that a comparatively long stroke of the valve is required for a given valve area opening. This is important, for instance, when the 35 valve is used in a feed water regulator controlled automatically by pressure against a diaphragm operating the valve. Without a restriction of the valve opening, the movement of the diaphragm caused by change of 40 water level in boiler might result in a comparatively larger opening of the valve area than required by actual steaming conditions and thereby causing a larger quantity of 45 water to be fed to the boiler than actually required, with the result that this change in water flow would be very noticeable on metering records—also steam output and the rate of feeding would not be in proportion to the actual requirements. The operation 50 would therefore be irregular; too much water would be fed at a time followed by a substantial stoppage of the feed, instead of the moderate graduated flow desired. By using the restriction, a larger movement of 55 the valve is necessary to permit the requisite flow and the valve operates without being entirely closed or entirely open, but playing back and forth as the service conditions require.

60 It will be noted that the outer surfaces of the Monel metal rings 35 and 36 are inclined substantially 45 degrees, whereas the surfaces of the fillers 37 and 38 are inclined at a much steeper angle. Accordingly, when 65 the Monel metal ring is moved away from

the seat ring a definite distance, the annular space is materially restricted by the filling cone. This restriction varies with the use to which the valve is to be put, but it is sufficient to prevent wire-drawing by the 70 passing fluid and to insure a large enough opening for a regular flow.

Another result of the steep-pitch filling cone is to protect the Monel metal ring from the discharging action of the fluid which 75 flows past the ring when the valve is open. Such fluid is diverted by the filling cone away from the Monel metal ring, whereby the latter is protected and its durability increased. This diversion of the fluid is indicated disagrammatically by the curved lines 80 W in Fig. 6. In this figure it will also be noted that the cone filler 37 overhangs the inner edge of the Monel metal ring 35, as shown at 29, and thus affords a further protection. 85 The construction is similar at the ring 36 and filling cone 38.

With such a valve as above described, I make the casing and the plug body of the same material, for example brass, so that 90 they have the same coefficient of expansion, and thus the relative distance between the two disks or heads changes in substantially the same proportion as the distance between the valve seats. By making the rings 20 and 95 21 and 35 and 36 of Monel metal I obtain a very tight seat, for this material is soft enough so that the edge of the stationary seat will form a perfectly tight joint with the ring carried by the plug. The softness 100 of the material enables the edge of the seat to sink slightly into the ring carried by the piston; at the same time the toughness of the material prevents its being broken down or roughened. The material, however, is not 105 suitable for making the body of the casing or the entire plug.

Monel metal may be purchased on the open market, and I understand has a composition approximately as follows: nickel 110 67 per cent., copper 20 per cent., manganese, iron and sulfur each a small per cent. It is to be understood, however, that these proportions are cited simply as illustrative and I do not intend to limit myself thereto. 115

Such a double seated disk valve as above described is very well adapted for use in a feed water regulator where the material of the valve must be something which will not rust nor contaminate the water. I have 120 found brass very satisfactory for the casing, but as the temperature of the feed water varies considerably I have had trouble with maintaining tight seating of the valve until I invented the present valve seating combination, which I have found accomplishes 125 the desired result.

The parts shown in Fig. 1, not already described, provide for shoving the valve in the opening direction by a fluid pressure 130

against a diaphragm opposed by a spring tending to seat the valve. I will now briefly describe such parts, though they are not claimed particularly herein.

5 In Fig. 1, 40 indicates a yoke secured to the casing 10 and carrying at its end a flexible diaphragm 41 clamped between a ring 42 and a head 43. 44 indicates a passage-way through the head 43, whereby fluid may
10 be forced against the diaphragm. On the other side of the diaphragm is a movable head 45 on the end of a rod 46 which passes through a stuffing box 47 carried by the casing and abuts the end of the valve plug,
15 at the junction of the wings 33.

It results from the construction described that pressure against the diaphragm may open the valve. The valve is given a constant pressure in the closing direction by a
20 spring 50 which is compressed between a yoke 51 carried by the casing and a head 52 on a rod 53 which bears against the boss 39 on the other end of the valve plug.

The rod 53 passes through a stuffing box
25 55 which is shown as carried by a removable cap 56 constituting part of the casing. The removal of this cap provides space for the removal of the valve plug and also for the removal of the Monel metal seats, the
30 threaded opening in the casing occupied by the cap being large enough to allow the passage of the Monel metal rings, and the threaded opening in the partition 18 being large enough to allow the passage of the
35 Monel ring 21 from the other partition 19. The interior of the cap 56 also provides a cavity allowing clearance for the movement of the valve. Lugs 57 in such interior form a suitable abutment for the valve.

40 I prefer to thread the free end of the stem 53 and mount on it a nut 58. This nut is normally idle but serves to hold the stem in place when the cap 56 is removed; also, by withdrawing the cotter pin 59 extending
45 through the rod, the nut may be rotated to draw the stem back from the valve if desired.

To force the valve open by hand whenever desired, I have shown a hand wheel 60
50 threaded on the rod 46 and adapted to bear

against a cross bar 61 of the yoke 40, whereby the rod 46 may be shoved to the left. This feature is claimed in Patent No. 970,421, issued September 13, 1910, to The "S-C" Regulator Company, as assignee of
55 N. G. Copley.

Having thus described my invention, what I claim is:

1. In a valve of the character described, the combination with a casing having an interior separator with a pair of partition
60 walls having alined openings therein, a pair of rings mounted at said openings to provide valve seats, a valve body having two heads and wings connected with each of said
65 heads, each of said heads having a grooved edge in which a ring having a conical exterior is placed, and conical filling portions between the wings of the valve body.

2. In a valve, the combination of an annular valve seat, a valve plug having an annular groove, a conical faced seating ring
70 occupying said groove, and a conical filler on the valve plug extending from said seating ring and slightly overhanging the portion of the seating ring of smallest outer
75 diameter.

3. In a valve, the combination of an annular valve seat, a valve plug having an annular groove, a conical faced seating ring
80 occupying said groove, and a conical filler on the valve plug extending from the small edge of the seating ring and having a more acute cone-angle than said seating ring.

4. The combination of a valve casing having
85 an annular valve seat, an integral valve plug having a head overhanging the seat, wings extending through the seat, a conical filler lying between the wings and extending from the head, and an annular groove about the
90 head adjacent to the large end of the filler, and a continuous metal seating ring of different material from the plug occupying said groove and held in place between said head and filler and having a conical exterior
95 coacting with the valve seat.

In testimony whereof, I hereunto affix my signature.

JOSEPH M. BARRETT.