J. M. PALMER.

VALVE.

APPLICATION FILED DEC. 30, 1910.

1,088,616. Patented Feb. 24, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

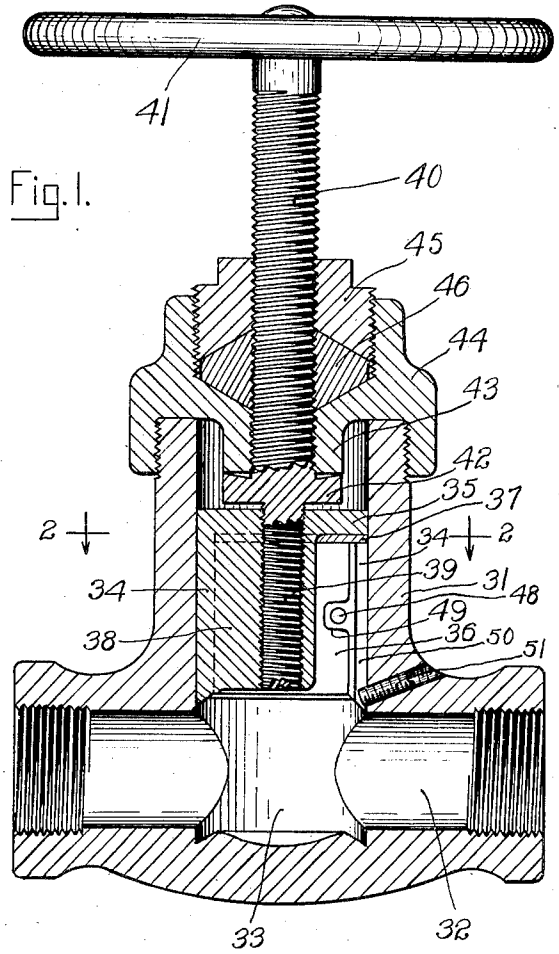
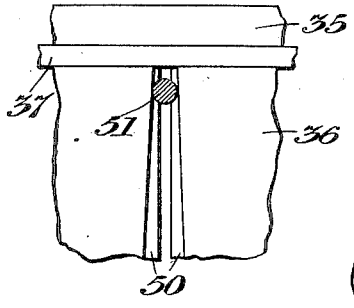


Fig. 7.



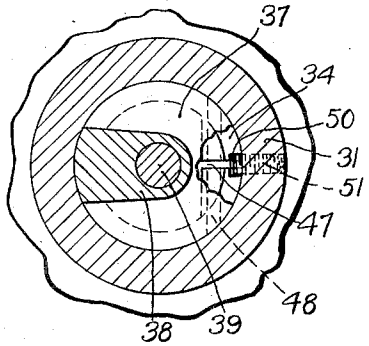


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

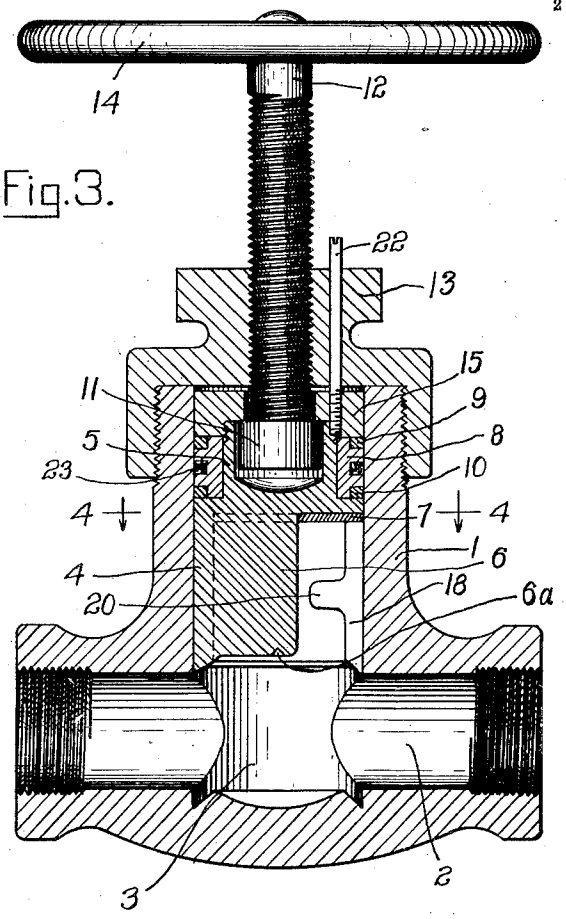


Fig. 4.

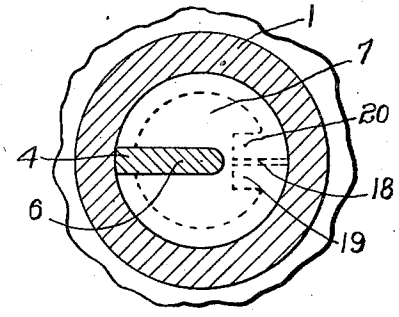


Fig. 5.

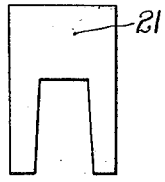
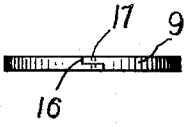


Fig. 6.



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VALVE.

1,088,616. Specification of Letters Patent. Patented Feb. 24, 1914.

Application filed December 30, 1910. Serial No. 600,097.

To all whom it may concern:

Be it known that I, JOHN M. PALMER, 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 Valves, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to valves for controlling the flow of water or steam and is particularly adapted for high pressure work, as the pressure exerted upon the valve is employed to tightly seat the valve member against the coöperating casing of the valve, when the valve is in its closed position.

By my construction I provide a casing free from passages of irregular conformation, as a result of which, the construction of the valve is much cheapened and simplified, it only being necessary to form in the casing, two straight cylindrical openings at substantially right angles to each other, one of which is finished to receive the valve mechanism. The valve mechanism employed has an outer surface, which is cylindrical and of uniform diameter and therefore easy to construct with a high degree of accuracy by grinding or an equivalent operation.

The several drawings illustrating my invention are as follows:—

Figure 1 is a central sectional view taken through the casing of the valve and shows the valve mechanism in its assembled condition, the valve mechanism being shown in this view in its open position. Fig. 2 is a sectional view of the parts shown in Fig. 1 and taken along line 2—2, with a portion of the disk 37 removed. Fig. 3 is a view similar to Fig. 1 of a modified construction of valve mechanism. Fig. 4 is a sectional view of the parts shown in Fig. 3 taken along the lines 4—4. Fig. 5 is a detailed view of a clip used in finishing the valve member. Fig. 6 is a detailed view of one of the packing rings employed in the valve. Fig. 7 is a detail view of the construction of the key way 50 which is slightly beveled as indicated to engage the screw 51 when the valve is closed so that the tubular portion of the valve member is held firmly against the bore of the valve casing.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 1 and 2 the valve consists of a casing 31 in which there are formed two cylindrical openings 32 and 33 at an angle to each other, the opening 33 being of slightly larger diameter than the opening 32 and finished to receive the valve member 34. The opening 32 is divided into two parts by the valve opening 33, each of such portions being threaded at the outer end to receive the pipe connections with which the valve is designed to operate. The valve member 34 consists of a disk 35 at its upper end and a tubular portion 36 at its lower end separated by a disk 37 which disk is not connected to either the disk 35 or the tubular portion 36 of the valve member. The portions 35 and 36 are connected together by a web 38 through which a threaded opening is formed longitudinally of the valve member 34 to receive the lower end 39 of the operating rod 40 to the upper end of which a hand wheel 41 is screwed for the purpose of rotating such rod. The valve member 34 is preferably formed of cast metal as cast iron or cast brass and during the casting operation the disk 37 is inserted in place, such disk consisting preferably of steel having smooth upper and lower surfaces as a result of which the disk 35 and the tubular portion 36 fit closely to the upper and lower surfaces of such disk. The smooth steel disk it will be understood has a slot extending into it from one edge as indicated in the drawings to receive the web 38 connecting the portions 35 and 36, and such smooth disk 37 serves to permit expansion and contraction of the tubular portion of the valve member relatively to the portion 35 of such valve member and at the same time fills the space between the tubular portion and the portion 35 so that leakage will be practically prevented from the lower portion of the valve casing past the disk 37 into the upper portion of the casing. The smooth surfaces of the disk 37 permit the tubular portion to move freely relatively to such disk when the tubular portion is expanded or contracted, and such smooth surfaces further serve to afford a tight joint between the portions 35 and 36 and the disk 37, as a result of the casting operation. During the casting operation, the surfaces of the disk 37 are not changed by

the hot metal as a chilling action takes place immediately upon the melted metal striking the disk 37 and the smooth surfaces are left practically unaffected. This has been found to be so whether the valve member be cast of brass or cast iron.

The operating rod 40 is provided with a flange 42 above the portion 35 of the valve member the upper surface of such flange being beveled as indicated to engage the downwardly extending boss 43 formed on the cap 44 which is internally threaded to engage the upper end of the valve casing 31 to close the upper end of the cylindrical opening 33. The upper end of the cap 44 is internally threaded and a screw plug 45 engages the internal thread referred to to secure a packing ring 46 preferably of wood or similar material in the space between the plug 45 and the cap 44 around the threaded operating rod 40. The packing ring 46 is beveled top and bottom to fit the lower end of the plug 45 and the bottom of the opening formed in the upper end of the cap 44 such packing ring being thicker at the center than at its periphery as a result of which by screwing the plug 45 in the cap 44 the packing ring 46 may be forced inward against the threaded rod 40 to completely fill the threads and thus prevent water or steam which may enter the upper end of the opening 33 from passing out through the threads formed on the rod 40.

The rod 40 and the lower thread on the cap 44 are of the same pitch as a result of which for any adjustment of the plug 45 the cap 44 may be removed from the valve casing 31 without change of position of the valve member 34. The upper portion of the operating rod 40 is provided with a right hand thread fitting coöperating threads in the plug 45 and the boss 43 while the lower portion 39 of the operating rod is provided with a left hand thread which engages a corresponding thread in the web 38.

In constructing the valve member 34 after it is cast with the disk 37 in place as described above the tubular portion 36 is slotted as indicated at 47 and such tubular portion is then drawn together by a screw 48 extending through the lugs 49 formed on the inside of the tubular portion 36. The outer surface of the valve member 34 is then turned and ground to the exact size of the finished cylindrical opening 33 after which the screw 48 is cut at 47 so that the tubular portion 36 may spring outward. A keyway 50 is formed in the outer surface of the tubular portion 36 on either side of the slot 47 to engage a screw 51 located in the casing 31 to prevent rotation of the valve member 34 without interfering with its longitudinal motion in the opening 33. The keyway 50 is narrower near the top than the bottom as shown in Fig. 7 so that when the valve member is in its closed position the screw 51 serves as a spreader to force the upper end of the tubular portion 36 firmly into contact with the casing 31.

I have found it preferable to construct the valve member 34 of cast iron and the casing 31 of cast brass since these metals wear upon each other better than a cast brass valve member would upon a cast brass casing and furthermore cast iron is more elastic than cast brass thus affording a better fit between the valve member and the casing than if the valve member were made of cast brass.

After finishing the valve member 34 the valve is assembled by compressing the tubular portion 36 and inserting it at the upper end of the opening 33 with the keyway 50 in line with the screw 51. The operating rod 40 is then screwed into the valve member 34 and the assembled cap 44 is screwed down the operating rod 40 and into engagement with the threaded upper end of the casing 31. The relation of the parts is such that when the valve member 34 is raised to its uppermost position, with the cap 44 screwed firmly against the upper end of the valve casing 31 the upper surface of the flange 42 is in engagement with the lower end of the boss 43 while the lower surface of the flange 42 is separated a small distance from the top of the valve member 34; thus the flange 42 serves when the valve is open to prevent in a large measure the passage of water or steam from the upper end of the opening 33 to the threads upon the upper portion of the rod 40 and such small amount of water or steam as may leak past the flange 42 is intercepted by the packing ring 46 and prevented from escaping through the plug 45.

In the modification shown in Figs. 3 and 4 the valve casing 1 is similar to the valve casing 31 above described and the valve member 4 consists of a tubular shell at its lower end, having a cylindrical extension 5 at its upper end, of smaller diameter than the lower portion 4. The portions 4 and 5 are connected together by a web 6. The valve member as shown, is formed of cast metal, and during the casting operation, a smooth disk 7, preferably of steel, is placed in the mold, so that when the valve member is cast, it will occupy the position indicated in Figs. 3 and 4, between the portions 4 and 5 of the valve member; the disk 7 thus serves to separate the portions 4 and 5, except where they are joined by the web itself and the portion of the tubular shell adjacent thereto. After the valve member is cast, the upper portion 5 is turned on its outer surface to receive a collar 8, provided with recesses in its ends to receive the packing rings 9 and 10. The cylindrical portion 5

is bored at its upper end to receive the head 11 of the operating rod 12, the latter being of smaller diameter than the head 11 and threaded to engage the cap 13, used to close the upper end of the valve casing. The rod 12 is provided with a hand wheel 14, by which it may be rotated. The upper end of the cylindrical portion 5 of the valve member is externally threaded to engage a nut 15, which is provided with a central opening, sufficiently large to clear the threaded rod 12, but engage the head 11, as a result of which the head 11 is retained in the valve member, but permitted to rotate therein.

Each of the packing rings 9 and 10 is constructed as indicated in Fig. 6, each ring being split, as shown at 16, so that such ring may expand to closely fit the opening 3 without allowing an open space between opposite sides of the ring. Before assembling the internal parts of the valve, the tubular extension 4 of the valve member is slotted, as indicated at 18 in Fig. 4, such slot extending through the lugs 19 and 20 and up to the disk 7. A clip 21 as shown in Fig. 5, is then forced upon the lugs 19 and 20 inside of the tubular portion 4, to spring the tubular portion together to close the slot 18.

In finishing the valve member to fit the opening 3, the packing rings 9 and 10 are first forced together to bring the ends into engagement, as shown in Fig. 6, in which position they are held by pins, as shown at 17, for the ring 9. The rings are placed in position in the annular recesses formed in the collar 8 and the assembled rings are then placed around the cylindrical portion 5 in the position shown in Fig. 3. The nut 15 is then screwed in position upon the cylindrical portion 5, in which position it preferably engages and clamps the collar 8 to prevent turning thereof, and the entire construction thus assembled is turned and finished on its outer surface to accurately fit the cylindrical opening 3, during which operation the web 6 serves at 6^a to engage the center of the machine employed.

A hole is drilled through the nut 15 into the upper end of the cylindrical portion 5 and threaded to receive the lower end of a threaded rod 22, extending through a suitable hole formed in the cap 13. The moving parts of the valve finished as described, are then prepared for final assembly by removing the clip 21, removing the pins from the rings 9 and 10, and inserting the rod 22 through the opening provided in the cap 13 into the nut 15 to engage the upper end of the cylindrical portion 5, which serves to lock the nut 15 to such cylindrical portion to prevent displacement of the parts and hold the operating rod 12 in proper position in the upper end of the cylindrical portion 5. The parts are then inserted in the valve casing and the cap 13 is screwed to the position shown, to close the upper end of such casing. The pin 22 is so disposed relatively to the slot 18 in the portion 4 of the valve member, that when the cap 13 is screwed solidly against the casing 1, the slot 18 is in line with that end of the opening 2 with which the source of pressure is connected, which in the drawing is assumed to be the right hand end of such opening 2. As a result, when the valve member is moved to its lower position so that its lower end seats against the bottom of the cylindrical opening 3, the pressure communicated to the right hand end of the valve casing, finds ready access to the interior of the tubular portion 4 and tends to expand such portion so as to make it forcibly engage the surface of the opening 3 and thus prevent communication between the right and left hand ends of the opening 2. The disk 7 at this time serves to practically prevent communication between the inside of the tubular member 4 and the upper portion of the upwardly extending member of the casing 1. Any steam or water that might leak past the disk 7 is prevented from entering the upper end of the opening 3 by the packing rings 9 and 10.

In constructing the ring 8 it is preferable to form a central groove 23 in its outer surface which is filled with heat-resisting packing as asbestos saturated with suitable lubricant to prevent undue wear of the valve member. The lower end of the tubular portion 4 of the valve member is preferably beveled as indicated in Fig. 3, so that in the event of foreign matter resting upon the lower end of the cylindrical passage 3 in a position to prevent the valve member bottoming properly the binding action resulting will tend to expand the tubular portion 4 to cause it to tightly engage the bore of the passage 3. The bottom of the passage 3 is of a conformation similar to the lower edge of the tubular portion 4, as a result of which when the valve member is moved to its closed position the tubular portion is forced outward firmly into engagement with the valve casing 1.

It is to be understood that while I have shown the inlet and outlet passages of the valve casing as in line with each other for convenience, that these passages may have any desired angular disposition relatively to each other the principal requisite being that both passages shall be intersected by the cylindrical passage 3 in such a manner that when the valve member is in its lower position communication between such passages is interrupted.

While I have shown my invention in the particular embodiments herein described, I do not, however, limit myself to these exact constructions, but desire to claim such mechanical equivalents as may occur to those skilled in the art.

What I claim is:

1. In a valve, the combination of a casing having inlet and outlet openings at opposite ends of a cylindrical passage and a second cylindrical passage intersecting the first passage, a valve member comprising a metal cylinder hollow at one end and capable of expansion, a metal disk separating the hollow portion from the body of the valve member, an operating rod projecting from the valve casing, a web connected with the valve member for receiving the rod to permit turning the same relatively to the web, and a device for preventing rotation of the valve member in the casing.

2. A valve member for a device of the class described comprising a straight metal cylinder hollow at one end and capable of expansion, and a metal disk separating the hollow portion from the other portion of the valve member.

3. A valve member for a device of the class described comprising a straight metal cylinder hollow at one end and capable of expansion, and a metal disk separating the hollow portion from the other portion of the valve member, such member having a longitudinal keyway in its surface to prevent turning thereof.

4. A valve member for a device of the class described comprising a straight metal cylinder hollow at one end and capable of expansion, and a metal disk separating the hollow portion from the other portion of the valve member, such hollow portion provided with an opening extending through its cylindrical wall on one side thereof.

5. In a valve, the combination of a casing having inlet and outlet openings at opposite ends of a cylindrical passage and a second cylindrical passage of larger diameter than the first passage, such second passage adapted to receive a valve member and intersecting such first passage, a valve member comprising a straight metal cylinder hollow at one end and capable of expansion and provided with an opening through its wall for affording communication between the pressure connection of the valve and the interior of such hollow portion when the valve is closed, a steel disk cast in the metal cylinder between the hollow portion and the remaining portion of such cylinder, an operating rod extending from the valve casing, such rod having threaded engagement with the valve member to cause its operation, and a device for preventing rotation of the valve member in the casing.

6. In a valve, the combination of a casing having inlet and outlet openings at opposite ends of a cylindrical passage and a second cylindrical passage of larger diameter than the first passage, such second passage adapted to receive a valve member and intersecting such first passage, a valve member comprising a straight metal cylinder hollow at one end and capable of expansion and provided with an opening through its wall for affording communication between the pressure connection of the valve and the interior of such hollow portion when the valve is closed, a steel disk cast in the metal cylinder between the hollow portion and the remaining portion of such cylinder, a threaded operating rod extending from the valve casing, a flange carried by the rod to form a supplemental valve, a web carried by the valve member having threaded engagement with the operating rod, and a device for preventing rotation of the valve member in the casing.

7. In a valve, the combination of a casing and a valve member comprising a head, a split tubular portion partially separated from the head, and a metal packing member between the head and the tubular portion.

In witness whereof, I hereunto subscribe my name this 22nd day of December, A. D. 1910.

JOHN M. PALMER.

Witnesses:

ALBERT C. BELL,

LEONARD E. BOGUE.