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DOUBLE SEATED VALVE

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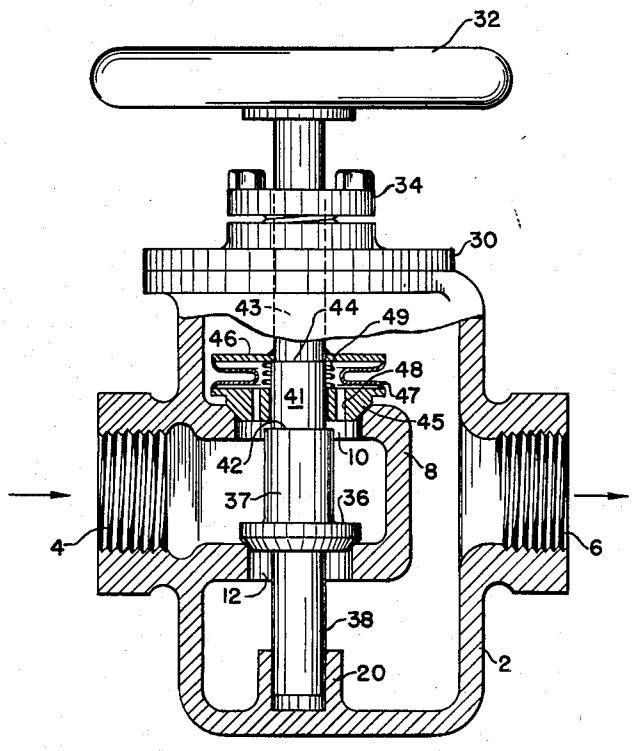

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DOUBLE SEATED VALVE

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1 Claim. (Cl. 137—625.36)

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This invention relates to valves and more particularly to double acting valves.

For many purposes a double acting valve is theoretically superior to a single acting valve. This theoretical advantage is, however, offset by the practical difficulty of constructing a valve in which both valve members will properly engage their seats throughout the range of temperatures, or temperatures and pressures, to which the valve is subjected in use.

Upon changes in temperature, the expansion or contraction of the valve casing in which the valve seats are formed or mounted may be greater or less than the expansion or contraction of the valve stem on which the valve members are mounted. As a result, the two valves of a double acting valve which will close properly under one set of conditions, may not function properly under another set of conditions.

In order to obtain the advantages of a double acting valve without this disadvantage, I propose to provide a construction in which one of the valves is yielding. The range through which the yielding part may move is sufficient to compensate for any differences that may be created in the distance between the valves and the distance between the seats in the temperature and pressure ranges in which the valve is used.

In use, the valve member that is capable of yielding will engage its seat first under all conditions and the closing of the valve is then continued until the other valve member has also engaged its seat. Thus, the two valves will be closed to prevent any leakage regardless of the temperature and/or pressure at which the closing is effected.

In the preferred form of the invention one of the valve members is yieldingly mounted on the valve stem and it is so constructed that a substantially balanced pressure is obtained at all times.

In the accompanying drawing I have shown one embodiment of the invention.

Referring to the drawing, the reference numeral 2 designates generally a valve casing having an inlet 4 and an outlet 6. Both the inlet and outlet are internally threaded to receive suitable connections. Within the valve casing I provide a casting 8 having aligned openings 10 and 12 to form the valve seats. The valves are mounted on a valve stem 37, the lower or outer valve 36 being of conventional construction and engaging a bevelled portion at the inner end of the opening 12. Beyond the valve 36 the valve stem is extended and the lower portion 38 is

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received in a suitable guide 20 formed in the valve casing.

The valve stem extends through a casting 30 arranged on the top of the valve casing and may be provided with an operating handle 32. A packing gland 34 may surround the valve stem.

In the form of the invention shown in the drawing, at a distance above the valve member 36, the stem is provided with a reduced portion 41 forming a shoulder 42. The upper portion of the stem is further reduced as at 43 forming a shoulder 44. A valve member 45 is slidably mounted on the portion 41 of the valve stem. A disc 46 is rigidly mounted on the valve stem in contact with the shoulder 44 and held in position by any suitable means, such as welding. The disc 46 and the valve member 45 are connected by a bellows member 47. The valve member is provided with one or more ports 48 through which the fluid may enter the space between the valve member and the disc, thereby enabling the fluid to exert its pressure on both sides of the valve member. A coil spring 49 may also be arranged between these two members. The relative areas of the valve member 36 and the valve member 48 subjected, respectively, to the inlet and outlet pressures are such that a substantially-balanced pressure on said valves is obtained.

The operation of this form of the invention will be apparent. In an ordinary construction of a double acting valve if, by expansion or contraction, the distance between the valve seats and the distance between the valve members should vary, when an attempt is made to close the valve, one or the other of the valve members would engage its seat first and it would then be impossible to move the valve any further to effect closing of the other valve member. In the valve shown in the drawing, the distance from the seat at the top of the outlet 12 and the seat of the valve 45 is such that under all conditions the valve member 45 engages its seat before the valve member 36 engages its seat. Due to the fact that the valve 45 may yield because of the provision of the bellows 47, closing of the valve is continued until the valve 36 engages its seat. The bellows member 47 may be formed of metal having sufficient spring to normally retain the valve member at the maximum distance from the disc 46. Then, upon closing of the valves, the valve member 45 engages its seat before the valve member 36 engages its seat. Further movement of the valve stem compresses the bellows member 47 until the valve member

36 engages its seat. The necessary spring may be built into the bellows member 47 or its action may be augmented by the spring 49, if desired. The provision of the ports 48 permits the steam or other fluid to enter the space between the disc and the valve member. Thus, pressure is exerted upwardly on the disc and on one side of the bellows construction and downwardly on the valve member and on the other side of the bellows construction thereby producing a substantially balanced effect.

I claim:

A double acting valve comprising a casing having an inlet opening and an outlet opening, a pair of aligned openings in the casing to permit communication between the inlet and outlet openings, each of said openings forming a valve seat, a valve stem extending through the aligned openings, a rigidly mounted valve on the stem cooperating with one of the valve seats, a second valve member slidably mounted on the valve stem and co-operating with the second valve seat, a disc secured to the valve stem adjacent the second valve member, and a bellows member connecting the second valve member and the disc, the second valve member having openings extending therethrough from one side thereof to the space within the bellows to permit fluid to flow from said one side into said space, whereby the fluid will exert its pressure on both sides of said second valve, the space within said bellows being

closed to the passage of fluid except through said openings, the relative areas of the first-mentioned valve and the second valve subjected, respectively, to the inlet and outlet pressures being such that a substantially-balanced pressure on said valves is obtained, and the second valve member being mounted on the valve stem at a distance from the rigidly-mounted valve such that it will engage its seat before the rigidly-mounted valve engages its seat.

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