April 6, 1926. 1,579,800

B. T. WILLISTON

GATE VALVE

Filed Feb. 15, 1924

Fig. 1

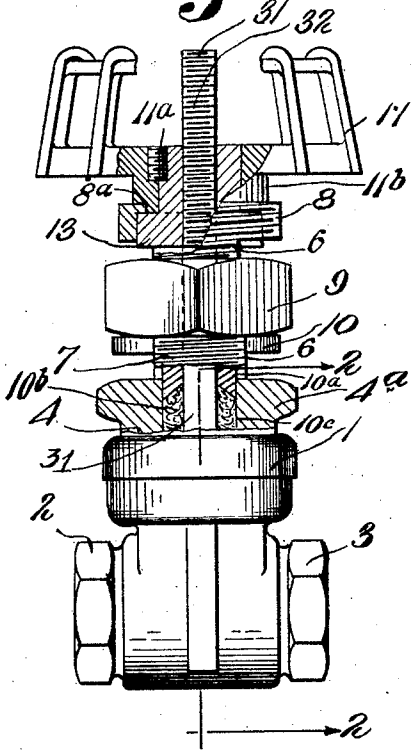


Fig. 4

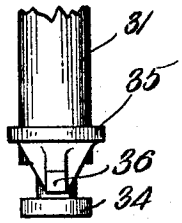


Fig. 6

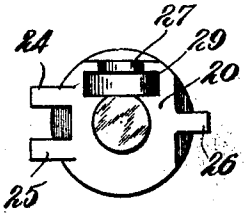


Fig. 7

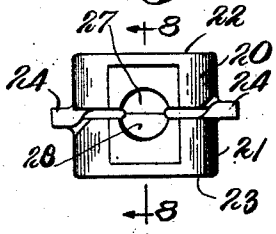


Fig. 5

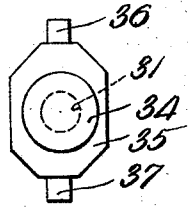


Fig. 8

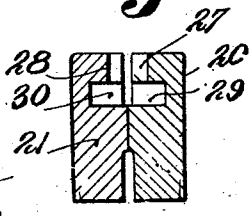


Fig. 3

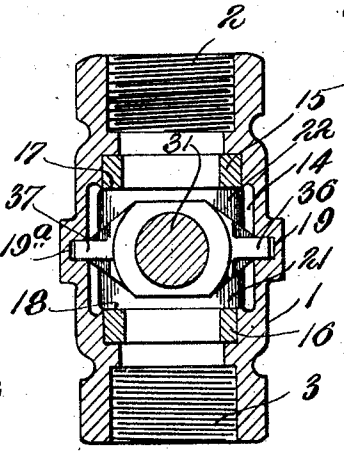
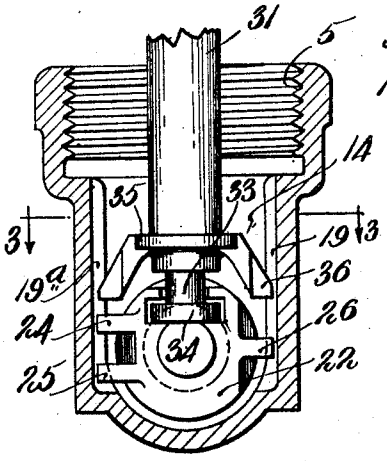


Fig. 2



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UNITED STATES PATENT OFFICE.

BELVIN T. WILLISTON, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO MANNING, MAXWELL & MOORE, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

GATE VALVE.

Application filed February 15, 1924. Serial No. 692,979.

To all whom it may concern:

Be it known that I, BELVIN T. WILLISTON, a citizen of the United States of America, and resident of Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Gate Valves, of which the following is a specification.

This invention pertains to gate valves of the type having opposed valve seats and a reciprocating head or gate cooperating with both seats and actuable by a reciprocal non-rotary stem, and relates more particularly to improved means for connecting the stem and head and for preventing rotation of the stem.

The usual mode of connecting the valve stem to the head consists in the provision of a neck at the lower end of the stem terminating in an enlargement of square or other polygonal contour fitted within a chamber of similar shape in the valve head. The head commonly consists of complemental independent disks cooperating respectively with the opposed valve seats, the meeting faces of the disks having recesses which collectively form the chamber which receives the enlargement at the end of the stem.

In the arrangement just described the head is guided and kept from turning by engagement with parts of the valve casing and the polygonal enlargement at the end of the stem is depended upon to prevent rotation of the stem. As the enlargement bears against opposed faces of the head-forming disks these faces are called upon to resist any force tending to turn the stem.

The polygonal enlargement is necessarily small owing to limitations of space and repeated operation of the valve frequently results either in rounding off the corners of the enlargement or cutting away the walls of the chamber in which it is positioned so that the stem is ultimately free to turn with the hand wheel and the valve can no longer be opened or closed. Even before wear to the extent just referred to has taken place much looseness and play between the parts may develop, while the reaction of the stem tends to separate the disks causing undesirable wear of their seating surfaces as well as of the valve seats.

The principal object of the invention is to provide an improved valve wherein the above weaknesses in valves of the existing type are substantially overcome and more particularly to provide means for connecting the valve stem to the valve head which avoids any undesirable reaction upon the head-forming disks and which is not subject to rapid wear, at the same time providing reliable means for preventing rotation of the stem.

In the accompanying drawings a preferred embodiment of the invention is illustrated by way of example;

Fig. 1 is a side elevation, partly in section, of the improved valve structure;

Fig. 2 is a vertical section to larger scale on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary side elevation showing the lower part of the valve spindle disconnected from the valve head;

Fig. 5 is a bottom plan view of the valve spindle;

Fig. 6 is an elevation of one of the disks which collectively form the valve head;

Fig. 7 is a plan view of the valve head removed from the spindle;

Fig. 8 is a vertical section of the valve head on the line 8—8 of Fig. 7.

The numeral 1 indicates the valve casing provided at the points 2 and 3 respectively with means for connecting inlet and outlet pipes. The top of the casing is provided with an opening which is normally closed by means of a threaded cap 4 which engages screw threads 5 at the interior of the opening.

The cap 4 has the general shape of an exterior-threaded hollow cylinder having an expanded hexagonal portion 4^a (suitable for engagement by a wrench when assembling with the casing 1) above the lower end which engages the thread 5 in valve casing 1, which has just been described. Above the hexagonal portion 4^a the threaded cylinder is bifurcated into two upstanding cylindrical sections 6, diametrically opposed and leaving diametrically opposed spaces 6^a (not shown) therebetween, the outer surfaces of said sections 6 being threaded as shown at 7 to cooperate with hexagonal nut 9.

Received within the cylindrical cap 4 is provided a circular disc or tube 10^a adapted to bear upon packing material 10^b received in an annular cavity 10^c in the lower por-

tion of cylinder 4. Disc or tube 10^a is provided with diametrically extending wings 10 which (after being inserted through openings 6^a in tube 4 and centrally positioned in cavity 10^c) project laterally therethrough and are engaged by the nut 9 in its downward movement on the threads 7, thus firmly seating the packing material 10^b about the central valve stem 31, later to be described.

The upper portion of cap 4 again forms a complete cylinder as shown at 8, having an inwardly projecting annular flange 8^a.

By removing nut 9, the hub 12 may be inserted through opening 6^a, and then raised to the position shown in Fig. 1, the diametrically extending flanges 13 engaging the annular flange 8^a, thereby being prevented from withdrawal upwardly therethrough though permitted to freely rotate within the cylinder portion 8 of member 4. Hand wheel 11 fits over the upwardly projecting end of hub 12, the annular ring 11^b thereon abutting the end of cylinder 8 and flange 8^a. Hand wheel 11 and hub 12 are connected to prevent relative axial or longitudinal movement, by insertion of a machine screw 11^a.

The central part of the casing 1 provides a chamber 14 whose opposite ends are defined by rings 15 and 16 respectively secured to the interior of the casing. The opposed surfaces 17 and 18 respectively of these rings are properly finished to form the spaced valve seats. In a plane intermediate the valve seat surfaces 17 and 18 the interior wall of the chamber 14 is provided with opposed parallel vertical slots 19 and 19^a respectively which constitute guideways for the valve head and the lower end of the valve spindle as will hereinafter be described.

The valve head consists of two disks 20 and 21 of duplicate construction arranged in face-to-face relation. The disk 20 has a finished exterior face 22 and the disk 21 has a finished face 23, said faces engaging the valve seats 17 and 18 respectively. Each disk has a pair of spaced ears 24 and 25 projecting from its edge at one side and a single projecting ear 26 at a point diametrally opposite the space between the ears 24 and 25. When assembled the single ear 26 of each disk is positioned between the ears 24 and 25 of the other disk. The several ears of each disk are so disposed that when the disks are assembled the ears of both disks all lie substantially in the plane of contact of the disks and when the valve head is assembled in the casing the ears engage the guide-grooves 19 and 19^a which guide the valve head in its movements and retain its parts in assembled relation.

The disk 20 has a radial semi-circular recess 27 and the disk 21 has a semi-circular recess 28, said recesses collectively forming a circular radial bore. The recesses 27 and 28 terminate at their lower ends in enlarged chambers 29 and 30 respectively, which collectively form a circular chamber of a diameter greater than the bore leading thereto.

The valve spindle 31 turns in a suitable bearing in the cap 4 and passes through the stuffing box above mentioned, and is screw threaded at 32 near its upper end for engagement with the internally screw-threaded bore of the hand wheel 11.

The lower end of the spindle 31 has a reduced axial projection 33 terminating in a disk 34 of a diameter greater than that of the part 33. When the valve head is assembled with the spindle the disk 34 occupies the chamber provided by the recesses 29 and 30 in the respective valve disks. The valve head is thus free to turn relatively to the spindle but is connected to the latter for axial movement therewith.

To prevent rotation of the spindle 31 relative to the valve casing, a yoke or collar 35 is secured thereto or made integral therewith. This yoke or collar is furnished with oppositely extending arms 36 and 37 which engage the guide-grooves 19 and 19^a respectively.

The valve spindle through its threaded engagement with the hand wheel is moved axially by rotation of the wheel, thus raising and lowering the valve head. During this movement the valve spindle is prevented from rotating by engagement of the arms 36 and 37 with the guide-grooves in the casing.

All tendency of the spindle to turn is opposed by the arms 36 and 37, so that the disks forming the valve head are not subjected to any force which would spring them apart or wedge them in their guide-grooves. Furthermore, as the connection between the valve head and the spindle is subjected only to forces acting in an axial direction, it is capable of withstanding long use without becoming so loose as to necessitate replacement.

I claim:

1. A gate valve having a casing provided with spaced parallel valve seats, a valve head comprising a pair of independent members each having a face cooperating with one of the valve seats, lugs projecting from opposite edges of each of said members and fitting into guide grooves in the inner surface of the casing, a stem having a disk like enlargement at one end, said enlargement being seated in a circular socket in the valve head and constraining the head to move axially with and to substantially the same amount as the stem, a hand wheel having threaded engagement with the opposite end of the stem for imparting axial movement to the latter, and lugs projecting in opposite

directions from the stem into the aforesaid guide grooves to prevent rotation of the stem, the latter lugs engaging the guide grooves at points above the lugs upon the valve head.

2. A gate valve having a casing provided with spaced parallel valve seats, an axially movable valve stem screw threaded at its upper end, a hand wheel having threaded engagement with the threaded part of the stem, a pair of ears projecting from the stem near its lower end, said ears sliding in opposed guide grooves in the casing to prevent rotation of the stem, the lower portion of the stem being of reduced diameter and terminating in a circular disk of a greater diameter than said reduced portion, and a valve head comprising independent members cooperable respectively with the said seats, each of said members having vertically spaced lugs having a sliding fit in the guide grooves in the casing and thereby constraining said members to move in parallel planes while sliding over their respective valve seats, said members having complementally opposed recesses for the reception of the disk at the lower end of the valve stem.

Signed by me at Boston, Massachusetts, this 12th day of February, 1924.

BELVIN T. WILLISTON.