March 26, 1929. L. J. BLACK 1,707,073

VALVE

Filed Sept. 20, 1927

FIG. 1.

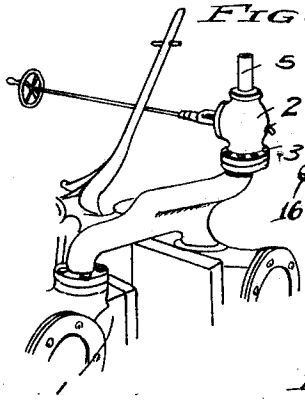


FIG. 6.

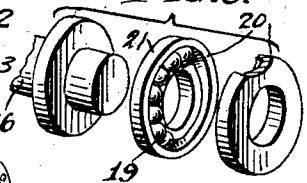


FIG. 2.

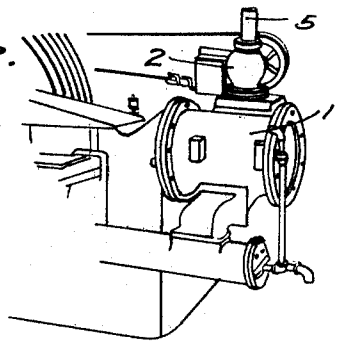


FIG. 3.

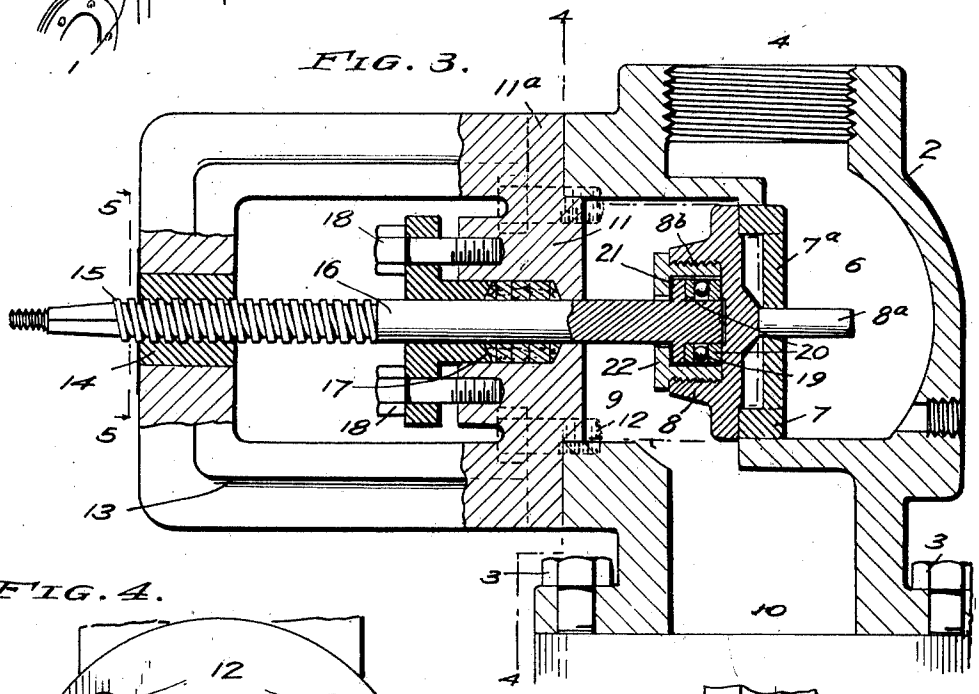


FIG. 4.

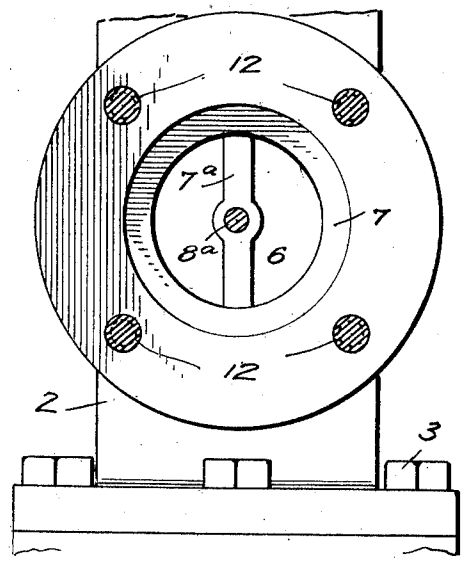
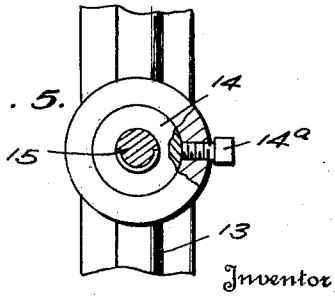


FIG. 5.



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UNITED STATES PATENT OFFICE.

LEE J. BLACK, OF BEAUMONT, TEXAS.

VALVE.

Application filed September 20, 1927. Serial No. 220,750.

My invention relates to improvements in valves and more particularly to throttle and other types of valves which are moved to and from seating position by rotation of the valve stem or equivalent.

Briefly, stated, the invention has for its primary object to provide an anti-friction bearing between the valve stem and head which will permit of free rotation of the stem when seating or unseating the valve, the bearing receiving the extreme pressure of the fluid, which, of course, is greatest at the initial and final movement of the valve in the opening and closing operation thereof, respectively, thus permitting the use of coarser threads on the valve stem than would otherwise be possible and which effect a rapid axial movement of the valve stem when the latter is turned.

Another object of the invention resides in the provision of an anti-friction bearing between the valve head and steam, which will permit the head to adjust itself relatively of the stem and valve seat so that a nice fit will be had between the valve and seat and no portion of either will be exposed to undue wear to ultimately result in leakage.

Another object of the invention is to provide a device of this character which can be readily applied to standard throttle and other valves of the species, mentioned hereinbefore; one which will be inexpensive of construction; highly efficient in practical use and which will be of material advantage in controlling the steam engines used in operating oil well machinery.

The foregoing and other objects of the invention are attained by means of a novel combination and arrangement of parts to be hereinafter described and claimed, and in order that the same may be better understood reference is had to the accompanying drawing which illustrates what is now regarded as a preferred embodiment of the invention. It is to be understood, of course, that various slight changes and modifications may be made in the invention, as shown and described, without however, departing from the spirit and scope of the subject matter claimed.

In the drawings,

Figure 1 is a fragmentary perspective view illustrating a portion of the steam engine with associated throttle valve which is controlled by a hand wheel rod;

Figure 2 is a similar view, but illustrating the so-called telegraph cord and grooved wheel for rotating the valve stem;

Figure 3 is a central vertical sectional view through the throttle valve, shown in Figures 1 and 2 and illustrating the application of my invention;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 3, and

Figure 6 is a group perspective view of the ball race elements.

Referring specifically to the drawing, wherein the same reference characters have been used to designate the same parts in all views, numeral 1 designates generally a steam engine while 2 refers to the throttle valve casing which is bolted to the engine as indicated at 3. The steam inlet of valve casing 2 is indicated by reference character 4, a supply pipe 5 being screwed thereinto, as indicated in Figures 1 and 2. The steam entering in through 4 is received in a chamber 6, the inner wall of which is provided with a circular opening in which is rigidly secured the annular valve seat 7, the latter having a transverse strap or post 7^a the intermediate portion of which has a guide hole for the medial or axial pin 8^a of the valve head 8. The medial pin 8^a projects from the valve head 8, concentrically of its active face and assists in guiding the head in its movements to and from seating position.

The rear portion of the valve head 8 is cored out and interiorly threaded, as indicated at 8^b, whereby an anti-friction connection between the head 8 and its stem may be effected in a manner to be presently described.

When the valve head 8 is unseated the fluid passes from the chamber 6 through the valve seat 7 and into the chamber 9 from which it passes through the outlet passage 10.

The chamber 9 is closed by the base plate 11 of the bonnet 13, bolts 12 being threaded through the flanged marginal portion 11^a of base plate 11 and into the body of the valve casing 2 surrounding the chamber 9.

The bight portion of bonnet 13 has a tapped bearing 14 secured therein by a set screw 14^a and the threaded outer end 15 of the valve stem 16 takes in the threads of said bearing 14. The construction of the

valve in general is more or less familiar, it being understood that the head 8 is actuated to and from its seat 7 by rotation of the valve stem 16.

Valve stem 16 extends through the base plate 11 of bonnet 13, and packing gland 17, bolted to base plate 11, as at 18, is availed of to prevent the escape of fluid from chamber 9 around the stem.

Within the chambered portion 8^b of valve head 8 is a ball race 19 surrounding the end of valve stem 16,—the ball race being confined between rings 20. One of the rings 20 abuts against the end wall of chamber 8^b while the other ring 20 contacts with the shoulder 21 of the valve stem near the end thereof. The bearing assembly 19, 20 is confined in chamber 8^b by means of a lock nut 22, which is cored out to receive said elements and the annular valve stem shoulder 21,—the lock nut being threaded in the valve head chamber, as clearly shown in Figure 3.

From the construction shown and described it will be evident that when closing the valve the thrust will be upon the ring 20, which is adjacent valve stem shoulder 21,—and likewise that when opening the valve the pressure will be upon the ring 20 which is adjacent the end wall of chamber 8^b. In each instance the full anti-friction effect of the ball race 19 is had and friction between the valve head 8 and its seat 7 is overcome in addition to relieving the valve stem threads 15 from additional strain making them bind with the threads of the bushing 14 and rendering the application of excessive force necessary to turn stem 16. Without my anti-friction bearing arrangement it is necessary in a throttle valve of this character to employ stem threads of a very fine character, say eight to the inch,—whereas by the employment of my anti-friction valve head and stem connection I am able to reduce the threads to four to the inch. This results in a very rapid operation of the valve, which is highly necessary in controlling the throttle of steam engines employed for operating oil well apparatus. By rapid manipulation of the valve it is also possible to save injury to the machinery which would otherwise be unavoidable.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a valve structure including a worm stem and a tapped bearing in which the stem works, the combination of a valve head having a recess in its rear portion, a circumferential shoulder on said stem and spaced from the end thereof, said shoulder being received within said recess and spaced from the end wall thereof, a ball race surrounding said stem end within said valve head recess, keeper rings on opposite sides of said ball race and contacting with the valve stem shoulder and the end wall of said recess respectively, and a lock nut surrounding said stem and having a chamber receiving said shoulder, ball race and keeper rings, said lock nut being screwed into said valve head recess.

2. The combination set forth in claim 1 and a value seat, a bearing carried by said valve seat, and an axial guide pin carried by said valve head, said guide pin projecting from the forward face of said valve head and through said bearing whereby to guide the valve in its movement.

3. In a valve structure having a tapped bearing and a threaded valve stem taking therein, a valve head rotatably mounted upon said stem and detachable therefrom, an anti-friction bearing surrounding said stem adjacent the end thereof, said valve head having a recess to receive said stem and bearing, a shoulder formed upon said stem adjacent said bearing, and a lock nut having a recess to receive said bearing and shoulder, said lock nut being threaded into the recess of said valve head.

4. In a valve structure having a tapped bearing and a threaded valve stem taking therein, a valve head, an anti-friction bearing surrounding said stem adjacent the end thereof, said valve head having a recess to receive said stem and bearing, a shoulder formed upon said stem adjacent said bearing, and means carried by said valve head and movable to engage said shoulder to rotatably hold said stem end and bearing within said valve head recess.

5. In a valve structure having a tapped bearing and a threaded valve stem taking therein, a valve head, an anti-friction bearing surrounding said stem adjacent the end thereof, said valve head having a recess to receive said stem and bearing, a shoulder formed upon said stem adjacent said bearing, and a lock nut surrounding said stem and having a threaded connection with said valve head, said lock nut engaging said shoulder to rotatably hold said stem end and bearing in said recess.

In testimony whereof I affix my signature.

LEE J. BLACK.