Feb. 16, 1932. R. J. SCHUYLER 1,844,985

TRAVELING VALVE

Filed Oct. 28, 1929

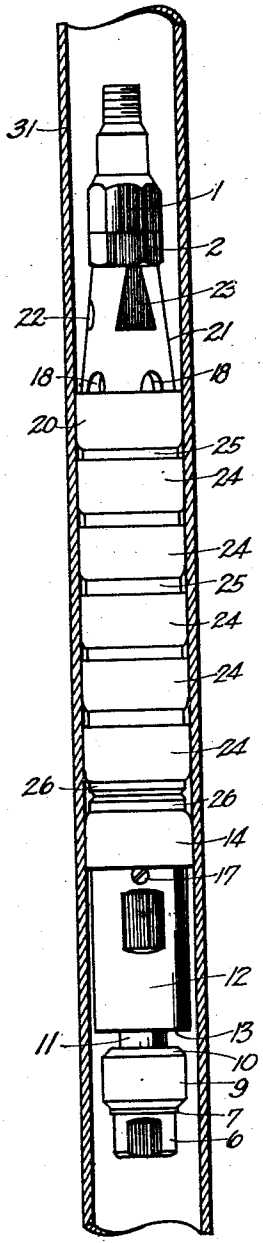


FIG. 1.

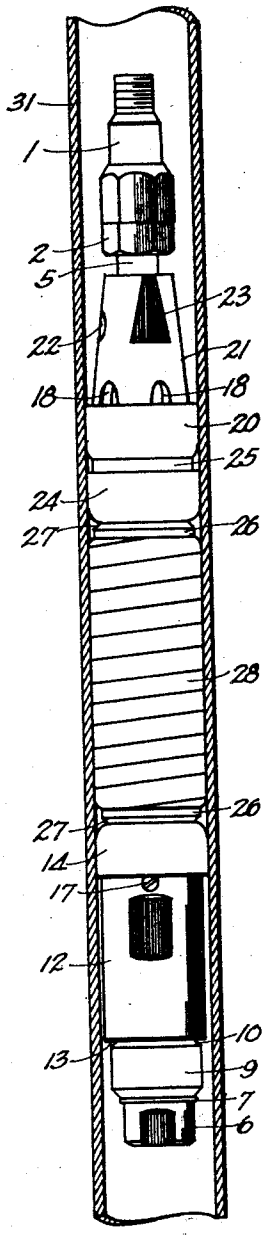


FIG. 3.

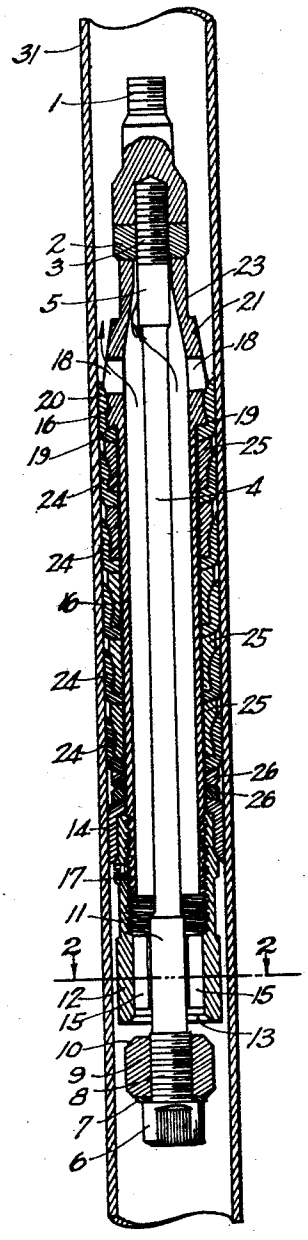


FIG. 4.

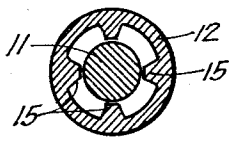


FIG. 2.

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UNITED STATES PATENT OFFICE

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TRAVELING VALVE

Application filed October 28, 1929. Serial No. 403,084.

My invention relates to traveling valves, such as are used in pumping oil wells and the like.

The objects of my invention are to provide a device of this class which is new, novel, practical and of utility; which will be self-cleaning as to sand; which will clean the enclosing barrel of sand; which will keep the sand moving with the liquid which is being pumped; which will prevent collection of sand upon working members of the valve; a device, the different parts of which may be assembled in various combinations suitable for duty in wells each of which require a different type of valve; which will eliminate much of the wear upon valve leathers and upon the barrel walls; which will be free from breakage usual to traveling valves; which will be free from losing in the well the valve body, cup leathers and spacers, an occurrence which is usual to traveling valves depending upon a nut and cotterpin upon the stem's lower end; which will be durable; which will be positive in action; which will not be hindered in action by the forces of loadstone or gas; which will not be affected in action by paraffine; which will be efficient in accomplishing all the purposes for which it is intended.

Traveling valves of present use are subject to frequent repair and replacement due to abrasive effects of sand in the liquid being pumped. This sand collects in the mouths of the cup leathers, packs tight thereabout and about the spacers therebetween and forms an annular mass which rapidly wears away both the leathers and barrel.

My valve provides for the automatic flushing away of the sand which would otherwise collect in the upper cup leather, and means is provided for sweeping the barrel clear of sand at each downward stroke of the valve. With the sand flushed away from the top portion of the valve, and wiped from the barrel at each downward stroke, the cup leathers are left practically free from sand and its abrasive effect.

Another cause of trouble with valves of present use is the breakage, due to crystallization, of the tempered and hardened valve stems. Valve stems of usual design are provided upon their lower end portion with guide lugs which are tempered to resist wear due to friction with the upper valve seat member. In the process of tempering these guide lugs, the valve stem, with which said guides are integral, is also tempered. These tempered stems break easily due to crystallization, and practically the whole of the device drops in the well.

In my device by placing the guide lugs within the upper valve seat member, which then is tempered, instead of upon the valve stem, I am permitted to use a valve stem of soft steel which will neither crystallize nor break.

Another frequent source of trouble with traveling valves of present use is occasioned by use of a nut and cotter pin upon the lower end of the valve stem. The continued vibration and hammer of the stem in operation loosens the nut, the cotter is sheared off, the nut gradually turns off the stem and the working members of the valve are lost in the well. In my device this cannot happen as the lower end of the valve stem is provided integrally with an enlarged top and shouldered portion which performs the office usually performed by a threaded nut.

With these and other objects in view as will more fully appear, my invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claim hereto appended, and illustrated in the accompanying one-sheet drawing, of which,

Figure 1 is an elevational view of one embodiment of my device disposed within a fragmentary pump barrel shown in section;

Figure 2 is a cross section through the device along the line 2—2 of Figure 4;

Figure 3 is a view similar to Figure 1, showing another embodiment of the device; and

Figure 4 is an elevational sectional view of the embodiment of the device shown in Figure 1.

Like characters of reference designate like parts in all the figures.

It is understood that various changes in

the form, proportion, size, shape, weight and other details of construction, within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention and without sacrificing any of the advantages thereof; and it is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

One practical embodiment of the invention as illustrated in the drawings comprises:

A usual sucker rod, connecting joint 1, lock nut 2, both threadedly embracing the threaded top portion 3 of a valve stem 4.

Said stem 4 comprises a cylindrical rod preferably of soft steel, its upper end threaded as shown at 3, and a cylindrical bearing surface 5 next adjacent said threaded portion 3. The lower end of said stem is provided with an enlarged head portion 6 integral therewith, said head adapted for receiving a usual wrench. The upper portion of head 6 is provided with a shoulder for seating a leak proof gasket 7, and thereabove with a threaded portion 8. Threadedly upon said portion 8 is a lower seat member 9, its lower outer edges beveled, and a shoulder therebetween adapted to seat upon said ring 7. The cylindrical sides of said member 9 are or may be milled, its upper and outer edges are beveled, a ground joint 10 is provided upon its upper end. Adjacently above the threads 8 said stem 4 is provided with a cylindrical bearing 11. Between bearings 11 and 5 said stem is reduced somewhat in diameter.

Next above said lower seat member 9 and upon stem 4 is slidably disposed the upper seat member 12. Seat member 12 is cylindrical, and is provided upon its lower end with a ground seat 13 adapted to co-act with the seat 10 upon the member 9 below. At its upper exterior end portion, said member 12 is diminished in diameter and so adapted, when desired, to accommodate an inverted cup leather 14. Interiorly the lower end portion of said member 12 is provided with a plurality of longitudinal lug bearings 15 adapted to co-act with said bearing 11 of stem 4. The upper end portion of member 9 is interiorly threaded for receiving the lower end portion of the valve body 16 thereabove. A set screw 17 through the upper side wall of member 9 is provided for locking thereto the valve body 16.

The said body member 16 is usual as to its central and its lower threaded cylindrical end portion. Its upper end is as usual provided interiorly with a cylindrical bearing adapted to coact with the said bearing 5 upon stem 4. The outstanding feature of this member as compared with similar members of the present art lies in the placement and function of its plurality of lower perforations shown as 18. Perforations 18 are here disposed in such relation to the shoulder 19 which supports thereabove the cup leather 20, that when properly positioned, the lip of said cup leather 20 envelops the lower portion of said alined perforations 18. The relationship thus established between cup leather 20 and perforations 18 affords a positive means for flushing away, by the jets of oil issuing from said perforations, the sand which usually collects with damaging results, within, and fills the mouth of the leather 20. From a point adjacent said perforations 18 to its top end said valve body tapers as is shown at 21. Through the tapered portion and above perforations 18 are provided a plurality of perforations shown as 22. The upper part of said body 16 is faced at oppositely disposed portions 23 to afford means for the application of a usual wrench.

For disposition upon the valve body 16, are provided a plurality of usual cup leathers 24, two of which have previously been indicated, because their certain positions upon said body 16, as 14 and 20. The usual spacers 25 are also provided. In addition to said usual spacers 25, I provide for use therewith a plurality of reversible seat rings 26, which I desire to claim as new in function and design. Each of said rings is adapted to closely but slidably encircle the barrel 16, and has an outside diameter similar to said usual spacers. The upper face of each said ring 26 is dished to better form a seat for one of said cup leathers 24, its lower face is preferably flat, and its lower outer edges are beveled as shown at 27 and as may best be seen in Figure 3.

In the assembly of my traveling valve as shown in Figure 1, the upper plurality of cup leathers and spacers are assembled upon the valve body in positions usual to said valves. Next adjacent to said upper seat member 12, however, and overlapping same from above, is shown one of said cup leathers inverted as shown at 14. Thereabove are two of said rings 26, placed bottom to bottom, the lower one providing a seat for said cup leather 14, the upper one forming a seat for one of the said cup leathers 24 thereabove. The presence of the two said rings 26, as here shown, are essential to, and permit the inversion, as shown, of the cup leather 14. The advantage of the inversion of this lower leather, is obvious as to its action in wiping the barrel clear of sand, at each downward stroke of the valve.

In Figure 3 the usefulness of the rings 26 are shown in permitting as in Figure 1 the inversion of the bottom leather 14, and further in providing a secure top and bottom seat for the usual rope packing 28. It will be apparent that by the use of one or more of the said rings 26, a number of differing assemblies of the cup leathers may be had, and wells requiring differing types of traveling valves may be serviced with a single type

of traveling valve, each having interchangeable parts.

In use my valves will be assembled as illustrated and described or in other desired combination, preferably however in each instance with the lowermost cup leather inverted. In Figure 1 at its lower part is shown an exposed portion indicated by the numeral 5 of the valve stem 4, indicating position of the lower seating member 9 with relation to the members thereabove, during the downward stroke of the valve. In this position the oil standing in lower portion of the pump barrel 31 will be forced upward between the top of seat 9 and the bottom of seat 12, through the channels shown as 29 and between the lug bearings 15 as shown in Figure 2. As the traveling valve descends the oil rises through the bore shown as 30 of the valve body 16 and is delivered therefrom through the perforations 18 and 22 at points above said cup leathers 20. As previously described none of the sand content of the oil is permitted to come to rest within said leather 20. Leather 20 therefore being clean and clear of sand is in condition for wiping on its upward travel the barrel 31.

During the upward stroke of the traveling valve the ground joints 10 and 13 will be closed between said seat members 9 and 12, no oil may thus enter through perforations 18 or 22, and the oil will be lifted in the barrel in usual manner by said cups 24 or other packing material such as 28.

The lifting action of the traveling valve and its positive valve action having been thus disclosed, its superiority to the usual faulty ball valve action will be apparent.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and I therefore consider as my own all such modifications and adaptations and other uses of the form of the device other than as herein described as fairly fall within the scope of my invention.

Having thus described my invention, what is claimed and desired to be secured by Letters Patent, is:

A traveling valve, embodying a valve stem having an integral head upon its lower end and a first enlarged partially threaded portion above and adjacent said head and having a second enlarged partially threaded portion adjacent its upper end for connectitng the bottom end of a sucker-rod connector, an interiorly threaded lower valve member around said first enlarged portion adjacent said head, a leak-proof gasket between said lower valve member and said head, a hollow upper valve seat member surrounding said stem, its upper end portion having an exterior shoulder for fitting within an inverted cup-leather, a plurality of integral interior stem guide lugs, a hollow cylindrical valve body surrounding said stem, its lower end portion threadedly received by the upper end of said lower valve member, its upper end portion enlarged to form an exterior shoulder for fitting within a cup-leather, said enlarged portion having a plurality of lateral perforations adjacent said shoulder and tapering upward from said perforations toward said stem, and a pair of annular reversible members for seating cup-leathers and packing, said annular members adapted to slidably fit the exterior of said body beneath said enlarged portion, said body having a first cup-leather invertedly disposed therearound with its sides snugly fitting said exterior shoulder on said upper seat member, said cup-leather held in place by one of said annular members, the other of said annular members inverted upon said first annular member and supporting an upturned cup-leather, said body further having a plurality of upturned cup-leathers therearound seated on and spaced by usual metal spacers, the upper one of said leathers contacting the bottom of the enlarged portion of said body with the upper edges of its sides partially covering said lateral perforations.

ROBERT J. SCHUYLER.