E. A. WHEELER.

OIL WELL PUMP VALVE.

APPLICATION FILED JAN. 17, 1912.

1,043,279.

Patented Nov. 5, 1912.

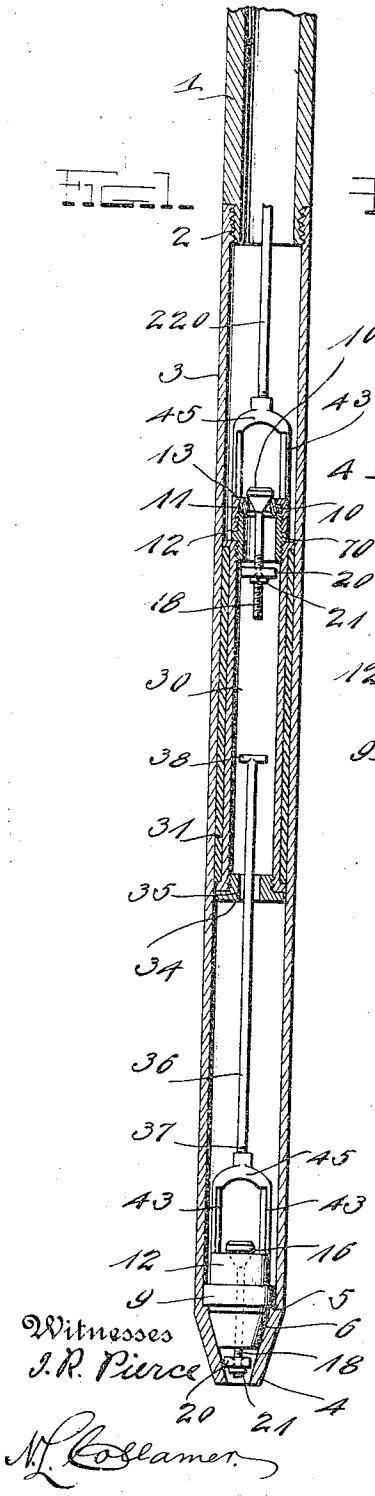

FIG. 1.

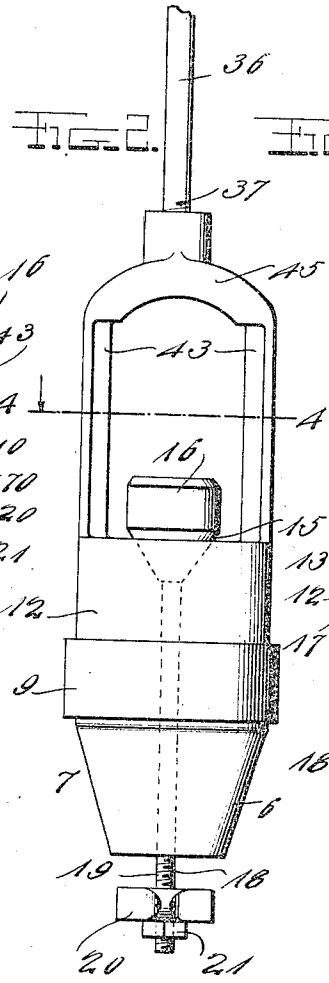

FIG. 2.

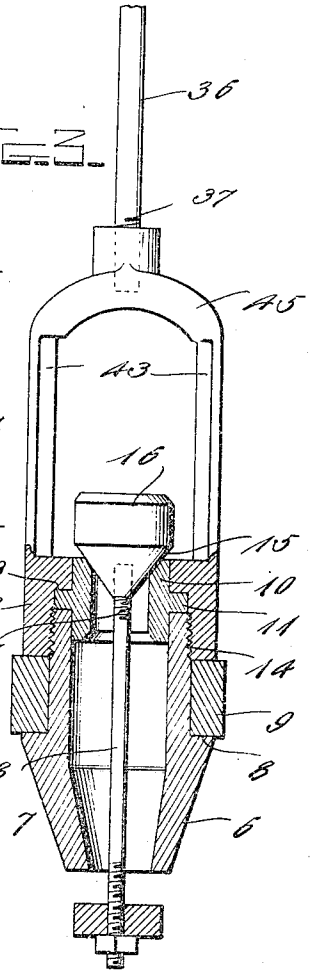

FIG. 3.

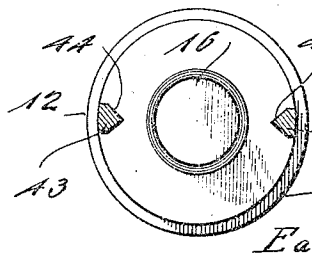

FIG. 4.

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UNITED STATES PATENT OFFICE.

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OIL-WELL-PUMP VALVE.

1,043,279. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed January 17, 1912. Serial No. 671,656.

To all whom it may concern:

Be it known that I, EARL A. WHEELER, a citizen of the United States, residing at Bakersfield, in the county of Kern and State of California, have invented certain new and useful Improvements in Oil-Well-Pump Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pumps, and more especially to those adapted for use in oil wells; and the object of the same is to effect certain improvements in the valve of a pump of this kind so that the same shall not become stuck or jammed within its cage or seat by the accumulation of non-fluid particles.

In United States Letters-Patent No. 1,013,246, granted to me on January 2, 1912, is shown and described an oil well pump having many characteristics common with the pump herein, and which patented device works successfully where the oil is quite fluid or at least is practically free from pebbles and sand.

The object of the present invention is to provide a valve mechanism which will automatically clear away from the valve head and seat any such non-fluid particles as may collect within and around the parts in sufficient quantities to interfere with the successful operation of the valve, as is sometimes the case where the oil being worked is of that nature. I find that if the valve head closes upon its seat on a line which is truly axial, and is held to such line of movement by mounting its stem in guides which prohibit lateral play of the head and maintain its strict axial position, its reciprocations crush or grind the non-fluid particles such as sand and pebbles upon the seat and around the conical face of the head itself so that they accumulate within the valve first perhaps at one point and eventually entirely around the same, with the result that the length of the strokes becomes less and less, the accumulation greater and greater, and finally the entire valve is jammed or "frozen" in place and its effectiveness is destroyed.

The object of the present invention, as stated above, is to avoid this condition which is present in wells whose oil contains a relatively high percentage of non-fluid particles, and this object I accomplish by making the valve head comparatively large and heavy, extending its stem downward and loosely through the seat instead of upward away from the same, and mounting on the stem an adjustable cross bar which limits the rise of the valve head and yet is so short that it permits the latter and its stem to have some considerable lateral play so that the particles are dislodged from the seat and the head and their accumulation is therefore prevented.

The following specification sets forth my preferred manner of carrying out the idea, as fully shown in the drawings wherein—

Figure 1 is a vertical sectional view of the working cylinder at the lower end of a tubular oil well, showing my improved pump complete as located therein. Fig. 2 is a side elevation, and Fig. 3 a central vertical section of the improved valve forming the subject matter of the present invention. Fig. 4 is a cross section on the line 4—4 of Fig. 2.

In the drawings the numeral 1 designates the usual well tubing, connected at its lower end as at 2 with the upper end of the working cylinder 3 in which operates my piston valve yet to be described, and the lower end of this cylinder is contracted internally as shown at 4 and shouldered as at 5 above its contracted or conical portion, and above the shoulder it is cylindrical throughout its length. Within the conical portion 4 of this cylinder is removably inserted the conical lower end 6 of a tubular member or shoe 7 which is externally shouldered as at 8 for the reception of the babbitt or leather washers 9 which fit closely within the bore of the cylinder 3 and rest upon its shoulder 5 when the conical lower end 6 fits closely within the tapered or conical lower portion 4 of said cylinder 3; and the upper end of said shoe 7 carries the standing valve.

Each valve includes a head which will be described below; a reversible seat 10 having on its outer side between its ends an annular ridge 11 which rests upon the upper end of the shoe 7 when the seat is in place within the bore of the shoe as seen in Fig. 3; and a cage comprising an annular body 12 having an internal shoulder 13 adapted to bear upon said ridge 11 and internal threads 14 below said shoulder for connecting the body with the tubular member below it and

clamping the ridge between said shoulder and member, and the cage also including two oppositely disposed upright prongs 43 whose inner edges are sharpened as at 44 and whose upper ends are connected by a yoke 45. The latter in turn is detachably connected as at 37 with a rod 36 which passes upward and loosely through a rather large hole 35 forming the bore of a ring or nut 34 screwed into the lower end of the cylindrical plunger 30. The latter is surrounded by packing 31 and is reciprocated within the working cylinder 3 by means of the sucker rod 220 which is connected with the upper end of said plunger by a similar cage and a "sub" 70 which screws into the upper end of the plunger 30 and into the threads 14 at the lower end of the cage. In all respects as far as this improved valve is concerned the sub 70 is the equivalent of the shoe 7 excepting possibly that the latter is a little longer than the former and the valve rod may have to be modified to that extent as will be clear. The upper end of the rod 36 has a T-head 38 which is longer but narrower than the diameter of the bore 35 through the nut 34, and therefore when the plunger is reciprocated vertically this head is engaged by said nut and the standing valve lifted out of place if the sucker rod is raised sufficiently, but under ordinary conditions and with the reciprocations of usual length the sucker rod moves only the piston valve in a manner well understood.

Coming now more particularly to the details of the present invention in so far as it differs from my former patent hereinbefore referred to, the valve head is comparatively large and heavy, having a cylindrical body portion 16 whose lower end is tapered or made conical as seen at 15 so as to fit within either end of the seat 10, and the valve rod or stem 18 is screwed into the apex or point of the tapered end 15 as at 17 and hangs therefrom so that it projects loosely through the seat 10 and the tubular member 7 or 70 which supports it, and its lower end is threaded as at 19. On these threads is screwed a cross bar 20 made preferably as thin as possible so that it shall not impede the flow of the oil, and of such length only that when the valve head rises off its seat the end of the bar strikes beneath the tubular member 7 or 70 as shown. Moreover, the bar is made of a length less than the internal diameter of the tapered lower end 4 surrounding the shoe 7, or less than the internal diameter of the plunger 30 surrounding the sub 70 (according to the location of the valve) so that said bar may have considerable lateral play while in place. Beneath the bar a jam nut 21 is preferably screwed up against it, although other means might be provided for preventing it from working loose on the threads 19. Carrying out further the idea of giving the valve and its stem considerable lateral looseness, the rod is made somewhat smaller than the interior of the seat as shown; and the head is made somewhat smaller than the interior of the cage 12 which has only two prongs and both of them brought to a sharp inner edge 44. This construction affords the greatest possible amount of space for the upward passage of oil which is in fact deflected outward between the prongs 43 by the conical shape of the valve head at 15. After the valve rises as far as the cross bar 20 will permit, its head falls aside, and this action is superinduced by its weight relatively to that of the stem and cross bar and by the upward rush of the oil past the head. It will be rare indeed that its cylindrical portion 16 will strike one of the sharp edges 44 so accurately that it will not pass off to one side of the same, and then it falls into one of the wide spaces between the two prongs 43 and positively dislodges any sediment which may have accumulated there. As the cage rises the valve descends and its stem 18—pushed rather than pulled down by the weighted head—slides over the upper end of the seat 10 and guides the conical end 15 thereinto, whatever lateral position the valve head may have assumed. The threads at both ends of the stem are useful singly or jointly for adjustment of the distance between the head and cross bar so as to permit the greatest degree of lateral movement with the object just described, consistent with the successful closing of the valve at proper moments to lift as much oil as possible.

In operation, the parts being connected as best seen in Fig. 1 and the working cylinder 3 lowered into the well, when power is applied to reciprocate the sucker rod 220 so that the piston valve and plunger move up and down within the cylinder without withdrawing the standing valve from its place at the lower end thereof as shown, at each upward stroke the oil above the head of the upper valve is lifted while the tendency is to produce a partial vacuum between the two valves as usual. The pressure of the oil beneath the head of the lower valve unseats the latter with the assistance of said vacuum, and during the rise of the plunger some of the oil flows through the standing valve into the working cylinder. On the return or downward movement of the latter the upper valve opens and the lower valve closes, its closing being occasioned by the weight of the column of liquid upon it, assisted by the weight of the valve head. Thus the reciprocation of the sucker rod and piston valve will cause the two valves to open and close alternately in a manner which is well understood in this art.

The parts may be of the desired sizes,

shapes, proportions and materials, and changes in details may be made as consistent with the scope of this invention.

What is claimed as new is:

In an oil well pump valve, the combination with the valve head having a weighted cylindrical body portion and a conical lower end, the valve rod screwed into the apex of the head and depending therefrom, and a cross bar adjustably mounted on said rod; of a seat whose internal diameter is smaller than the largest diameter of said head but considerably larger than the rod, a tubular member depending from said seat and throughout whose length the rod projects, the internal diameter of this member being smaller than the length of said cross bar but larger than the seat and considerably larger than the rod, and a cage comprising a body surrounding the upper end of said seat and connecting it with said member, two prongs rising from the outer edge of said body and having sharpened inner edges spaced considerably farther apart than the largest diameter of the valve head, and a yoke connecting their upper ends.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EARL A. WHEELER.

Witnesses:
V. L. COLLAMER,
J. A. GRIESBAUER, JR.