

No. 776,377.

PATENTED NOV. 29, 1904.

W. S. BEERS.

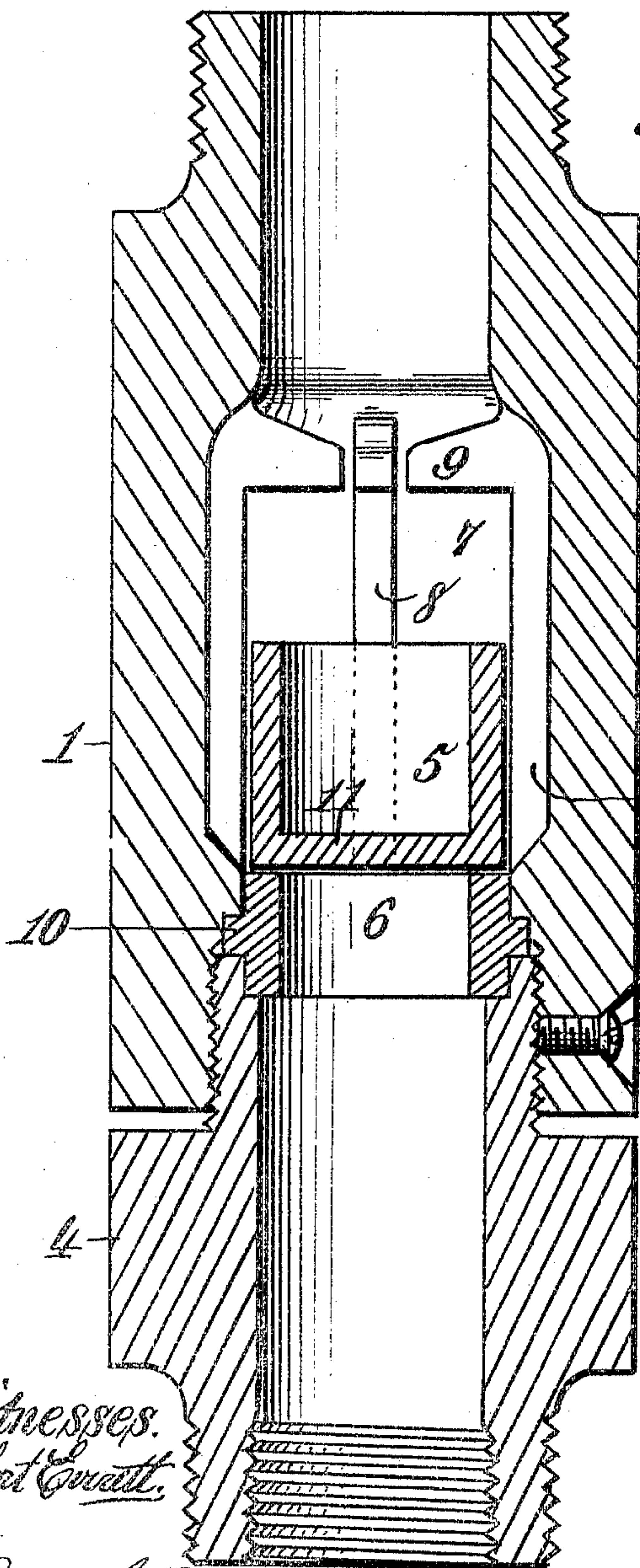
STANDING VALVE FOR OIL OR ARTESIAN WELL PUMPS.

APPLICATION FILED DEC. 11, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

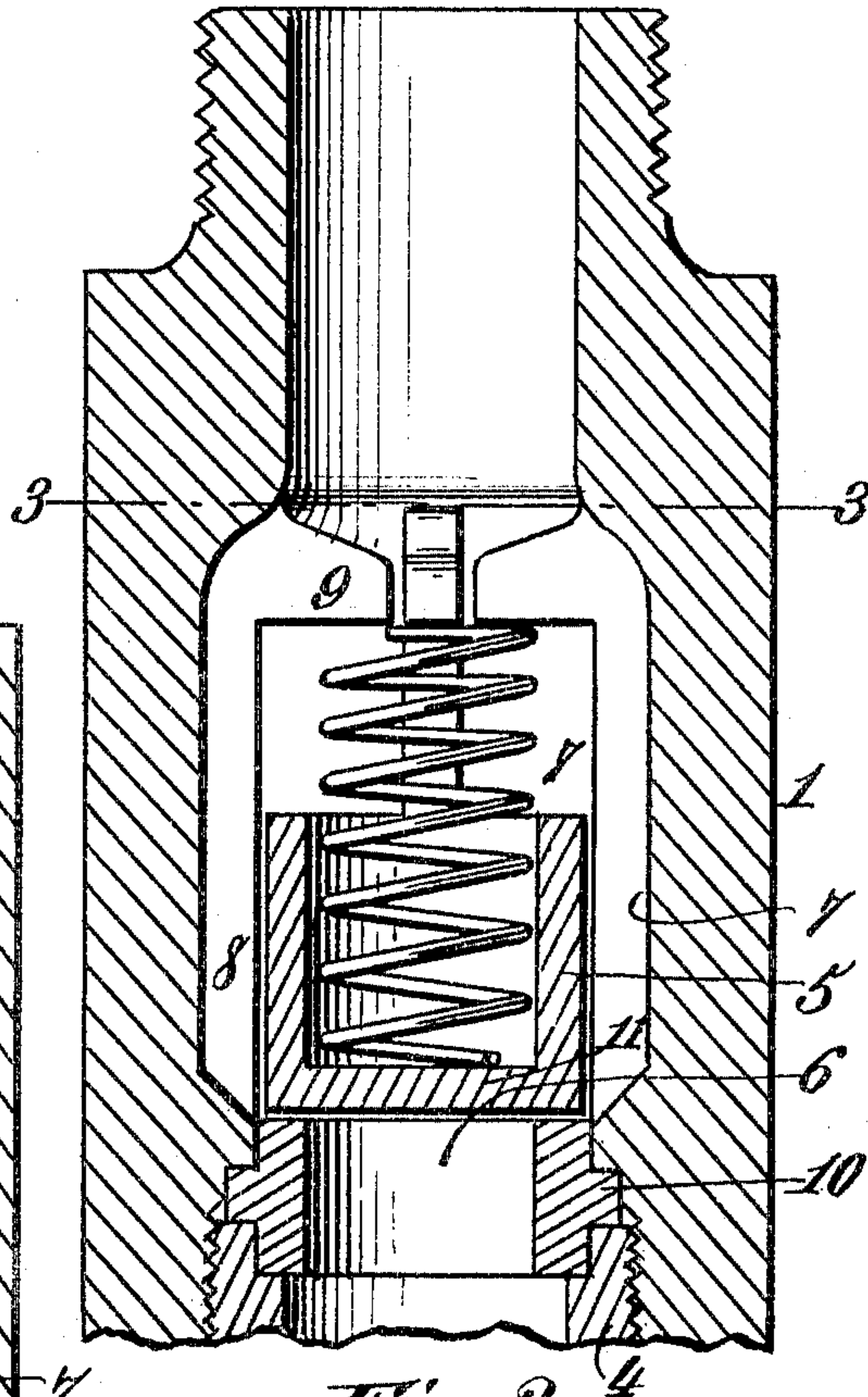
*Fig. 1.*



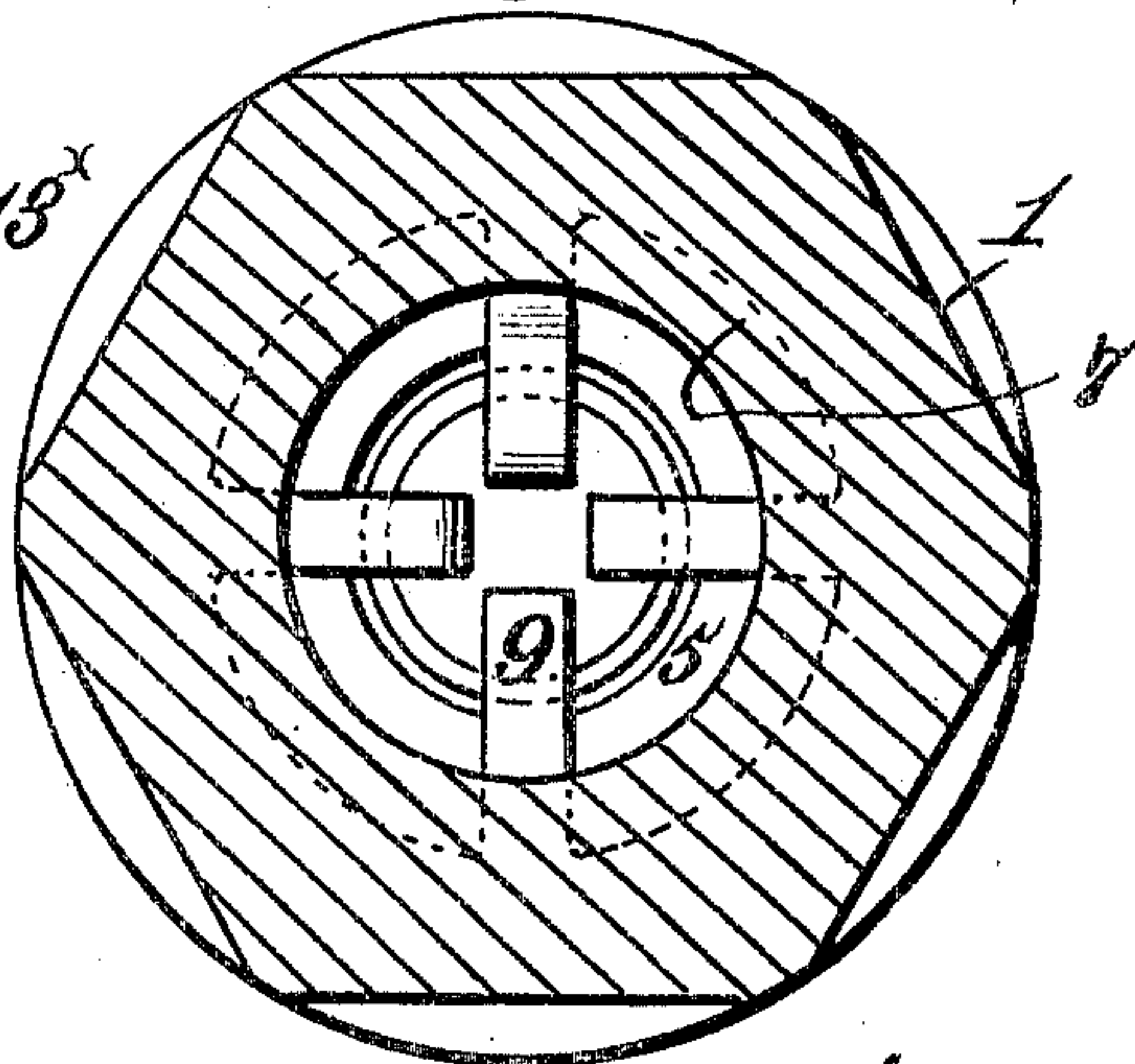
Witnesses.  
*Robert C. Smith.*

*James L. Norris Jr.*

*Fig. 2.*



*Fig. 3.*



*Inventor.*  
*Walter S. Beers.*  
*By James L. Norris.*  
*Att'y.*



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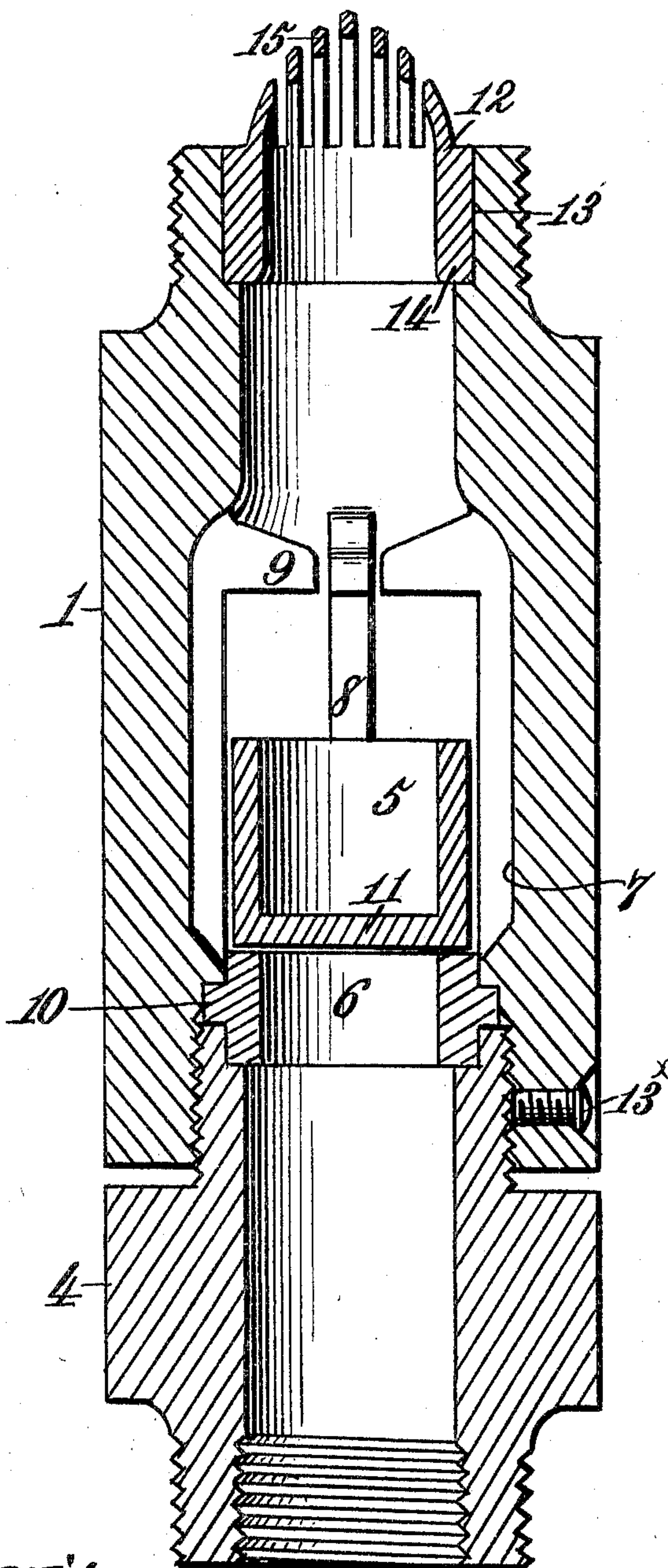
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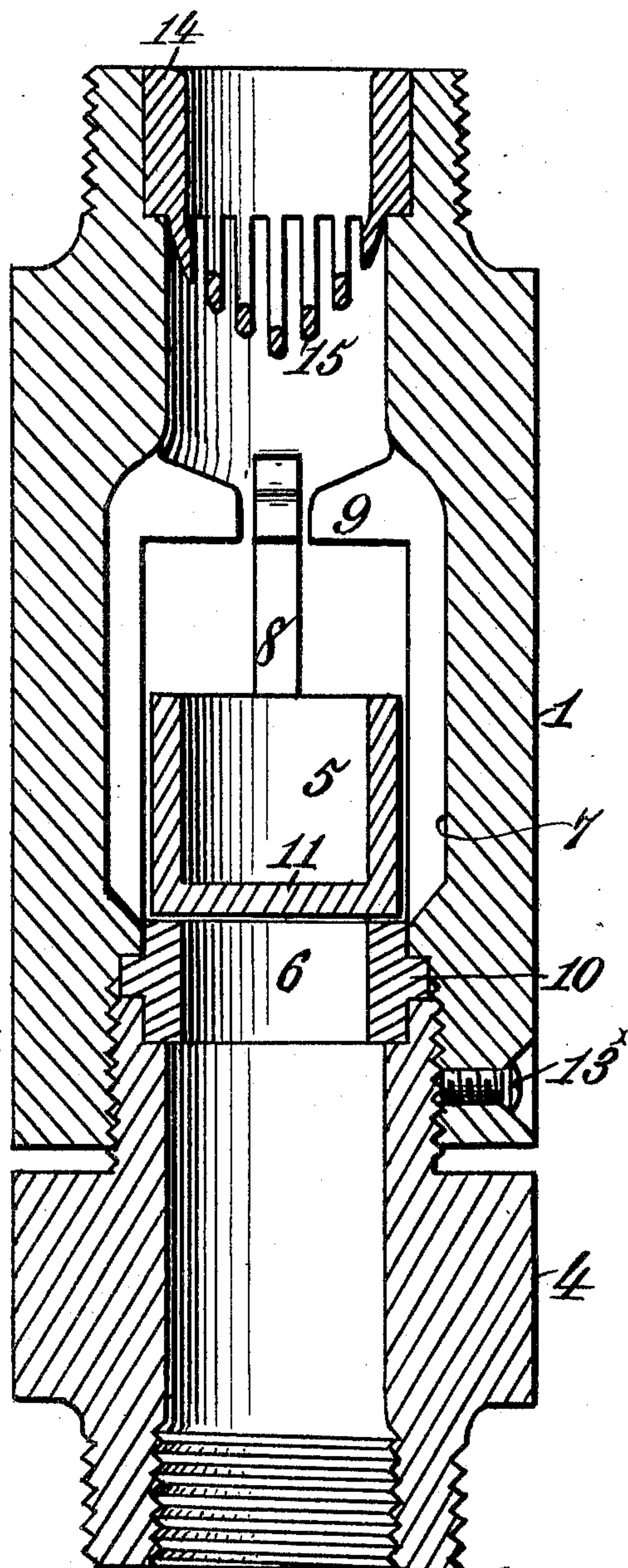
2 SHEETS—SHEET 2.

*Fig. 4.*



*Witnesses.*  
*Robert Everett.*  
*James L. Norris, Jr.*

*Fig. 5.*



*Inventor.*  
*Walter S. Beers.*  
*By James L. Norris.*  
*Att'y.*



## UNITED STATES PATENT OFFICE.

WALTER S. BEERS, OF MARION, INDIANA, ASSIGNOR TO BEERS BROTHERS  
& COMPANY, OF OIL CITY, PENNSYLVANIA, A FIRM.

## STANDING VALVE FOR OIL OR ARTESIAN WELL PUMPS.

SPECIFICATION forming part of Letters Patent No. 776,377, dated November 29, 1904.

Application filed December 11, 1903. Serial No. 184,814. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER S. BEERS, a citizen of the United States, residing at Marion, in the county of Grant and State of Indiana, have invented new and useful Improvements in Standing Valves for Oil or Artesian Well Pumps, of which the following is a specification.

This invention relates to standing valves for use in connection with the working barrels of oil or Artesian well pumps.

The present invention is an improvement upon a standing valve for pumps for which Letters Patent of the United States were granted to William L. Betts October 13, 1903, No. 741,217.

The valve in the patent referred to, while being thoroughly effective for the purposes designed, has certain inherent disadvantages, to improve which is the object of the present invention.

Briefly stated, in the valve of the said patent provision is made for preventing uneven wear of the valve-seat, so that positive operation of the valve is secured under all circumstances. This is effected by the employment of a valve-casing provided intermediate of its ends and on its inner side with a plurality of vertical ducts or channels which extend from a point approximately in alinement with the upper face of the valve-seat to any preferred distance above the upper face of the valve, the ribs or partitions formed by the channels terminating in inturned or overhanging lugs, which constitute stops for limiting the upward movement of the valve. The valve, which is cup-shaped and inverted—that is to say, with the bottom upward—bears upon a reversible valve-seat, and by this arrangement provision is made for readily compensating for any uneven wear of the valve-seat which would tend to interfere with the proper operation of the pump. As is well known, oil-pumps are frequently rendered inoperative by the dropping into the valve-casing of rivets which loosen and fall from the sucker-rod, also from sand and gravel drawn up in the operation of the pump. If the sand be loose, it will drop back through the tubing, but

where in lumps it will frequently enter beneath the lower face of a valve and the valve-seat, and thus destroy the suction, so that the pump becomes inoperative. In the case of the disconnection of the rivets connecting the sections of the sucker-rod with the traveling valve such rivets will drop into the valve-casing and frequently lodge between the valve and its seat, thus rendering the device totally inoperative and necessitating the withdrawal of the tubing—that is to say, the casing inclosing the working or traveling valve, the standing valve, the perforated pipe, and the anchor-pipe—entailing heavy expense and great loss of time. In the patent referred to it is stated that the object of the invention is in a ready, simple, thoroughly efficient, and practical manner to obviate pounding, and thus unnecessary wear of the valve, with attendant danger of breaking; to dispense with the employment of flanges or wings on the valve to effect its proper guiding within the valve-casing; to render possible the employment of a cup-valve presenting a solid structure—that is to say, one devoid of lateral openings for the passage of oil; to effect positive cushioning; to provide for free passage of a larger volume of liquid through the barrel than with valves of the ordinary construction; to adapt the valve for use either above or in the liquid to be raised; to permit of the employment of a larger-sized valve without increasing the size of the valve-casing than has heretofore been possible with valves of this character; to provide for free suction without danger of binding of the valve; to adapt the valve-casing for attachment to the working barrel of an oil or Artesian well pump, and generally to render more durable, simplify the construction, and improve the general details of valves of this character.

The present invention has in view all of the objects above stated, but, further, the positive prevention of any extraneous material contained in the oil from rendering the valve inoperative.

In addition and in connection with all of the objects of the valve of the patent referred to it is proposed in the present invention posi-



tively to catch and retain any extraneous matter drawn into the valve-casing from below or dropping into from above, and, further, to cause the valve to be positively operative under a gas-pressure which would otherwise render the valve inoperative.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists, generally stated, in a tubular casing having its inner walls provided with ducts or channels spaced by ribs or partitions terminating at their upper ends in stops, and a cup-valve disposed within the casing and guided by the ribs or partitions and having its mouth disposed upward, the valve being limited in its upward movement by the stops.

The invention consists, further, in a tubular casing having its inner walls provided with ducts or channels spaced by ribs or partitions terminating at their upper ends in inturned stops, a cup-valve disposed within the casing and guided by the ribs or partitions, the open mouth of the valve being disposed upward, and a coiled spring having its upper end bearing against the stops and its lower end resting upon the bottom of the valve.

The invention consists, further, in a tubular casing having internal ducts or channels spaced by ribs or partitions terminating at their upper ends in inturned stops, a cup-valve disposed within the casing and guided by the ribs or partitions, the open mouth of the valve being disposed upward, and a coiled spring having its upper end bearing against the stops and its lower end resting upon the bottom of the valve, the whirls of the springs being disposed contiguous to the inner walls of the valve.

The invention consists, further, in a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a cup-valve disposed within the casing and having its open end disposed upward, a coiled spring having its upper end in engagement with the stops and its lower end bearing against the bottom of the valve, and means for preventing entrance of extraneous substances to the casing from above the valve.

The invention consists, further, in a casing provided with internal guides terminating at their upper ends in inturned stops, a cup-valve arranged within the casing and having its open end disposed upward and being limited in its upward movement by the stops, and means disposed above the stops for catching and retaining any extraneous material entering the casing from above the valve.

The invention consists, further, in a casing having its inner walls provided with guides, a cup-valve disposed in the casing and having its open end disposed upward, means for limiting the upward movement of the valve, and a cup-shaped open-work trap disposed above the valve.

The invention consists, further, in a valve embodying a tubular casing provided with internal ribs or partitions terminating at their upper ends in inturned stops, a cup-valve arranged in the casing and limited in its upward movement by the stops, the mouth of the valve being disposed toward the top of the casing, and a trap arranged above the stops.

The invention consists, further, in a valve for oil or Artesian well pumps comprising a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a cup-valve in engagement with the guides and limited in its upward movement by the stops, the open mouth of the valve being disposed toward the top of the casing and the upper end of the casing being provided with a seat, and a reversible cup-shaped trap or screen engaging the seat.

The invention consists, further, in the various novel details of construction of a standing valve for oil or Artesian well pumps, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there are illustrated four forms of embodiment of the invention, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in vertical section, exhibiting the valve in its operative position within the casing. Fig. 2 is a view similar to Fig. 1, showing a spring for holding the valve-seat against valve-pressure. Fig. 3 is a view in transverse section on the line 3 3 of Fig. 2. Fig. 4 is a view in vertical section, exhibiting a screen combined with the casing to shed any extraneous material from above the valve which would operate to prevent its proper operation. Fig. 5 is a view similar to Fig. 4, exhibiting the screen shown in Fig. 4 inverted to constitute a trap to catch and retain any extraneous material from above the valve.

Referring to the drawings, 1 designates the valve-casing, the upper end of which is in this instance provided with exterior threads and the lower portion with exterior and interior threads, it being understood, of course, that if desired this arrangement may be reversed. The casing is adapted to be connected with the working barrel of an Artesian or oil well pump, the assemblage being effected through the medium of a coupling or union of the usual or any preferred construction. The valve of this invention can operate equally well submerged in the liquid to be raised or be disposed above it. The lower end of the casing has connected with it a coupling or union 4 to be assembled with the usual perforated pipe, which may or may not have an anchor-pipe at its lower end.



The valve-casing, its contained valve 5, and reversible valve-seat 6 will be made in standard sizes, so that where a part is damaged, thereby requiring renewal, it may be readily effected without the employment of a skilled machinist. The parts above enumerated may be made of any suitable material and may or may not be case-hardened, although in practice it will be preferred to harden the valve and its seat; but these latter parts may be made of hard brass or of machine-steel, if found desirable.

The valve-casing is provided at a point intermediate of its ends and on its inner side with a plurality of vertical ducts or channels 7, which extend from a point approximately in alinement with the upper face of the valve-seat to any preferred distance above the upper face of the valve, the ribs or partitions 8 formed by the channels terminating at their upper ends in intumed or overhanging lugs 9, which constitute stops for limiting the upward movement of the valve, the said stops being projected inward toward the vertical diameter of the casing a sufficient distance to present effective bearings for a spring, presently to be described, which operates to hold the valve seated against any excessive gas-pressure that would operate to interfere with the proper operation of the valve. As herein shown, the portion of the valve-casing above the stops 9 is somewhat constricted; but it is to be understood that it may be of the same diameter as that portion in which the valve works and still be within the scope of the invention.

The valve-seat 6, to which reference has been made, is provided intermediate of its ends with a circumferential flange 10, to be clamped between the valve-casing and the coupling 4, thereby to hold it rigidly in place. The flange 10 is by preference disposed approximately midway of the length of the valve-seat, thus to permit the latter to be reversed when one side becomes worn, and thereby in a measurable manner to prolong the life of the seat.

The valve 5 is by preference a true cylinder, with its lower end closed by a head 11, which may or may not be integral therewith, although by preference it is preferred that it be integral, the valve being of a size to work easily within the valve-chamber formed between the stops 9 and the upper face of the valve-seat and to be readily responsive to the suction-strokes of the pump without danger of binding or locking. The combined areas of the channels will be substantially equal to the cross-area of the bore of the valve-casing above the valve, so that, in effect, the valve will not detract from the full carrying capacity of the casing, which would otherwise result if the valve worked closely against the sides of the casing and were provided with openings to permit passage of the oil, such as is com-

mon with the ordinary cage-valves in use. By the provision of the ribs or partitions the employment of a cage-valve is obviated and flanges or wings to effect guiding of the valve are rendered unnecessary.

In the use of the valve on the upstroke of the pump the valve is lifted and the oil passes readily through the ducts or chambers upward through the working barrel, the ducts being thus filled with oil; but with the downward stroke of the pump at each pulsation the valve would ordinarily seat itself with great force and cause rapid wear of the valve-seat; but under the arrangement shown the oil contained in the ducts passes onto the valve-seat, and thus presents a cushion upon which the valve strikes, causing it to seat itself gradually and without pounding, thus eliminating all danger of undue or uneven wear.

In the Betts patent referred to the valve is shown as an inverted cup, and for the purposes designed this valve is thoroughly effective in use. In the present invention the valve is shown with its open mouth upward, the object for thus disposing the valve being, as before stated, to cause it to constitute a trap to catch and retain any extraneous materials, such as pebbles or lump sand, from below the valve, or rivets or bolts loosened from the sucker-rod above the valve. The greatest danger lies in the latter, as frequently a rivet or bolt will loosen from the sucker-rod and drop into the valve-casing and lodge beneath the valve, thereby rendering the latter absolutely inoperative, and to render the pump again operative it is necessary to withdraw the entire tubing, thereby entailing heavy expense and great loss of time. Under the arrangement shown in Fig. 1 any extraneous material from above will be caught by the valve; but as an additional preventive against passage to the valve-casing and the valve of any substances that would operate to prevent the valve from performing its function there may be employed a retarder arranged above the valve for catching such substances. This retarder may be in the nature of a screen made of reticulated metallic fabric or of a foraminous sheet of metal or, as shown in Figs. 4 and 5, it may be in the nature of a gridded cup 12, adapted to fit within the upper end of the valve-casing, which latter is provided with a seat 13 for this purpose. When the device is disposed as shown in Fig. 4, it constitutes a screen, and when disposed as shown in Fig. 5 it constitutes a trap, the retarder being preferably made of cast-iron and constituting an annulus 14 to fit within the casing and a cone-shaped gridded portion 15 to present either a screen or form a cup. While the disposition of the retarder as shown in Fig. 4 will be thoroughly effective for the purpose designed, it will generally be preferred to arrange it as shown in Fig. 5, for



the reason that it frequently happens that the valve proper becomes inoperative either from breakage or other causes, and to obviate the removal of the tubing from the ground and to save the expense and loss of time referred to the supplemental standing valve will be dropped through the tubing and will rest upon the valve-casing. Thus it will be seen that if the retarder be disposed as shown in Fig. 4 a close union between the supplemental standing valve and the casing could not be secured, whereas if the retarder be disposed as a trap, as shown in Fig. 5, a perfect juncture between the valve-casing and the supplemental standing valve can be secured.

In the patent referred to disconnection between the coupling or union below the valve and the valve-casing is secured through the medium of a jam-nut, and in the present instance this nut may be employed; but it is preferred to employ a jam bolt or screw 13<sup>x</sup>, the head of which will lie within the outer diameter of the valve-casing, as clearly shown in the drawings.

By the peculiar arrangement of the valve-chamber—that is to say, of the ribs or partitions and ducts or channels—the valve is positively guided in a vertical direction under the impulses of the strokes of the pump, and at the same time free and uninterrupted passage of oil past the valve is secured. On the downward stroke of the pump the valve is caused to seat itself squarely without pounding, and by reason of the cushion included between the lower face of the valve and the seat a seal is presented which will effectively prevent escape of oil downward past the valve. In the event of the breakage of the sucker-rod, as from the fracture or loosening of one or more of its bolts or rivets and the disconnection of these from the rod, such bolts or rivets, should they drop down the tubing, will either be contained within the tubing above the retarder when the latter is disposed as shown in Fig. 4 or will be caught and retained when the retarder is in the position shown in Fig. 5. In the event that such bolts or rivets or parts thereof should pass the retarder they will be caught by the barrel and be prevented from rendering the latter inoperative.

As a whole the valve of this invention is exceedingly simple of construction, there being practically no wear either to the valve or its seat, owing to the constant presence of oil; but should either of these parts become worn or damaged to such an extent as to render them inoperative either or both may be removed with readiness and ease and new parts

supplied with little trouble and with but slight expense.

It is desired, finally, to accentuate the fact that while a retarder such as that shown in Figs. 4 and 5 is thoroughly adapted for the purposes designed the invention is not to be limited to the employment of such arrangement, as any means for accomplishing the purpose designed—namely, the passage into the valve-casing of extraneous materials from above the valve—may be employed and still be within the scope of the invention.

Having thus described the invention, what is claimed is—

1. A valve for oil or Artesian well pumps comprising a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a cup-valve in engagement with the guides and limited in its upward movement by the stops, the open mouth of the valve being disposed toward the top of the casing, and the upper end of the casing being provided with a seat, and a reversible cup-shaped trap or screen engaging the seat.

2. A valve for oil or Artesian well pumps comprising a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a valve-seat arranged within said casing, a cup-valve interposed between said stops and said seat and having the open mouth thereof disposed toward the top of the casing, and a reversible open trap engaging in the upper end of said casing.

3. A valve for oil or Artesian well pumps comprising a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a valve-seat arranged within said casing, a cup-valve interposed between said stops and said seats and having the open mouth thereof disposed toward the top of the casing, and a reversible open trap supported by the upper end of said casing.

4. A valve for oil or Artesian well pumps comprising a tubular casing provided with internal guides terminating at their upper ends in inturned stops, a valve-seat arranged within said casing, a cup-valve interposed between said stops and said seat and having the open mouth thereof disposed toward the top of the casing, and an open trap engaging in the upper end of and supported internally upon said casing.

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

WALTER S. BEERS.

Witnesses:

JAMES L. NORRIS,

JAMES L. NORRIS, Jr.