

No. 780,992.

PATENTED JAN. 31, 1905.

S. N. HALL.
PUMP.

APPLICATION FILED SEPT. 5, 1903.

2 SHEETS—SHEET 1.

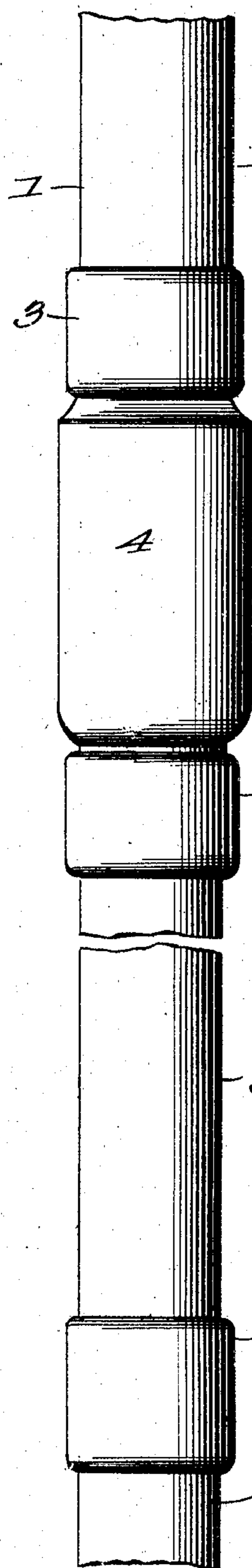


Fig. 1.

Fig. 5.

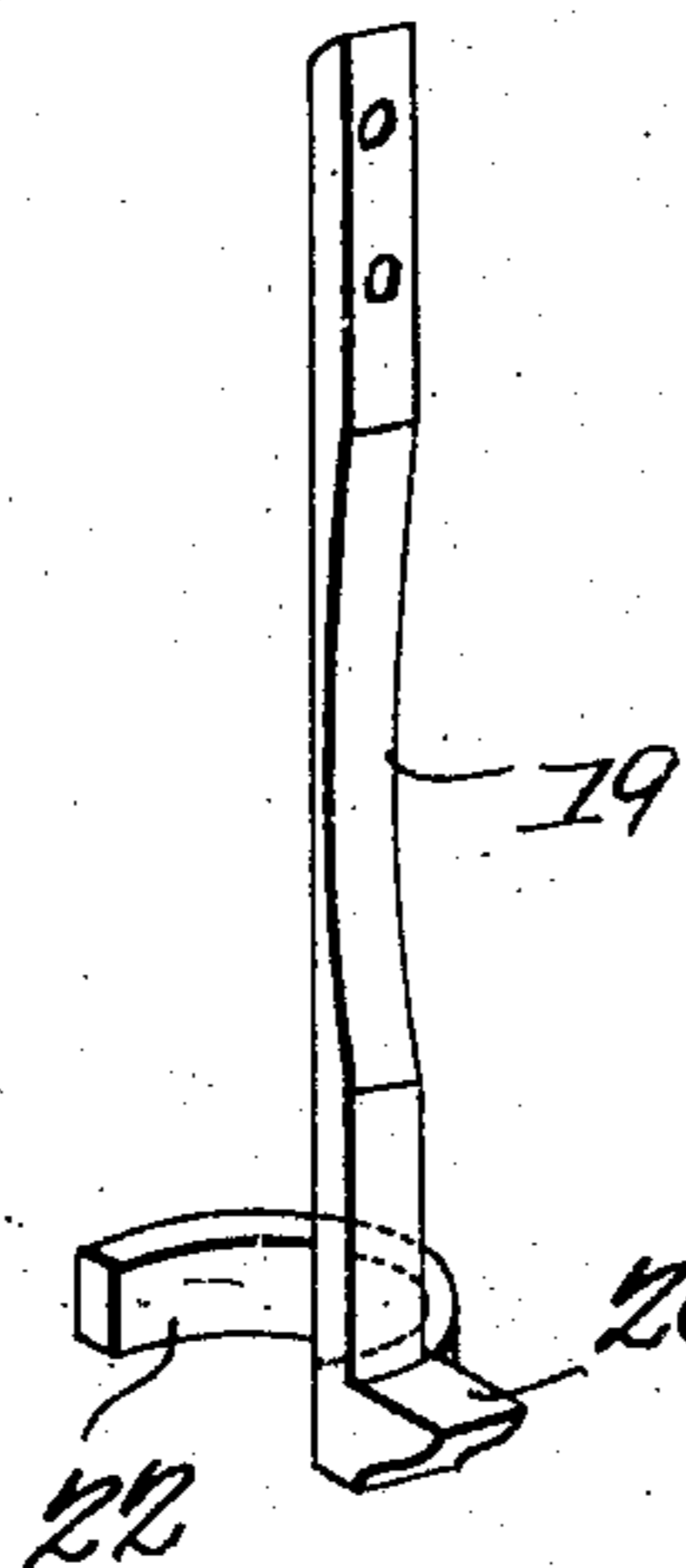


Fig. 3.

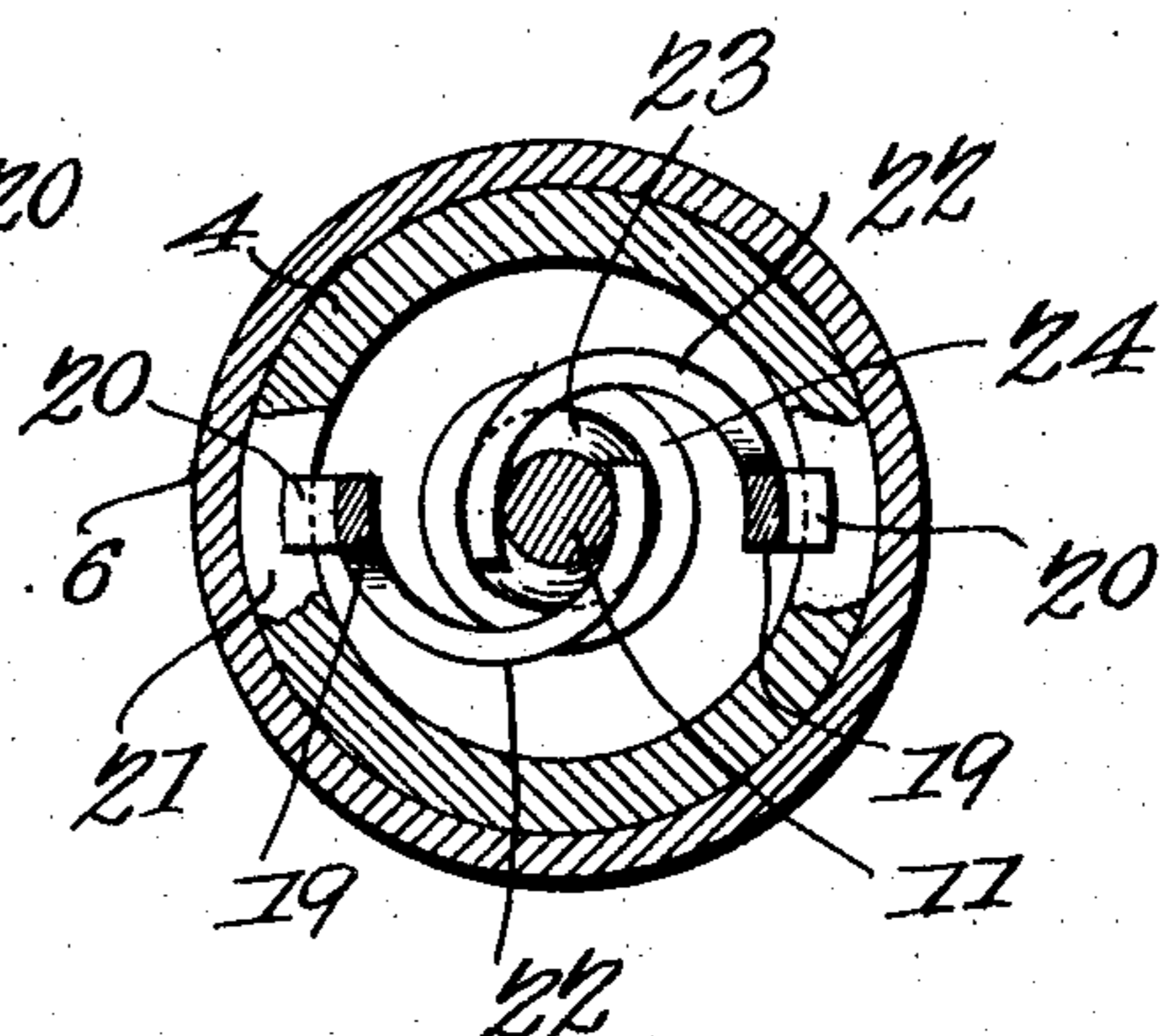
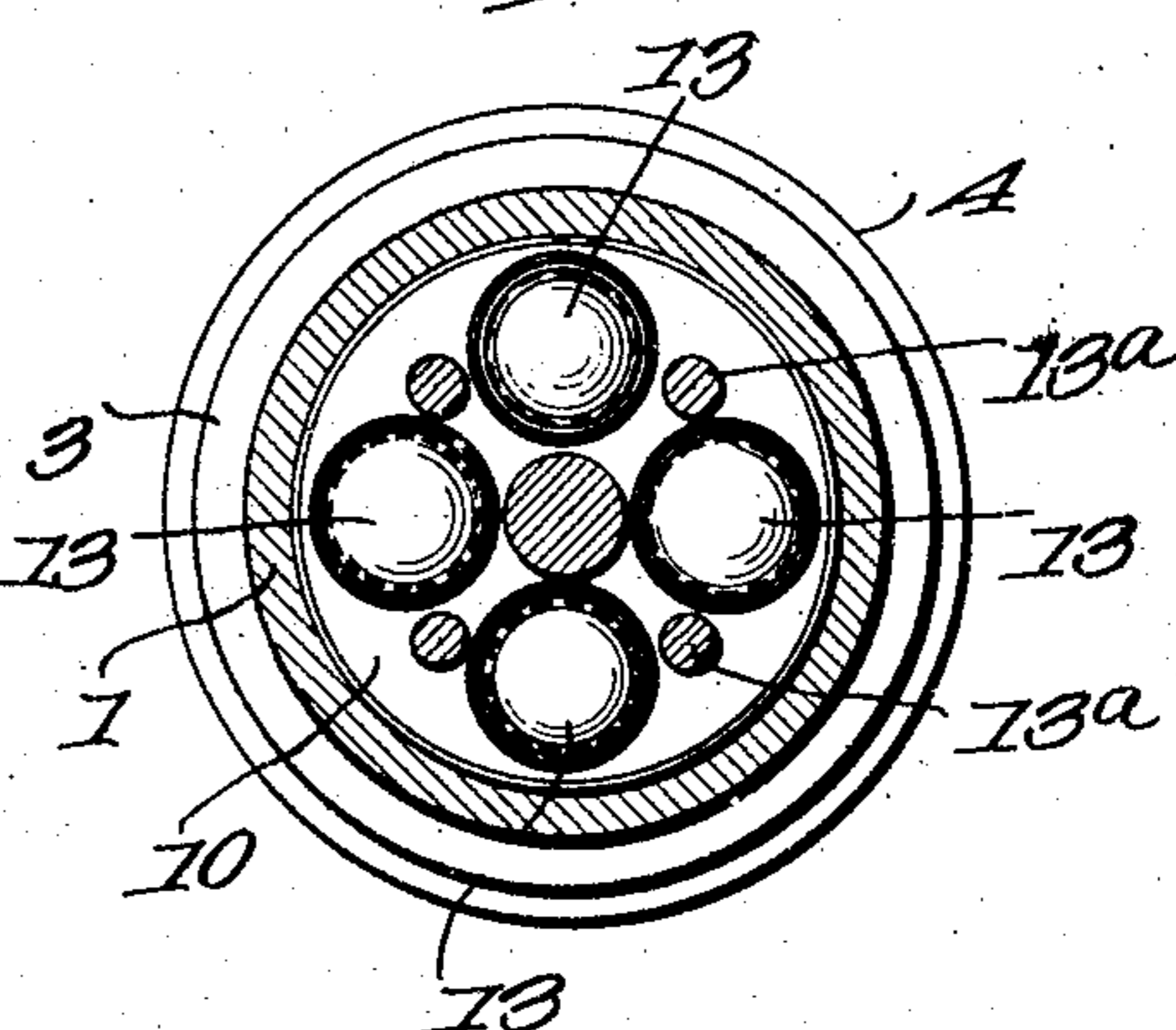


Fig. 4.

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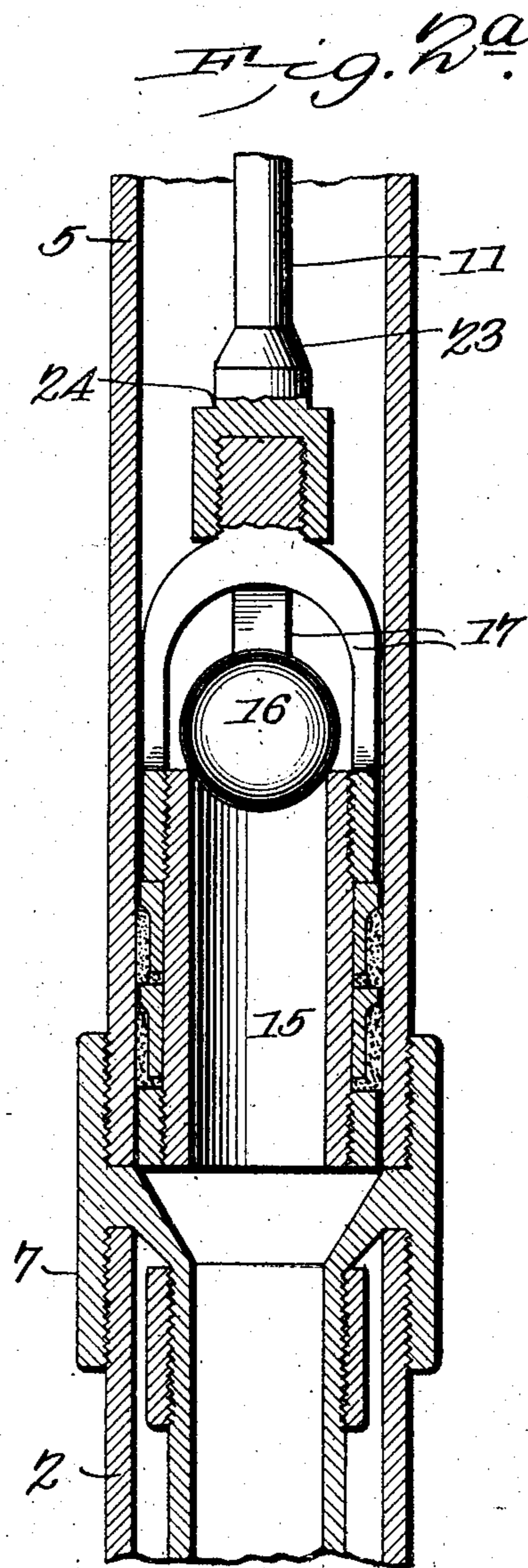
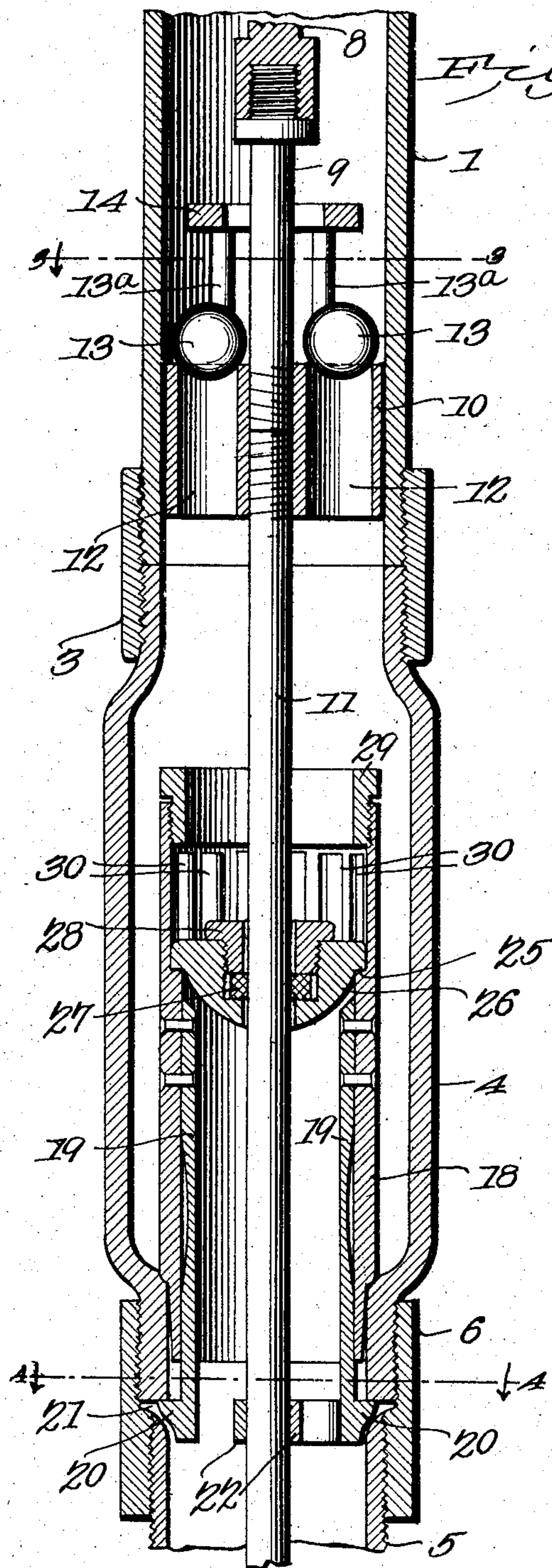
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

SAMUEL N. HALL, OF HOUSTON, TEXAS.

PUMP.

SPECIFICATION forming part of Letters Patent No. 780,992, dated January 31, 1905.

Application filed September 5, 1903. Serial No. 172,164.

To all whom it may concern:

Be it known that I, SAMUEL N. HALL, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented a new and useful Pump, of which the following is a specification.

This invention relates to pumps, and more especially to pumps for oil-wells, though the invention may be applied to wells of other kinds with good results, as is also the case with the device shown and claimed in the co-pending application filed by myself, Serial No. 196,316.

The invention is especially designed for use in wells of great depth; and the principal object of the invention is to provide a pumping mechanism in which the ordinary check-valve below the traveling valve, which moves with the pump-piston, is done away with.

A further object of the invention is to provide, in a pumping mechanism, a chamber for the reception of nuts, bolts, and other small objects which may fall into the well and which if not caught in a suitable receptacle would interfere with the operation of the pump.

Another object of the invention is to provide on the "sucker-rod" a supplemental lifting-valve above the traveling valve of the piston to relieve the valve in the piston of a portion of the weight of the superincumbent liquid.

With the objects above mentioned and others in view, as will appear when the invention is better understood, the same consists in the construction and combination of parts of a pump hereinafter described, illustrated in the accompanying drawings, and having the novel features thereof particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view of the pump mechanism in side elevation. Fig. 2 is a view in vertical section of the upper portion of the pump. Fig. 2^a is a view in vertical section through the lower portion of the pump, forming a continuation of Fig. 2. Fig. 3 is a horizontal section on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section on the line 4 4 of Fig. 2. Fig. 5 is a detail view of one of the spring-catches to hold the check-valve casing in position.

Referring to the drawings, in which corresponding parts are designated by the same character of reference throughout the several views, 1 and 2 designate upper and lower sections of the pump-tube. Attached to the bottom of upper section 1 of the tube by means of a coupling 3 is a housing 4 for a valve and casing supporting the same, which will presently be described. At the bottom of the housing 4 is secured the working barrel 5 of the pump, being attached to the housing by means of a threaded coupling 6. At the bottom of the barrel is a coupling 7, by means of which the barrel is secured to the lower section 2 of the pump-tubing. The coupling 7 is preferably of the form shown, having outer portions into which the adjacent ends of the pump-barrel and lower section of tubing are screwed and having an inner portion projecting inward and downward between the ends of the pump-barrel and lower section of tubing to present a conical surface.

In the upper section 1 of the pump-tubing there reciprocates a sucker-rod, the upper section of which (shown in the drawings) is designated 8. Connected with the section 8 is a short section 9, to which is secured, by means of a collar 10, the piston-rod proper, 11. The collar 10 fits smoothly within the upper section 1 of the pump-tubing and is provided with a plurality of ports 12, which are normally kept closed by ball-valves 13, seated in the upper ends of the ports. The valves 12 are guided in their movement by pins 13^a, rising from the collar 10, and by the walls of the tube-section 1. The upward movement of the valves 13 is limited by a plate 14 at the top of the pins.

At the lower end of the piston-rod 11 is secured the piston 15, which is hollow, as usual, and is provided at the top with a large ball-valve 16, guided in its movements and secured against displacement by means of a cage 17. The piston 15 is arranged for reciprocation within the pump-barrel, and when the pump is in operation the piston does not rise above the top of the barrel.

Within the housing 4, which is of larger diameter than the pump-barrel, there is fitted a tubular casing 18, which is reduced in ex-

ternal diameter at its lower end and slightly tapered in order to make it fit securely in the lower end of the housing. The external diameter of the casing 18 is considerably less than the internal diameter of the housing 4, so that when the casing is in position a considerable space is left between the outer surface of the casing and the wall of the housing, thus forming a chamber into which nuts, bolts, or other small objects which may accidentally enter the well may lodge and be prevented from interfering with the operation of the pumping mechanism. The casing 18 is secured in position by means of a pair of spring-latches 19, whose upper ends are riveted to the casing-wall slightly above the middle and which have catch-lugs 20 disposed below the bottom of the casing and adapted for engagement with recesses 21, provided between the top of the pump-barrel and the bottom of the housing. The latches 19 are adapted to engage automatically with the recesses 21 when the casing is seated in the bottom of the housing, and in order to provide means for disengaging the latches when it is necessary or desirable to remove the casing from the housing there is provided on each latch a hook-arm 22, which forms a semicircle having a radius a little greater than half the radius of the casing. The arms 22 are normally disposed in the position indicated in Fig. 2, lying on opposite sides of the piston-rod 11, which is provided just above its juncture with the piston with a conical enlargement 23. The enlargement is adapted to engage with the arms 22 when the rod is drawn upward to remove the piston from the well, and by so engaging with the arms 22 the enlargement forces the arms apart and withdraws the lugs 20 from operative position. The continued upward movement of the piston-rod will raise the casing and the structures associated therewith, as the arms 22 will rest upon an annular shoulder 24, formed at the base of the enlargement 23.

The casing 18 is counterbored at its upper end for a short distance to form an annular shoulder 25, which is adapted to serve as a seat for a valve 26, which encircles the rod 11. The valve 26 fits loosely on the rod 11 and is recessed on its upper surface to receive a packing-washer 27 of smaller diameter than the recess and fitting closely around the piston-rod. The packing-washer is secured in position by a nut 28, threaded into the valve. The upward movement of the valve 26 is limited by a collar 29, threaded into the upper end of the casing 18, and to afford means of escape for the liquid in the casing when the valve rises a plurality of slots 30 are formed in the casing-wall between the shoulder 25 and the bottom of the collar 29.

When the pump is in operation, the piston 15 is reciprocated in the usual manner, raising the check-valve 26 upon each upward

stroke and forming a partial vacuum between the piston and check-valve on each downward stroke. The partial vacuum so formed creates suction, which draws the oil or other liquid upward through the hollow piston as the piston moves downward. Upon the next upstroke the liquid which has been drawn through the piston will be carried upward thereby, owing to the closure of the traveling valve, and will be forced through the check-valve 26 at the top of the casing 18. When the pump has been in operation long enough to lift the oil or other liquid above the collar 10, the liquid above the collar will be raised at each upward stroke of the sucker-rod by means of the collar and the ball-valves seated on the top thereof, so relieving the piston of all the weight of the liquid except that lying between the piston and the collar 10.

By doing away with the check-valve usually employed beneath the piston and substituting the valve 26 the clogging of the check-valve from the action of sand or earth, which frequently occurs in pumps constructed in the old manner, is almost entirely obviated, and when any clogging of the check-valve occurs the removal of the valve for cleansing and its return to position after cleansing are made easy. With the old form of check-valve located beneath the piston it was necessary in the event of clogging to withdraw the pump-tubing from the well in order to bring the valve to the surface; but in case the valve 26 becomes clogged the valve and its casing may be automatically released from their connection with the housing 4 and lifted to the surface by merely drawing up the piston. The return of the valve and casing to operative position in the housing is effected as easily as their removal. When the piston is lowered, the casing will descend with it until the tapered lower end thereof becomes seated in the bottom of the housing. The downward movement of the casing will then cease, and the continued downward movement of the piston will cause the enlargement 23 on the piston-rod to pass out of engagement with hooked arm 22 on the spring-latches 19 and permit the lugs 20 to be thrown outwardly into the recesses 21, so securing the casing in operative position.

As explained in a preceding paragraph, the valve 26 fits loosely upon the rod 11, and the packing-washer, fitted in the recess on the upper surface of said valve, fits tightly around the rod. By this arrangement of parts the rod is permitted to vibrate laterally without forcing the valve hard against the wall of the casing, as the washer 27 moves with the rod without imparting movement laterally to the valve.

While I have described and illustrated the preferred form of embodiment of the invention, it will be obvious that various changes in the form, proportions, and exact manner

of assemblage of the elements exhibited may be made without departing from the spirit of the invention or sacrificing its advantages, and I therefore reserve the right to make such changes in the construction as lie within the scope of the appended claims.

Having thus described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pump, the combination with the pump-tubing, of a working barrel, a piston arranged for reciprocation in said barrel, a casing detachably mounted at the top of said barrel, a check-valve provided in said casing, spring-latches provided in said casing to secure it in position at the top of said barrel, said latches having curved arms encircling the piston-rod, and means at the top of the piston for spreading said arms and thereby releasing said latches.

2. In a pump, the combination with the pump-tubing of a working barrel, a piston arranged for reciprocation in said barrel, a casing detachably mounted at the top of said barrel, a check-valve within said casing, spring-latches within said casing for securing it in position, said latches having curved arms encircling the piston-rod, and a conical enlargement above said piston for engagement with said arms to release said latches.

3. In a pump, the combination with the pump-tubing, of a working barrel, a piston arranged for reciprocation in said barrel, a check-valve disposed above said barrel and rigidly held against lateral movement, a pis-

ton-rod extending through said valve and having a certain amount of lateral play therein, and a packing-washer fitted loosely within said valve and fitted closely around said piston-rod.

4. In a pump, the combination with the pump-tubing, of a working barrel, a piston arranged for reciprocation in said barrel, a vertically-movable check-valve above said barrel, a piston-rod extending through said check-valve and fitting loosely therein, and a packing-washer fitted closely around said piston-rod and so secured in relation to said valve that a certain amount of relative lateral movement of the valve and packing-washer can take place.

5. In a pump, the combination with the pump-tubing, of a working barrel, a piston arranged for reciprocation in said barrel, a check-valve above said barrel, a piston-rod extending through said check-valve and fitting closely therein, said check-valve being arranged for vertical movement and having a chamber therein to receive a packing-washer, a packing-washer of smaller diameter than said chamber fitted closely around said rod, and means for securing said washer in said chamber without interfering with the lateral movement of said washer in said chamber.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

SAMUEL N. HALL.

Witnesses:

T. B. ALLMAN,

HARRY A. SHAFFER.