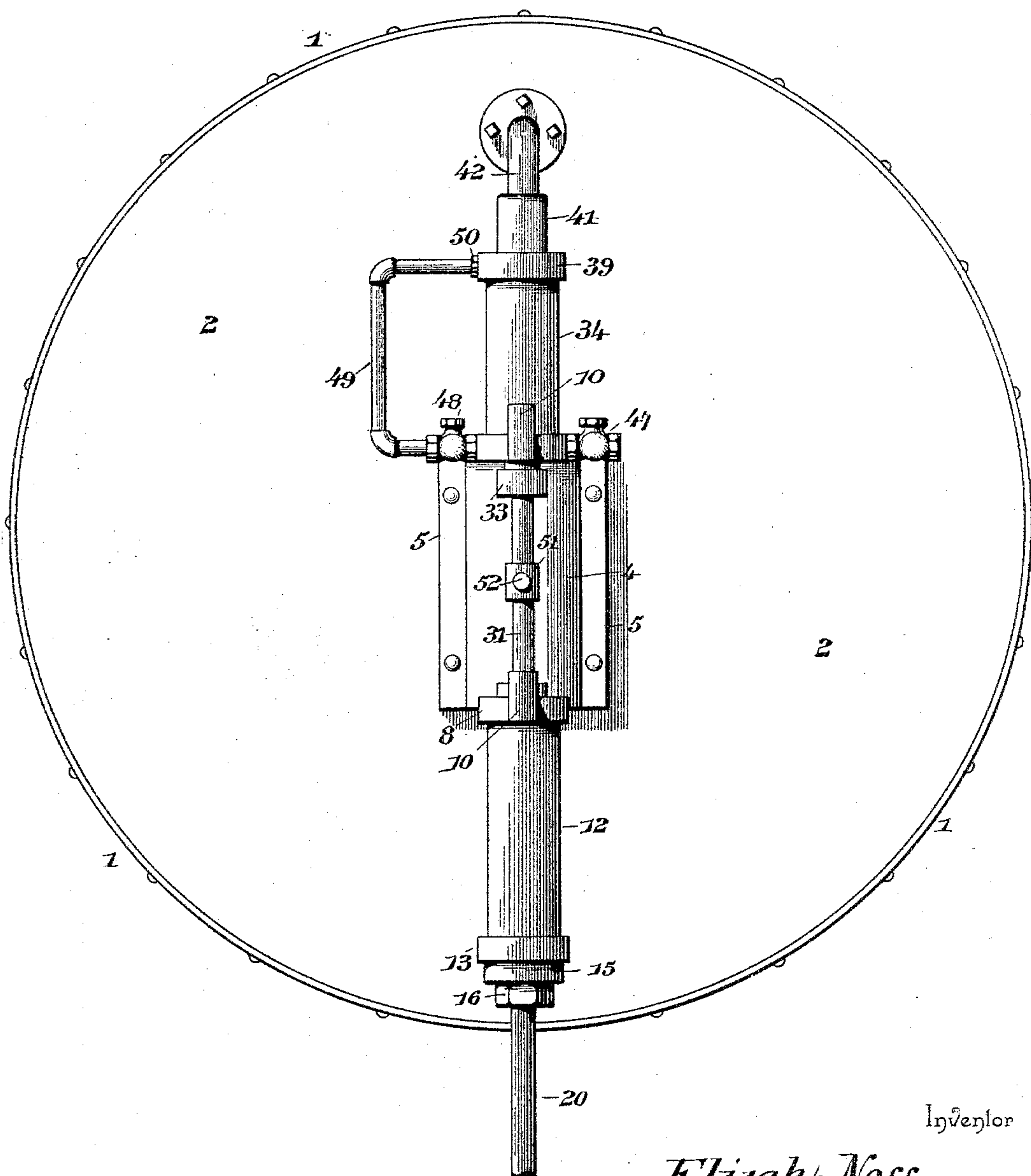


2 Sheets—Sheet 1.

No. 571,680.

Patented Nov. 17, 1896.

FIG. 1.



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(No Model.)

2 Sheets—Sheet 2.

E. NEFF.

PUMP FOR DOMESTIC WATER SYSTEMS.

No. 571,680.

Patented Nov. 17, 1896.

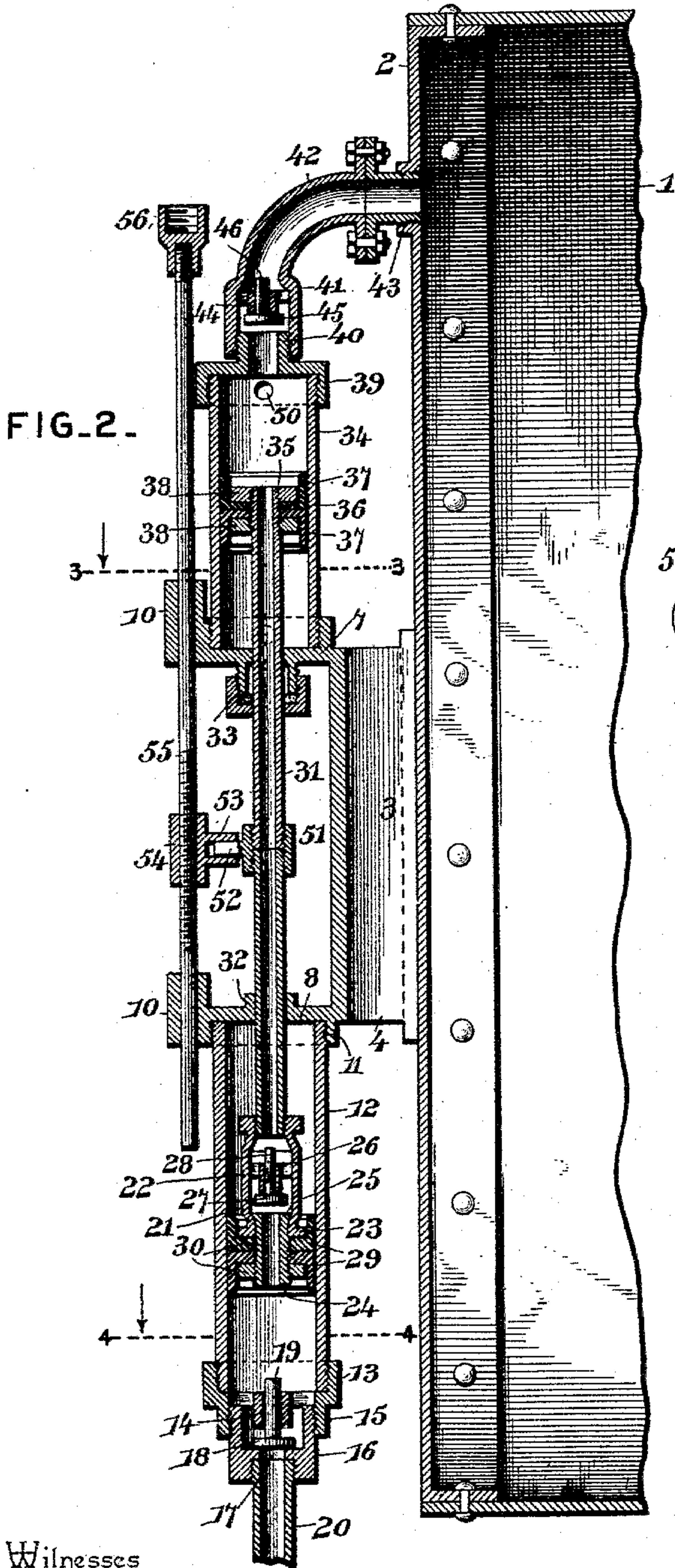


FIG. 3.

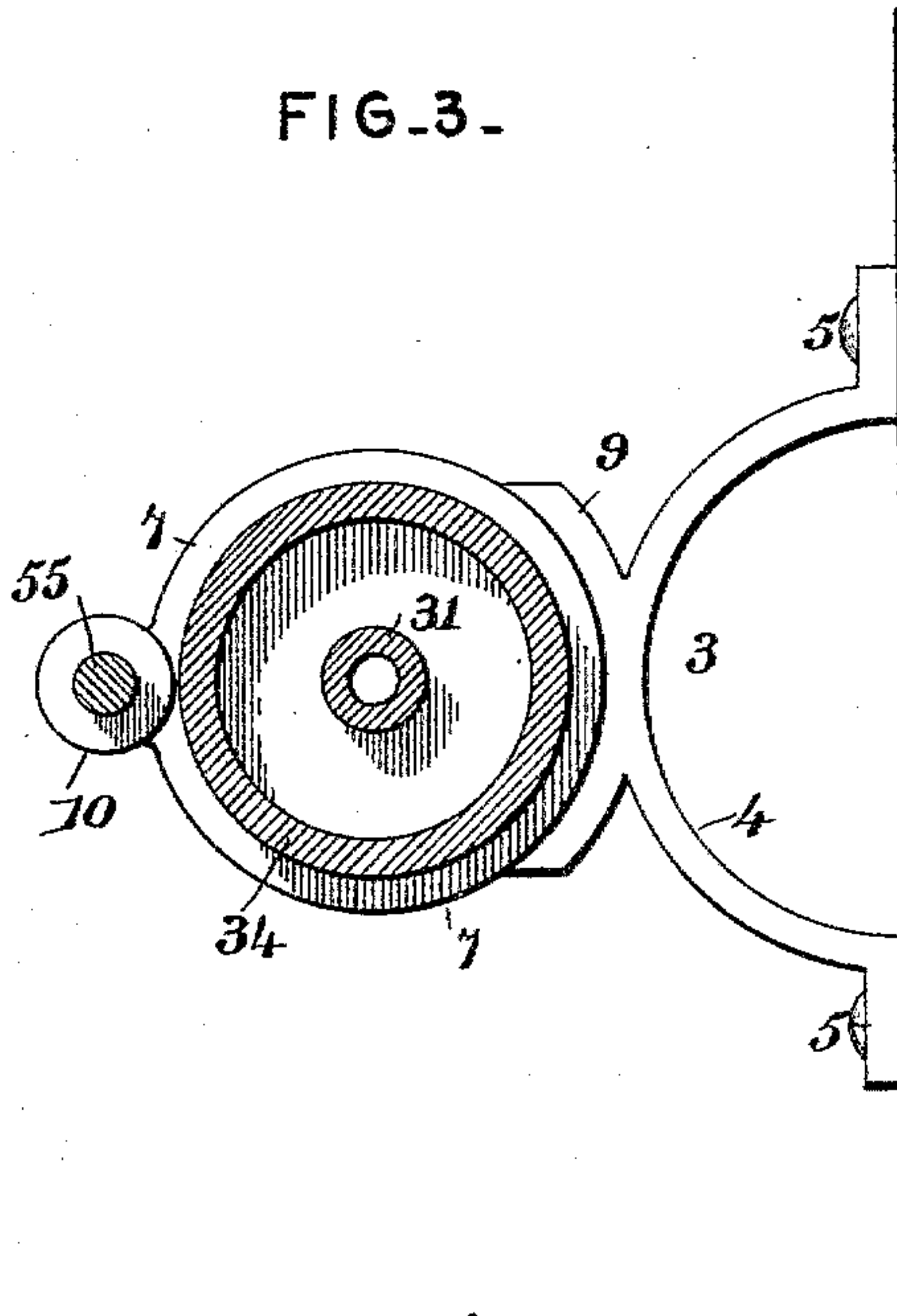
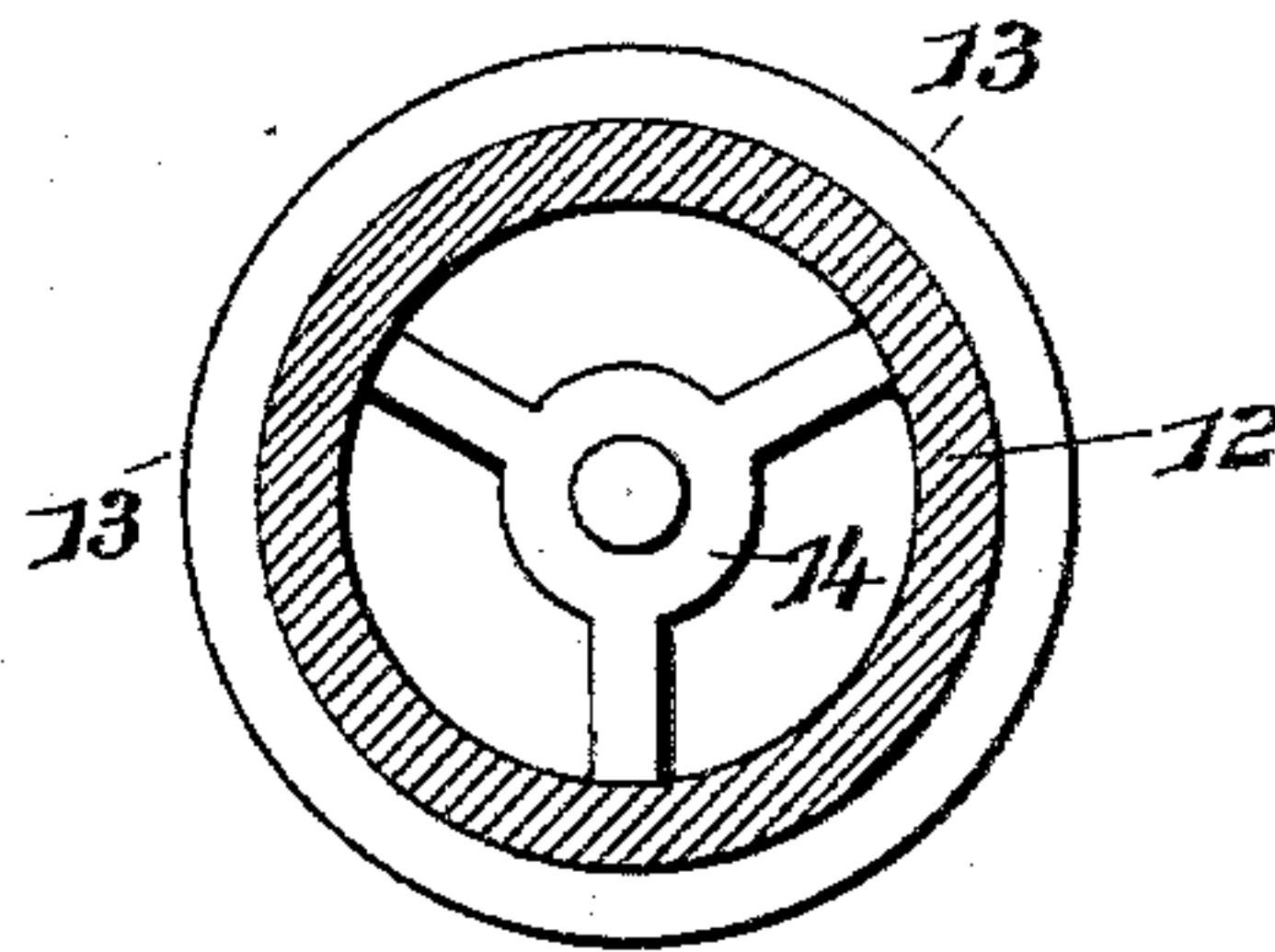


FIG. 4.



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UNITED STATES PATENT OFFICE.

ELIJAH NEFF, OF MILFORD, INDIANA.

PUMP FOR DOMESTIC WATER SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 571,680, dated November 17, 1896.

Application filed May 28, 1896. Serial No. 593,446. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH NEFF, a citizen of the United States, residing at Milford, in the county of Kosciusko and State of Indiana, have invented a new and useful Pump for Domestic Water Systems, of which the following is a specification.

This invention relates to pumps for domestic water systems, and it has for its object to provide a new and useful pumping device of this character having simple and efficient means for collecting and storing a quantity of water and air, so that the compression of the latter will provide for the distribution of the water to the point of use under air-pressure.

To this end the main and primary object of the invention is to simplify the construction of pumping devices such as set forth in my former patents, Nos. 451,835 and 512,737, especially with a view of arranging and combining the packing and valves of the pump in such a manner as to thoroughly protect the same and greatly prolong the usefulness thereof.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a side elevation of a pumping apparatus constructed in accordance with this invention. Fig. 2 is a vertical longitudinal sectional view of the pumping apparatus. Fig. 3 is a transverse sectional view on the line 3 3 of Fig. 2. Fig. 4 is a similar view on the line 4 4 of Fig. 2.

Referring to the accompanying drawings, 1 designates a compression storage-tank of any suitable size and form designed to have pumped therein a supply of water and air and to hold the air under sufficient compression, so as to force the water out through any line of distributing pipe or pipes that may be connected with the tank in any suitable manner and led to any desired point of use, this function of the storage-tank and the line of distributing-piping being the same as set forth in connection with the storage-tanks disclosed in my former patents hereinbefore referred to.

In the drawings a portion only of the tank

1 is illustrated, and the numeral 2 designates one of the end heads of the tank, said end head in the present invention being designed to support the pumping apparatus in connection with a skeleton pump-supporting frame 3. The skeleton pump-supporting frame 3 essentially comprises an arched body portion 4, having at its opposite side edges the bolt-flanges 5, adapted to rest flat against the outer side of the end head 2 of the storage-tank and to receive suitable fastening-bolts for clamping the supporting-frame firmly in position on the end of the storage-tank. The said skeleton arched pump-supporting frame 4 is arranged in an upright position and is provided at its upper and lower ends with the offstanding vertically-alined cylinder-caps 7 and 8, respectively, which cylinder-caps are carried by the curved arms 9 at the upper and lower ends of the frame and are provided at their outer side edges with the tubular rod-guides 10, the rod-guides 10 of the oppositely-located cylinder-caps 7 and 8 being arranged in precise vertical alinement for the purpose of forming a perfect guide for the pump-rod to be referred to. The cylinder-cap 8 at the lower end of the pump-supporting frame 3 is interiorly threaded and receives therein the upper threaded end 11 of the lower water-cylinder 12 of the apparatus. The lower water-cylinder 12 of the apparatus is of any suitable or desired length and has fitted on its lower end opposite the cap 8 the lower cylinder-cap 13, which cap is provided with a spider valve-guide 14 and a depending neck portion 15, in which is removably threaded a hollow valve-plug 16. The hollow valve-plug 16 is provided with an interior valve-seat 17, over which works a valve 18, having an upwardly-disposed stem 19, working in the guide 14, and immediately below the interior valve-seat 17 the hollow valve-plug 16 has fitted therein the upper end of a water-supply pipe 20, which leads into the well or other source of water supply.

The lower water-cylinder 12 of the apparatus accommodates for movement therein a valved plunger-head 21. The valved plunger-head essentially comprises a closed valve-cage 22, provided at its lower end with a packing-flange 23, an exteriorly-threaded tube extension 24 below said flange, an interior

valve-seat 25 above the plane of said flange 23, and an interior valve-guide 26 immediately above said interior valve-seat. The interior valve-seat 25 of the valve-cage 22 has arranged to work thereover and thereon the plunger-valve 27, the stem 28 of which works in the guide 26, and the lower tube extension 24 of the valve-cage has arranged thereon a pair of flanged packing-disks 29, which are clamped tightly in position against the flange 23 by the clamp-nut 30, secured on the tube extension 24 below and against the said disks 29. The packing just described for the plunger-head has a perfectly water-tight contact with the inner sides of the water-cylinder 12, so that there is positively no leakage of water into the cylinder above the plunger-head, but the water at all times is confined in the cylinder 12 between the plunger-head therein and the bottom or lower end of the cylinder.

The closed valve-cage 22 of the valved plunger-head 21 has fitted in its upper end the lower end of a reciprocating plunger-tube 31, which works through a guide 32 in the cap 8 at the top of the cylinder 12 and also slides through a stuffing-box 33, arranged on the under side of the cylinder-cap 7 at the upper end of the pump-supporting frame 3. The upper portion of the plunger-tube 31 extends through the stuffing-box 33 and into the upper combined air and delivery cylinder 34. The cylinder 34 is fitted at its lower end in the cap 7, so as to be arranged in precise vertical alinement with the lower water-cylinder 12, and the upper end of the tube 31 within the cylinder 34 is exteriorly threaded, as at 35, and carries a piston-head 36. The piston-head 36 on the upper end of the tube 31 comprises a pair of flanged leather packing-disks 37, similar to the plunger packing-disks 29, and a pair of clamping-nuts 38, secured on the threaded upper extremity of the tube 31 respectively above and below the pair of leather disks 37.

The upright upper combined air and delivery cylinder 34 has fitted on its upper end the upper cylinder-cap 39, provided with an upwardly-disposed valve-neck 40, exteriorly threaded to receive thereon the lower end of a valve-cage enlargement 41 at one end of the gooseneck delivery-pipe 42, having a connection 43 with one end of the storage-tank 1 near the extreme upper side of the said tank to provide for the discharge of water and air into said tank. The valve-cage enlargement 41 at one end of the pipe 42 is provided therein with a valve-guide 44, below which is arranged the check-valve 45, working on the valve-neck 40 of the cylinder-cap 39 and having its stem 46 working through the valve-guide 44.

The upper combined air and delivery cylinder 34 has fitted to its lower end at one side a valved air-inlet nipple 47, which provides for the admission of air into the cylinder 34 below the piston-head 36, and said cylinder

has connected therewith at its lower end and at the side directly opposite the valved inlet 47 the valved end 48 of an air-delivery pipe 49, which connects at its upper end, as at 50, with the upper end of the cylinder 34 and discharges air into said upper end of the cylinder above the piston-head 36 working therein.

At a point intermediate of the two cylinders 12 and 34 the reciprocating plunger-tube 31 has fitted thereon a collar 51, provided at one side with an offstanding coupling-pin 52, which is loosely received in the coupling-socket 53, formed at one side of an adjustable coupling-sleeve 54, adjustably fitted on the reciprocating pump-rod 55. The pump-rod 55 is arranged to work parallel with the tube 31 in the vertically-alined rod-guides 10 at the adjacent ends of the two cylinders, and the upper end of said rod has fitted thereto a suitable coupling 56 for connection with a windmill or other source of power.

The operation of the pump will be readily understood, it being noted that on the upstroke of the plunger-head 21 the plunger-valve 27 closes and the foot-valve 18 of the cylinder 12 opens, thereby allowing water to be drawn into the said cylinder 12 below the plunger-head therein, and on the downward stroke of said plunger-head the position of the valves 18 and 27 becomes reversed and the water in the cylinder 12 passes through the valved plunger-head 21 and the plunger-tube 31 into the upper combined air and delivery cylinder 34 above the piston-head in said latter cylinder. On the upstroke of the valved plunger-head 21 in the water-cylinder it will also be observed that the piston-head 36 is simultaneously moved upward, and on this upstroke of the piston-head 36 air is drawn into the lower part of the cylinder 34 through the valved air-inlet 47, but on the downstroke of the piston-head 36 at the same time water is rising through the tube 31 the valve in the inlet-nipple 47 is closed and the air within the cylinder 34 below the said piston-head 36 is forced through the pipe 49 into the upper end of the said cylinder. It will therefore be seen that during the operation of the pump both water and air are discharged into the cylinder 34 above the cylinder-head 36 therein, and when the said piston-head moves to the upper end of the cylinder 34 the water and air are both discharged through the gooseneck-pipe 42 into the storage-tank 1, from which tank the water is forced by air-pressure in the manner already referred to.

In connection with the operation of the herein-described pump it is to be observed that the water in being delivered from the cylinder 12 into the cylinder 34 is not discharged against the pressure in the tank, nor is the air discharged against such pressure in being delivered from the lower to the upper end of the cylinder 34, and the water and air are only discharged out of the cylinder 34

into the storage-tank against the pressure existing in said tank, thereby greatly relieving the wear and strain on the working parts of the pump. Another feature of importance to note is that the water discharges into the cylinder 34 above the piston-head therein, and thereby serves to keep the said cylinder always cool while compressing the air as it is forced into the tank 1. By reason of the water thus keeping the cylinder cool at all times leather packing may be employed without danger of burning out, as the packing of the piston-head 36 is always covered with water, which also forms a seal to prevent leakage of air and causes a perfect discharge of air through the pipe 32 into the storage-tank, and the use of a gooseneck-pipe 42 provides for sealing the check-valve 45 when said valve is closed so as to prevent leakage of air back into the cylinder 34.

Other advantages will appear to those skilled in the art, and it will be understood that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In a water-pumping apparatus, the combination with a storage-tank; of a pair of spaced vertically-alined cylinders, the lower of which has a water-supply-pipe connection with its lower end, suitable air-pipe connections with the upper cylinder, a single delivery-pipe leading to the storage-tank and connected with the upper end of the upper cylinder, said delivery-pipe having at its point of connection with the upper cylinder a check-valve sealed with water when closed, and a reciprocating plunger-tube carrying at its lower end a valved plunger working in the lower cylinder, and at its upper end a piston-head which works in the upper cylinder and provides for feeding air from one end of said upper cylinder to the other and for the expulsion of air and water out of said cylinder through a single delivery-pipe, substantially as set forth.

2. In a water-pumping apparatus, the combination with a storage-tank; of a pair of spaced vertically-alined cylinders, the lower of which has a water-supply-pipe connection with its lower end, a valved gooseneck delivery-pipe having a valved lower end connected with the upper end of the upper cylinder and leading to the storage-tank, a valved air-inlet connection with the lower end of the upper cylinder, a valved air-delivery pipe leading from the lower to the upper end of said upper cylinder, and a suitably-reciprocated plunger-tube carrying at its lower end a valved plunger and at its upper end a piston-head, said piston-head operating to draw air into the lower end of the upper cylinder, to deliver the supply of air into the upper end of said cylinder, and to expel the air and water thereabove out of the upper cylinder through said delivery-pipe, substantially as set forth.

3. In a water-pumping apparatus, the combination with a storage-tank; of a pump-supporting frame bolted to one end of the tank and provided at its upper and lower ends with integral offstanding vertically-alined cylinder-caps having tubular rod-guides formed integrally at their outer side edges, a combined air and delivery cylinder supported on the upper of said cylinder-caps and having air-pipe connections for delivering a supply of air from the lower to the upper end thereof, a valved delivery-pipe connection between the upper end of the upper cylinder and the storage-tank, a lower water-cylinder fitted at its upper end to the lower of the cylinder-caps, a reciprocating plunger-tube carrying at its lower end a valved plunger-head for the lower cylinder and at its upper end a piston-head for the upper cylinder, and a pump-rod working in said rod-guides and having a coupling connection with the plunger-tube, substantially as set forth.

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

ELIJAH NEFF.

Witnesses:

H. H. MCINTIRE,
EVERTON TREMAIN.