(No Model.) 3 Sheets—Sheet 1.

# H. L. PARKER.

## COMPRESSION PUMP.

No. 544,927. Patented Aug. 20, 1895.

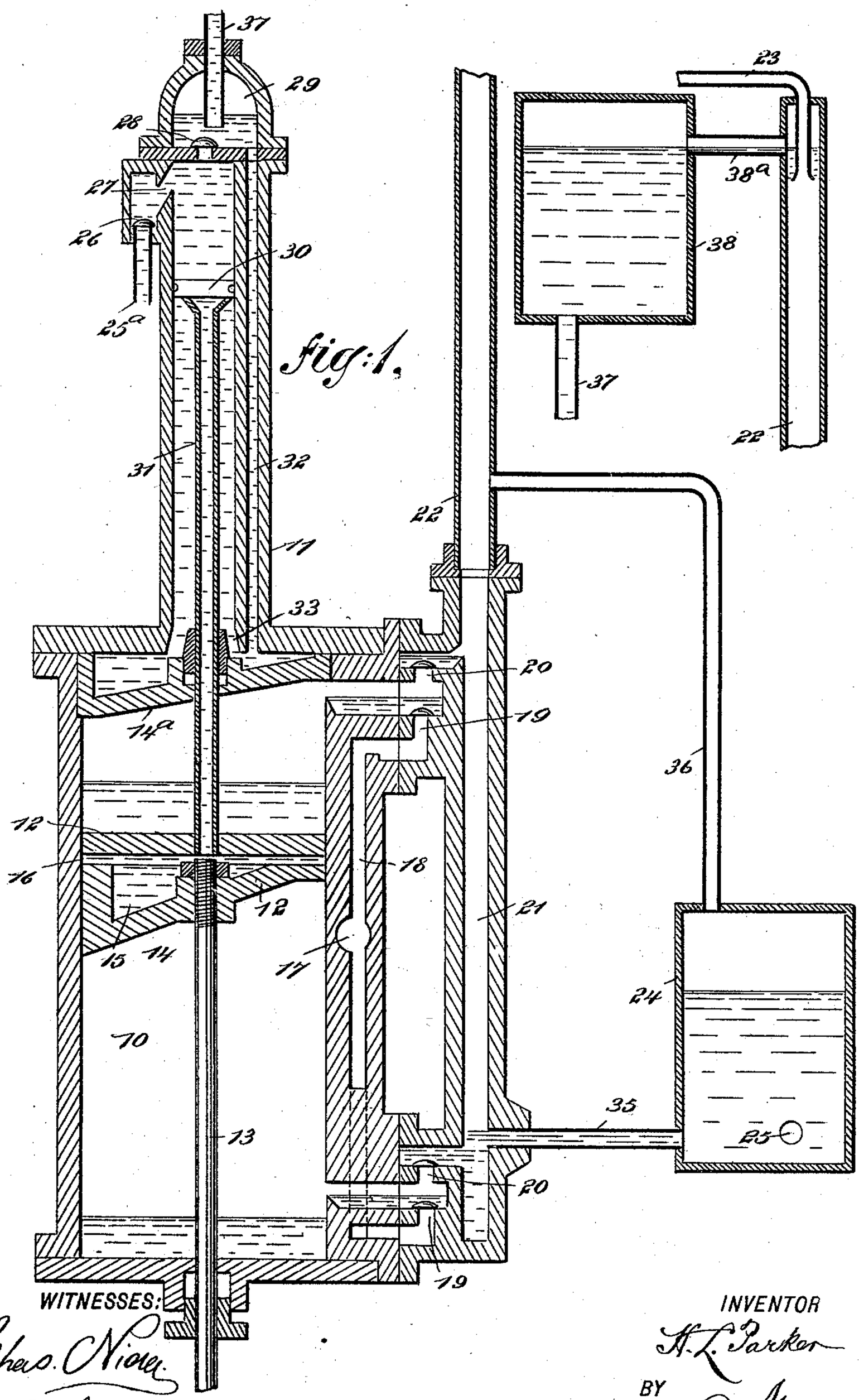


Fig. 1.

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## COMPRESSION PUMP.

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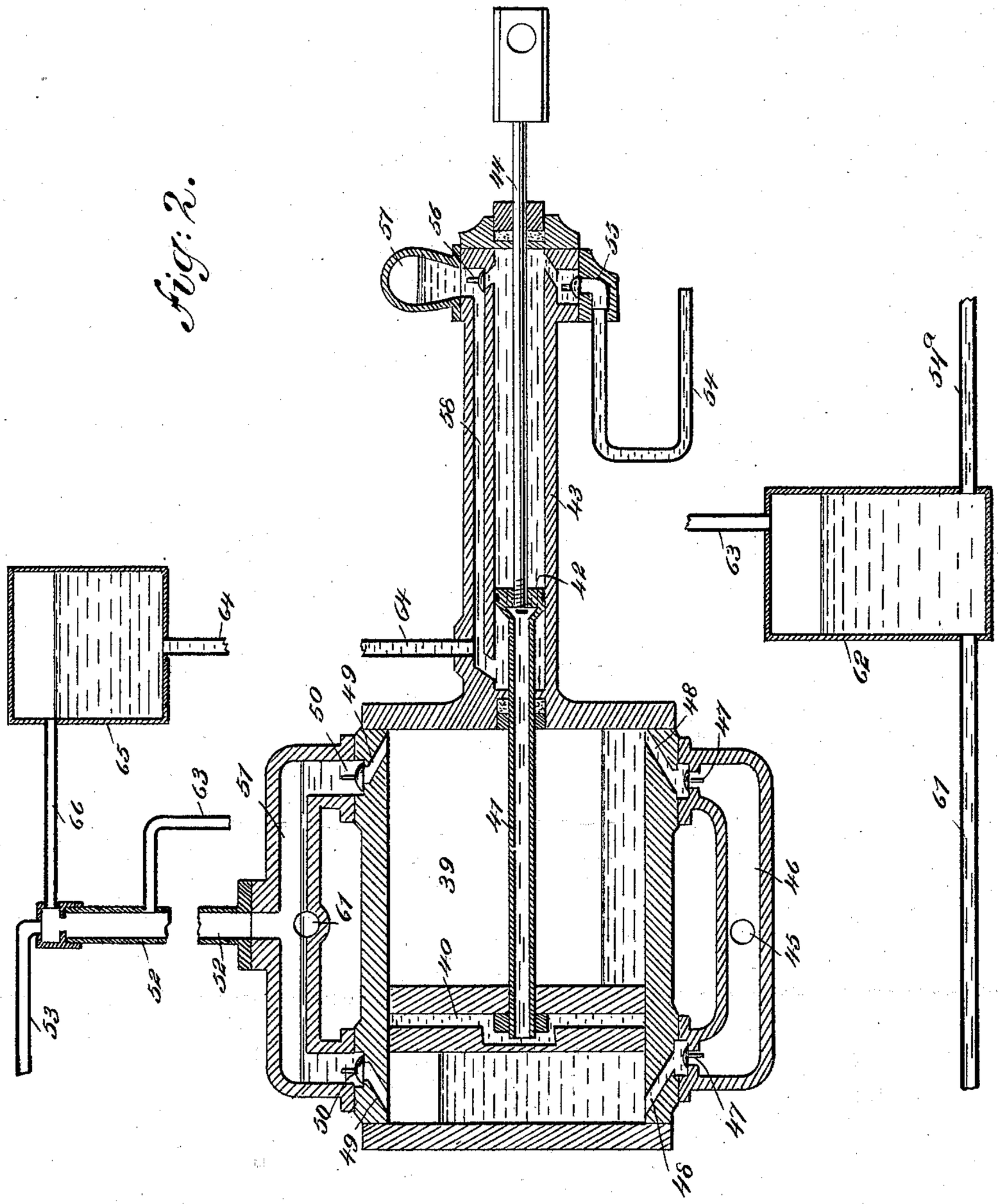
Fig. 2.

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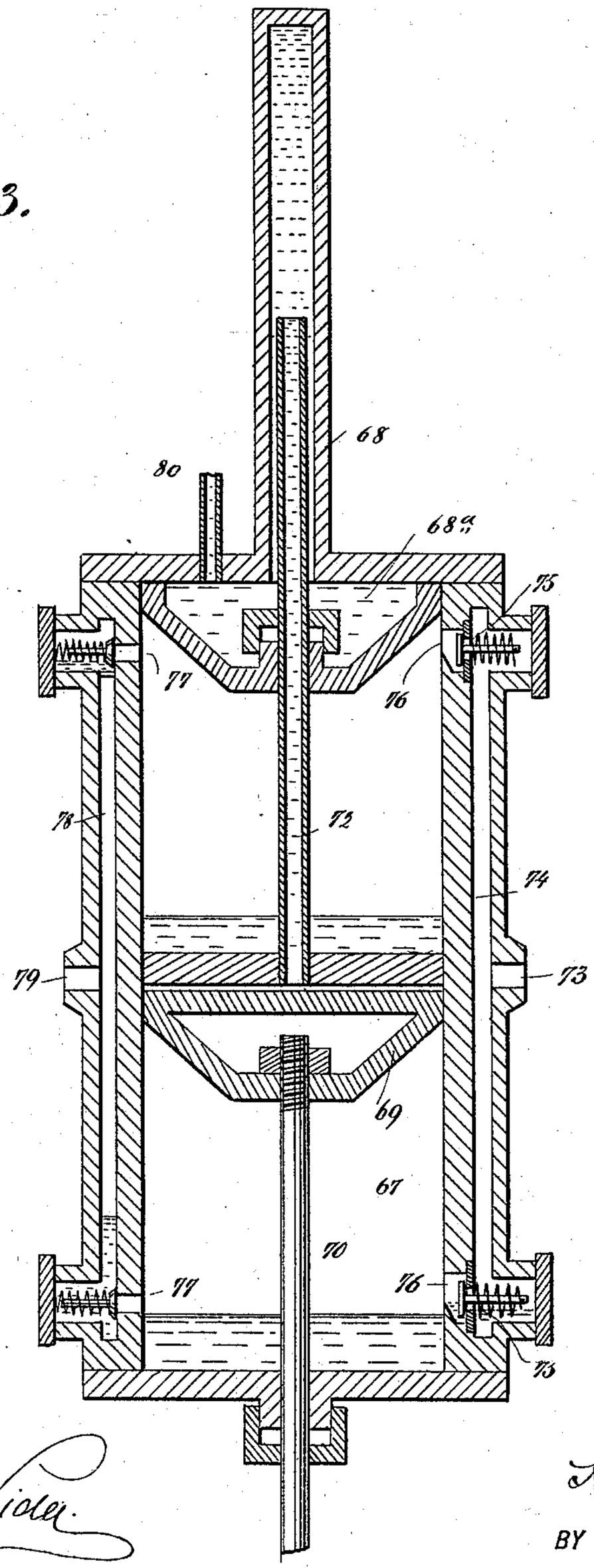
## COMPRESSION PUMP.

No. 544,927. Patented Aug. 20, 1895.

*Fig: 3.*

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# UNITED STATES PATENT OFFICE.

HARRY L. PARKER, OF PRINCETON, ILLINOIS.

## COMPRESSION-PUMP.

SPECIFICATION forming part of Letters Patent No. 544,927, dated August 20, 1895.

Application filed December 3, 1894. Serial No. 530,662. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY L. PARKER, of Princeton, in the county of Bureau and State of Illinois, have invented a new and Improved Compression-Pump, of which the following is a full, clear, and exact description.

My invention relates to improvements in compression-pumps which are adapted to compress and force ammonia and other gases and which are well adapted for use in connection with ice-making plants, although the pump may be used for other purposes.

The object of my invention is to produce a very simple and efficient pump, which is comparatively inexpensive, which is adapted to compress ammonia or other gas to any necessary pressure, which has an oil or other liquid circuit arranged to keep the movable parts of the pump thoroughly lubricated and at the same time absorb the heat of compression, and which also has the pump cylinder and piston in connection with the oil arranged to force out every particle of gas from the pump-cylinder.

To these ends my invention consists of certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken longitudinal section of the pump and accessory attachments. Fig. 2 is a similar view of a modified form of the pump in which the cylinder is horizontally arranged, and Fig. 3 is a longitudinal section of another modification of the pump.

The pump is provided with a cylinder 10, on the upper end of which is an oil chamber or cylinder 11, and within the main cylinder 10 is the reciprocating piston 12, which is worked by a piston-rod 13 in the usual manner, and this has its lower side inclined, as shown at 14, while the upper cylinder-head is interiorly inclined in a similar way, as shown at 14ª, and these two inclinations, in connection with the oil above and below the piston, cause the gas to be entirely expelled, as it will flow along the inclination and out through the discharge-ports at each reciprocation of the piston.

The piston 12 is hollow, as shown at 15, and provided with lateral ports 16, through which the oil from the piston oozes and thus lubricates the sides of the piston and, at the same time, effects a gas-tight packing between the piston and cylinder. The gas is admitted to the cylinder through the port 17 to the channel 18 in one side of the cylinder, and from here it passes through the valves 19 to the cylinder 10 and is expelled through the valves 20 to the stand-pipe 21, an extension 22 of which projects above the cylinder 10, and from the stand-pipe the gas passes off through the pipe 23 to the condenser.

The oil is supplied from a tank 24 by means of the pipes 25 and 25ª, which conduct the oil through suitable cooling apparatus and deliver it through the valve 26 and port 27 to the oil chamber or cylinder 11, the oil being delivered above or behind the oil-piston 30, which connects with the piston 14 by means of a hollow piston-rod 31, this serving to conduct the oil to the interior of the piston 12.

The piston 30 forces the oil up through a valve 28 to the air-chamber 29 at the upper end of the oil-cylinder 11, and from here the oil passes downward through the channel 32 and port 33 to the lower portion of the oil cylinder or chamber, so that it may enter the piston-rod 31 and pass to the piston 12. The oil flows out from the piston 12, lubricating the sides of the cylinder 10, and it is forced out through the valves 20 to the stand-pipe 21, and from this through a pipe 35 to the tank 24, thus completing the circuit. To equalize the pressure a pipe 36 leads from the top of the tank 24 to the stand-pipe 22. The excess of oil necessary to lubricate the cylinder 10 is, by the piston 30, forced up through a pipe 37, leading from the air-chamber 29, and is delivered to a tank 38, from which an overflow-pipe 38ª leads to the upper end of the stand-pipe 22, and the oil which overflows the tank 38 trickles down the pipe 22, absorbing the heat of compression, and it passes through the pipe 35 to the tank 24.

As shown in Fig. 2, the apparatus has a horizontal cylinder 39, in which is a hollow piston 40, which delivers oil to the sides of the cylinder, as above described, and the oil is supplied to the piston 40 through a hollow piston-rod 41, which also carries an oil-piston

42, working in the oil chamber or cylinder 43 at one end of the cylinder 39, and from this oil-cylinder the piston 40 receives its supply. The gas enters at 45 a pipe 46 on one side of the cylinder and passes through check-valves 47 and ports 48 to the cylinder, from which it is ejected by the piston through ports 49 and valves 50 to a pipe 51, from which it passes into the stand-pipe 52 and off through a pipe 53 to the condenser.

The oil is supplied from suitable cooling-pipes through a pipe 54 and passes through a valve 55 to the oil-cylinder 43, from which it is pushed by the piston 42 through a valve 56 to the air-chamber 57, and from here it passes through a channel 58 to a point behind the oil-piston 42, and then passes through the hollow piston-rod 41 to the piston 40, and from here to the cylinder 39, as already specified. The oil is expelled from the cylinder through the valves 50, the pipe 51, from which it passes through the pipe 61 to the oil-tank 62, and from here it goes back to the cooling-pipes through a pipe 54ª. The tank 62 is connected by an equalizing-pipe 63 with the stand-pipe 52. A portion of the oil is ejected from the cylinder 43 through a pipe 64 to a tank 65, and from here the overflow passes through a pipe 66 to the stand-pipe 52, down which it trickles, absorbing the heat of compression and passing through the pipe 61 to the tank 62.

In Fig. 3 I have shown another modification of the pump, which has a cylinder 67, with an oil chamber or cylinder 68 at one end, this connecting with a supplemental oil-chamber 68ª within the main cylinder 67. The cylinder 67 is provided with a reciprocating piston 69, which is operated by a piston-rod 70 and is hollow, having transverse channels 71 delivering to the walls of the cylinder, so as to lubricate it in the manner already described, and the piston is supplied with oil by means of the pipe 72, which is secured to the piston and extends upward through a stuffing-box in the bottom of the chamber 68ª and into the oil chamber or cylinder 68.

The gas is supplied to the cylinder through an inlet 73, channel 74, valves 75, and ports 76, and when ejected by the piston it passes out through the valves 77, channel 78, and outlet 79, which may be connected with a suitable pipe to convey the gas to the condenser or other receptacle. The oil is supplied through a pipe 80, which delivers into the chambers 68ª and 68, and from here it passes through the pipe 72 to the piston 69, through the piston to the cylinder 67, and thence out through the valves 77 and outlet 79, where it may be taken care of in any convenient manner. It will be seen that each form of pump has the hollow piston, the means of supplying cool oil to the piston, so as to lubricate and pack the same, and the valve-controlled ports for the inlet and discharge of both gas and oil, and that in each form no water-jacket is necessary, as the cool oil is arranged to circulate and to absorb the heat of compression.

While I have referred to oil as the medium for lubricating and cooling the cylinder, it will be understood that any other suitable liquid—glycerine, for instance—may be used, if desired.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the pump cylinder, the stationary liquid chamber at one end of the cylinder, the hollow piston located within the cylinder and having ports adapted to discharge liquid into the cylinder, the hollow piston rod secured to the piston to move therewith and extending into the liquid chamber, said piston rod communicating with the hollow of the piston and with the liquid chamber, and another piston secured to the said rod within the liquid chamber substantially as described.

2. A pump of the kind described, comprising a cylinder having suitable inlet and discharge ports, a reciprocating piston within the cylinder, means for supplying liquid to the cylinder, a stand pipe to receive the liquid and gas discharged from the cylinder, a liquid tank connected with the stand pipe and with the cylinder supply, and a second tank adapted to receive liquid from the cylinder supply and to overflow into the stand pipe, substantially as described.

3. The combination of the pump cylinder, the liquid chamber, the hollow piston in the cylinder, means for forcing the liquid from the liquid chamber to the interior of the piston, and an outlet pipe connected to the liquid chamber to allow the surplus liquid to escape therethrough, substantially as shown and described.

4. A compression pump, comprising a cylinder having suitable inlet and discharge ports, a hollow piston reciprocating in the cylinder, a liquid chamber at one end of the cylinder, a liquid piston reciprocating in the liquid chamber, a hollow piston rod connecting the two pistons and supplying liquid to the main piston, a stand pipe receiving the discharge from the cylinder, a liquid tank connected with the stand pipe and with the liquid supply chamber, and a second tank also connected with the liquid chamber and overflowing into the stand pipe, substantially as described.

5. A compression pump, comprising a cylinder having suitable inlet and discharge ports, a liquid chamber at one end of the cylinder, a hollow piston in the cylinder, a liquid piston in the liquid chamber, a hollow piston rod connecting the two pistons and supplying liquid to the main piston, and an air chamber having a valve-controlled connection with the outer end of the liquid chamber, and a channel connection with the inner end thereof, substantially as described.

6. The combination of the pump cylinder, the stationary liquid chamber forming an axial continuation thereof, the hollow piston within

the cylinder, the hollow piston rod extending from the piston into the liquid chamber and another piston secured to the piston rod within the liquid chamber, substantially as shown and described.

7. The combination with the pump cylinder and the hollow piston, of a hollow piston rod connected to the piston, and a liquid tank permanently communicating with the interior of the said piston rod and located at a higher level than the piston whereby the liquid will be constantly forced into the piston by gravity, substantially as described.

8. The combination with the pump proper and the stand pipe into the lower portion of which the gas is discharged, of a liquid supply device connected to the upper portion of the stand pipe for causing a cooling liquid to trickle down the said pipe, as and for the purpose set forth.

9. The combination with the pump proper and a stand pipe whose lower portion is connected to the gas discharge ports of the pump, of a liquid supply tank located at the upper portion of the stand pipe and connected thereto to allow a cooling liquid to trickle down the said pipe, and connections from the tank to both ends of the pump cylinder to keep up a continuous circulation of liquid during the operation of the pump, substantially as described.

HARRY L. PARKER.

Witnesses:
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