

(No Model.)

T. L. RANKIN.

GAS COMPRESSING PUMP FOR ICE MACHINES.

No. 361,596.

Patented Apr. 19, 1887.

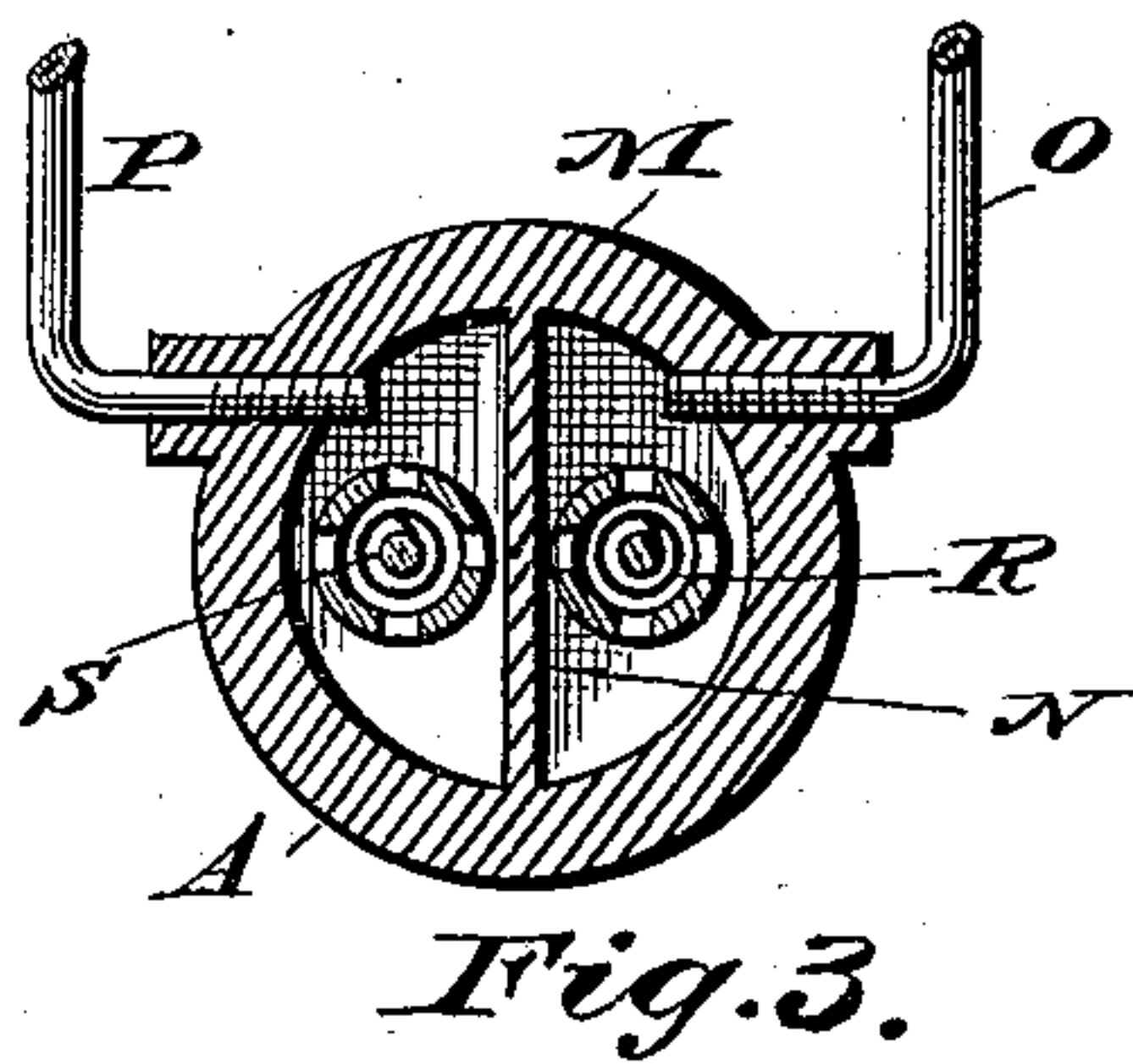
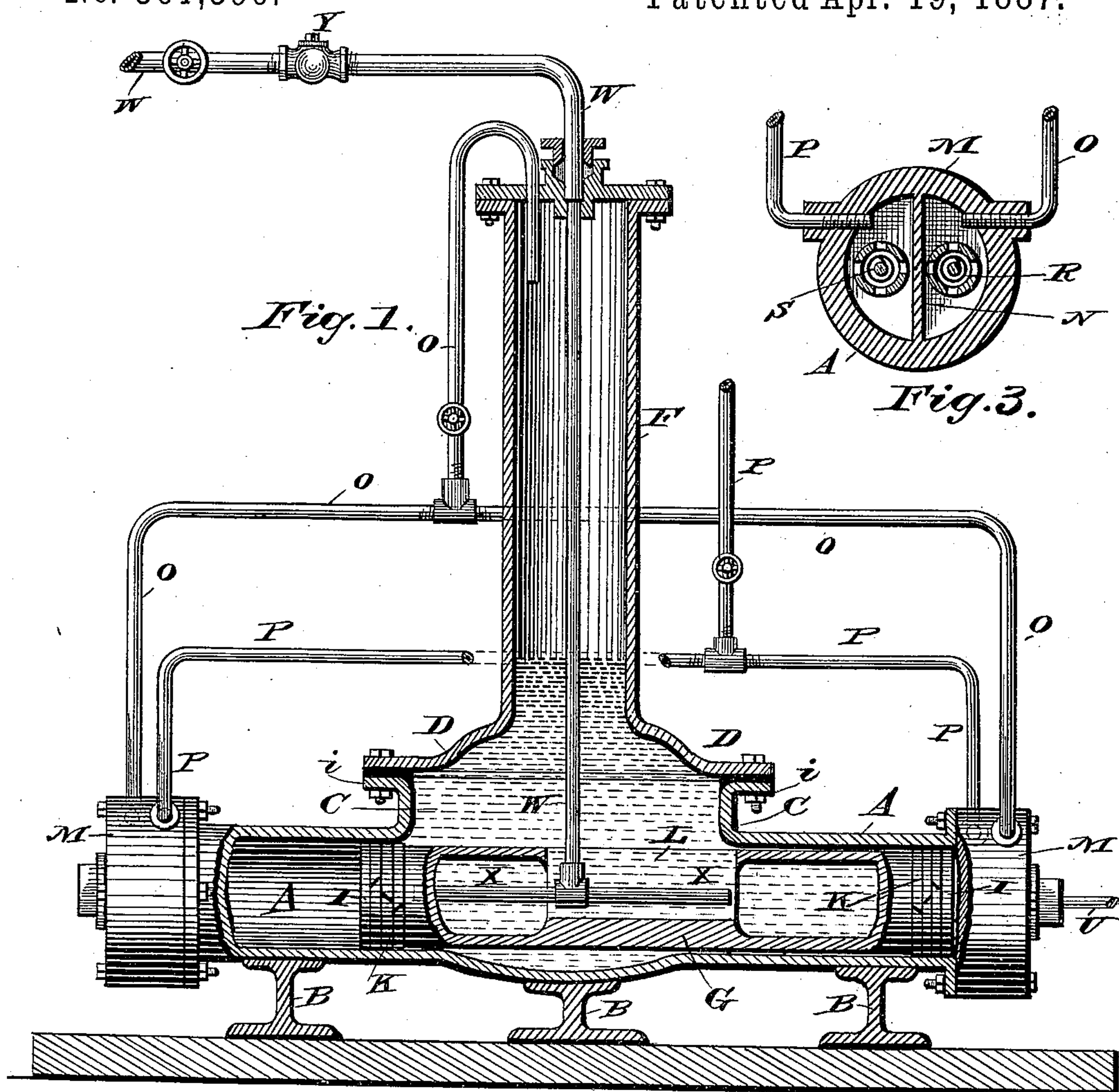
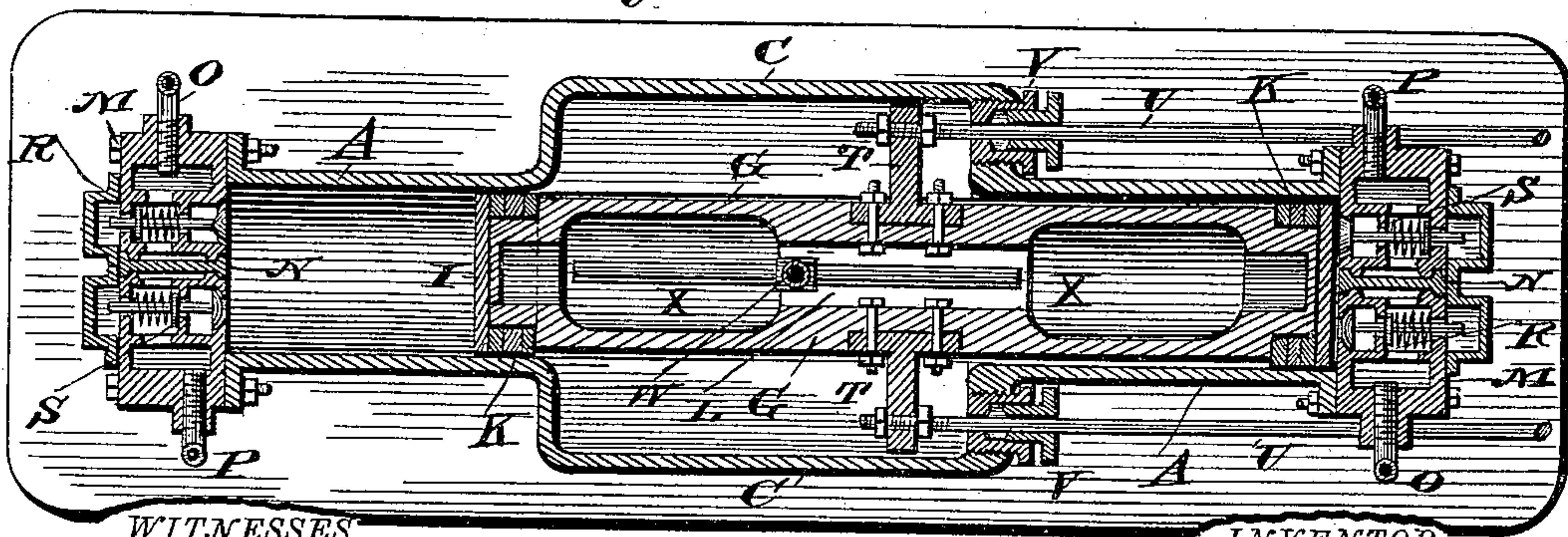


Fig. 2.



WITNESSES

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# UNITED STATES PATENT OFFICE.

THOMAS L. RANKIN, OF QUENEMO, KANSAS.

## GAS-COMPRESSING PUMP FOR ICE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 361,596, dated April 19, 1887.

Application filed January 25, 1887. Serial No. 225,446. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS L. RANKIN, of Quenemo, in the county of Osage and State of Kansas, have invented certain new and useful  
5 Improvements in Gas-Compressing Pumps for Ice-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 represents a view showing partly a side elevation and partly a vertical section of my improved pump. Fig. 2 represents a horizontal sectional view thereof. Fig. 3 represents a transverse section taken at one end of the pump, showing two of the valve-chambers thereof.

This invention relates to certain improvements in horizontal pumps for ice-machines, being particularly designed for pumping the gaseous ammonia from the cooler and compressing the same into the condenser, or for  
25 pumping the aqua-ammonia in absorption-machines.

In pumps of this class as heretofore constructed great difficulty has been experienced in properly lubricating the piston and in preventing the oil from being forced into the circuit, where it is impossible to trap and remove it, so that it often accumulates to such an extent as to clog the pipes and interfere with the operation of the machine. Moreover, in the case of the vertical pumps heretofore generally employed for compressing gases, difficulty  
35 has been found in locating them in many instances, on account of their height rendering them impracticable for many purposes—such as for use upon shipboard, refrigerating-cars, and in other places where rooms or chambers  
40 have low ceilings.

It is the object of my invention to obviate these objections and provide a horizontal pump that will at all times be thoroughly lubricated, that will not leak or force the oil  
45 into the circuit, and that will be compact and capable of being erected in the least possible vertical space, and can be operated with little attention, as the lubrication is automatic and  
50 permanent.

The above-mentioned objects I attain by the

means illustrated in the accompanying drawings.

The letter A indicates the cylinder of the pump, which is mounted horizontally upon the vertical supports B. Midway between the ends the cylinder is enlarged, as indicated by the letter C, for the purpose hereinafter explained. This enlarged portion is open at the top and is flanged at its edges, and to  
55 said edges is bolted the flanged edge D of a stand-pipe, F, which is securely closed at the top in any convenient manner.

The letter G indicates the piston, which is cylindrical and hollow throughout its entire length, and turned so as to closely fit the chambers H at each end of the pump-cylinder. The ends of the piston are closed by the plates I, and are provided with the ordinary packing-rings, K, which work in the chambers above  
65 mentioned. The piston has an upward opening, L, midway between its ends, for the purpose hereinafter explained.

The valve-chests M are located at each end of the cylinder, being bolted thereon. Each valve-chest is divided into two compartments by means of a partition, N, one compartment communicating by means of a pipe, O, with the stand-pipe, and the other by means of a pipe, P, with the condenser of the machine. These chambers are subdivided, and are provided with openings into the cylinder and with valve-seats R S, having puppet-valves held normally to their seats by means of springs, the valves being arranged relatively to the  
75 seats in such manner that the valve R, when away from its seat, will open the induction-port of the cylinder, while the valve S, when away from its seat, will open the eduction-port, and vice versa, in the manner familiar  
80 to skilled mechanics. To the piston at each side are secured extensions T, from which extend the piston-rods U, through the ordinary packing-boxes, V, to any suitable motor.

The letter W indicates a pipe which leads from the expansion-chamber of the ice-machine through a stuffing-box at top of the stand-pipe, down through the same, and into the hollow piston through the opening therein, before mentioned. The lower end of the pipe W is  
95 branched, as indicated by the letter X, the branch extending longitudinally toward each



end of the piston. The said pipe W is provided with a check-valve, Y, to prevent any possible back-pressure and injury that might result therefrom.

5 The operation of my invention is as follows: The central portion of the pump-cylinder and lower part of the stand-pipe are filled with oil, which also fills the hollow piston, but does not enter the pump-cylinders ahead of the piston  
10 on account of the packing thereon. As the piston is reciprocated it draws in the gas alternately at each end, as will be readily understood, and forces it out alternately at each end at the same time to the condenser, the ex-  
15 haust taking place at one end while the induction is being effected at the other. Upon relieving the pressure in the upper part of the stand-pipe by exhausting through the pipe O, the gas will be drawn off from the cooler or  
20 expansion-chamber, bubbling up through the oil out of the ends of the branch pipe. As the piston travels in oil, the pump-chambers will be alternately lubricated thoroughly, and, as but an infinitesimal quantity can pass the pack-  
25 ing-rings, there is comparatively little danger of the oil finding its way into the circuit, except by back-pressure, incident to impaired machinery, and this is effectually guarded against by the check-valve in pipe W.

30 Any leakage of oil is provided against, as it will be seen that the piston-rods are packed against the back-pressure in the cylinder—that is, on the exhaust side of the piston—and therefore pressure outward is brought upon the  
35 oil to force it out.

By making the piston hollow and carrying the gaseous vapor from the cooler or expanding-chamber directly to the ends of the same, it is cooled, and the heating effect, due to the  
40 powerful compression of the gas, is counteracted, more effective work secured, and the durability of the pump materially enhanced.

By slightly changing the valves, leaving off the stand-pipe, and closing the top of the part

C, my improved pump may be employed as an 45 aqua-ammonia pump for absorption-machines. In this case, however, the small pipe is carried back from the central chamber of the pump to the suction, in order to relieve the pressure in case any liquid should pass the rings and get 50 ahead of the piston in the end chambers of the cylinders, thus preventing any high pressure upon the stuffing-boxes.

Having described my invention, I claim—

1. The combination, with a horizontal pump- 55 cylinder having a hollow piston and an oil-receptacle, of the stand-pipe, the pipe leading from the expanding-chamber of an ice-machine through said stand-pipe and into the hollow piston, the valve-chests provided with induc- 60 tion and eduction chambers and valves, and connected with the stand-pipe and condenser by means of suitable pipes, the whole being arranged to operate substantially in the man- 65 ner and for the purposes specified.

2. The combination, with the cylinder hav- 65 ing a central enlargement forming an oil-chamber, of the hollow piston having extensions T, working in said chamber, and the piston-rods U, connected to said extensions and working 70 through packing-boxes in one end of said chamber, substantially as described.

3. The combination, with the hollow piston, of the branch pipe within it, connected to a 75 pipe extending from the cooling or condensing chamber of the ice-machine, whereby the piston and parts will be kept cool and the heating effects of the compression counteracted, substantially as specified.

In testimony that I claim the foregoing as my 80 own I affix my signature in presence of two witnesses.

THOMAS L. RANKIN.

Witnesses:

T. H. ALEXANDER,  
ROBERT E. MORRIS.