

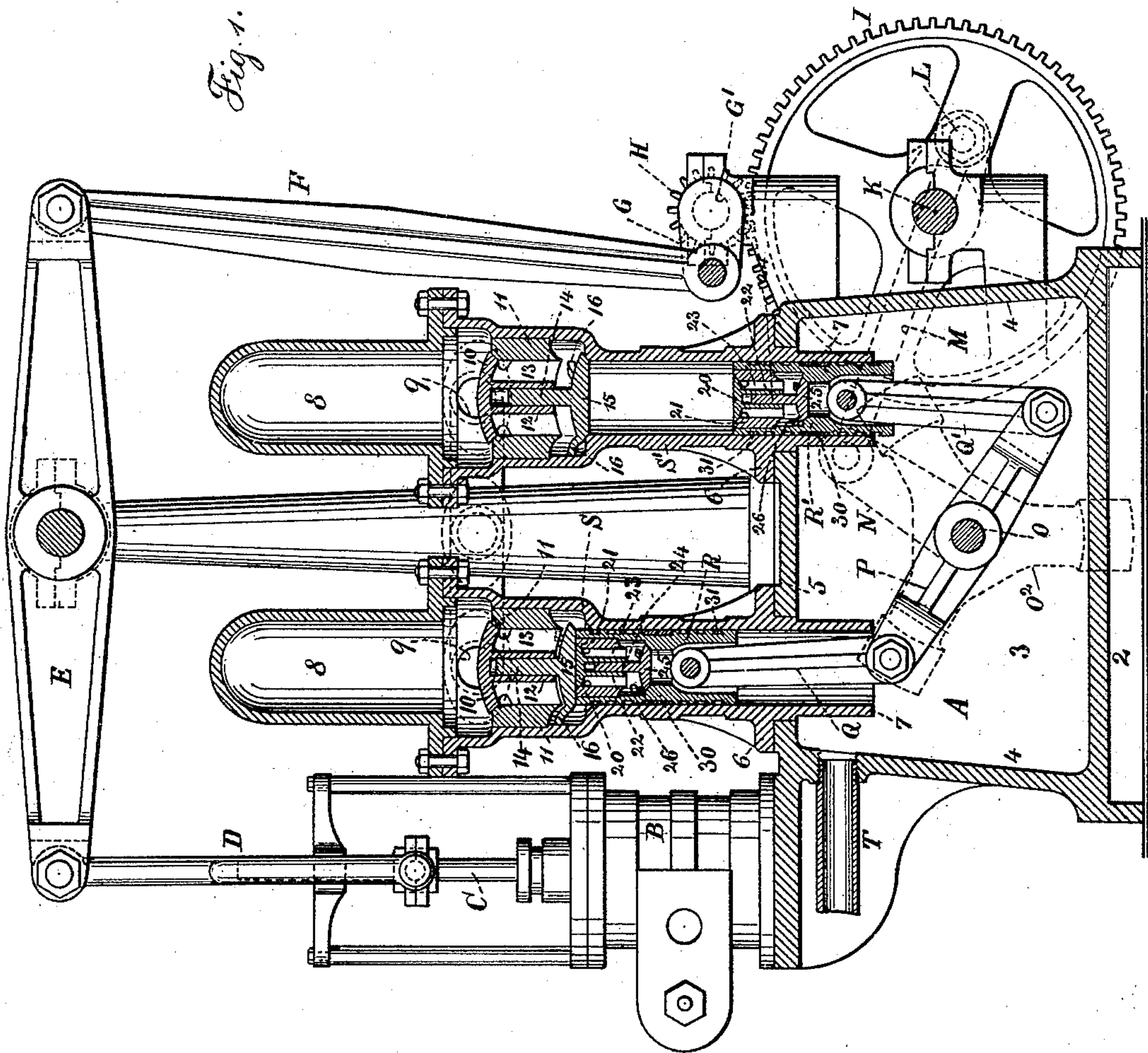
(No Model.)

2 Sheets—Sheet 1.

D. L. HOLDEN & J. J. HAYES.
EXHAUST AND PRESSURE PUMP.

No. 467,578.

Patented Jan. 26, 1892.



Witnesses:

J. Staib
Chas. N. Smith

Inventors:

Daniel L. Holden
John J. Hayes
per Lemuel W. Serrell atty

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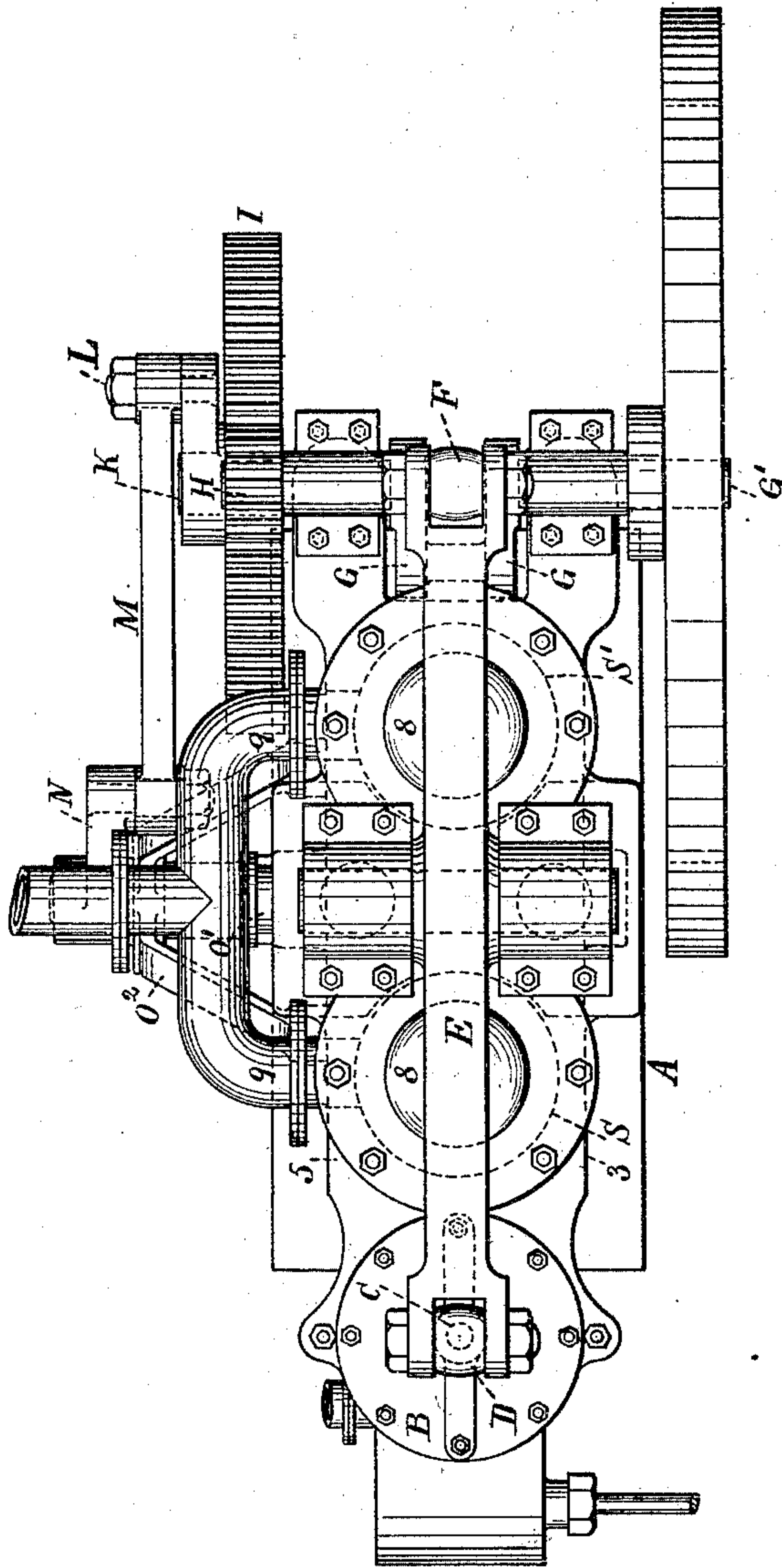
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Fig. 2.



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UNITED STATES PATENT OFFICE.

DANIEL L. HOLDEN, OF NEW YORK, AND JOHN J. HAYES, OF BROOKLYN,
NEW YORK.

EXHAUST AND PRESSURE PUMP.

SPECIFICATION forming part of Letters Patent No. 467,578, dated January 26, 1892.

Application filed March 23, 1891. Serial No. 385,977. (No model.)

To all whom it may concern:

Be it known that we, DANIEL L. HOLDEN, of New York, in the county and State of New York, and JOHN J. HAYES, of Brooklyn, in the county of Kings and State of New York, both citizens of the United States, have invented an Improvement in Exhaust and Pressure Pumps, of which the following is a specification.

10 This pump is especially intended for use in refrigerating apparatus in which anhydrous ammonia is made use of, and the pump is adapted to producing a very perfect vacuum or of compressing the ammonia or other
15 gases or pumping liquid material with great rapidity and reliability.

We make use of a holder that receives the fluid to be operated upon, and above this holder are two inverted pumps, and the actuating devices for the pumps are within this
20 holder; and the invention relates to the features of construction hereinafter set forth and claimed.

In the drawings, Figure 1 is a vertical section of the holder and pumps, and Fig. 2 is a plan view of the apparatus.

The holder A is preferably in one casting having a bottom 2, sides 3, ends 4, and top 5, and this holder is advantageously used as
30 the base for supporting the engine-cylinder B, which is either vertical or horizontal. We have represented the same as vertical and provided with a piston-rod C and connecting-rod D to the walking-beam E, from which the
35 connecting-rod F passes to the crank G upon the crank-shaft G', and it is advantageous to employ a pinion H, driving the gear-wheel I upon the cross-shaft K, and there are bearings or journal-boxes upon the end 4 of the
40 holder A for supporting the shafts G' and K. Upon the gear-wheel I or on a crank is a crank-pin L and connecting-rod M to the lever-arm N upon the rock-shaft O, which rock-shaft passes through a stuffing box or gland
45 O' at one side of the holder A, and it passes into a socket at the other side of such holder A. The outer end of this rock-shaft O is preferably supported by a suitable bearing, such as triangular frame O², in order that pressure
50 and wear may be relieved from the packing-gland O'. Within the holder A and upon

the rock-shaft O is the lever P, with connecting-rods Q Q' to the pistons R R' in the pumps S S', so that by this arrangement the pistons R R' are actuated alternately and
55 the pumps are single-acting. The pumps S S' are provided with flanges 6 and downward cylindrical extensions 7, passing through openings in the top 5 of the holder A, and the flanges 6 are bolted firmly to such holder
60 and made air-tight by suitable packing. The pistons and valves of the respective pumps are made alike, and the valves are double for increasing the reliability of their action, as hereinafter described. It is advantageous to
65 provide air-chambers or expansion-vessels 8 upon the upper parts of the pumps, and the discharge passage-ways 9 are connected together and to a pipe leading to the refrigerator or other apparatus, and between the piston
70 and such discharge passage-ways are double check-valves.

The valve 10 rests upon a seat 11, which is preferably cylindrical and is forced into an enlargement of the pump and rests upon a
75 seat or shoulder, and it is rendered air-tight either by being ground into its place or by any suitable material upon the respective surfaces that are in contact, and the valve 10 has a tubular stem 12 and guide-wings 13.
80 There may be three or four of these guide-wings, so that the valve is kept in position; but it can be easily ground upon its seat to make it perfectly tight. The tubular stem 12 forms a guide for the stem 14 of the valve 15,
85 which valve is seated upon a shoulder at the upper end of the cylindrical portion of the pump-barrel, and this valve 15 may have guide-wings 16, if desired. By this construction a double check or discharge valve is pro-
90 vided for each pump. The pistons of the pumps are provided with similar double valves, but of a smaller size, there being a valve 20 upon a seat 21, which is driven into the cylinder-piston tightly upon a shoulder,
95 and this valve 20 has a tubular stem 22, with guide-wings 23, and the tubular stem 22 receives the stem 24 of the valve 25, which valve 25 rests upon a shoulder in the piston, which forms a seat, and there may be upon such
100 valve the guide-wings 26. The pistons are to be provided with suitable packing-rings 30

or small grooves 31, or both, to render the pistons gas-tight, but allow them to move freely within the respective pump-cylinders, and the motion given to the respective pistons is to be sufficient to cause the upper flat surface of the valve 20 to come against the under surface of the valve 15 and slightly lift the same, and these two surfaces are preferably ground together, so that there will not be any intervening appreciable space, and these surfaces are advantageously flat; but they might be convex or concave and ground together.

The fluid or liquid to be operated upon passes into the holder A by the supply-pipe T. When this pump is to be used with a liquid, the liquid will accumulate in the holder A until it rises as high as the lower ends 7 of the pump-cylinders, and the parts of the pump and connecting-rods will be lubricated thereby, or, where gas is to be pumped, suitable lubricating material is allowed to run into the holder A, and it is advantageous to supply the same progressively, so as to lubricate the parts of the pump, and there should be a trap or similar device to catch the lubricating material that may pass over through the discharge passage-ways 9, so as to return the same to the holder A, and it will now be apparent that when either piston rises the liquid or gaseous material that is between the upper end of the piston and its valve 20 and the valve 15 is entirely expelled from the pump, because the upper surface of the valve 20 comes in contact with the valve 15 and lifts the same and the valve 15 by its weight will settle down upon the valve 20 as the piston descends and the valve 15 will rest upon its seat before the piston draws away from it. Hence a perfect or nearly perfect vacuum will be formed in the pump-barrel, and whatever liquid or gaseous materials may be in the holder A will pass the valves 20 and 25 into the pump-barrel, to be forced out upon the next rising movement of the piston, and under all circumstances there will be a small quantity of liquid or lubricating material upon the respective valves and seats to aid in keeping such valves gas-tight, because all the valves close downwardly upon their seats.

This pump can be used in connection with any engine or condenser, or it can be used in a refrigerator for forcing the ammonia under pressure to the condenser or in producing a vacuum in the apparatus, as usual in either absorption or compression refrigerating apparatus.

We claim as our invention—

1. The combination, with the holder A and the pump-barrels S S', passing through the top thereof and fastened thereto, of the rock-shaft within the holder and passing through one side thereof, the lever and connecting-rods within the holder, the tubular pistons within

the pumps and to which pistons the connecting-rods are jointed, the double valves, one above the other, within the tubular pistons, and the double check-valves, one above the other, in the discharge-passage at the upper ends of the pump-barrels, substantially as set forth.

2. The combination, with a pump-piston, of a cylinder having a valve-seat at the upper end and being continued upwardly to form a valve-chamber, a removable valve-seat within such chamber, a valve closing downwardly upon the seat at the end of the cylinder, and a valve at the upper end of the removable valve-seat, substantially as specified.

3. The combination, in a pump having an inverted barrel or cylinder and a tubular piston actuated from below, of two valves, one above the other, in the tubular piston, the upper valve covering the opening through the piston and having an upper surface flush with the upper end of the piston, and a valve at the upper end of the pump-barrel and resting upon a seat formed thereat and having a flat under surface to fit the top of the piston-valve, so that the discharge-valve can rest upon the upper surface of the piston and its valve to exclude air at the time the discharge-valve closes, substantially as set forth.

4. The combination, in a pump having an inverted pump-cylinder and a tubular piston and means for actuating the piston from below, of two valves, one above the other, in the opening through the piston, and double check-valves, one above the other, in the discharge-opening at the upper end of the pump-cylinder, substantially as set forth.

5. A double valve for a pump-piston or check, composed of an upper valve with wings sliding in a removable valve-seat and having a tubular stem and a lower valve with a stem passing into said tube, the valve resting upon a seat below the removable valve-seat of the upper valve, substantially as set forth.

6. The combination, with the holder A, of the steam-cylinder supported by the holder, a rock-shaft passing into the holder and provided with a packing-gland, a lever-arm on the rock-shaft outside the holder and connections between the same and the piston of the steam-cylinder, a lever upon the rock-shaft within the holder, pump-cylinders upon the holder and passing through the top thereof, pistons within the pumps and connections from the same to the lever upon the rock-shaft, and valves in the respective pumps, substantially as set forth.

Signed by us this 17th day of March, 1891.

DANIEL L. HOLDEN.
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Witnesses:

GEO. T. PINCKNEY,
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