

No. 886,863.

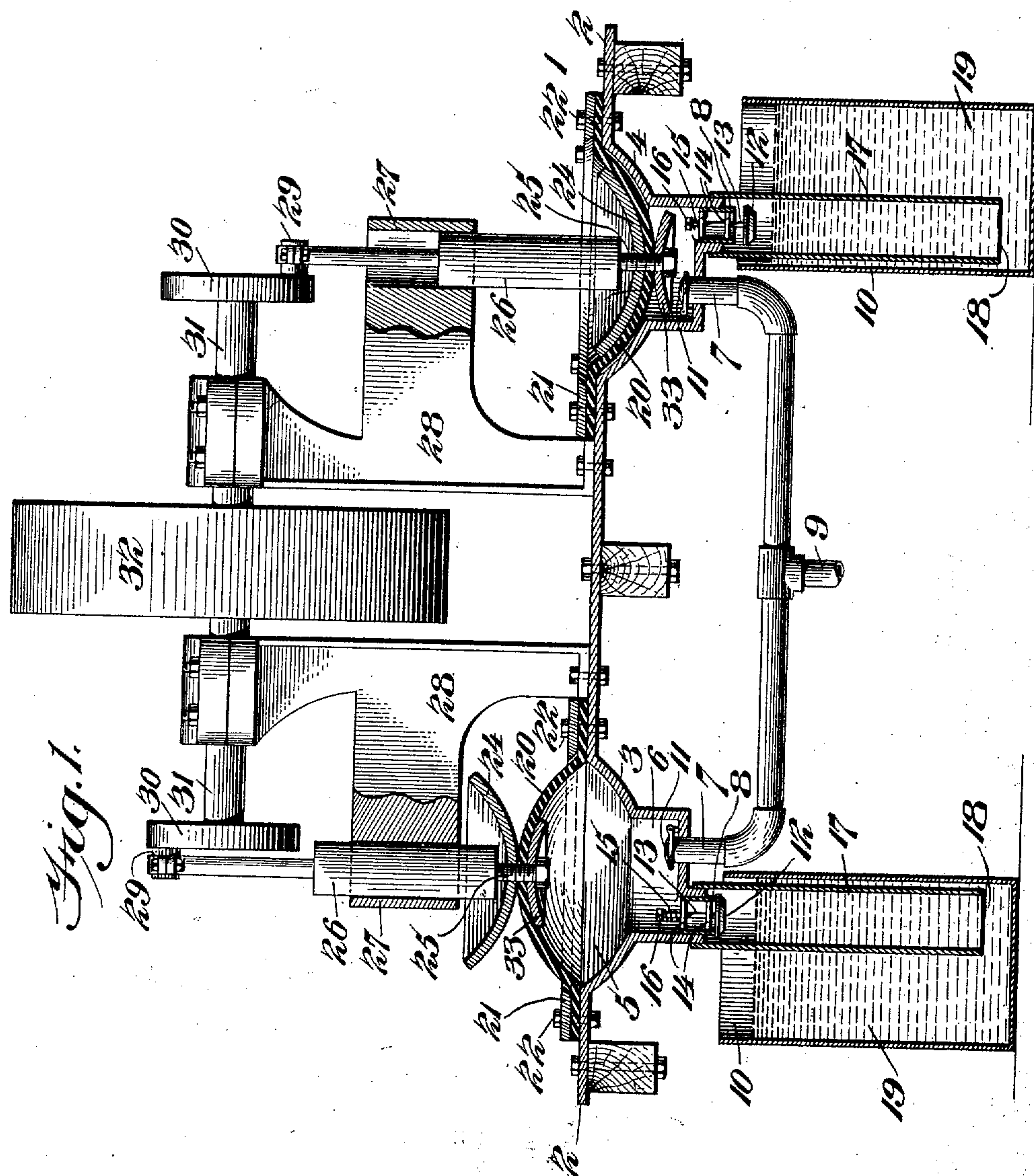
PATENTED MAY 5, 1908.

H. G. RIEBENACK.

PUMP.

APPLICATION FILED SEPT. 14, 1907.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

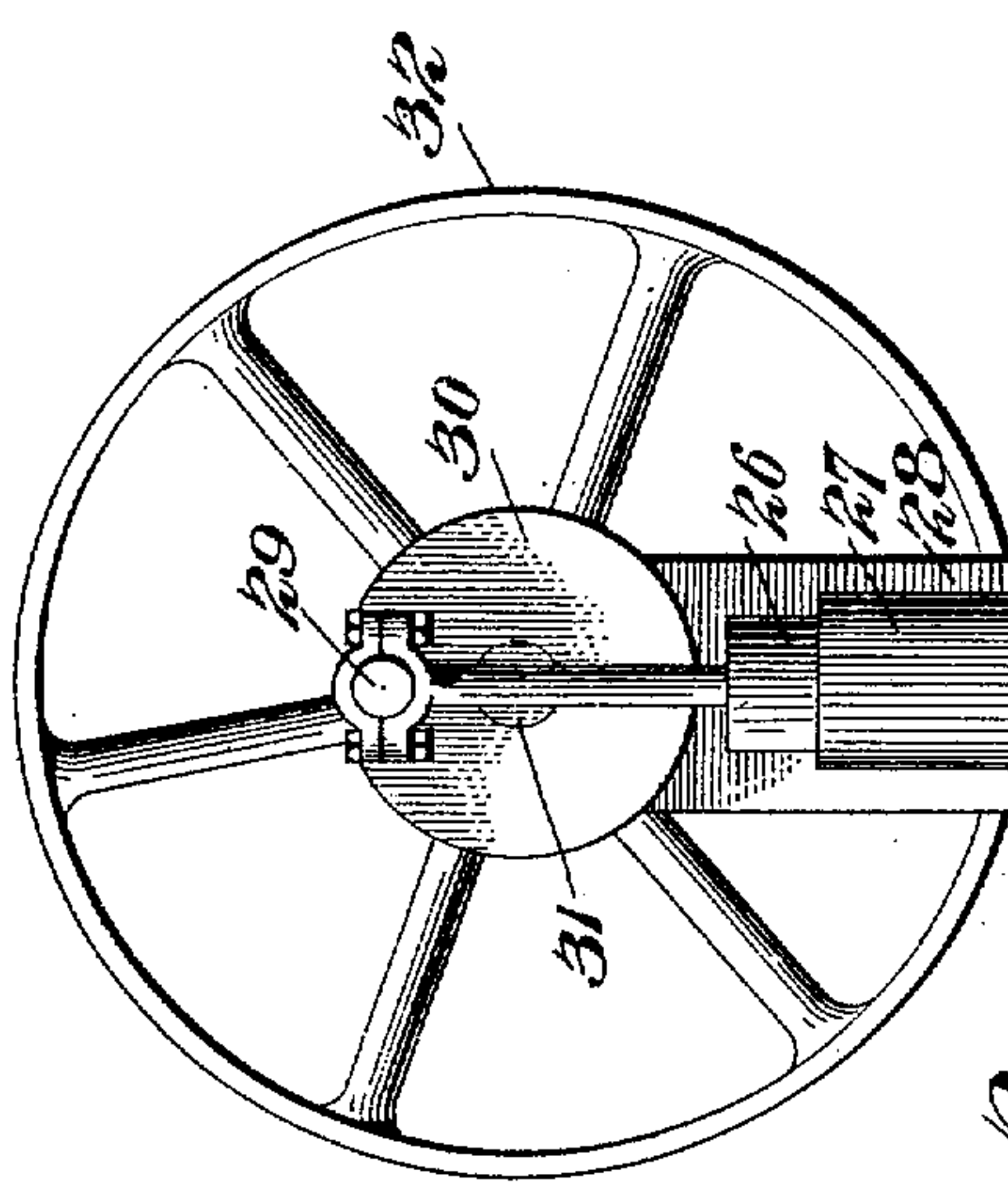
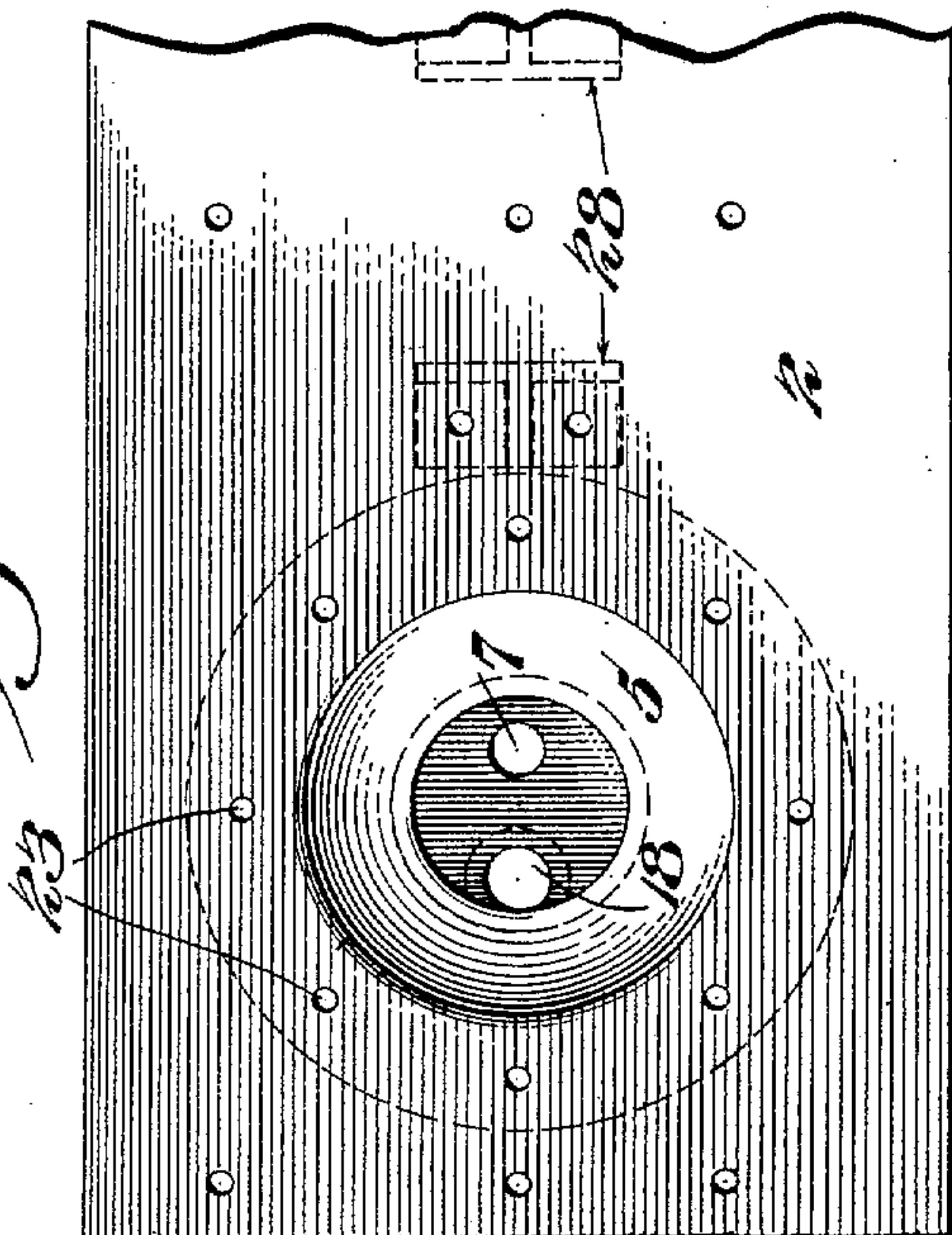
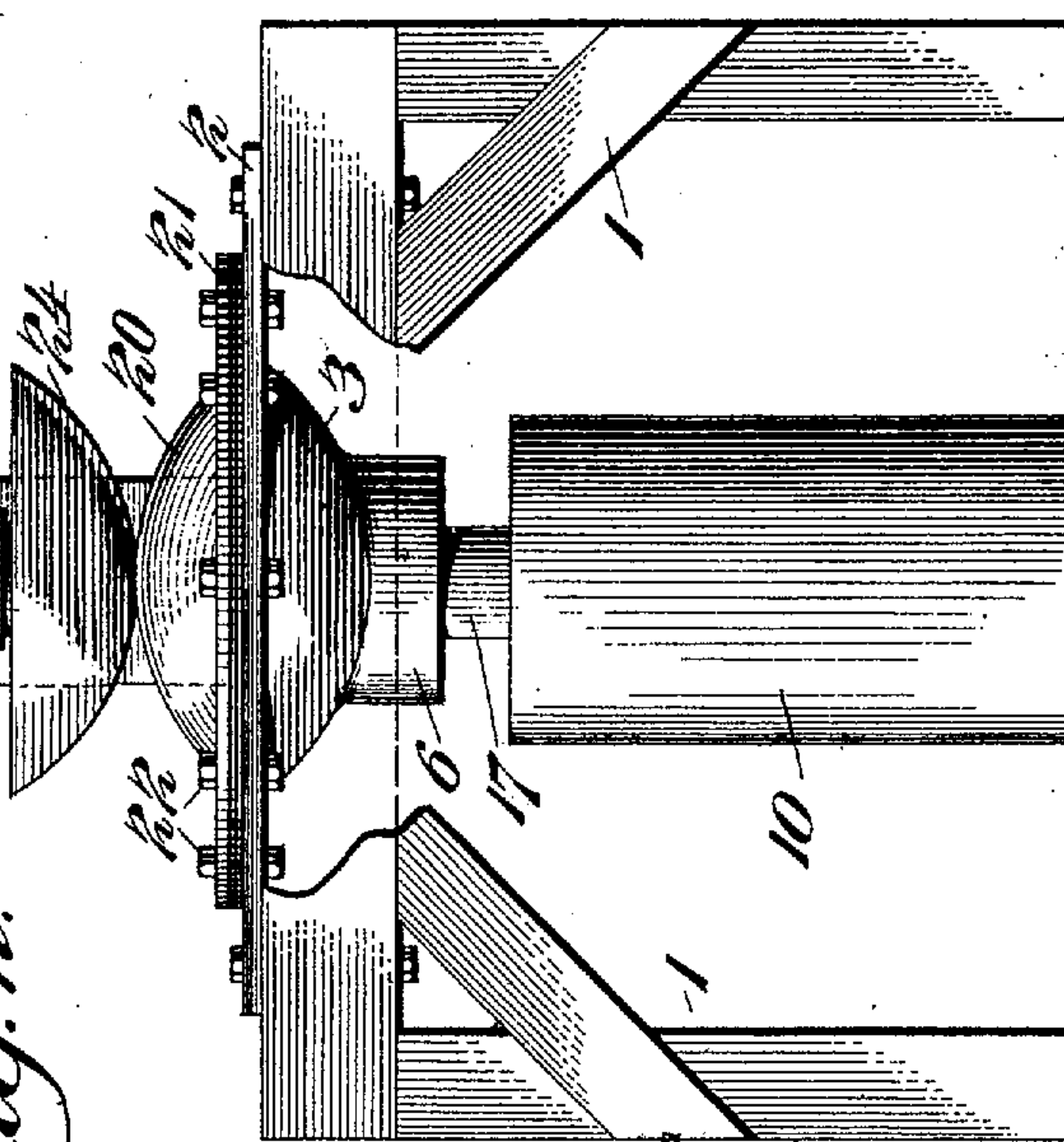


Fig. 2.



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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY G. RIEBENACK, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Pump, of which the following is a specification.

The object of my invention is to provide a novel construction of a pump particularly suited for use with dust laden air and having pistons of rubber or other suitable resilient material and guiding piston heads.

A further purpose of my invention is to provide, in a vacuum pump, a piston chamber having concave outwardly facing walls and a piston of flexible material guided by the piston head in its inner and outer or extreme positions.

A further purpose of my invention is to so arrange a vacuum pump that a flexible piston operates toward and from a concave outwardly facing piston chamber having inlet and exhaust openings from said chamber and to also supply guides for the flexible piston.

For the purpose of illustrating my invention, I have shown in the accompanying drawings, one form of a device since this embodiment best illustrates the principles thereof and gives reliable and satisfactory results in practice, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown.

Figure 1 represents a vertical sectional view partly in elevation, the section being through the center of the pistons of a pump embodying my invention. Fig. 2 represents a broken end elevation of Fig. 1. Fig. 3 represents, in broken plan view, a portion of Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates any suitable framework, upon which I support my novel construction of a pump, said framework being preferably elevated to give room for the mechanism of the pump beneath it, but this mechanism may evidently be correspondingly depressed with reference to the surface considered if desired.

The framework 1 supports a plate 2, which may also be considered as a frame member, but which in the form which I have illus-

trated is made integral with and in this manner carries piston chambers 3 and 4, which are concave and outwardly faced at 5, which have depressions or offsets forming the chambers 6, in each of whose base walls are a plurality of seats for valve parts for my mechanism the valves and seats thus being close to each other on said chambers 6 for quick operation relatively to each other. Within the seats thus formed, I provide the inlet or suction pipes 7 and the outlet or discharge openings 8, these pipes and openings communicating respectively with the main pumping or suction pipe 9 and the water tank 10.

The inlet 7 and exhaust 8 are controlled by valves 11 and 12 respectively, the valve 11 being preferably of an ordinary flap or trap form, while the valve 12 is preferably of direct vertical movement type guided in any suitable manner as by the stem 13, working within the supports 14 and normally held in upward position by the spring 15 which presses against a nut or projection 16 upon the upper end of the stem 13 and which at its other end presses against one of the supports 14. I preferably exhaust directly into a pipe 17, whose terminal 18 is placed below the surface of a supply of water 19 within the tank 10.

Since my device is primarily intended for exhaust cleaning purposes in which dust and dirt are gathered within an air carrier which may be attached to the suction 9 and pumped thereby, it is quite desirable to exhaust this air through the water, in order that the water may take up the dust and permit the cleansed air to escape to the atmosphere free from the contamination of the dust and dirt with which it was originally laden.

The piston chambers 3 and 4 are used in connection with flexible pistons 20, which are secured in position by an annular plate 21, secured by bolts or other fastening devices 22, the latter extending through apertures 23 in said plates. The piston 20 must not only be preferably flexible, but is preferably also elastic and is pressed to position at the downward end of the stroke by a piston head 24 conforming to the shape of the cooperating portions of the parts 3 and 4. Since these spherical portions 24 do not quite make contact with the corresponding portions of 3 and 4, they must preferably be formed upon substantially corresponding or similar radii. Said piston heads 24 are carried by any suit-

able retaining means 25 connected to cross-heads 26, which latter are movable in guides 27 of the frames 28 by means of crank pins 29 mounted upon disks 30, said cranks being 5 mounted upon a shaft or shafts 31 which are driven by any suitable means such as the pulley 32. During the operation of pumping, the heads 24 press the flexible pistons into the position shown in the right hand of 10 Fig. 1 thereby expelling the air from the piston chamber thereof. Upon the upward stroke the auxiliary piston head 33 which is also preferably of curved shape but small enough to pass within the opening 6, stretches 15 the flexible piston to the position shown in the left hand portion of Fig. 1 thereby insuring full extension thereof and a corresponding complete filling of the piston chamber with air upon this limit of the stroke the 20 same being effectively discharged with the dust, etc. into the adjacent chamber 3 or 4 and from thence forcibly directed to the discharge valve 12.

The flexible pistons are thus alternately 25 moved between the limits shown in the two positions of Fig. 1 with consequent filling and exhaust of the piston chambers and pumping action thereof and as both the piston and valve mechanisms are constructed 30 in substantially the same manner, I have deemed it unnecessary to describe them in further detail.

It will be seen that the members 24 and 33 are reversely curved and are of such a curvature 35 as to coact with the curvatures on which the piston chambers are formed, in that they preferably are portions of spheres having radii differing from the radii of the spheres of the piston chambers preferably by the 40 thickness of the pistons 20.

It will be apparent that while I have described my suction pipe 9 as being adapted to be connected to a flexible hose having a dust collecting device thereon, I do not desire 45 to be limited to this application of my invention, as the same can be put to numerous other uses as is evident. It will also be apparent that the curvature of the parts 24 and 33 can be varied and that the pistons or 50 diaphragms 20 can be connected to their operating devices by other means than those shown without departing from the spirit of my invention. It will also be apparent that the precise construction of the valves 11 and 55 12 and the manner of mounting and operating the same may be varied by those skilled in the art, and that the manner of trapping and purifying the dust laden discharge may also be varied if desired.

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

1. In a pump of the character described, a piston chamber, a flexible piston for said 65 chamber, means for actuating said piston, an

offset in a wall of said chamber, a plurality of valve seats occupying said wall close to each other, and suction and exhaust valves fitted to said seats.

2. In a pump of the character stated, a 70 piston chamber, a flexible piston for said chamber, means for actuating said piston, an offset in a wall of said chamber, a plurality of valve seats occupying said wall close to each other, suction and exhaust valves fitted to 75 said seats, a pipe leading from the seat of the exhaust valve, and a tank into which said pipe dips.

3. In a device of the character described, a frame plate depressed to form coöperat- 80 ing piston chambers, valve chambers therefor depressed from the bottom of said chambers, vertically movable suction and exhaust valves in said valve chambers, flexible 85 pistons for said piston chambers, and means for moving said flexible pistons into and out of said chambers.

4. In a device of the character described, a frame plate depressed to form a piston chamber, a valve chamber therefor depressed 90 from the bottom of said chambers, vertically movable suction and exhaust valves in said valve chambers, a flexible piston having its annular edges secured to said frame, a piston head upon the opposite side of said piston 95 from said piston chamber, a piston head upon the same side of said piston as the piston chamber and adapted to pass within said valve chamber, and means for actuating said piston head. 100

5. In a device of the character described, a frame plate depressed to form a piston chamber and further depressed to form a valve chamber centrally placed with respect to 105 said piston chamber, a flexible piston secured to said frame about its depression, a piston head of less diameter than that of the piston chamber and of the diameter of the valve chamber, a piston head upon the opposite side of the piston from the first named 110 head, a water tank, a pipe extending downward thereinto, a vertically movable exhaust valve in said valve chamber and opening into said pipe and means for actuating said piston head. 115

6. In a device of the character stated, a supporting frame, a piston chamber, a valve chamber depressed from the bottom and located below said piston chamber and having suction and exhaust openings, a vertically 120 movable suction valve in said valve chamber, a vertically movable independent discharge valve in said valve chamber, a dust trap controlled by said suction valve and connected with said valve chamber, a discharge 125 pipe leading from said discharge valve to said trap, a flexible diaphragm having its edges secured around said piston chamber, a rod passing through said diaphragm, oppositely curved devices carried 130

by said rod and located on opposite sides of said diaphragm, and means for actuating said rod.

7. In a device of the character stated, a
5 supporting frame, a piston chamber, a valve chamber depressed from the bottom of and located below said piston chamber and having suction and exhaust openings, a vertically movable suction valve in said valve
10 chamber, a vertically movable independent discharge valve for said valve chamber, a discharge pipe leading from said discharge valve, a flexible diaphragm, an annular device securing the outer periphery of said
15 diaphragm in position on said frame, a rod passing through said diaphragm, oppositely curved devices carried by said rod and located on opposite sides of said diaphragm, means for actuating said rod, a suction pipe
20 leading to said suction valve, a water tank, and a pipe depending therein and connected with said valve chamber and containing the discharge valve.

8. In a device of the character stated, a
25 supporting frame, a plurality of piston cham-

bers, valve chambers depressed from the bottom of and located below said piston chambers having suction and exhaust openings, vertically movable suction and discharge valves in said valve chambers, said
30 valves being movable independently of each other, water tanks, discharge pipes leading from said discharge valves to said tanks to near the bottom thereof, said pipes receiving
35 said discharge valves, a plurality of flexible diaphragms having their edges secured to said frame, a rod passing through each of said diaphragms, oppositely curved devices carried by said rod and located on opposite
40 sides of said diaphragms, a crank shaft suitably supported, connections from said crank shaft to said rods, whereby the latter are alternately reciprocated, and a connection from each of said suction valves leading to a common suction pipe.

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