

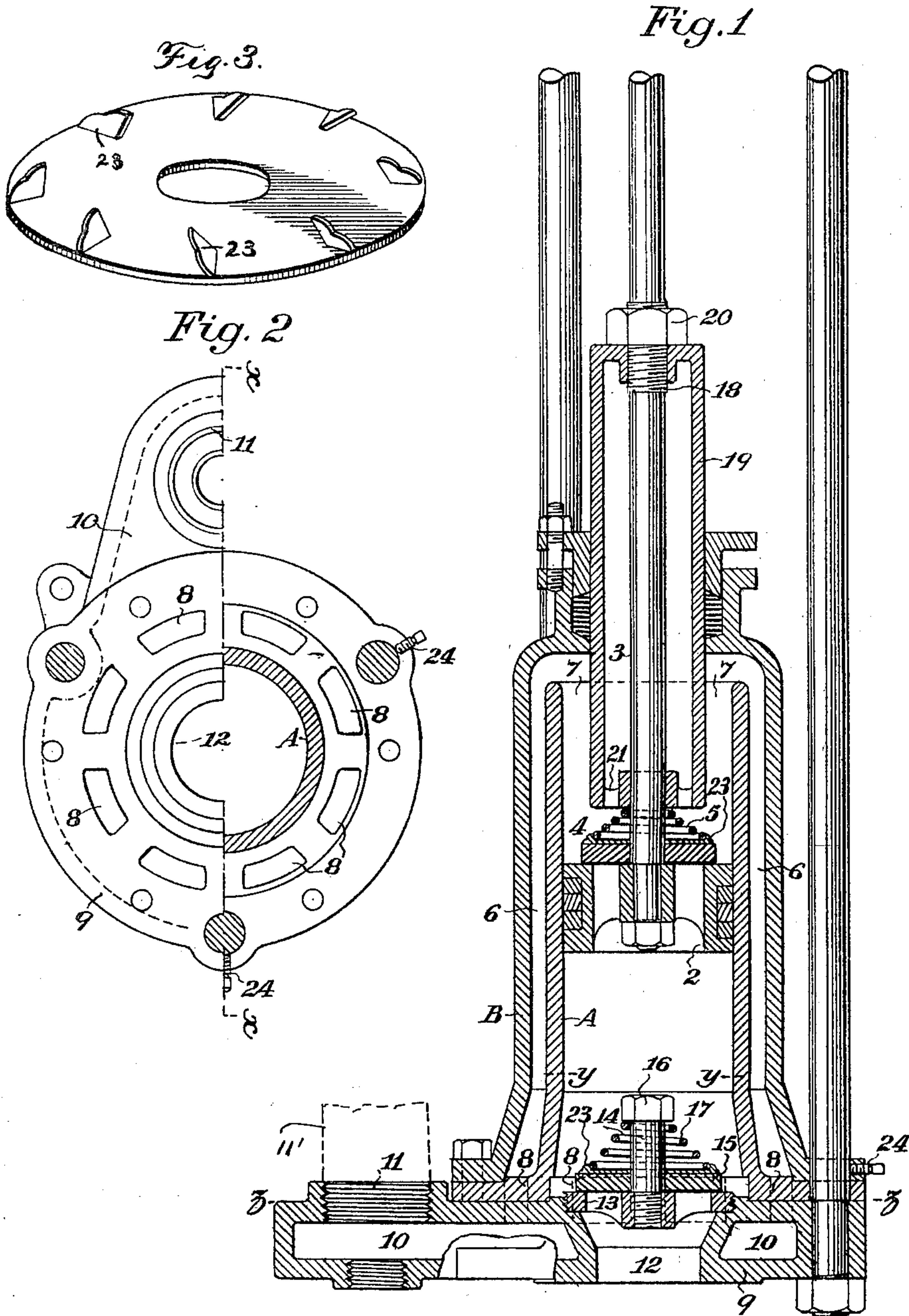
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G. A. KROHN.
PUMPING APPARATUS.

(Application filed Nov. 1, 1900.)

(No Model.)



Witnesses,

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UNITED STATES PATENT OFFICE.

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PUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 681,828, dated September 3, 1901.

Application filed November 1, 1900. Serial No. 35,114. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE A. KROHN, a citizen of the United States, residing at Coarsegold, county of Madera, State of California, have invented an Improvement in Pumping Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a pumping apparatus; and it is especially designed to be operated by steam-power; but it may be driven by any suitable or convenient power.

It consists in a novel construction of a pump-cylinder having double concentric walls, with an inlet-valve at the lower part of the inner cylinder, a valved piston, the piston-rod of which is surrounded by a hollow chamber, which is reciprocable through a stuffing-box on the top of the main outer cylinder.

It also consists of a chambered base-plate, to which the cylinder is removably attached, said base-plate forming also the support for the discharge-pipe.

My invention also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of my pumping apparatus, taken on the line xx of Fig. 2. Fig. 2 is a part plan and part sectional view of the base-plate and cylinder. Fig. 3 is a detail showing the inclined wings 23 on the upper disk of the valve.

This apparatus comprises an inner cylinder A and an outer cylinder B. The inner cylinder is bored to receive the piston 2, which is suitably packed and is connected by a rod 3 with any suitable source of power, as a reciprocating engine, so that the piston 2 can be reciprocated within the cylinder A. This piston has openings made through it, and a valve 4 is seated upon the top of the piston by the action of a spiral spring 5, which presses upon the top of the valve. The valve is composed of any suitable material, as metal, having a face which will seat and form a tight joint for the passages through the piston, and the valve fits around the piston-rod, so as to move loosely and be guided by it.

Between the inner and outer cylinders A

and B are passages 6, which at the top communicate with the open upper end of the cylinder A, as shown at 7. These passages 6 extend down upon each side of the cylinder A to the bottom flange, through which openings 8 are made. This flange has lugs by which it is bolted upon a base-plate 9, and the base-plate is in turn fixed to any suitable permanent support. The interior of the base-plate is chambered, as shown at 10, and the openings 8 connect the passages 6 with the chamber 10. At one side the base-plate extends to one side of the pump-cylinder, and the chamber 10 extends into this portion. This extension has an opening at the top, as shown at 11, and to this the conducting discharge-pipe 11' is connected, so that any water forced into the chamber will pass out through the conducting-pipe. As the pump-cylinder and its connected mechanism are bolted upon a base-plate by means of lugs, as shown, it will be seen that the cylinder can be removed at any time without in any way interfering with the base-plate or the connected discharge-pipe, and this is a matter of considerable importance where the discharge-pipe is of great length and the water is to be forced to a very considerable height. Centrally through the bottom of the base-plate is an opening, as shown at 12, this opening leading directly into the bottom of the cylinder A.

13 is a perforated valve-seat screw-threaded upon the periphery and adapted to be screwed into and fitted to the opening 12. A centrally-located vertical stem 14 is fixed in this valve-seat, and the valve 15 is loosely slidable upon the stem, the head 16 of which serves as an abutment against which the upper end of a conical spiral spring 17 abuts. The lower part of the spring rests upon the top of the valve 15 and normally closes it upon the seat.

The operation of the pump thus far described is as follows: When the piston 2 is drawn upward within the cylinder A, it produces a vacuum in the lower part which acts to raise the valve 15 against the pressure of its spring and allow the liquid to enter the pump-cylinder, the valve in the piston remaining closed by spring and other pressure from above. When the piston is again moved

down, the lower valve closes and the water confined between the piston and the bottom of the cylinder forces its way up through the piston-valve and into the upper part of the cylinder, escaping thence through the passages 7, 6, and 8 into the chamber 10 in the base-plate, and thence passing up through the discharge-pipe previously described.

The piston-rod 3 has an enlarged screw-threaded portion, as 18, and upon this the head of the hollow cylindrical chamber 19 is screwed and is afterward secured by a lock-nut, as 20. The piston-rod also passes through the lower end of the cylinder 19, and around it are openings 21, which admit water into the interior of the cylinder. When the piston 2 is forced down, the piston-rod 3 and the hollow cylinder 19 move in unison with it; but as the cylinder 19 fills a considerable portion of the upper part of the cylinder A it will be manifest that the amount of water forced through the piston from the lower part of the cylinder will not find a space within the upper part of the cylinder sufficiently large to receive it. Therefore this downward movement of the piston and the cylinder 19, causing the latter to occupy a portion of the space above the piston, will force a portion of the water equal to the area of the cylinder through the passages 7, 6, and 8 to the discharge-pipe. When the piston is again lifted, the remainder of the liquid above the piston will be forced through these passages to the discharge, thus rendering the discharge of the pump double acting and dividing the amount lifted by each stroke of the pump in proportion to the size of the cylinder 19. If this cylinder is equal to half the area of the interior pump-cylinder A, then one-half the water which is brought above the piston 2 will be discharged at the down-stroke and the other half at the upstroke, and any other desired proportion of discharge at each stroke can be had by varying the size of the reciprocating cylinder. The openings 21 in the bottom of this cylinder allow the water in the pump-cylinder to enter the cylinder 19, and as the latter is closed at the sides and top it will be manifest that air will be compressed in this cylinder, which thus acts as an air-chamber for the pump and relieves the shock caused by the weight of a high column in the discharge-pipe and sudden changes of movement in the reciprocations of the plunger.

In order to prevent the pump-valves 4 and 15 from becoming worn and leaky by reason of continual rising and falling upon the same seat, the valves are made as follows: Upon the upper disk of the valve and around the periphery are fixed a series of diagonally-disposed wings 23, which are so placed that when the water rushes up past the open valve it will strike these wings, and as the wings are inclined the current of water acts upon them like a propeller and turns the valve a little upon its stem. Each turn of the valve thus

made allows it to fall in a new position, and the seat and valve will thus be evenly worn, and wear from dirty water or other obstructions, which would cause the valve to leak, will be prevented.

24 are set-screws screwing into the flanges in line with the bolts which hold the parts together, and these set-screws may be turned up so as to lock the bolts when they are screwed down to prevent their becoming loose and turning out.

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

1. The combination in a pump of an inner cylinder, a plunger reciprocable therein, an outer cylinder formed and concentric with the inner cylinder having parallel passages between the two connecting with the inner cylinder at the top, a permanently-fixed chambered base-plate, and means whereby the cylinder is removably attached to said base-plate, said plate having openings connecting the passages between the cylinders with the chamber in said plate, and an extension of the plate to one side and an open connection between said extension and a discharge-pipe.

2. The combination in a pump of an inner cylinder, a piston reciprocable therein, an exterior cylinder with open passages between it and the inner one connecting with the upper open end of the inner cylinder, lugs or flanges at the bottom of the cylinder, a permanently-fixed chambered base-plate to which the cylinder is removably bolted, openings connecting the passages between the cylinders with the chamber of the base-plate, an extension of the base-plate and its chamber beyond one side of the cylinder, and an opening connecting the base-plate chamber with a discharge-pipe.

3. The combination in a pump of concentric cylinders having intermediate passages extending longitudinally between them with open connection with the upper end of the inner cylinder, a permanently-fixed chambered base-plate and means whereby the cylinders are removably secured thereto, and a discharge-pipe permanently attached to said base-plate, stuffing-boxes formed in the upper end of the outer cylinder, a cylinder having less diameter than that of the main interior cylinder, and a piston-rod to which it is concentrically fixed and slidable through the stuffing-box, a valved piston fixed to the lower end of a piston-rod and an inlet-valve in the lower end of the inner cylinder.

4. The combination in a pump of concentric main cylinders having longitudinal passages between the two, the upper ends being connected with the open upper end of the inner cylinder, a hollow permanently-fixed base-plate and discharge-pipe opening therefrom, means for removably securing the cylinders upon said base-plate, openings connecting the passages between the cylinders with the chamber of the plate, an independent opening

through the center of said plate into the interior cylinder, a valve-seat and valve secured in said opening through which water is admitted into the inner cylinder, a piston reciprocable in the inner cylinder having an upwardly-opening valve and a cylinder fixed to and reciprocable with the piston-rod so as to fill a portion of the upper part of the cylinder on the downstroke of the piston whereby the liquid above the piston is partially discharged at each upward and downward stroke of the piston.

5. The combination in a pump of concentric cylinders with passages between connecting with the upper open end of the inner cylinder, and at the bottom with a chambered base-plate and discharge-pipe, a piston reciprocable in the inner cylinder, upwardly-opening spring-pressed valves in the bottom of the cylinder and through the piston, a hollow cylinder fixed to and carried by the piston-rod and reciprocable therewith through a stuffing-box in the upper end of the outer cylinder, said reciprocable cylinder having openings in the lower end for free communication with the water-chamber of the cylinder, whereby

said movable cylinder acts as an air-chamber and also to divide the discharge of the water into approximately equal portions for each stroke of the piston.

6. The combination in a pump of concentric cylinders with longitudinal passages between them connecting with the open upper end of the inner cylinder and with a discharge-passage at the bottom, a piston having an opening through it and valves controlling the inlet and the piston-openings, said valves having angularly-disposed peripheral wings against which the passing liquid acts to turn the valves at each rise and fall thereof, a cylinder connected with the piston-rod and reciprocable in the said inner cylinder, and closed at the top and having its lower end provided with openings for the passage of liquid, and a permanently-fixed base-plate having a chamber with which the discharge connects.

In witness whereof I have hereunto set my hand.

GUSTAVE A. KROHN.

Witnesses:

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