(No Model.) 2 Sheets—Sheet 1.

C. CHAMBERLIN.

PUMP.

No. 475,296. Patented May 24, 1892.

Fig. 1.

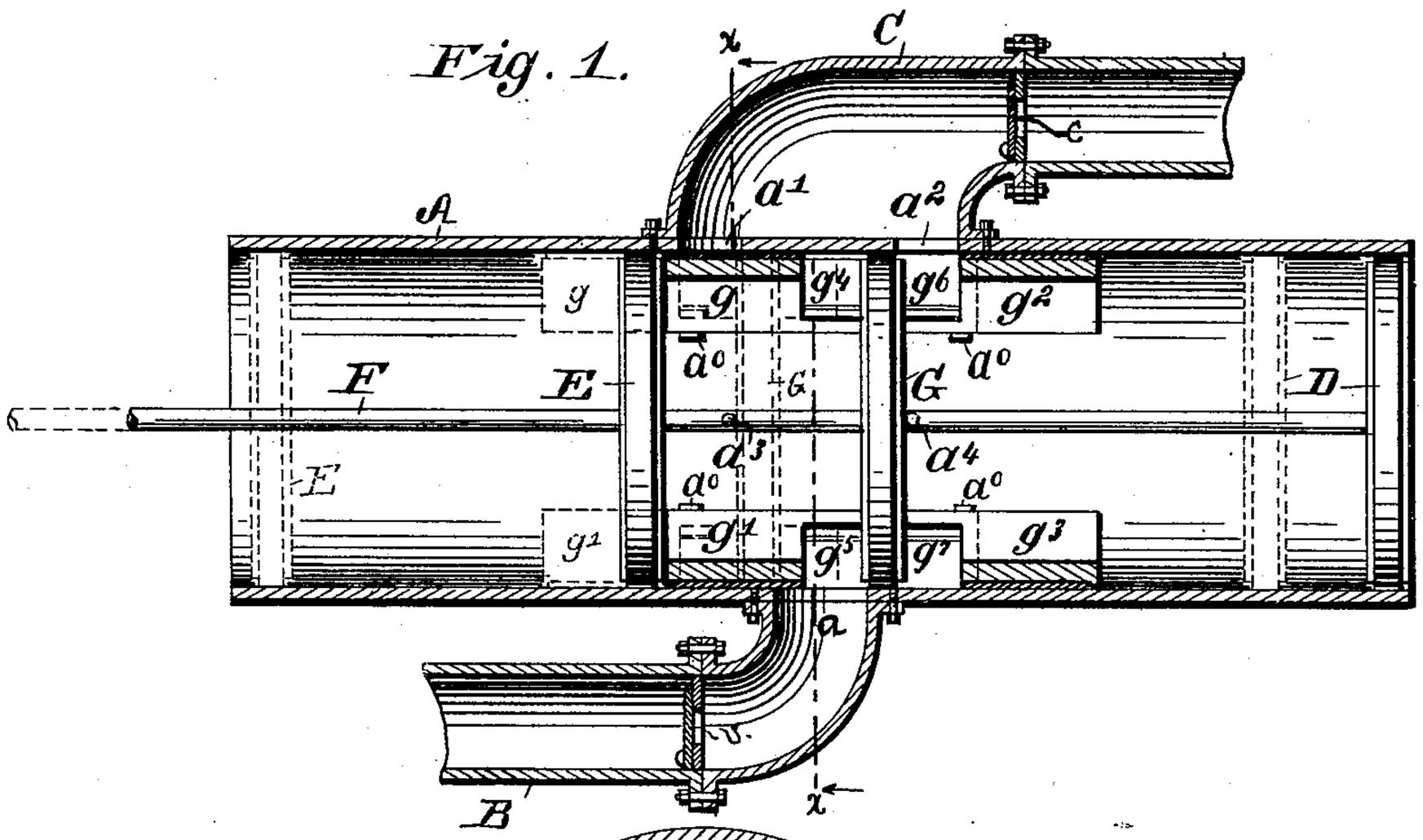


Fig. 2.

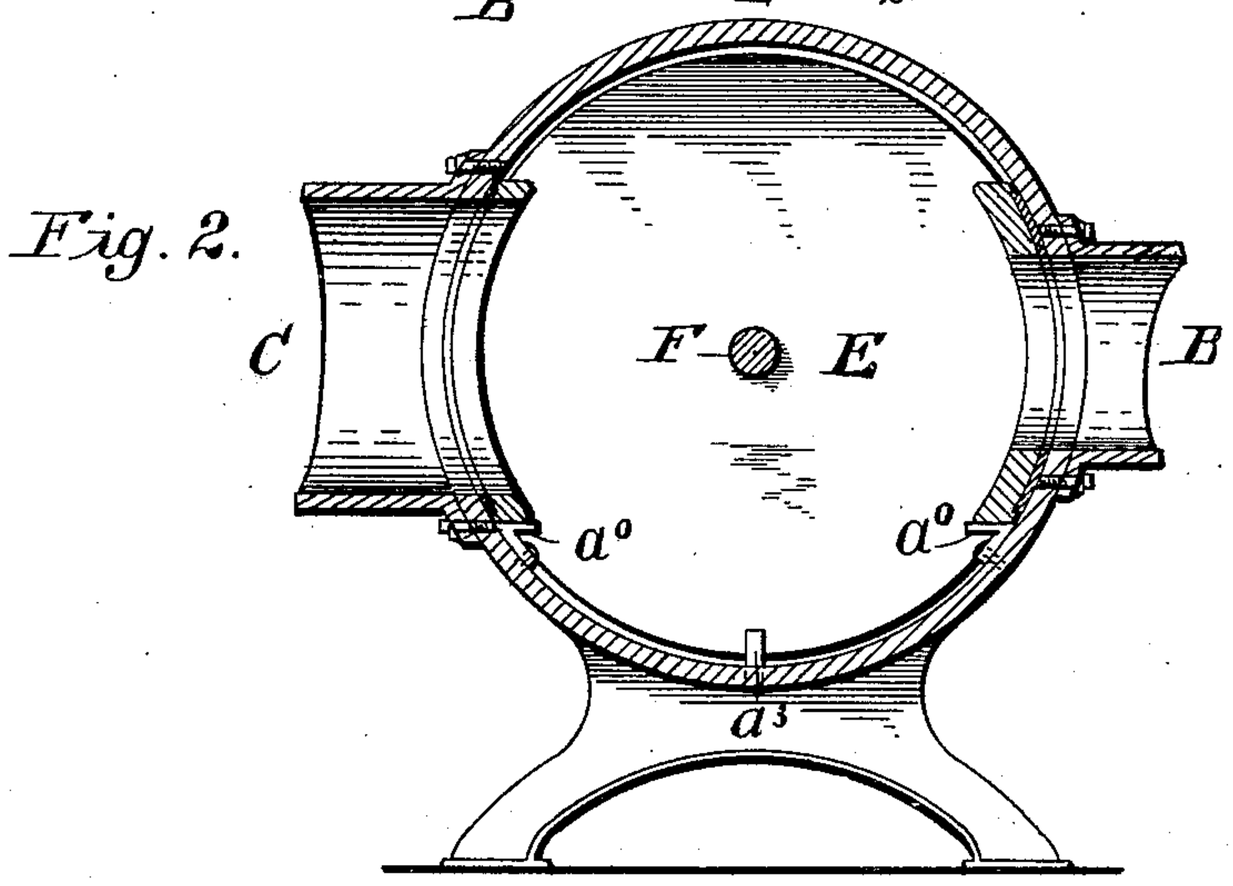
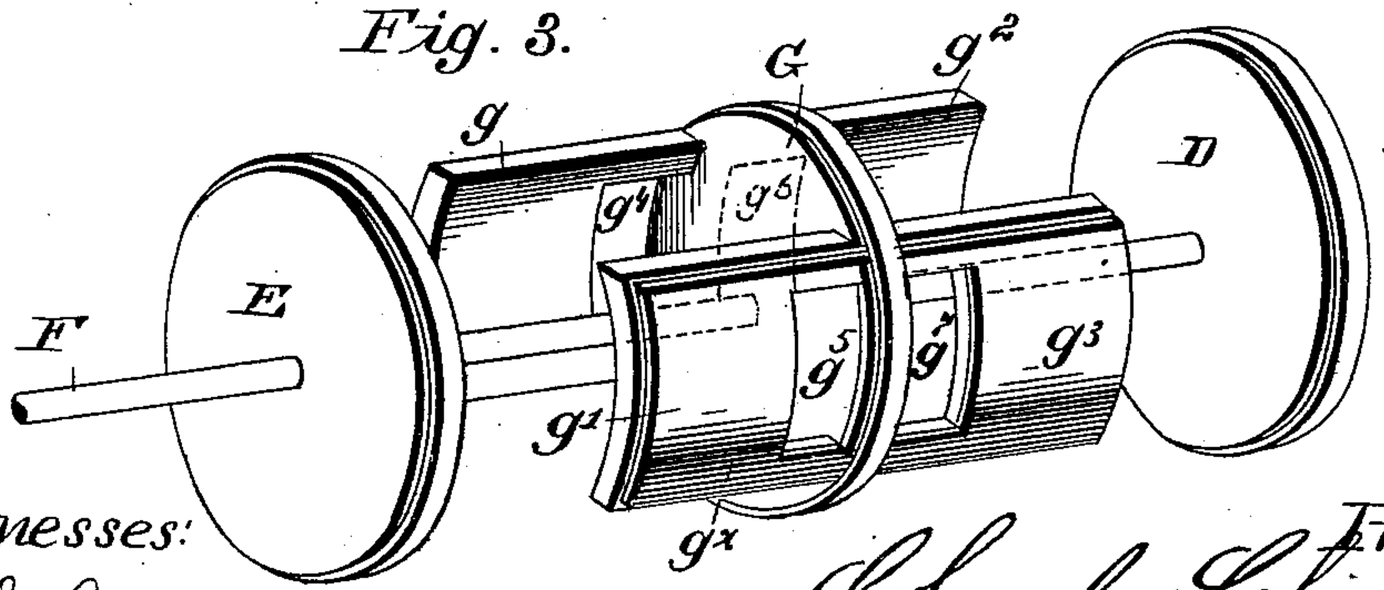


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

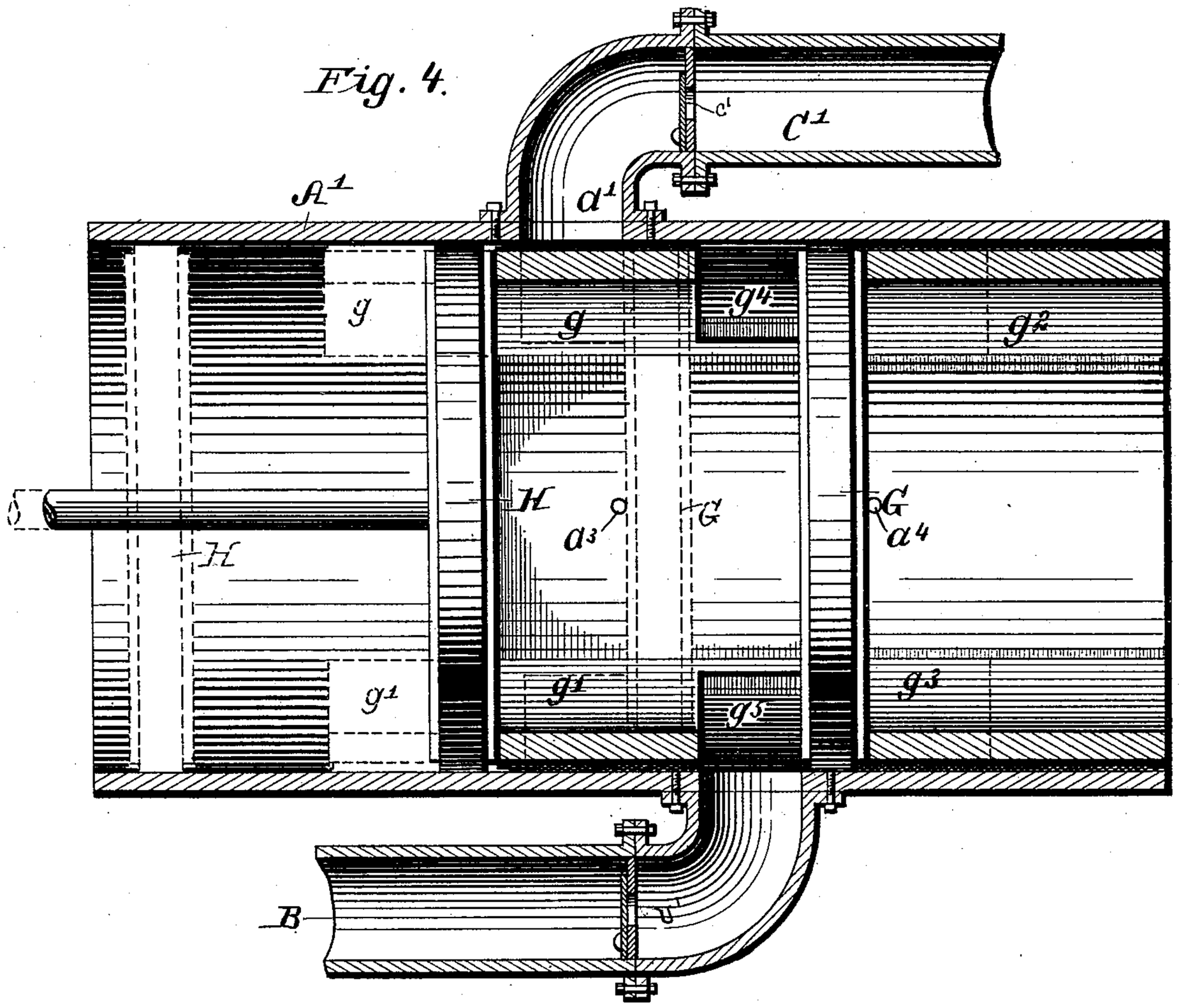
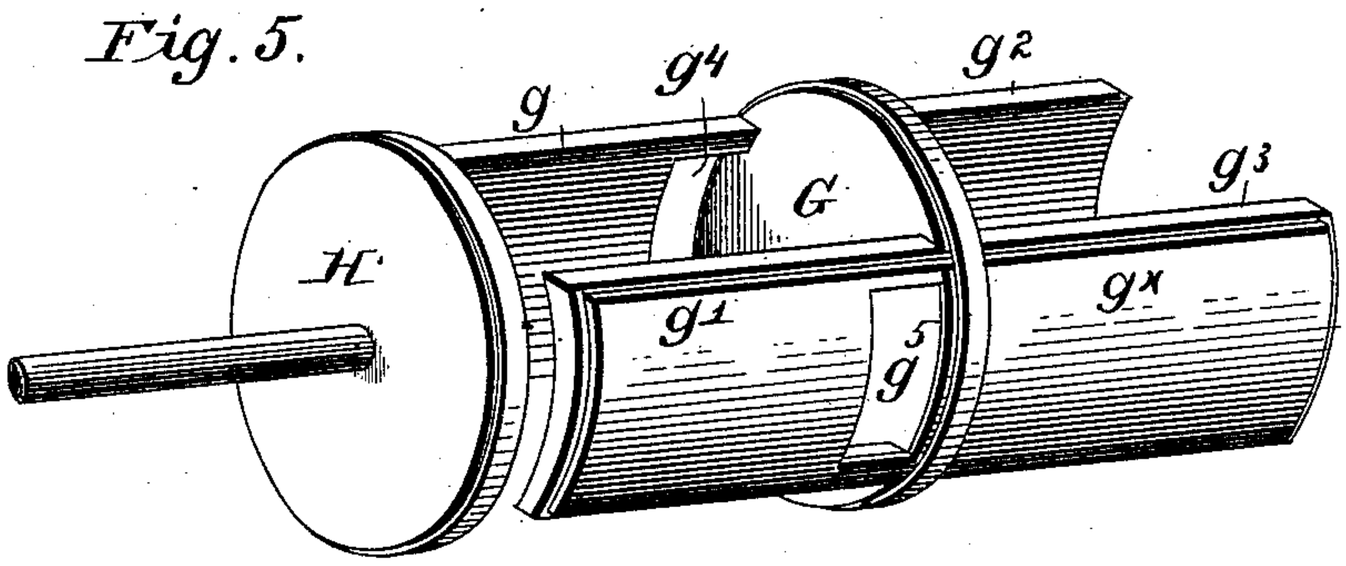


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PUMP.

SPECIFICATION forming part of Letters Patent No. 475,296, dated May 24, 1892.

Application filed December 30, 1891. Serial No. 416,602. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CHAMBERLIN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention is to exclude the admission of rarefied air within the cylinder of a suction and force pump, and thus enable the compression of the plunger to be brought instantaneously upon the fluid and the consequent discharge of the fluid with increased power and regularity; and it consists in the novel construction and combination of parts, which will first be fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a longitudinal sectional view of the pump-cylinder, showing the double-acting plungers and the intermediate sliding diaphragm in position at the end of a full stroke of the plunger in the direction of one end of the pump-cylinder and in dotted lines the position of the respective parts at the end of the return stroke and the other end of the cylinder. Fig. 2 is a vertical sectional view of the pump, taken upon the line $x\,x$ of Fig. 1. Fig. 3 is a detail perspective view of the sliding diaphragm, showing the port-closing flanges, the pistons on both sides of the diaphragm, and the piston-rod. Fig. 4 is an alternate view showing the sliding diaphragm applied to the cylinder or body of a single-acting pump. Fig. 5 is a perspective view in detail showing the diaphragm for the single-acting pump.

Similar letters of reference indicate corresponding parts in all the figures.

In carrying out my invention, A represents a longitudinal hollow case, preferably cylindrical in form and open at both ends. Through the side of the case A, at a point equidistant from both ends, is made a discharge opening or port a. To the outer side portion of the case A and extending around the port a is rigidly attached one end of the discharge-pipe B. Upon the other side of the case, in the same horizontal plane with that of the port a, and through said case are made the induction openings or ports a' a^2, and in which pipe is a foot-valve c. The port a' is placed in position a short distance toward one end of the case A from the point equidistant from both ends of said case, and the port a^2 is placed toward the other end of said case the same distance, thereby placing the ports a considerable distance apart. To the outer side portion of the case is rigidly attached one end of the induction-pipe C, which extends around and incloses both ports a' a^2. Within the cylinder A and near one end is placed the piston D. In the other end of the cylinder is placed a piston E. To the piston D is attached one end of a piston-rod F, which passes longitudinally through the interior of the case A and also through the piston E, both pistons being secured rigidly to the said rod, the position of the piston E being near the port a' when the piston D is at the outer end of the case A.

Within the case A, between the pistons D E and sliding loosely on the rod F, is a circular plate or diaphragm G. To one side of the diaphragm or plate G is cast or formed an extended plate or cut-off g, which extends over the induction-opening a' and is comparatively narrow in width. The outer surface $g^{\times}$ of the plate g is on the same plane and describes the same curvature as that of the periphery of the diaphragm G. Upon the same side of the diaphragm G and from the peripheral portion of the diaphragm in the same horizontal plane with the plate g is cast or formed a similar plate or cut-off g', which extends over the discharge-opening a in the case A. Upon the other side of the diaphragm and extending in the same line and in opposite directions to the plates g g' are the plates g^2 g^3, which are formed precisely as the plates g g', the plate g^2 extending over the port a^2 and the plate or cut-off g^3 closing with the cut-off g' the discharge-opening a alternately. Through the plate g, close in position to the side of the diaphragm G, is made a transverse opening g^4, corresponding in size to the opening a' in the case A. Through the plate g', directly opposite the opening g^4 on plate g, is made an opening g^5, which passes through the respective plates g^2 and g^3. Upon the other side of the diaphram G are made the openings g^6 g^7, which

are close in position to the said diaphragm and correspond to the openings g^4 g^5 in dimensions. Beneath the lower edge of each one of the respective plates g g' g^2 g^3 and attached to inner side of the case A are the short rails or seats a^0, which extend along the sides of said case toward the diaphragm G only so far as is necessary to keep the plates in exact position for closing the openings in the case A without interfering with the movement of the diaphragm. In the path of the diaphragm G and in the inner side of the case A are secured two pins or stops a^3 a^4. One of said pins a^3 is placed in position in line transversely with the case A with the inner edge of the eduction-opening, which is toward the induction-opening a^2. The other pin is placed upon the other side of the diaphragm and in a line with the inner edge of the induction-opening a^2, which is toward the induction-opening a'.

In Fig. 4 I have shown a pump-cylinder A′ provided with but one discharge and one induction opening and a single piston H.

a' represents the induction-opening, in which is inserted one end of an induction-pipe C′, in which pipe is a foot-valve c'. B′ represents the induction or discharge pipe, which is connected with the discharge-opening in the cylinder A′, which opening is arranged a short distance from and at one side of a line drawn transversely through the cylinder A′ and through the eduction-opening a'. In the eduction-pipe B′ is placed an ordinary check-valve v'. The diaphragm is constructed precisely as shown in Fig. 1, with the exception of the openings g^6 g^7, which are rendered unnecessary. In the operation of the piston-rod F, as seen in the position of the pistons E D in Fig. 1, in which the piston D is at the extreme end of the cylinder, the port a^2 and the opening g^6 in the plate g^2 are in a position to register, and thus fill the compartment of the cylinder between the piston D and the diaphragm with liquid. In the forward movement of the pistons D E the action of the piston D is upon the liquid, while the piston E is endeavoring to create a vacuum by suction through the port a'. In this movement of the piston E the diaphragm moves or slides automatically in the direction of the movement made by the pistons D E, thus closing the eduction-opening a^2 and opening the induction-opening a' and permitting the fluid to be discharged through the discharge-opening a, and at the same time closing the discharge from the suction-chamber between the piston E and the diaphragm G. There is no vacuum in either chamber formed by the pistons E and D, as between said pistons and the diaphragm both chambers are filled with water alternately, and as a result of the action of the pistons the diaphragm G moves simultaneously with the movement of the pistons D and E and in the same direction and the cut-off is effected. The diaphragm G moves toward the stop a^4, and upon reaching said stop a chamber is formed for induction, which is filled with water in the movement of piston E as it departs or moves in the direction indicated, the outlet or eduction opening being closed and the induction open, and vice versa. In the reverse movement of the piston the same result follows, and the discharge-openings being constantly passing the discharge-opening a a continuous stream with great lifting power is attained. The action of the piston in either single or double piston pumps is the same. The suction causes the diaphragm to follow the piston, which movement of the diaphragm is limited by the stops a^3 a^4. An ordinary foot-valve in the induction-pipe prevents a return of the water to the well or other source of supply.

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

1. A pump consisting of a hollow cylinder having open ends, a piston and an automatically-sliding cut-off within said cylinder, said cylinder having a chamber between said cut-off and piston, induction and eduction pipes connected with said chamber and opened and closed alternately by means of said automatic cut-off, and a check-valve in said pipes, substantially as and for the purpose described.

2. In a double-acting pump consisting of a hollow cylinder having open ends and a piston in each end, an automatic sliding cut-off between said pistons, said cylinder having chambers between said cut-off and said pistons, an induction-pipe connected with each chamber, and a discharge-pipe connected with both chambers and opened and closed alternately by means of said automatic sliding cut-off, and means for checking the backflow of the liquid in said induction-pipe, substantially as described.

CHARLES CHAMBERLIN.

Witnesses:
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WM. GILLHAM.