S. O. BERTILSEN.

FORCE PUMP.

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1,011,149.

Patented Dec. 12, 1911.

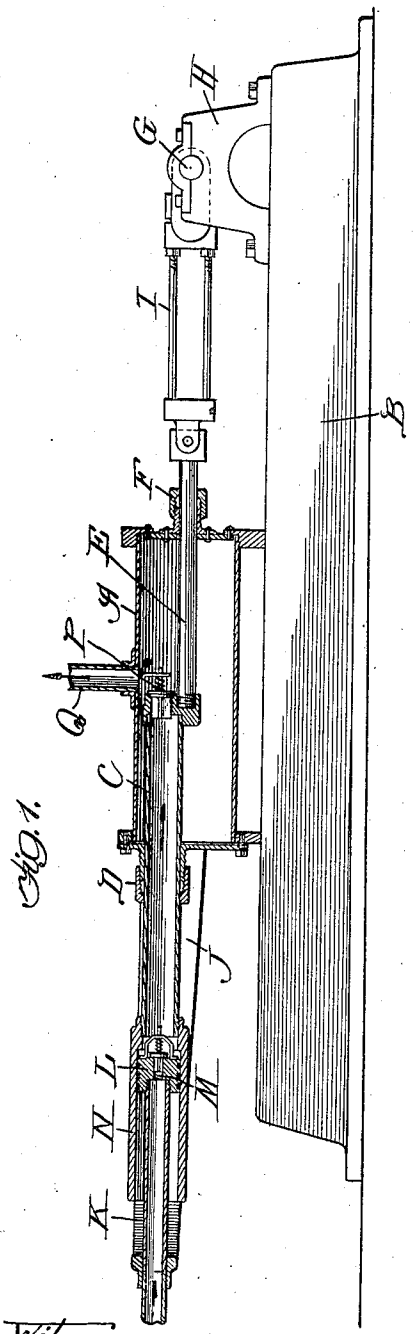

Fig. 1.

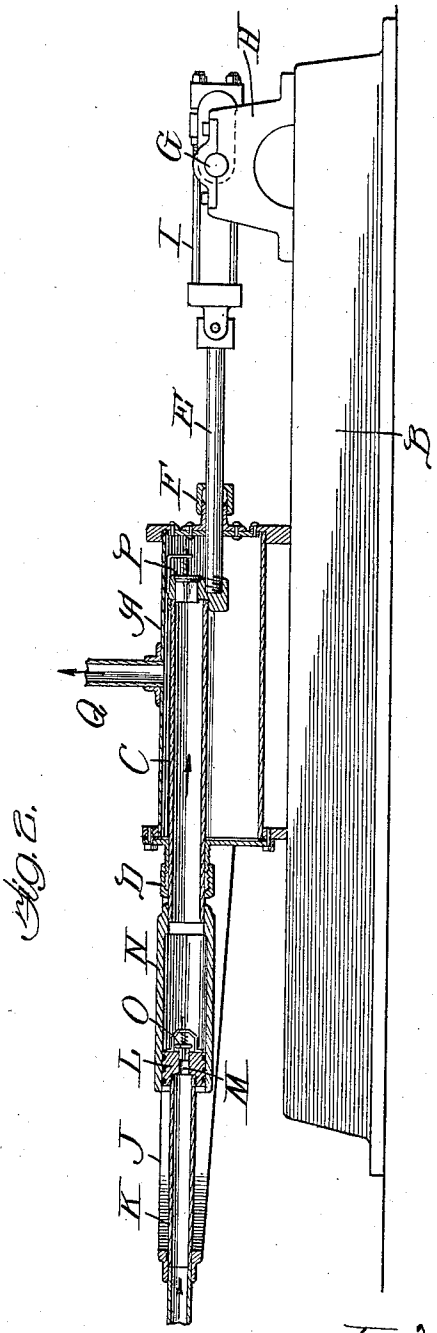

Fig. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

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FORCE-PUMP.

1,011,149. Specification of Letters Patent. Patented Dec. 12, 1911.

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To all whom it may concern:

Be it known that I, SIVERT OLAI BERTILSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Force-Pumps, of which the following is a specification.

My invention relates to a force pump, intended particularly for operating on liquids, and the invention has for its object to provide certain novel and improved constructions and arrangements of the operative parts of a device of this sort, to be hereinafter described and claimed, whereby a pump is provided which is more positive in its action, more efficient relative to the power used, and at the same time simpler and cheaper in its construction than force pumps which have been heretofore used.

The invention, in a preferred embodiment, is illustrated in the accompanying drawing wherein—

Figures 1 and 2 are sectional elevations showing the moving parts in different positions.

Like characters of reference indicate like parts in both figures of the drawing.

Referring to the drawing, A designates the pump casing shown as supported on a base B.

C designates a hollow, preferably tubular, movable piston which enters the pump casing A through a suitable stuffing box D. Preferably the movable piston C is provided with a piston rod E which extends through a suitable stuffing box F at the opposite end of casing A from stuffing box D. When this construction and arrangement is employed the piston C may be reciprocated by means of a crank shaft G supported in suitable bearings formed on the standards H and connected with the piston rod E by means of the connecting link I.

Supported preferably by the yoke J is the supply pipe K on the end of which is secured what I shall term a stationary piston L formed with an inlet port M. Piston L fits snugly within a cylinder N which is attached to and constitutes a continuation of the tubular movable piston C. A check valve O is arranged on the inner side of piston L so as to permit the flow of fluid from pipe K into the interior of piston C while preventing flow in the opposite direction. A check valve P is provided at the inner end of the hollow piston C. This valve also permits inflow while preventing outflow. Q is a pipe leading from casing A and constituting a discharge port.

The operation of the pump will be made clear by comparing the figures of the drawing. Fig. 1 shows the relative positions of the operative parts of the pump at the time the hollow piston C commences its forward stroke. Fig. 2 shows the position of the parts at the moment piston C reaches the end of its forward stroke. With the parts in the positions shown in Fig. 1 and the casing A filled with the fluid, the forward stroke of piston C seats the check valve P and forces the fluid out through the discharge pipe Q, the amount of the fluid discharged depending upon the difference in the cross sectional area of piston C and its piston rod E. The cross sectional area of the latter must always be smaller than that of the former. By the same movement a vacuum is created in the cylinder N, or, more strictly speaking, the pressure in the hollow structure, C, N is reduced, and as a result valve O opens admitting fluid from the supply pipe K. In Fig. 2 valve O is shown as open. As soon as the piston C begins its back stroke valve O seats and the continued movement backward of the hollow piston C forces a portion of the body of fluid in C, N, past valve P into the valve casing A. This volume of fluid forces a corresponding volume out of the casing through discharge pipe Q. It will be seen, therefore, that the action of the pump is balanced. It discharges the fluid at both strokes of piston C. The simplicity of the construction of the pump and the positive character of its action will be apparent.

While I have shown and described the invention as embodied in what I now consider the most desirable construction, it might be possible to modify this construction in some respects without departure from the invention. Therefore I do not limit myself to the precise constructions, arrangements and devices shown except so far as the same are made limitations on certain of the claims herein. It will be understood that the terms "movable" and "stationary" as applied to the elements C and L are intended as defining the relationship between these elements and the pump casing A. One of the pistons must, in all events, be mov-

able with respect to the casing A, while the other must be stationary with respect thereto.

I claim:

1. In a force pump, the combination with a pump casing having a discharge port through the wall thereof, of a movable hollow piston which has a smaller cross sectional area than the cross sectional area of the chamber formed within said casing and extends into said casing, means for reciprocating said piston, a stationary piston contained within said movable piston and formed with an inlet port, a supply pipe communicating with said inlet port, and valves adapted to permit inflow from the supply pipe to the pump casing while preventing flow in the opposite direction.

2. In a force pump, the combination with a pump casing having a discharge port through the wall thereof, of a movable hollow piston which has a smaller cross sectional area than the cross sectional area of the chamber formed within said casing and extends into said casing, means for reciprocating said piston, a stationary piston contained within said movable piston and formed with an inlet port, a supply pipe communicating with said inlet port, and check valves at the inner side of said stationary piston and at the inner end of said movable piston, substantially as described.

3. In a force pump, the combination with a pump casing having a discharge port through the wall thereof, of a movable hollow piston which has a smaller cross sectional area than the cross sectional area of the chamber formed within said casing and extends into said casing at one end thereof, a piston rod of smaller cross sectional area than said piston which extends through the casing at the opposite end, means for reciprocating said piston, a stationary piston contained within said movable piston and formed with an inlet port, a supply pipe communicating with said inlet port, and valves adapted to permit inflow from the supply pipe to the casing while preventing flow in the opposite direction.

4. In a force pump, the combination with a pump casing having a discharge port through the wall thereof, of a movable tubular piston which has a smaller cross sectional area than the cross sectional area of the chamber formed within said casing and extends into said casing at one end, a piston rod of smaller cross sectional area than the piston which extends through the casing at the opposite end, means connected with said piston rod for imparting reciprocating movement to the same, a cylinder secured to the outer end of said tubular piston, a stationary piston fitted within said cylinder and formed with an inlet port, a supply pipe communicating with said inlet port, and check valves at the inner side of said stationary piston and at the inner end of said movable piston, substantially as described.

5. In a force pump, the combination with a pump casing having a discharge port through the wall thereof, of a movable tubular piston which has a smaller cross sectional area than the cross sectional area of the chamber formed within said casing and extends into said casing, means for reciprocating said piston, a yoke secured to said casing, a supply pipe supported on said yoke, a stationary piston secured to the end of said supply pipe, a cylinder secured to the end of said tubular piston, within which the stationary piston is fitted, and check valves on the inner side of said stationary piston and at the inner end of said tubular piston, substantially as described.

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