

(No Model.)

2 Sheets—Sheet 1.

G. F. BLAKE.

PUMP.

No. 271,775.

Patented Feb. 6, 1883.

Fig. 1.

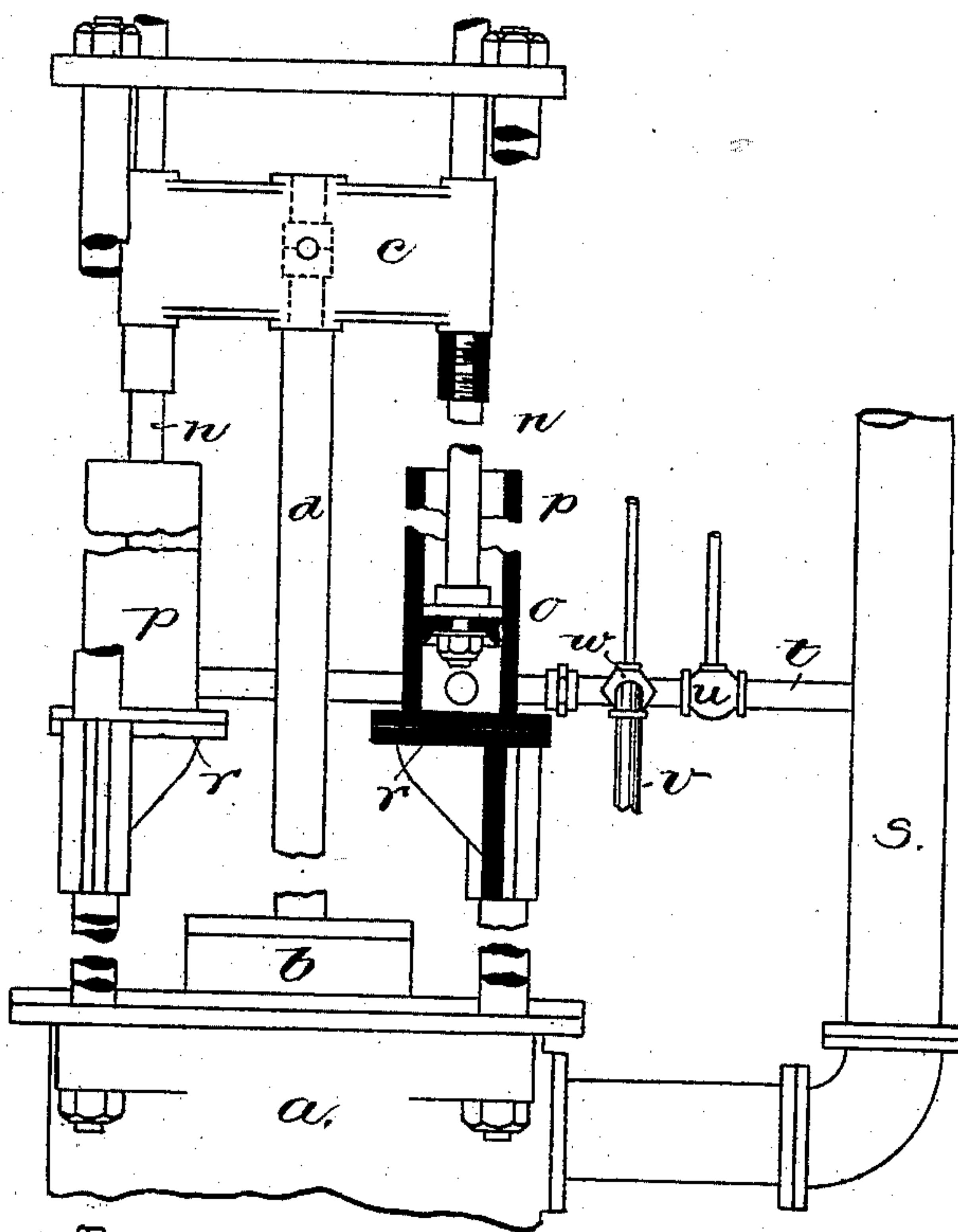
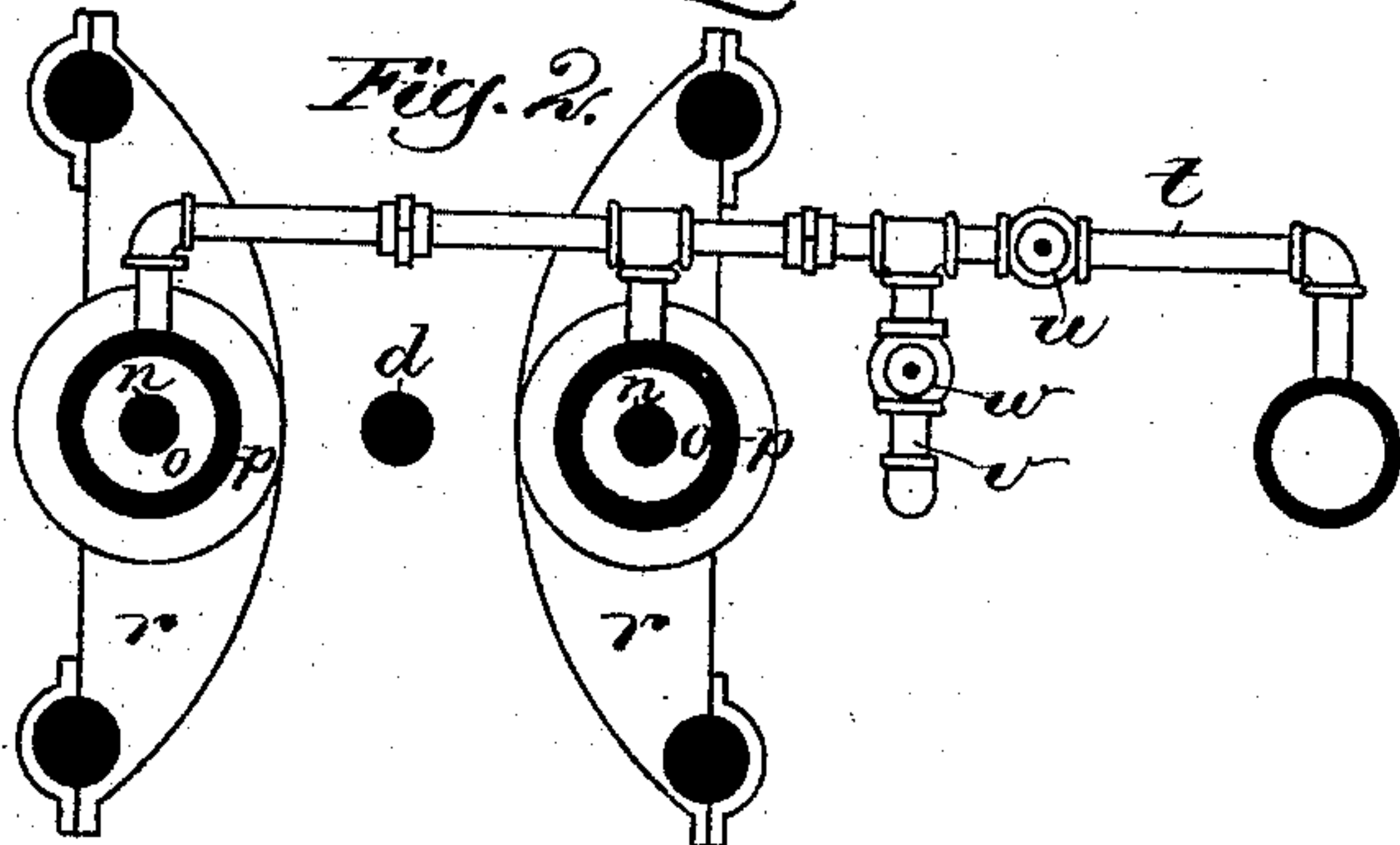


Fig. 2.



Witnesses.

Fred A. Powell.

John F. C. Reinkert.

Inventor:

George F. Blake.

by Crosby & Gregory Attys

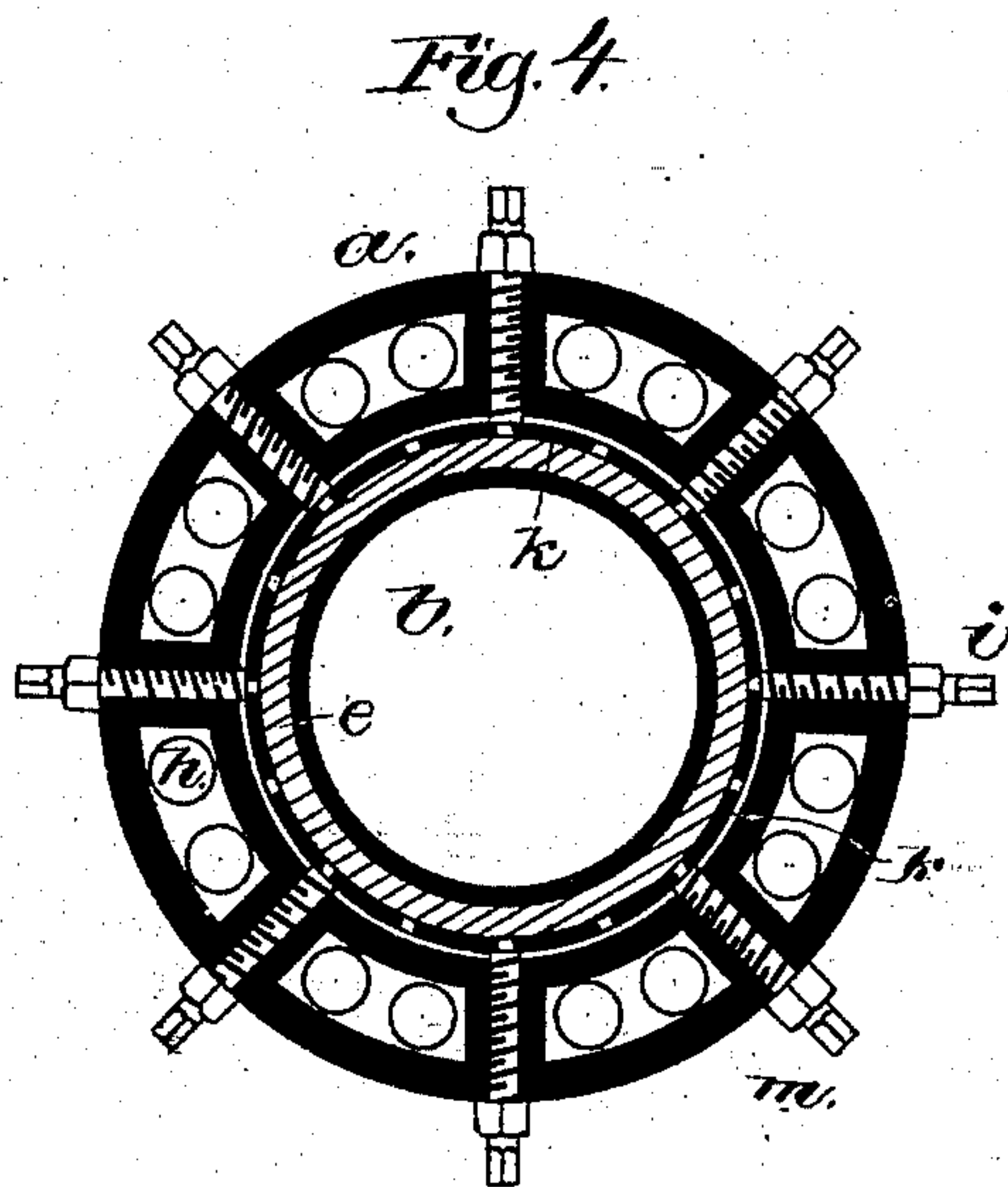
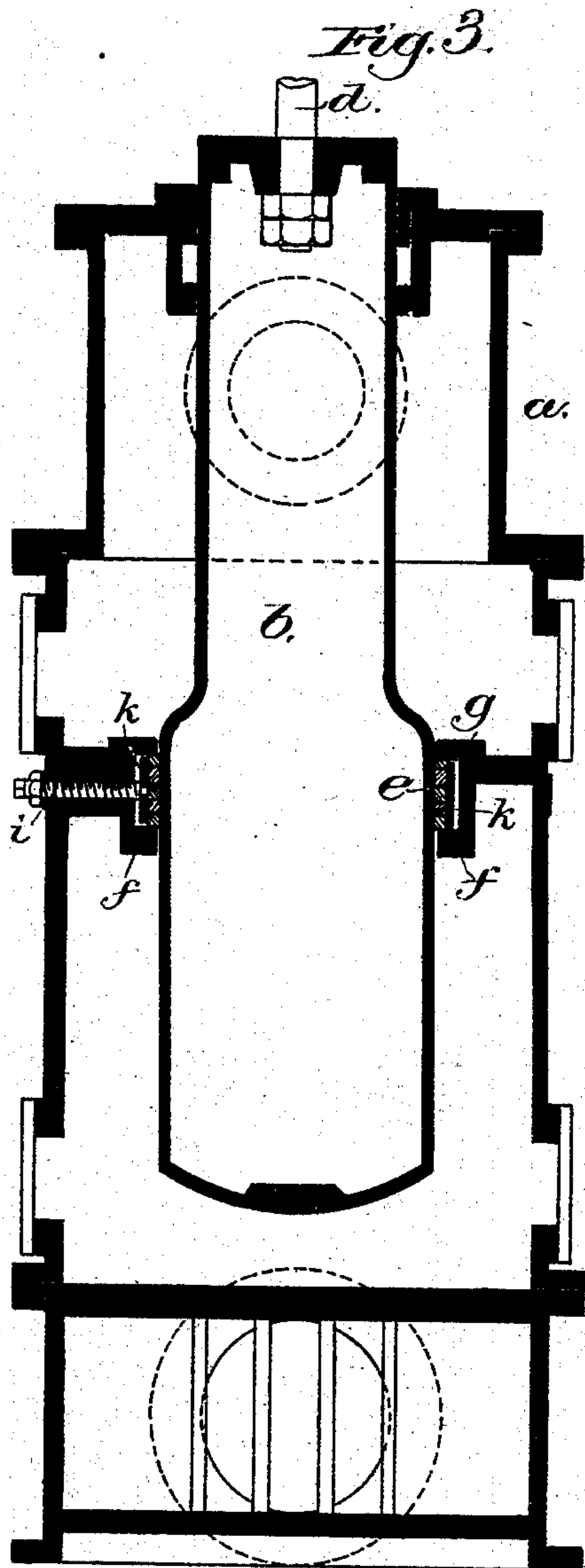
(No Model.)

2 Sheets—Sheet 2.

G. F. BLAKE.
PUMP.

No. 271,775.

Patented Feb. 6, 1883.



Witnesses,
Fred A. Druell,
George Stoeckel

Inventor,
George F. Blake.
By Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

GEORGE F. BLAKE, OF BELMONT, MASSACHUSETTS.

PUMP.

SPECIFICATION forming part of Letters Patent No. 271,775, dated February 6, 1883.

Application filed October 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. BLAKE, of Belmont, county of Middlesex, State of Massachusetts, have invented an Improvement in Pumps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relating to pumps is embodied in a direct-acting steam plunger pump intended to be used in a vertical position; and the invention consists partly in the means employed for packing the plunger or maintaining a tight joint between it and the cylinder in which it works.

The invention also consists in means for balancing the weight of the reciprocating parts to render the effect of the downstroke, in which the steam-pressure is assisted by the weight of the parts, substantially the same as the upstroke, in which the said weight acts in opposition to the pressure of the steam. The packing for the plunger is the reverse of that of an ordinary piston, it consisting of a series of packing-rings surrounding the said plunger in an annular chamber in the pump-cylinder. The said rings are pressed against the sides of the plunger and adjusted by means of segmental pressing-plates acted on by bolts extending out through the sides of the cylinder, and adapted to be operated by suitable wrenches at the outside thereof, so that the packing may be adjusted while the pump is in operation. The balancing apparatus for the reciprocating parts consist of cylinders into the lower ends of which water is admitted from the main discharge-pipe of the pump. The pistons fitted in the said cylinders are connected by suitable rods with the cross-head or piston rod of the engine, or both. The downward movement of the reciprocating parts is thus resisted by the pressure of the water in the cylinders, which is expelled from the said cylinders at each downward stroke and enters them again at the upward stroke of the reciprocating parts. The flow of water from the cylinders and consequent amount of its retarding effect upon the reciprocating parts may be controlled by a regulating-valve in the pipe through which the water enters the cylinder.

Figure 1 is a side elevation of the upper por-

tion of a pump-cylinder with its plunger and plunger-rod provided with balancing-cylinders in accordance with this invention, one of the said cylinders being shown in vertical longitudinal section. Fig. 2 is a horizontal section thereof; Fig. 3, a central longitudinal section of the pump-cylinder and plunger, and Fig. 4 a horizontal section thereof.

The pump-cylinder *a* and plunger *b* therein may be of any usual construction and actuated by any suitable engine, the piston rod or rods of which will usually be connected with the cross-head *c* of the plunger-rod *d* of the said pump. The packing of the plunger *b* is the reverse of that of an ordinary piston; and it consists of a series of packing-rings, *e*, of usual material or construction, contained in an annular chamber, *f*, in the pump-cylinder, the said rings being held against longitudinal movement with the plunger by means of an annular follower, *g*. The said chamber *f* is shown in Fig. 4 as connected with or forming a part of the partition or diaphragm separating the ends of the cylinder *a*, and provided with a portion of the valves *h*, controlling the flow of the pumped liquid in the usual manner.

The packing-rings *e* are adjusted in their pressure against the sides of the plunger by a series of bolts, *i*, acting upon segmental bearing-plates *k*, which press against the outside of the said packing-rings. The adjusting-bolts *i* extend out through the sides of the cylinders and have their outer ends made square or of other suitable shape to be engaged by a wrench, so that they may be adjusted without the removal of any plates on the pump-cylinders and consequent stopping of the operation of the pump. The bolts *i* are all of the same length, so that the amount they are screwed in can be measured on the outside of the cylinder and the plunger properly centered therein. Check-nuts *m* are preferably employed to prevent the bolts *i* from working loose or changing their position except when it is desired to adjust the packing.

The cross-head *c* of the plunger-rod *d* is provided with additional rods *n*, to which are fastened pistons *o*, working in the balancing or retarding cylinders *p*, which are supported upon brackets *r*, upon the connecting frame-work, between the engine and pump cylinders. The liquid that is being raised or forced by the

pump through the discharge-pipe *s* thereof is admitted to the lower end of the cylinders *p* through the pipe *t*, connected with the said discharge-pipe *s* of the pump. The downward
5 movement of the reciprocating parts is thus resisted by the pressure of the liquid in the cylinders *p*, the said liquid being expelled from the said cylinders and forced back into the discharge-pipe *s* at each downward stroke of
10 the reciprocating parts.

The flow of the liquid from the cylinders *p* and the consequent amount of its retarding effect upon the reciprocating parts may be controlled by a regulating-valve, *u*, in the
15 pipe *t*.

The liquid may be withdrawn from the cylinders *p*, when it is not desired to make use of its retarding action, through an eduction-pipe, *v*, controlled by a stop cock or valve, *w*.

20 When the pump is in operation and the effect of the retarding or balancing cylinders is desired, the stop-cock *w* will be closed and the valve *u* set to give the desired amount of retarding effect, and when it is desired to stop
25 the operation of the engine the reciprocating parts may be supported at any desired point in their stroke by entrapping the desired amount of liquid in the cylinders *p* by closing both valves *u* and *w*.

30 If desired to lower the reciprocating parts after they have been stopped at any point, with the valves *u* and *w* closed, this can be accomplished by opening the valve *w* and letting the water escape from the cylinders *p*, when the re-
35 ciprocating parts will sink by their own weight

to the desired point, where they may be stopped by again closing the valve *w*.

I claim—

1. The combination of a cylinder and plunger therein with a series of packing-rings surrounding the said plunger, segmental plates
40 bearing against them, and adjusting-bolts for the said plates, operated from the outside of the said cylinder, substantially as described.

2. In a vertical pump, the combination, with
45 the plunger and connected reciprocating parts, of the balancing or retarding pistons and cylinders therefor, connected with the discharge-pipe of the pump, substantially as described.

3. The combination of the plunger, balancing-cylinders, and pistons therein, connected
50 with the plunger, with a pipe connecting the said cylinders, with the discharge-pipe of the pump, and a regulating-valve therein, substantially as and for the purpose described.

4. The balancing or retarding cylinders, a connecting-pipe between them and the discharge-pipe of the pump, and a regulating-
55 valve therein, combined with the outlet or eduction pipe for the said cylinders and controlling-valve therein, substantially as described.
60

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. F. BLAKE.

Witnesses:

JOS. P. LIVERMORE,
B. J. NOYES.