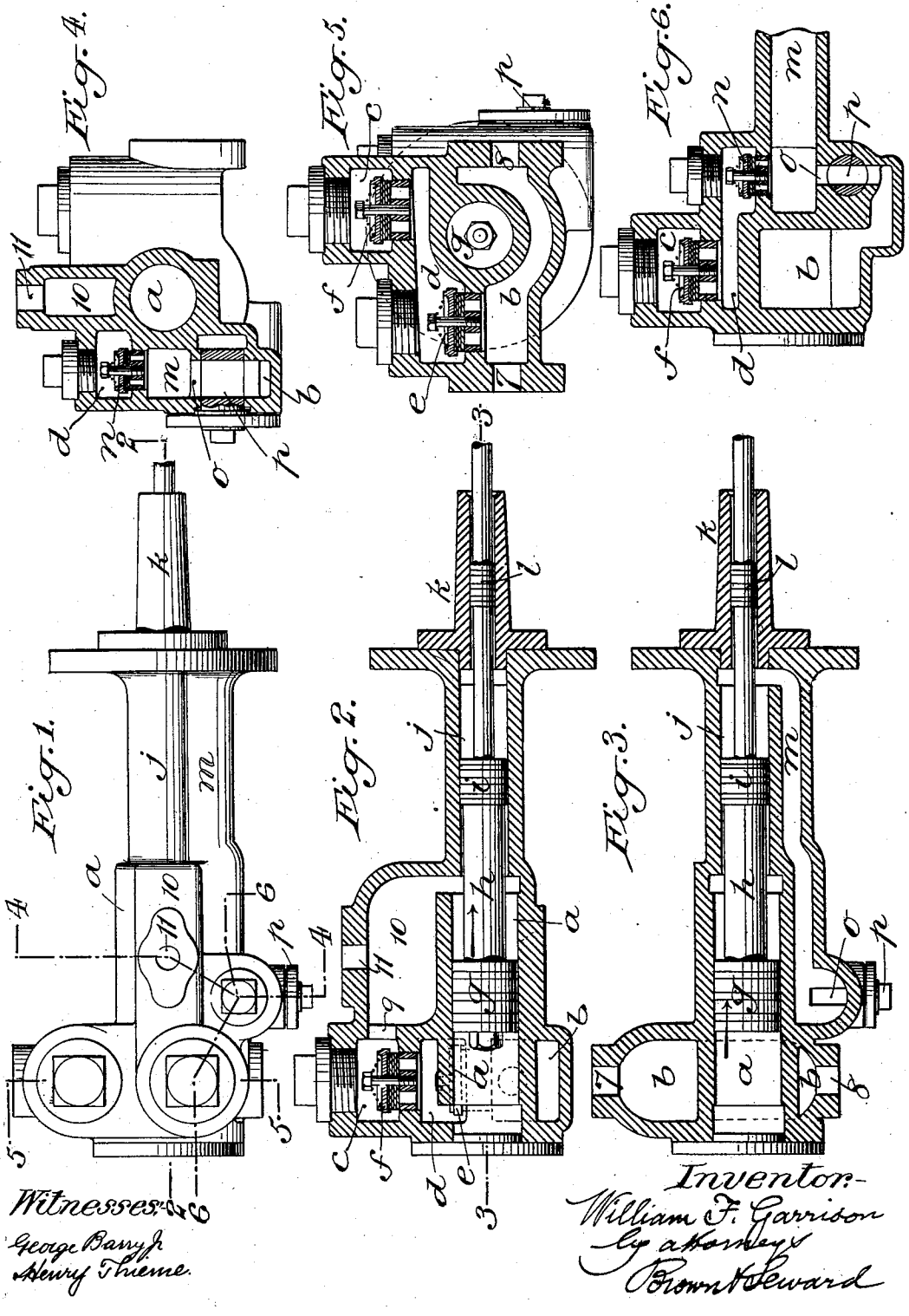
No. 703,648. Patented July 1, 1902.

W. F. GARRISON.

PUMP.

(Application filed Feb. 28, 1901.)

(No Model.)



Witnesses:
George Barry Jr.
Henry Thieme.

Inventor:
William F. Garrison
by a Harney &
Brown & Seward

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM F. GARRISON, OF BROOKLYN, NEW YORK, ASSIGNOR TO GUILD & GARRISON, OF BROOKLYN, NEW YORK, A FIRM.

PUMP.

SPECIFICATION forming part of Letters Patent No. 703,648, dated July 1, 1902.

Application filed February 28, 1901. Serial No. 49,201. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GARRISON, a citizen of the United States, and a resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Improvement in Pumps, of which the following is a specification.

This invention relates to pumps which may be used for various purposes, but which are especially applicable to the compression of gases or aeriform fluids to very high tension.

The object of the improvement is to provide for the return to the pump-cylinder of any leakage which may pass the piston-rod and to provide for such return in such manner that the said leakage may either be prevented from mixing with the fresh incoming gas or may be permitted to mix therewith as may be desirable, as will be hereinafter explained; and to these ends the invention consists in the novel system of passages and valves for controlling the same which is hereinafter described and claimed.

The accompanying drawings represent a pump embodying my invention.

Figure 1 is a plan view; Fig. 2, a longitudinal vertical section on the line 2 2 of Fig. 1; Fig. 3, a horizontal section on the line 3 3 of Fig. 2; Fig. 4, a transverse vertical section on the line 4 4 of Fig. 1; Fig. 5, a transverse vertical section on the line 5 5 of Fig. 1; Fig. 6, a longitudinal vertical section on the line 6 6 of Fig. 1.

a is the cylinder, which is open at both ends and partly surrounded by a casing in which are three chambers *b c d*. The lower chamber *b* is the suction-chamber, with which the suction-pipe connects at 7 or 8. The upper chamber *c* is the discharge-chamber, the outlet of which is at 9 to a passage 10, with which the discharge-pipe is connected at 11. The intermediate chamber *d*, which is in direct and free communication with the rear or left-hand end of the cylinder *a*, as shown in Fig. 2, also communicates with the suction-chamber *b* through the inlet-valve *e* and with the outlet-chamber *c* through the discharge-valve *f*. The outlet-chamber *c* is also in uninterrupted communication with the front end of the cylinder through the opening 9 and passage 10.

g is the piston, the rod *h* of which passes through the last-mentioned end of the cylinder. As thus far described, the several parts may be considered as common.

I will now proceed to describe the parts which in combination with the parts described constitute my invention.

From that end of the cylinder-casing at which the cylinder *a* communicates with the outlet-chamber *c* there projects in line with the cylinder *a* a truly-bored cylindrical extension *j*, within which works a packed piston *i*, formed on the rod *h*. This rod, reduced in size beyond the piston *i*, projects beyond the cylinder extension *j* and into and through a prolongation *k* of said extension *j*, beyond which it is to be connected with any suitable motor. The part of the rod which works within the cylinder extension *j* is furnished with a packing *l*, which works tightly within the bore of the extension *k*, the said prolongation *k* and packing *l* being the equivalent of a stuffing-box for the rod. From the outer end of the extension *j* of the cylinder communication is provided for with the intermediate chamber *d* and the rear end of the cylinder *a* through a passage *m*, which extends along one side of the cylinder, and a self-acting discharge-valve *n*, which opens outward from said passage to said chamber *d*. From the end of the passage *m* below the valve *n* there is a branch *o*, leading to the suction-chamber *b* and fitted with a stop-cock or hand-valve *p*, by which to open and close communication at will between the suction-chamber and the outer end of the cylinder extension *j* beyond the piston *i*.

Suppose the pump to be in operation. During the forward stroke of the piston *g*—that is to say, in the direction of the arrows shown in Figs. 2 and 3—the cylinder *a* takes in at its rear or left-hand end, through the suction-valve *e*, a volume of fluid equal to the full displacement of the piston. During its return stroke the piston displaces this volume through the discharge-valve *f*, a proportion of said volume passing through the opening 9 and passage 10 and following the piston *g* into the cylinder, at the front or right-hand end thereof, and the remainder being discharged at 11. The proportion thus passing depends on the difference of area between

the faces of the piston, the area of one face including only the annular surface which surrounds the rod *h* and the area of the other face being equal to the area of the bore of the cylinder. During the next forward stroke of the piston, while the cylinder is again filled behind it through the suction-valve *e*, the discharge-valve *f* being closed, the piston forces out through the front end of the cylinder and through the passages 10 11 that proportion of the volume received at the rear end which was not forced out in the last rearward stroke. It will thus be seen that the pump only takes in the gas during the forward stroke, but discharges during both the forward and return stroke of the piston. In running under a moderate pressure the cock or hand-valve *p* may be kept open, as shown in Figs. 4 and 6, and the passage *m* from the front end of the cylinder extension will then be open uninterruptedly to the suction-chamber *b* outside of and independently of its inlet-valves, and whatever leakage passes the piston *i* will escape into that chamber and the valve *n* remain closed and inoperative; but in running under a high pressure the cock *p* should be closed to shut off communication between said passage *m* and the suction-chamber *b*, and then any leakage which may occur around the piston *i* will be forced out by said piston during its forward stroke through said passage *m* and by the opening of the valve *n* will be caused to pass into the intermediate chamber *d*, wherein it will be retained by the said valve *n* and the suction-valve *e* during the return stroke of the piston, and whence during the next forward stroke of the piston it will pass into the cylinder along with the fresh gas taken into the latter. In this way the leakage is prevented from mixing with the incoming gas, which is of great importance in the compression of highly-volatile gases to a high degree, for the leakage, being gas which by its compression has been highly heated, if allowed to mix with the fresh incoming gas would so considerably heat and produce the expansion of the latter as to seriously impair the operation of the pump.

What I claim as my invention is—

1. In a pump, the combination of a cylinder and a piston and piston-rod working therein, a cylindrical extension at one end of the cylinder, a second piston on said rod working in said extension, a packing for said piston-rod beyond said second piston, a suction-chamber and a discharge-chamber and a suction-valve and a discharge-valve at the other end of the cylinder, an intermediate chamber in free communication with said other end of the cylinder between the suction and discharge chambers and valves, a leakage-passage leading from the space within said cylindrical extension between said second piston and said packing to said intermediate chamber, and a self-opening and self-closing discharge-valve between said passage and said intermediate chamber, substantially as herein described.

2. In a pump, the combination of a cylinder and a piston and piston-rod working therein, a cylindrical extension at one end of the cylinder, a second piston on said rod working in said extension, a packing for said piston-rod beyond said second piston, a suction-chamber and a discharge-chamber and a suction-valve and a discharge-valve at the other end of the cylinder, an intermediate chamber in free communication with said other end of the cylinder between the suction and discharge chambers and valves, a leakage-passage leading from the space within said cylindrical extension between said second piston and said packing to said intermediate chamber and having a branch leading to the suction-chamber, a self-opening and self-closing valve between said passage and said intermediate chamber, and a hand-controlled stop-valve in said branch, substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 27th day of February, 1901.

WILLIAM F. GARRISON.

Witnesses:

FREDK. HAYNES,

HENRY THIEME.