F. LAMPLOUGH.

PUMP.

APPLICATION FILED MAR. 28, 1910.

1,009,420.

Patented Nov. 21, 1911.

2 SHEETS—SHEET 1.

Fig. 1

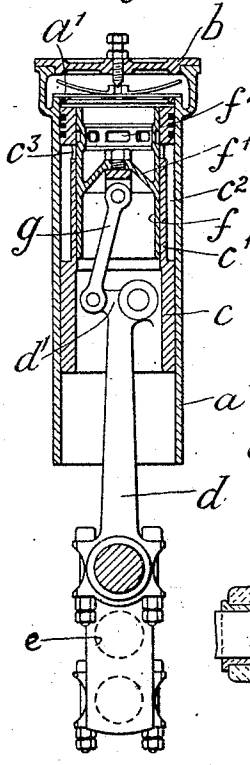
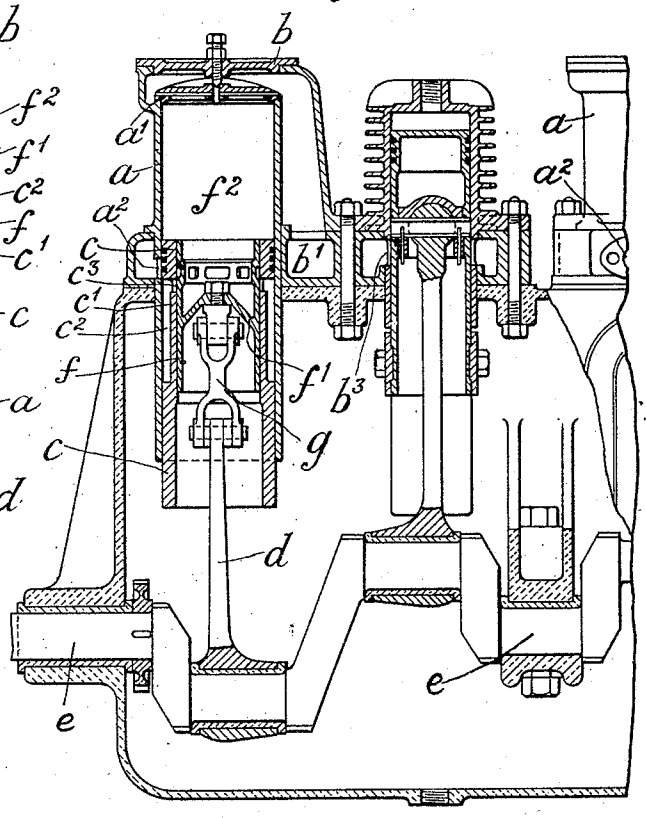


Fig. 2



Witnesses
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2 SHEETS—SHEET 2.

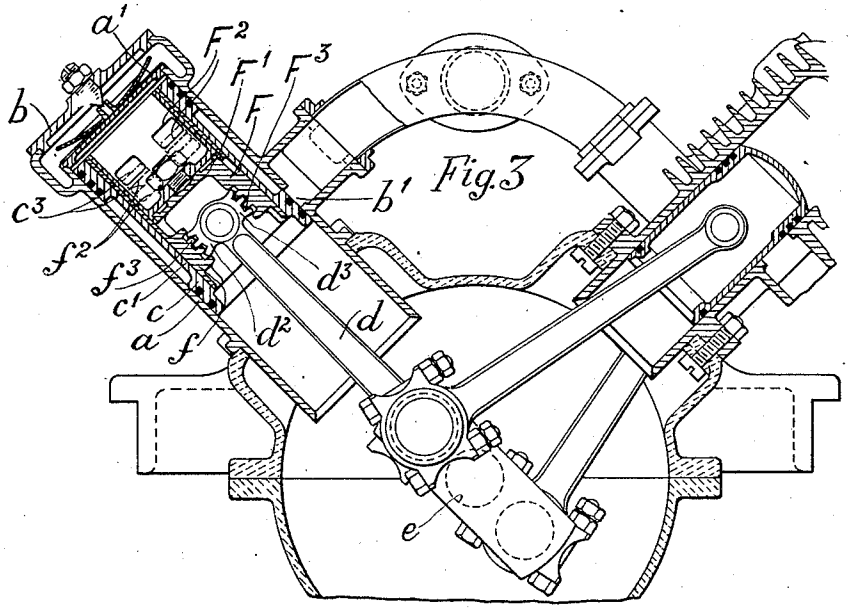
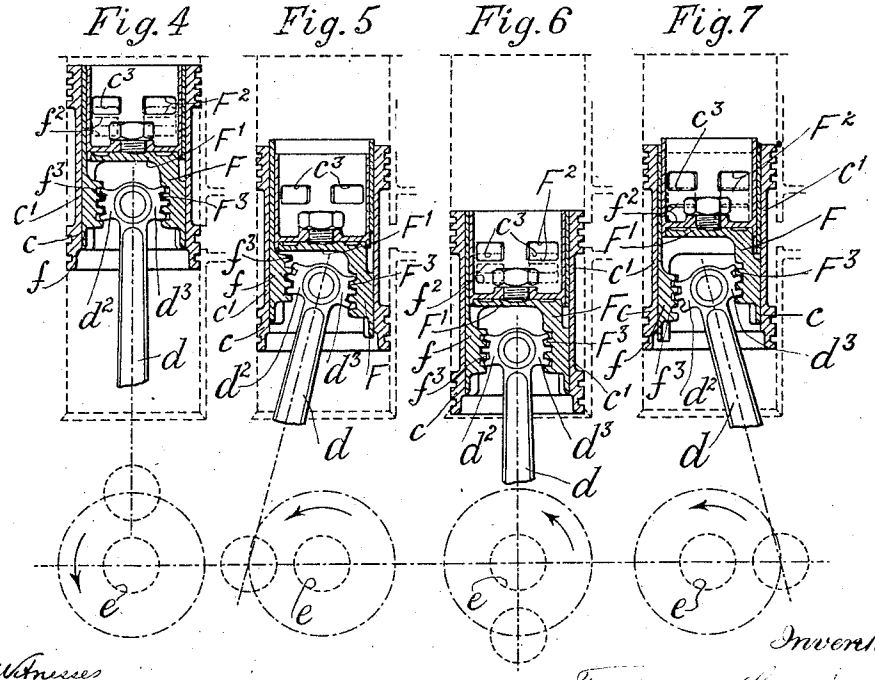


Fig. 3

Fig. 4 Fig. 5 Fig. 6 Fig. 7



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UNITED STATES PATENT OFFICE.

FREDERICK LAMPLOUGH, OF LONDON, ENGLAND.

PUMP.

1,009,420. Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed March 28, 1910. Serial No. 552,051.

To all whom it may concern:

Be it known that I, FREDERICK LAMPLOUGH, a subject of the King of Great Britain, residing at London, England, have invented a new and useful Improvement in Pumps, of which the following is a specification.

The invention relates to that class of pump having ports in the walls of the cylinder and a piston having a portion of reduced diameter, into which reduced portion the ports in the cylinder open. The piston has ports formed in that portion which is of reduced diameter and it is provided with an internal sleeve also provided with ports. The piston is connected with a crank shaft and during its stroke, the internal sleeve is moved with relation to the piston so that during part of the suction stroke, the ports in the piston and the ports in the internal sleeve coincide and during the compression stroke, the sleeve having moved with relation to the piston, the ports in the piston are closed by the sleeve. The pump is provided with a non-return valve in the head of the cylinder, which non-return valve is covered by a chamber having an outlet. In this pump the sleeve has at its inner end a valve which seats itself in a seating in the inner end of the piston, which latter is open at its outer end. The sleeve is moved in one direction to open the valve by means of a projection on the end of the connecting rod coming into contact with a projection on the interior of the sleeve, and it is moved in the other direction to close its valve by means of a spring.

The object of the present invention is to improve this type of pump by positively connecting the inner sleeve with a projection or projections on the small end of the connecting rod, and by getting rid of the valve carried by the sleeve. According to the present invention, the piston is closed toward its outer end by means of a cross web carried by the inner sleeve. By these means I am able to construct a pump capable of working at a high speed which is specially suitable for use as a charging device for internal combustion engines, but which may be used generally for compressing or exhausting air or gas.

The invention is illustrated in the accompanying drawings as applied to an internal combustion engine.

Figure 1 is a longitudinal section of the pump, and Fig. 2 is another longitudinal section of the pump taken at right angles to Fig. 1. In Fig. 2 a cylinder of an internal combustion engine is also shown. Fig. 3 is a longitudinal section of a modified form of pump, and Figs. 4, 5, 6 and 7 show various positions of the parts of the piston during a complete revolution of the driving shaft.

The pump cylinder a is closed by a diaphragm non-return valve a' at one end, and is open at the other end. The closed end of the cylinder is provided with a cover b, forming a passage, and said cover has an outlet b'. In the drawings at Fig. 2, this outlet is shown communicating with a cylinder of an internal combustion engine. The pump cylinder a has an inlet port a^2 which may communicate with a carbureter. The piston has an exterior part c in the form of a sleeve fitting the pump cylinder a at each end, and it has a portion c' of smaller external diameter between the two ends leaving an annular space c^2 between the sleeve c and the cylinder a. The portion c' of the piston has ports c^3. The exterior part c of the piston has a connecting rod d pivoted thereto, by means of which it is driven from the crank shaft e.

So far the construction shown in Figs. 1 and 2 and that shown in Fig. 3 are identical. In both constructions the exterior part c of the piston has an interior part f which slides within the exterior part c and is positively moved in both directions with relation to the exterior part c by a lever projecting laterally from the connecting rod d. In the construction shown in Figs. 1 and 2, there is only one interior sliding part f, whereas in the construction shown in Fig. 3, there are two interior sliding parts.

As shown in Figs. 1 and 2, the connecting rod d is pivoted at one side to the exterior part c and it has a lever d' connected by a link g to the interior part f. This method of moving the inner part f is similar to that shown and described in the specification of my Patent No. 574915, for moving the interior part of another pump piston. This part f has a cross web f' and above this a series of ports f^2, which in one position communicate with the ports c^3 in the portion c' of the exterior part c. During the outward stroke of the piston c, air or gas is drawn into the pump cylinder a through the port a^2, after which the ports c^3 are closed, due to the relative movement

of the parts c and f, and the air or gas is partially compressed during the inward stroke. The air or gas having passed the diaphragm non-return valve a', passes into the cover b, which is shown extending over the top of the pump and down one side and is preferably cast in one piece with the pump cylinder a. The air or gas passes from this cover through the port b' directly into the explosion cylinder of an engine.

In the construction shown at Fig. 3, the connecting rod d is pivoted centrally to the piston c and instead of employing one lever d', I employ two levers d^2, d^3; I also employ two interior sliding parts f, F. The part f has ports f^2 and the part F has a cross web F′ and ports F². These sliding parts f and F are provided with teeth f^3 and F³, with which engage the levers d^2, d^3, which are provided at their ends with teeth. It will be understood that as the connecting rod, by the rotation of the crank, swings to one or the other side of the dead center, the sliding parts f and F are moved, the one upward and the other downward with relation to the exterior part c, with the result that the three sets of ports c^3, f^2 and F² at certain parts of the stroke, all coincide and are then open, whereas at other parts of the stroke, the ports f^2 and F² move away from the ports c^3, thereby closing these latter.

The action of the parts is clearly shown in Figs. 4, 5, 6 and 7, which illustrate the positions assumed by the parts during one complete revolution of the driving shaft.

I claim as my invention:

In a charging pump specially suitable for use in an internal combustion motor, the combination of a cylinder open at both ends, a hollow piston in said cylinder; a portion of the hollow piston of smaller diameter than the ends thereof, forming an annular space between the piston and the cylinder, a port in the cylinder walls always open to the atmosphere, ports in the piston walls leading into the annular space, an internal moving sleeve fitting the interior of said piston, a second moving sleeve having a cross web and fitting the interior of the first moving sleeve, ports in said sleeves which coincide with each other and with those in the piston, a connecting rod pivoted to said piston, a lever on said connecting rod, means operated by the lever for moving said sleeves with relation to the piston and to each other, a non-return valve closing one end of the cylinder, a cover inclosing the non-return valve, and an outlet in said cover, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FREDERICK LAMPLOUGH.

Witnesses:
CLAUDE K. MILLS,
WM. GIRLING.