No. 765,923. PATENTED JULY 26, 1904.

J. S. HERRIOT.

AIR COMPRESSOR.

APPLICATION FILED OCT. 13, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

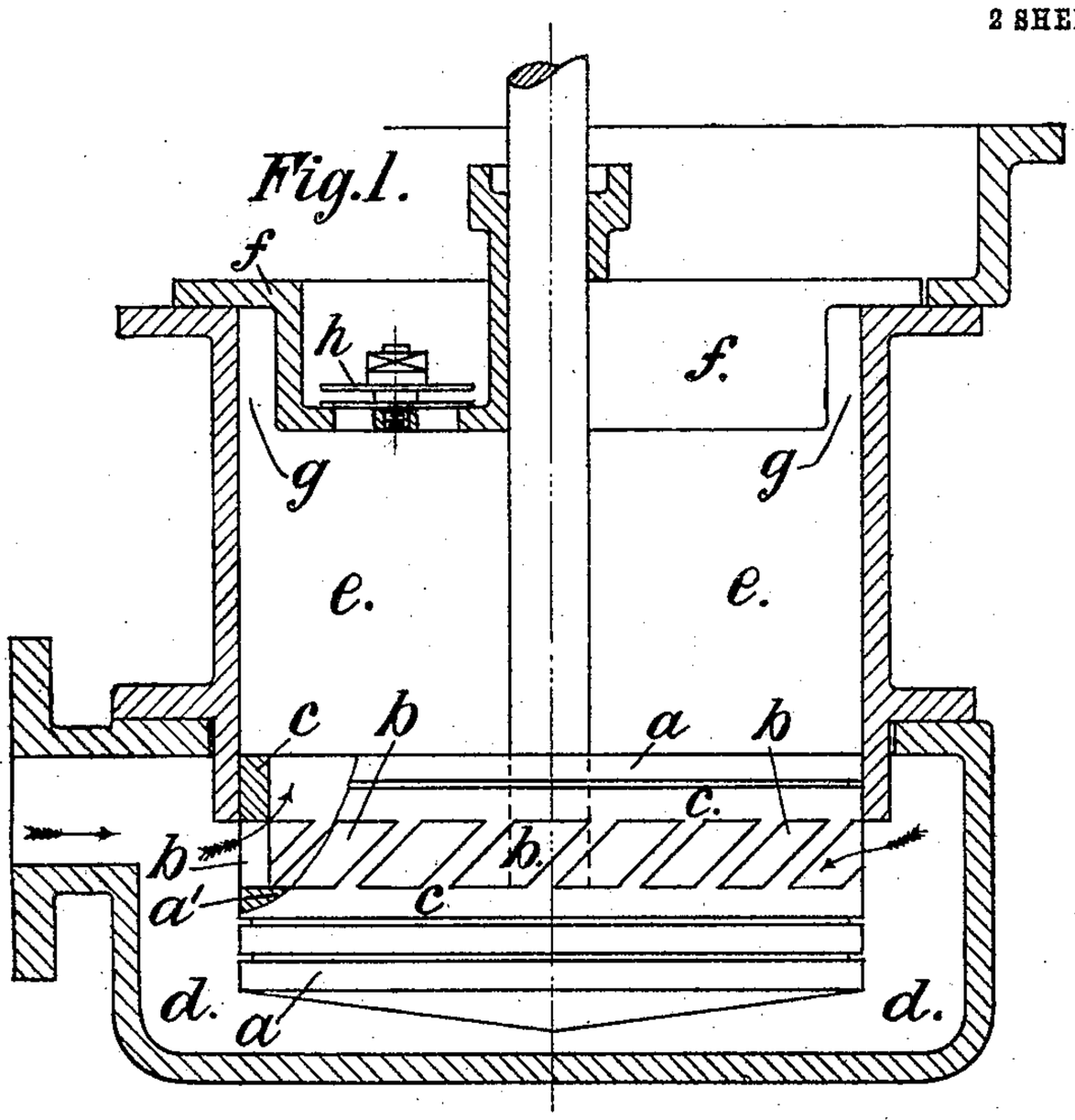
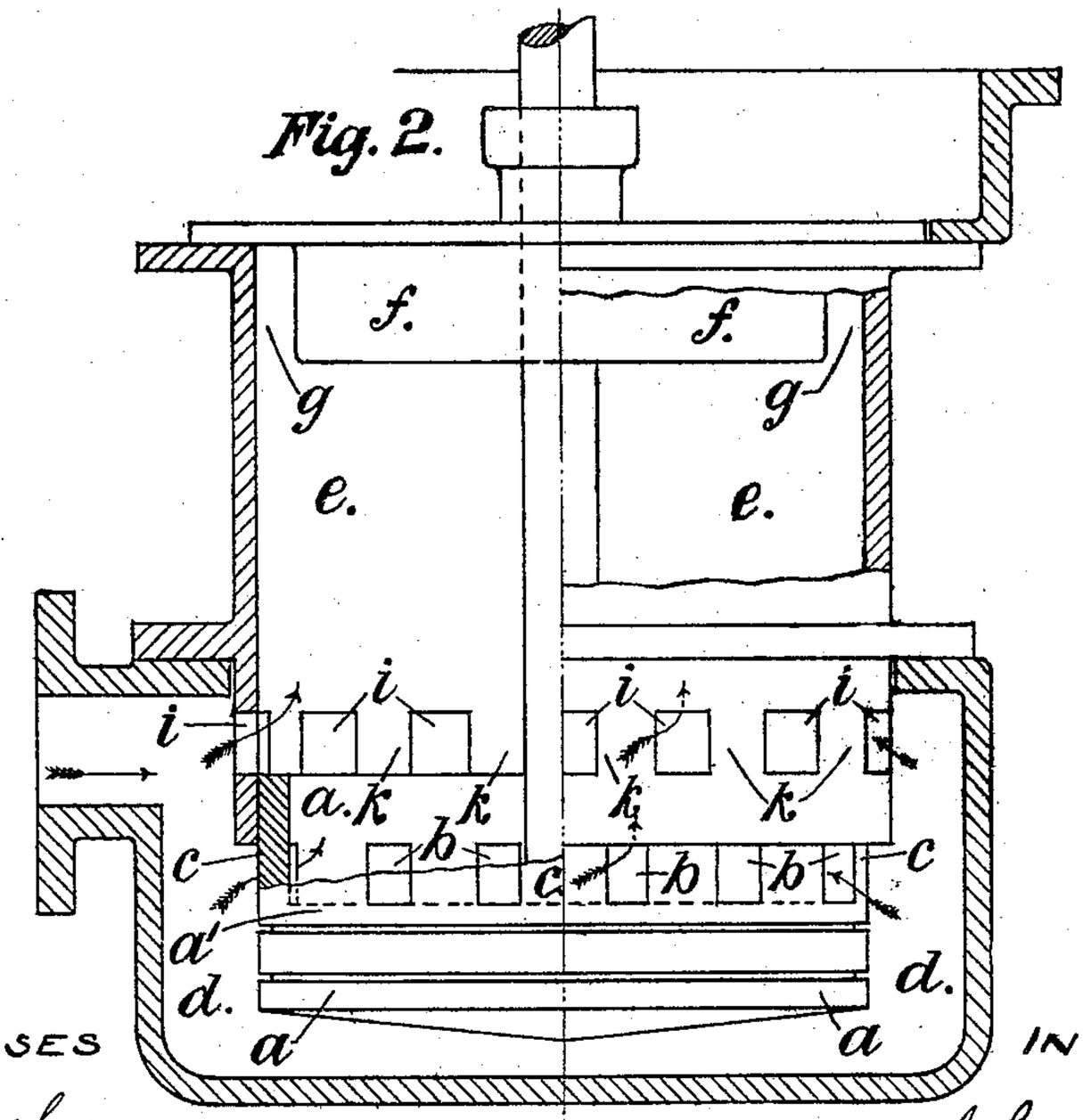



Fig. 2.




WITNESSES

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NO MODEL. 2 SHEETS—SHEET 2.

*Fig. 3.*

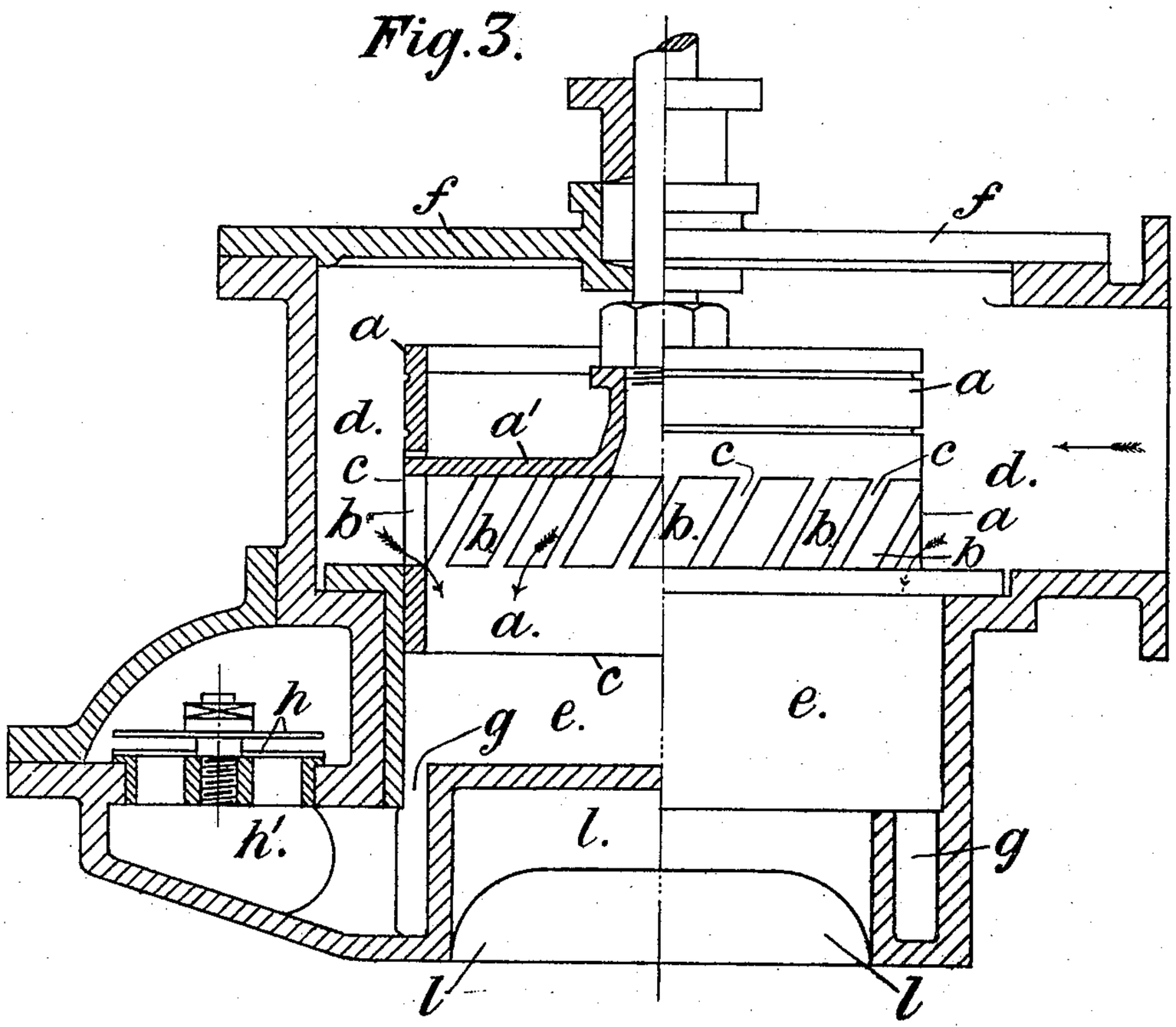
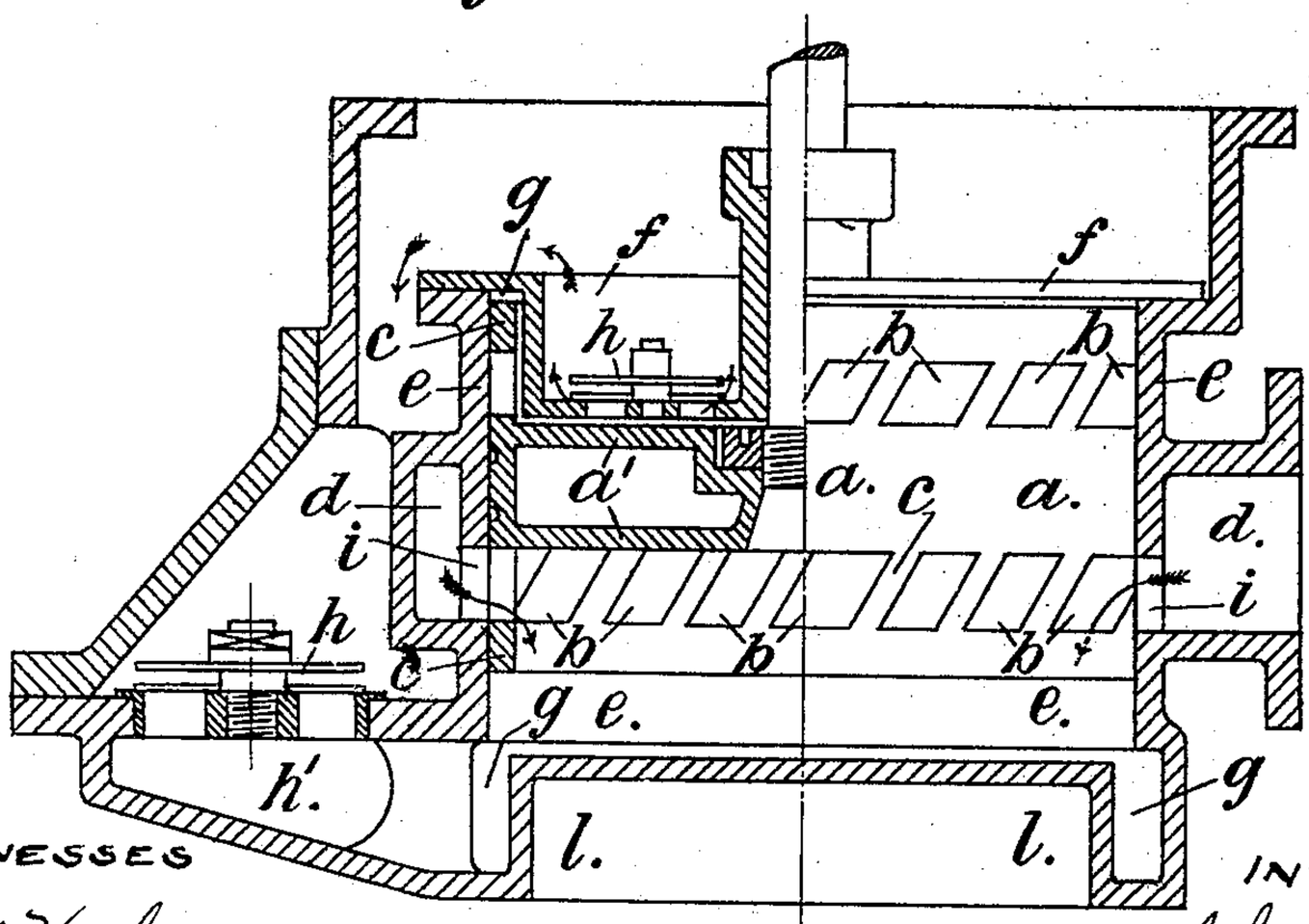



*Fig. 4.*

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No. 765,923. Patented July 26, 1904.

# UNITED STATES PATENT OFFICE.

JOHN SCOTT HERRIOT, OF LIVERPOOL, ENGLAND.

## AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 765,923, dated July 26, 1904.

Application filed October 13, 1903. Serial No. 176,931. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN SCOTT HERRIOT, a subject of the King of England, and a resident of Wavertree, Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention has reference to that class of air-pumps employed for maintaining a vacuum in connection with steam-engines and systems in which there are no inlet or suction valves and the piston or bucket itself, in conjunction with the cylinder, makes and cuts off communication between the interior of the cylinder and the fluid-inlet conduit or conduits.

According to this invention, among other effects, an air-pump of the kind described is so constructed and arranged as to produce a pump of this kind which is comparatively short for a given capacity.

The invention will be described with the aid of the accompanying drawings, in which—

Figure 1 is a sectional elevation showing one construction of a pump according to it. Fig. 2 shows in sectional elevation an arrangement and construction for maximum efficiency. Fig. 3 shows a modification of a single-acting air-pump having its discharge at the bottom, while Fig. 4 shows a pump having its discharge both at the bottom and at the top.

In the construction shown in Fig. 1 the intake is at the bottom and the discharge is at the top. The upper part of the piston or bucket *a* is of dished or cup form, and apertures or ports *b* are provided in its side wall *c*, which when the bucket is at the bottom of its stroke are in free communication with the well or chamber *d*, to which the condensed water and air or vapor pass. In the case shown these apertures *b* may come below the lower edge of the pump-cylinder *e*, and in this position the water and vapor enter the cylinder from the chamber *d*.

When the bucket is lifted, the ports *b* in it become closed by the cylinder-wall *e*, and when it reaches the upper end of its stroke the water and vapor or air are expelled. The bottom of the bucket and well may be inclined or conical.

The cover or top *f* of the cylinder *e* is of annular form, extending down into the cylinder, with a space *g* between itself and the cylinder-wall *e*, and carrying the discharge-valves *h*, and into this annular space *g* the part *c* of the dished or cupped bucket *a* above its diaphragm enters at this end of the stroke, and the diaphragm or bottom *a'* comes close to the bottom of the depending cover *f* at the top of the stroke, so as to cause full discharge of vapor and fluid through the discharge-valves therein. These valves may be of the ordinary or any suitable kind.

According to the modification in Fig. 2, in addition to the ports *b* in the bucket *a*, as above described, ports *i* are provided in the cylinder *e* and at a level at which they will be uncovered or passed by the upper edge of the dished bucket-wall *c* at the bottom of its stroke. These apertures *i* when uncovered will admit the vapor or air, and those in the bucket will admit the liquid, and these two sets of ports *b* and *i* have an alternate arrangement as regards their position vertically in the bucket and cylinder, so that in the stroke of the bucket the ports in it do not pass over the cylinder-ports, but over the metal bars *k* between such ports. Consequently when the cylinder-ports are closed by the upper part of the bucket they remain closed for the rest of the stroke.

According to another modification, (shown in Fig. 3,) which shows the application of the invention to a single-acting pump with the discharge at the bottom, the bucket *a* is made of dished or cupped form on the lower side, and in the wall *c* of this part ports *b* are provided similarly as in the bucket shown in Figs. 1 and 2. The inflow of the fluids takes place at the top of the stroke from an inlet or suction conduit *d* and enters the cylinder through the bucket-ports *b*. In this case the lower cover or bottom *l* of the cylinder is of annular form, projecting up into the cylinder, forming an annular space *g*, so as to correspond with and receive the dished lower part *c* of the bucket, the discharge-valves *h* being provided in a case or chamber *h'* in this lower part.

In a double-acting air-pump according to

this invention, as shown in Fig. 4, the plunger or bucket is of dished or cupped form on both sides of the diaphragm and is provided with ports *b* in the walls of these upper and lower parts, and the top and bottom covers or ends *f* and *l* of the cylinder project downward and upward, respectively, in the manner above described, so that the piston-diaphragms *a'* come close against them in the upward and downward strokes, as above described. In the upper cover or end *f* and in the case or chamber *h'* in the bottom or lower cover discharge-valves *h* are placed. In this case the inlets for the fluids will be by ports *i* in the walls of the cylinder *e* between its upper and lower end or part.

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

1. An air-pump comprising a cylinder *e;* a bucket of dished form, with an annular wall *c* with apertures *b* therein, adapted at the end of the stroke to pass the end of the cylinder *e;* and an end on said cylinder projecting into the same and having an annular space *g* round it; substantially as set forth.

2. An air-pump having a cylinder; a piston of dished form, with an annular wall *c* with apertures therein, said apertures being adapted at the end of the stroke to pass the end of the cylinder *e;* ports *i* in the cylinder *e* above the lower end of the cylinder; the fluid-chamber *d* communicating with the cylinder by the ports *i;* and an end on said cylinder projecting into the same, and having an annular space *g* round it; substantially as set forth.

3. In an air-pump, a cylinder; a piston of dished form at one end having apertures, *b*, in the walls *c* thereof, through which fluid is adapted to pass into the interior of the cylinder; an end on the cylinder in connection with which the piston works; a fluid-supply chamber *d* between the upper and lower end covers *f* and *l*, having apertures *i*, through which the fluid is adapted to flow to each side of the bucket *a* by way of the ports *b* therein, at the opposite ends of the stroke; substantially as described.

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

JOHN SCOTT HERRIOT.

Witnesses:

SOMERVILLE GOODALL,

ROBERT DARRACOTT.