

No. 716,110.

Patented Dec. 16, 1902.

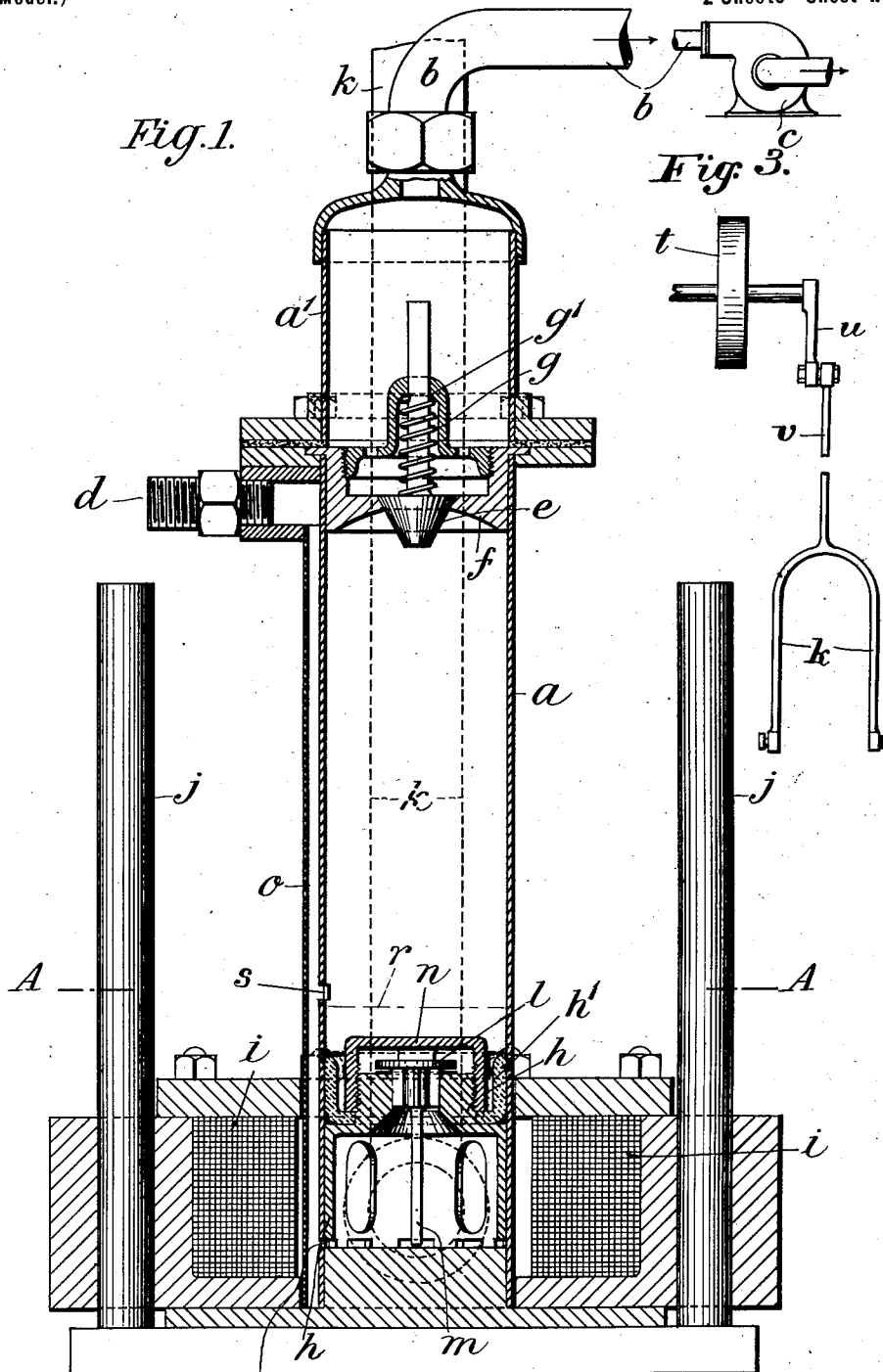
T. A. ROSE, W. A. GWYNN & A. M. BARNES.

VACUUM PUMP OR EXHAUSTER.

(Application filed Apr. 18, 1902.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES. S1

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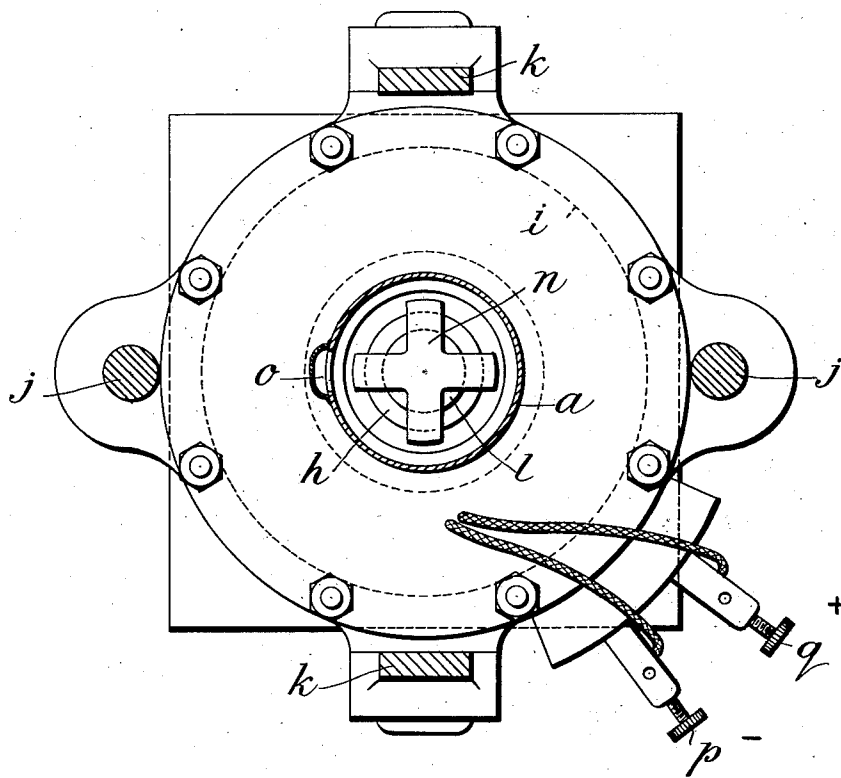
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Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS ARCHER ROSE, OF LONDON, WILLIAM ALFRED GWYNN, OF WALTHAMSTOW, AND ALBERT MOORE BARNES, OF LONDON, ENGLAND, ASSIGNORS OF THREE-TENTHS TO WALTER GOLDFINCH BATE, OF LONDON, ENGLAND.

VACUUM PUMP OR EXHAUSTER.

SPECIFICATION forming part of Letters Patent No. 716,110, dated December 16, 1902.

Application filed April 18, 1902. Serial No. 103,650. (No model.)

To all whom it may concern:

Be it known that we, THOMAS ARCHER ROSE, of 9 Adam street, Strand, London, WILLIAM ALFRED GWYNN, of 116 Blackhorse road, Walthamstow, county of Essex, and ALBERT MOORE BARNES, of 25 Lydford road, St. Peter's Park, London, England, subjects of His Majesty the King of Great Britain, have invented certain new and useful Improvements in Vacuum Pumps or Exhausters, of which the following is a specification.

This invention relates to what are commonly called "vacuum pumps" or "exhausters"—such, for example, as those used for exhausting the air from the bulbs of incandescent lamps or for similar purposes where it is desired to produce as complete a vacuum as possible—though the invention is applicable to pumps for other purposes.

The invention consists of an improved form of pump the construction and operation of which are such that the usual internal piston-rod, with its corresponding stuffing-boxes, is entirely dispensed with, the requisite motion to an internal piston being imparted by means of an external electromagnet, all as more fully hereinafter set forth with reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation; Fig. 2, a plan view on line A A of Fig. 1; and Fig. 3 is a view, on a reduced scale, of the magnet-lifting device.

In said drawings, *a* represents the pump-cylinder, and *a'* a chamber above same, the latter being connected at *b* to an ordinary exhaustor or pump, (indicated at *c* on a reduced scale.) To the pipe *d* is attached in the ordinary manner the fitting carrying the bulbs of the incandescent lamps or other article to be exhausted, and a branch pipe (not shown) may lead therefrom to the ordinary exhaustor *c*, so that a preliminary or partial exhaust may be first secured, although this is not necessary where suitable electric currents are cheaply obtainable.

The pump-cylinder *a*, which is of non-magnetic material, carries a valve *e*, separating it from chamber *a'*, which valve is normally

held to its seating *f* by spring *g*, suitably guided by a retaining-cap *g'*, and it also carries or contains piston *h*, made of soft iron or other material capable of being attracted and caused to travel in cylinder *a* by the external electromagnet *i* when same is caused to move up or down its guides, *j* by means of a yoke *k*, (shown by dotted lines in Fig. 1 and in full lines in Fig. 2,) mechanically operated in any convenient manner.

The device shown in Fig. 3 by way of example for raising the yoke *k* and magnet *i* consists of a pulley *l*, driven from any suitable source, having a crank *u* on its shaft and a lever *v* connected to such crank. The lever *v* carries the yoke *k*, which is pivoted to the magnet *i*, so that the operation of the crank causes the magnet to be raised and lowered.

The piston *h* is provided with a non-magnetic valve *l* and with a suitable packing-ring or cup-leather *h'*, the valve *l* having a stem *m*, adapted to open when piston *h* is in its lowest position by contact with the bottom of the cylinder, thus permitting oil (indicated at *n*) or other liquid free access to both sides of the piston through the open or skeleton cap *n*, which covers the valve and is screwed to the piston *h*. A channel *o* on the outer wall of the cylinder connects pipe *d* with cylinder *a* by passages *s s'* in the walls of said cylinder, and terminals *p q* are carried by the electromagnet *i* to carry connections for any suitable source of electricity whereby the magnet may be energized.

The complete exhaust through pipe *d* may be effected solely by the pump, the subject of this invention, or the first part of same may be effected by the exhaustor *c*, as stated, in which case the continued operation after the connection with *c* had been cut off would be as follows: The yoke *k* being raised by the mechanical means employed and the magnet *i* being energized, the piston *h* will follow, passing passage *s* and forcing the air in front of it through valve *e*, which is lifted partly by the pressure and partly by the exhaust from *c*, while valve *l* will be closed, owing to the pull of the partial vacuum in cylinder *a*

below the piston *h*. To prevent this acting as a drag on the piston *h*, the passage *s'* in the lowest part of channel *o* is provided, so that as the piston passes and closes passage *s* air may still pass under the piston from channel *o* sufficient to allow it to move freely. When piston *h* reaches the top of its stroke, the cap *n* holds up the valve *e* for a moment after the return stroke begins, thus allowing some of the oil above the piston which has passed into chamber *a'* and acts as a liquid-valve to return back to the top of the piston. As magnet *i* and piston *h* descend valve *e* is closed by spring *g* and valve *l* rises. As piston *h* reaches the bottom of its stroke the valve *l* is again positively held open, and the oil, which has accumulated at the bottom of the cylinder, passes through such valve to the top of the piston. A small quantity of oil passes at each stroke through the passage *s* and after passing down channel *o* enters the cylinder again through the passage *s'*.

With the construction indicated an almost complete vacuum through *d* may be attained, as it will be noticed that there is no internal piston-rod with its requisite stuffing-boxes, which either permit leakage of air or are else so elaborate and packed so tight as to entail the expenditure of considerable excess power and wear and tear.

It will be obvious that any form of magnet for surrounding or partly surrounding the cylinder may be employed, so long as it is capable of lifting a metallic piston inclosed therein.

What is claimed is—

1. In a pump and in combination, a cylinder of non-magnetic material, a piston therein of material capable of being magnetically attracted, a magnet external to the cylinder and a connection for moving same.

2. In a pump, and in combination, a cylinder of non-magnetic material, a piston therein of material capable of being magnetically attracted, a valve in said piston, a magnet external to the cylinder and movable thereon, and means carried by said magnet whereby it may be reciprocated.

3. In a pump and in combination, a cylinder of non-magnetic material, a piston therein of material capable of being magnetically attracted, a valve in said cylinder, an exhaustor connected to the cylinder above the valve, a magnet external to the cylinder and a connection for moving said magnet.

4. In a pump and in combination, a cylinder of non-magnetic material, a piston therein of material capable of being magnetically attracted, a valve in said piston, a valve in said cylinder above the piston, an exhaustor above the valve in said cylinder, a magnet external to the cylinder, and a connection for moving said magnet.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

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Witnesses:

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