No. 805,552. PATENTED NOV. 28, 1905.

L. VOM HOFE.

ROTARY PUMP.

APPLICATION FILED JULY 2, 1904.

Fig. 1

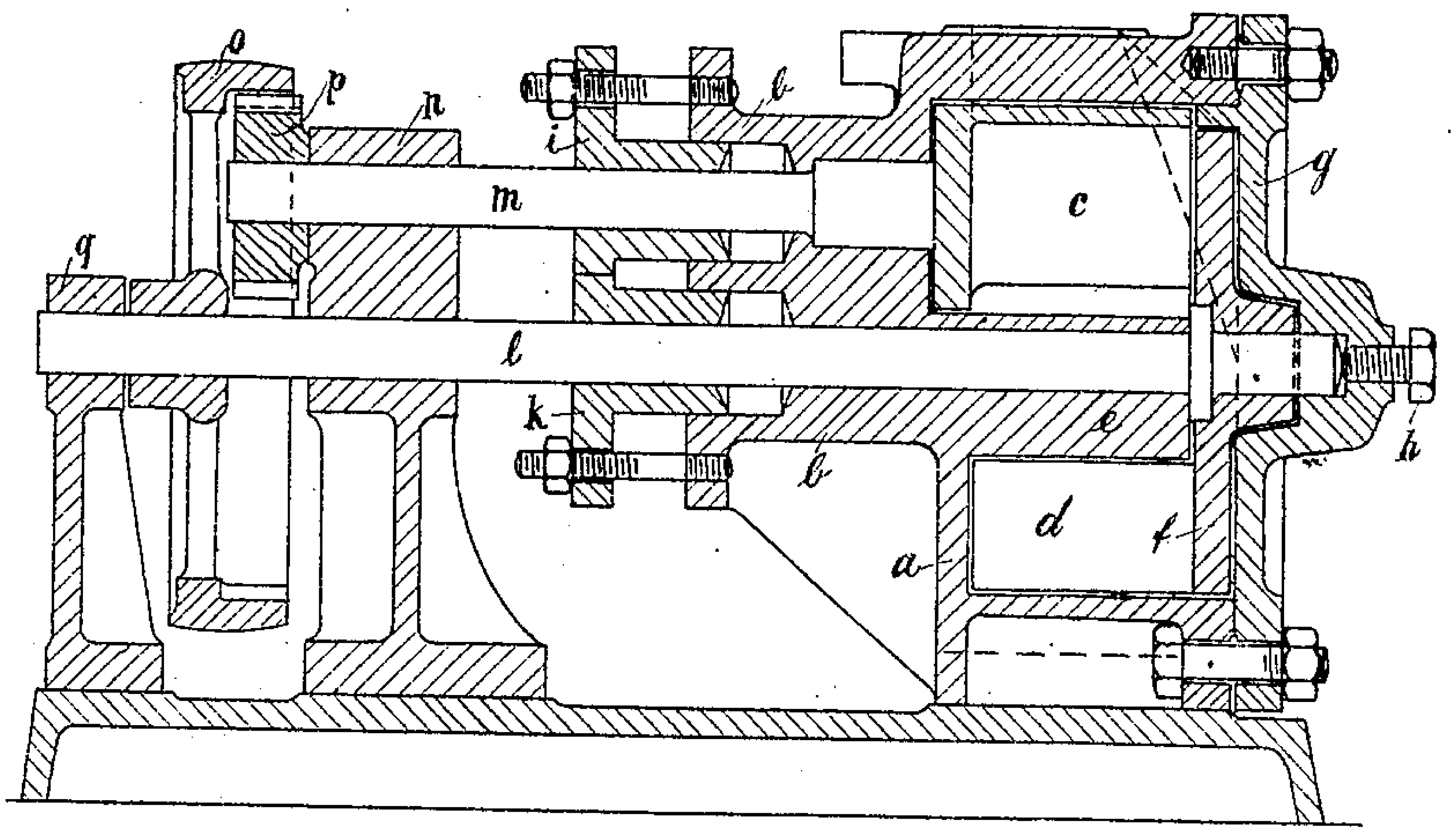


Fig. 2.

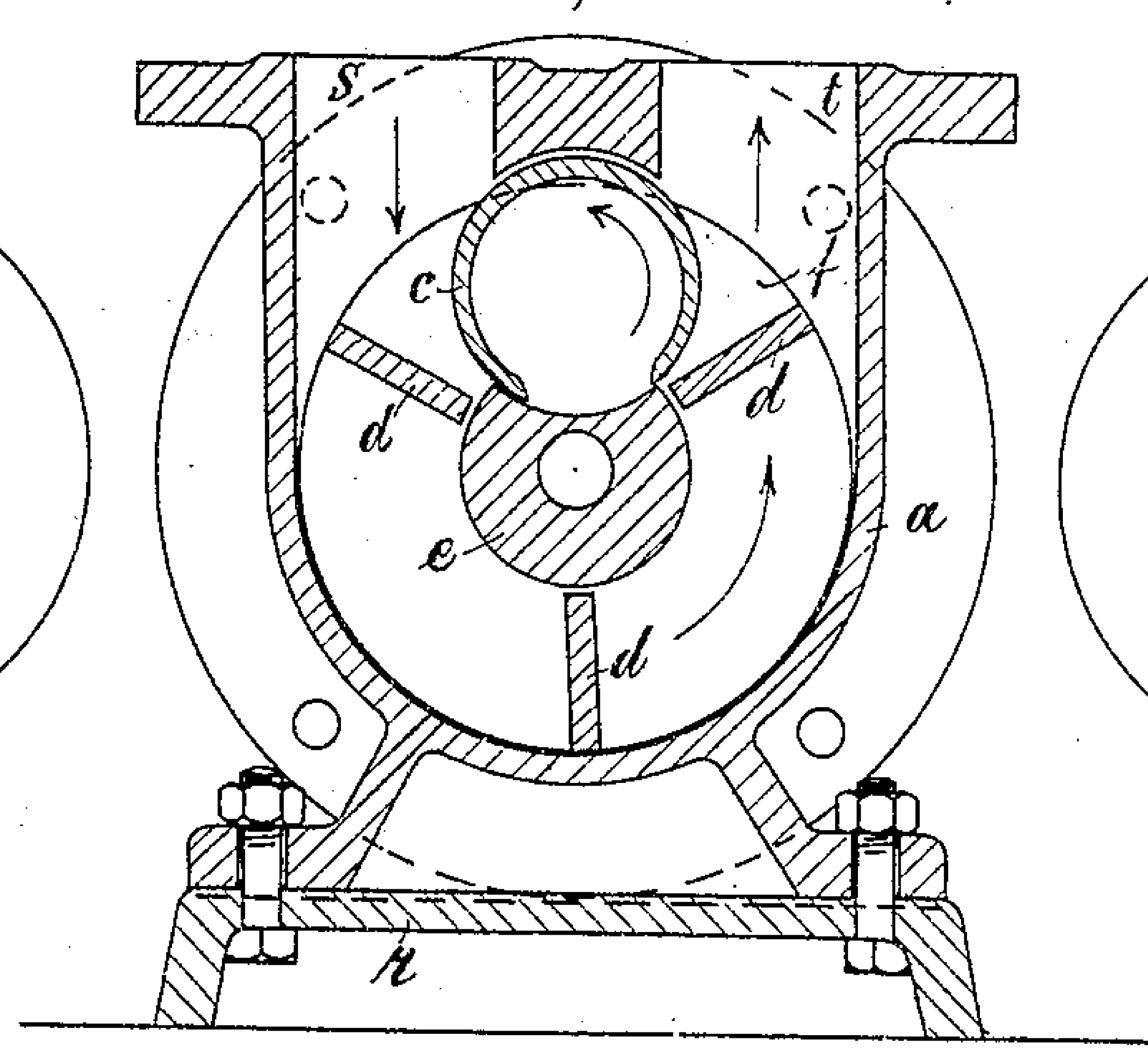


Fig. 3.

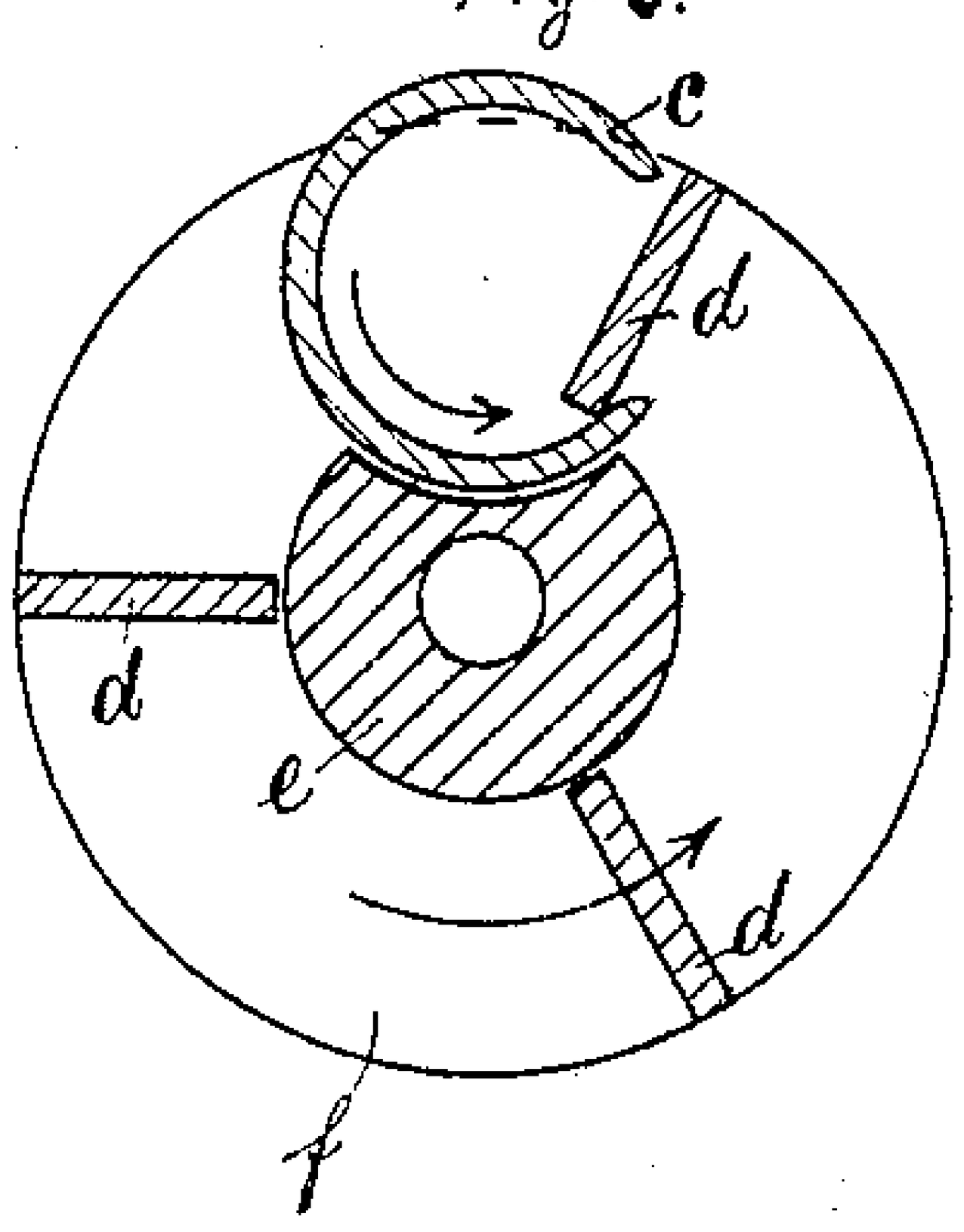


Fig. 4.

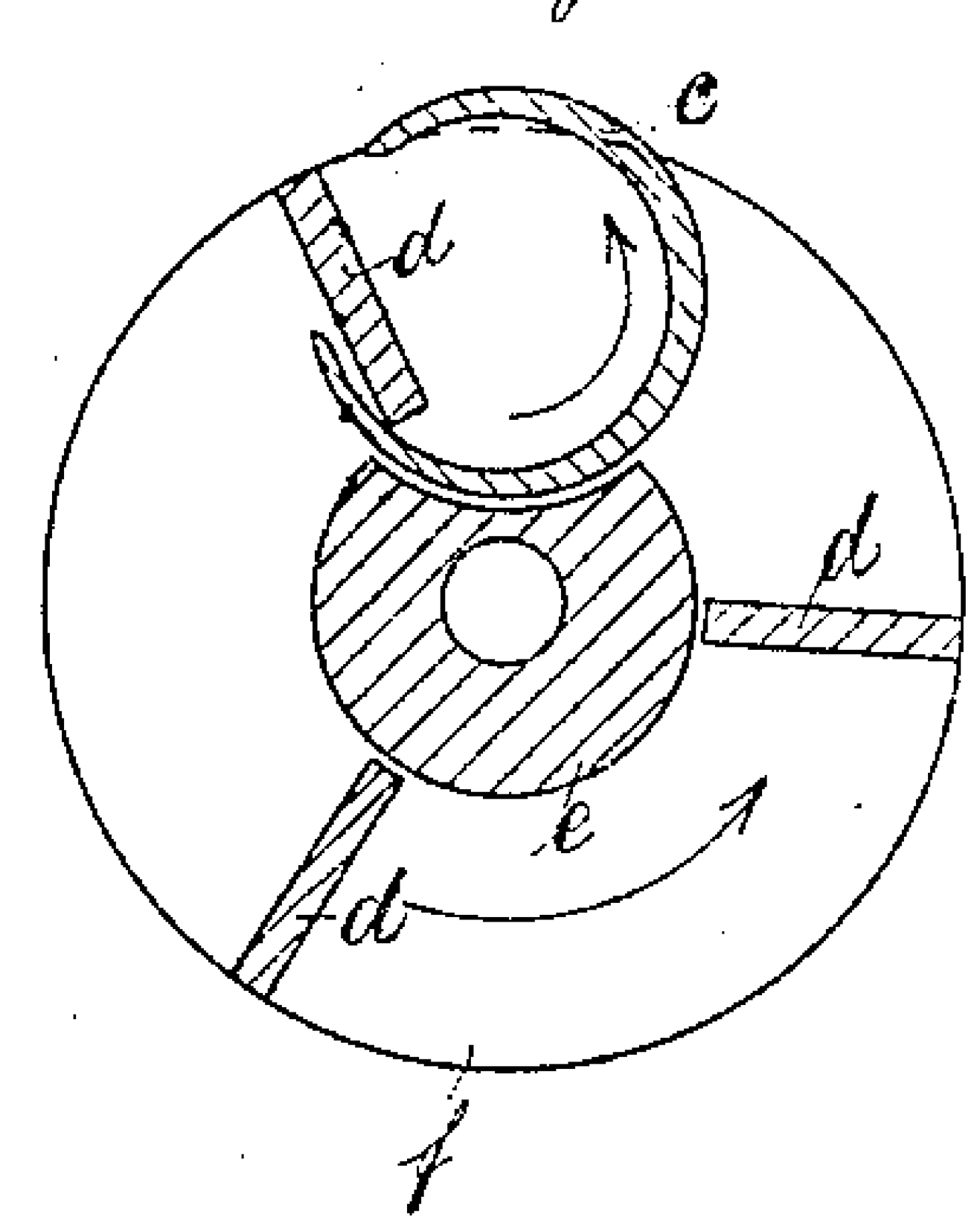


Fig. 5.

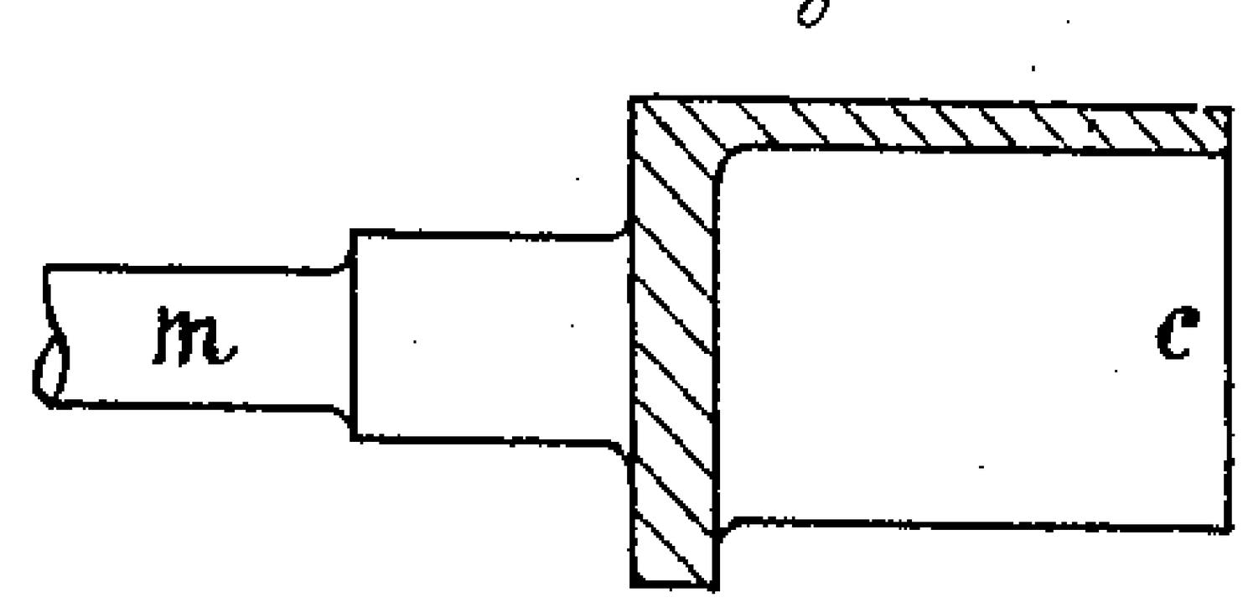
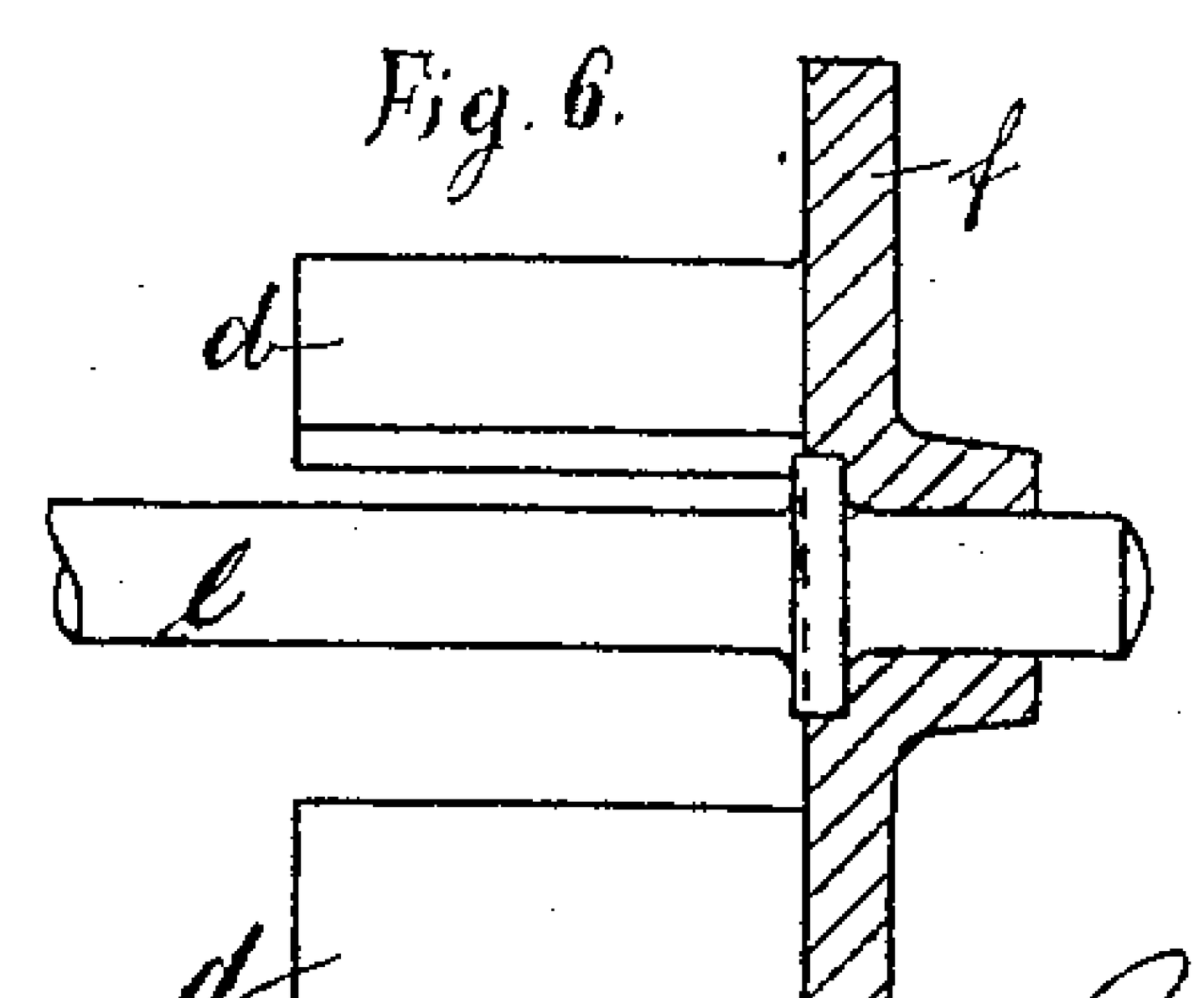


Fig. 6.



Witnesses:
[illegible]
[illegible]

Inventor
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UNITED STATES PATENT OFFICE.

LEOPOLD VOM HOFE, OF LÜDENSCHEID, GERMANY.

ROTARY PUMP.

No. 805,552. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed July 2, 1904. Serial No. 215,162.

To all whom it may concern:

Be it known that I, LEOPOLD VOM HOFE, a subject of the King of Prussia, German Emperor, residing at Lüdenscheid, Germany, have invented certain new and useful Improvements in or Relating to Rotary Pumps, Blowers, Motors, and the Like, of which the following is a specification.

This invention relates to a valveless rotary pump, blower, motor, or the like provided with a hollow distributer-piston, the operative blades entering the same and being almost completely encircled by it during rotation.

In the rotary pumps hitherto known the distributing-piston is provided with a through-spindle and a recess to allow passage of the vanes or blades, tight joint being produced at the most important points inside; but the joint in question is not sufficiently tight. In such pumps the vanes or blades are secured to a core, and the whole construction necessitates a large casing with useless space. In the well-known pumps built on the principle of surface joints, with blades rotating about a fixed core, the distributing-piston is also provided with a through-spindle and has as many recesses as there are blades. In the latter pumps the casing has also to be made comparatively large and the waste space is large.

In both the above cases the recesses in the piston can extend at the outside up to the spindle or center of the piston, the result being that the piston must be very large in comparison with the height of the blades and that its center must be situated outside the circle described by the blades. This results in the necessity of providing the casing, as well as the cylinder for receiving the blade-body, with a recess for receiving the distributing-piston, thereby necessitating a large and heavy casing. In both kinds of pump the blades rotate in the direction opposite to that of the piston. A suction is therefore produced at the outlet acting against the direction of the discharge, which leads to shocks and the like and unfavorably affecting the efficiency and leading to useless consumption of power. The recesses on the circumference of the distributing-piston must be greater than the height of the blades, and the piston must therefore be made of a comparatively large diameter. In the latter kind of pump, where the surface removed from the fixed core at the top to allow the passage of the piston constitutes the surface for making a tight joint, said surface must be longer than the recesses on the circumference of the piston in order to insure a good joint, the result being that the fixed core must be large in comparison with the height of the blades—that is to say, with the operative space of the pump.

In pumps in which the distributing-piston is a hollow body without a through-valve and the blades are secured to a rotating core the deep hollow of the piston cannot be utilized and is even injurious, as if the operative blades were extended the inlet-opening in the piston would have to be so large that the piston could no longer be used as a closing device. Moreover, in pumps of that kind there is only a partial surface-joint, while at the main points where the pressure is exercised there are only line-joints, and there also occurs in this case the above-referred-to suction due to the direction of rotation of the piston acting in opposition to the direction of flow of the liquid. The center of the distributing-piston can be arranged at the outside up to the circle described by the operative blades; but this has no advantage.

The above drawbacks affecting the efficiency of the pump are obviated in the machine constructed according to this invention, in which the distributing-piston is hollow, the blades consecutively entering it completely and the piston revolving almost completely round the blades. The height of the blades relatively to the piston can be made greater than in any other construction. The center of the piston is placed so far within the circle described by the blades that the piston projects beyond them only to the extent of the thickness of its wall. The casing is therefore merely a cylinder of a diameter equal to that of the circumference of the circle described by the rotating blades, in which there is a slight recess or enlargement for the piston, which recess need be only as deep as the thickness of the walls of the piston. The casing is therefore small and possesses only a small clearance. The piston and the blades rotating in the same direction, no suction unfavorably affecting the direction of the discharge can take place, as the direction of the rotation of the moving parts is the same as that of the fluid. The width of the opening in the circumference of the piston can be very much less than the height of the blades, which need not pass through the whole height, the only consideration being the relation between its size and the position of the opening. The result is a smaller joint-

surface of the fixed core, and consequently a smaller diameter of the core compared to the height of the blades than in all other systems.

The efficiency of the pump or motor according to this invention is much greater than that of other similar machines, the working being smoother and less power being consumed. The piston must of course revolve as many times as there are blades in the cylinder.

The invention is illustrated by way of example as applied to a pump.

In the accompanying drawings, Figure 1 is a longitudinal section; Fig. 2, a cross-section. Fig. 3 shows the position of the piston when a blade enters the opening in it, and Fig. 4 the position at the moment just before the blade leaves the piston. Fig. 5 shows the piston, and Fig. 6 the blades or vanes with their securing-disk and spindle.

The casing *a*, which has two stuffing-boxes *b* on one side, has a removable back for introducing the distributing-piston *c* and the blades *d* and is provided in the center with a fixed core or central support *e*, the side and lower surface of which forms the surface against which the inner edges of the blades travel, while the upper surface is cut away to allow the tubular piston *c* to rotate between the core *e* and the cylinder-casing. The hollow piston *c* is open at the back and down one side in order to enable the blades *d*, mounted on a disk *f*, to penetrate into the piston during their rotation.

The casing *a* is closed at the back by a cover *g*, in which is mounted the blade-disk *f*, provided with a central cone or boss, the adjustment of the disk *f* and of the piston *c* being regulated by means of a set-screw *h*. The stuffing-boxes *i* and *k* serve to produce good joints at the points where the spindles *l* and *m* pass through the casing *a*, said spindles being supported at the other end in a common bearing *n*.

The spindle *l* is driven by means of a pulley *o*, provided with inner peripheral teeth, from which the spindle *m* is driven by a toothed wheel *p* in such manner that it has the same direction of rotation as the blade-spindle *l*. The latter is supported on the other side of the pulley *o* in a bearing *q*, and this, together with the bearing *u* and the casing *a*, is secured to a bed-plate *r*.

The working of the pump is the same as that of well-known rotary pumps, the liquid being drawn in through the opening *s* and discharged through the opening *t*. The same principle is applied in constructing a blower, gas-exhauster, or the like, only insignificant detail changes being necessary.

As already stated, the novel features of the invention consist in making the piston hollow or in the form of a hollow cylinder, thus enabling its center to lie in the circle described by the blades and in causing the piston and the blades to rotate in the same direction.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A rotary engine comprising a substantially circular working chamber, a stationary central longitudinally-recessed abutment, a series of radial blades adapted to turn about said abutment and a slotted circular tubular rotatory distributing-piston, all mounted and working within the circular working chamber substantially as set forth.

2. A rotary engine comprising a substantially circular working chamber, a stationary central longitudinally-recessed abutment, a series of radial blades adapted to turn about said abutment, a disk carrying said blades, a central spindle carrying said disk and a slotted circular tubular rotatory distributing-piston, all mounted and working within the circular working chamber substantially as set forth.

3. A rotary engine comprising a substantially circular working chamber, a stationary central longitudinally-recessed abutment, a series of radial blades adapted to turn about said abutment, and a rotatory circular tubular distributing-piston having a longitudinal slot of a width less than the depth of the radial blades, all mounted and working within the circular working chamber substantially as set forth.

4. A rotary engine of the kind described comprising a circular working chamber, a stationary central abutment, a slotted circular rotating tubular distributing-piston of an inner diameter substantially equal to the depth of the radial blades mounted within said working chamber and circularly-recessed surfaces in the inner wall of the working chamber and the opposed face of the central abutment substantially as set forth.

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

LEOPOLD VOM HOFE.

Witnesses:
OTTO KÖNIG,
F. A. RITTERSHAUS.