(No Model.) 4 Sheets—Sheet 1.

# R. F. HASSINGER.

## ROTARY PUMP.

No. 319,093. Patented June 2, 1885.

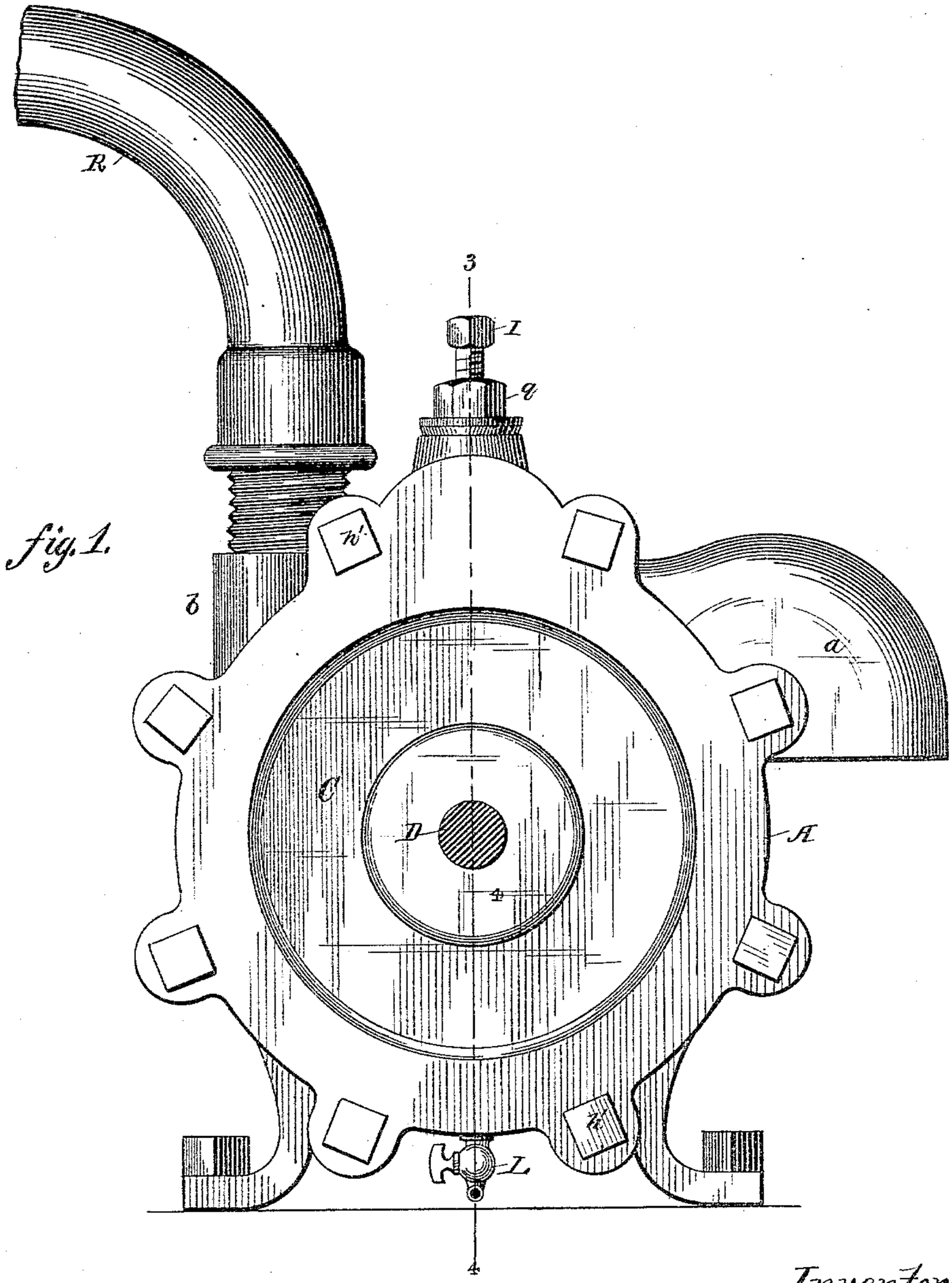



fig. 1.

Witnesses:
John G. Hinkel
K. G. Tannmann.

Inventor:
R. F. Hassinger,
By Dasler & Thuman
Attorneys.

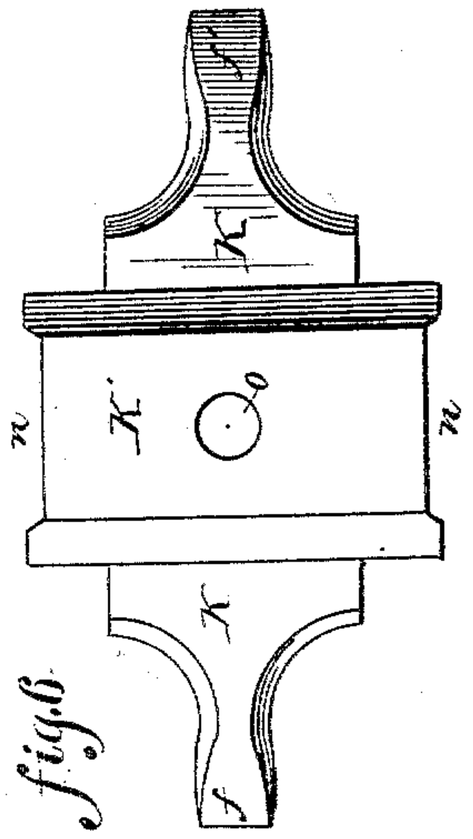
(No Model.)

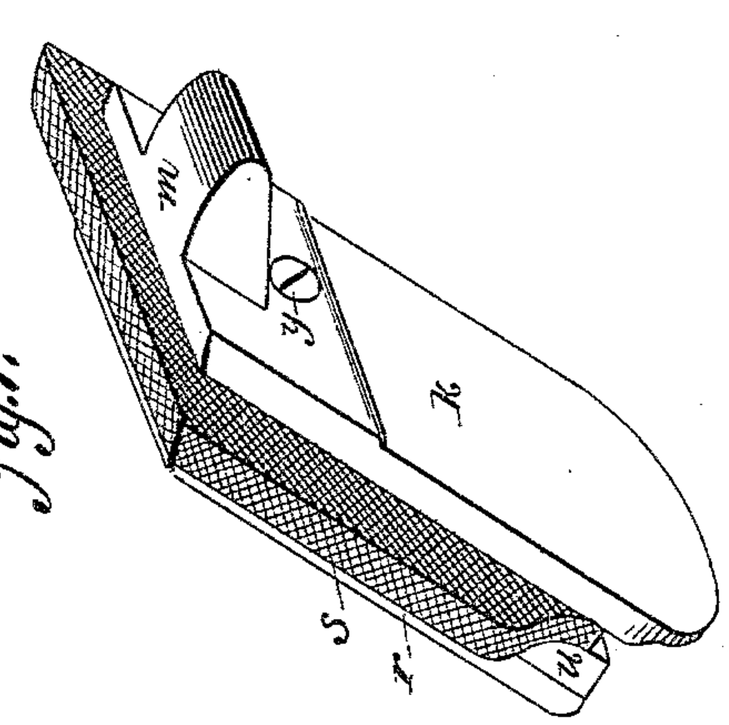
4 Sheets—Sheet 2.

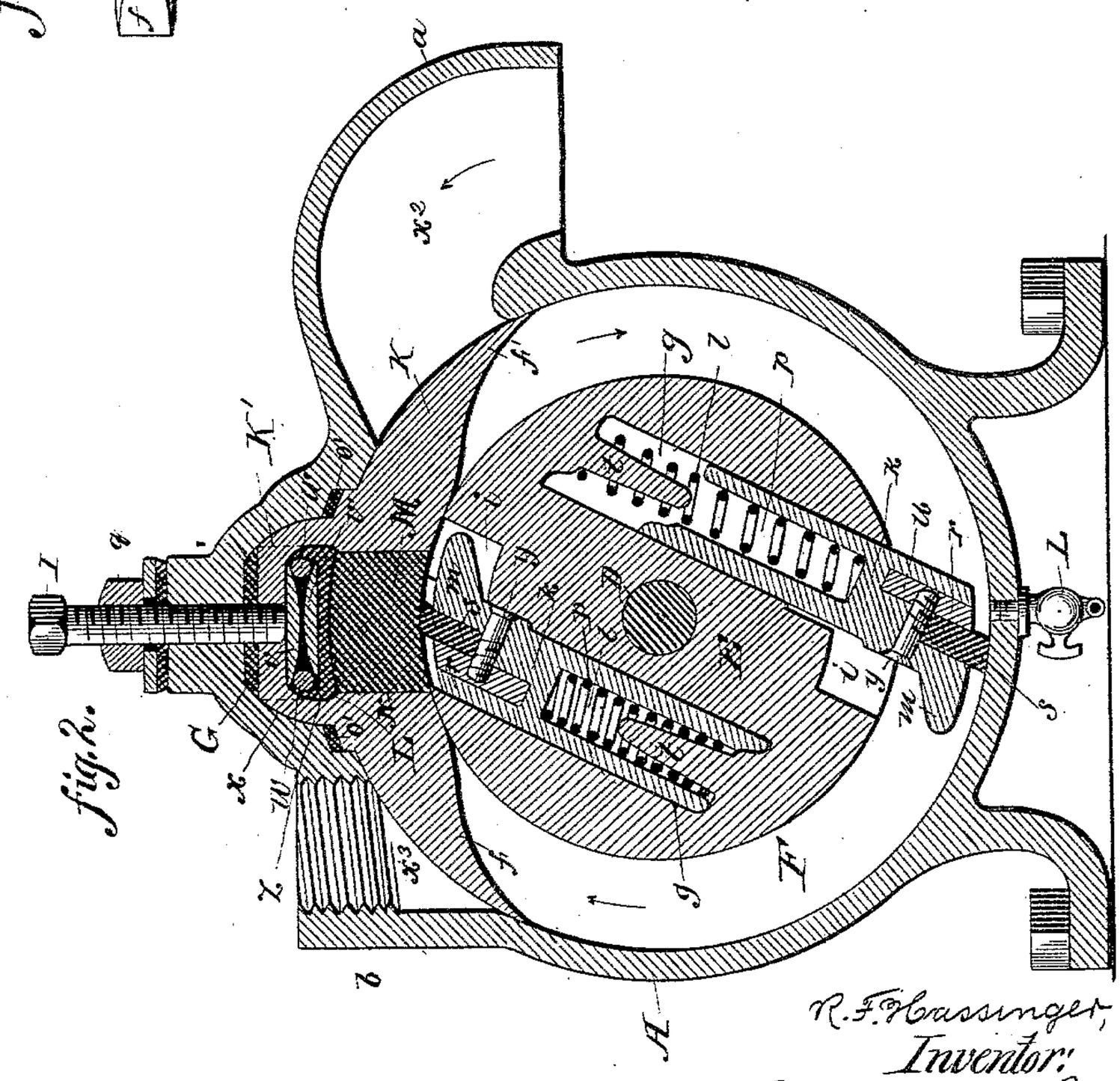
# R. F. HASSINGER.

## ROTARY PUMP.

No. 319,093. Patented June 2, 1885.




Witnesses:
John G. Honkel
L. E. Tansmann.

R. F. Hassinger,
Inventor:
By Foster & Freeman
Attorneys.

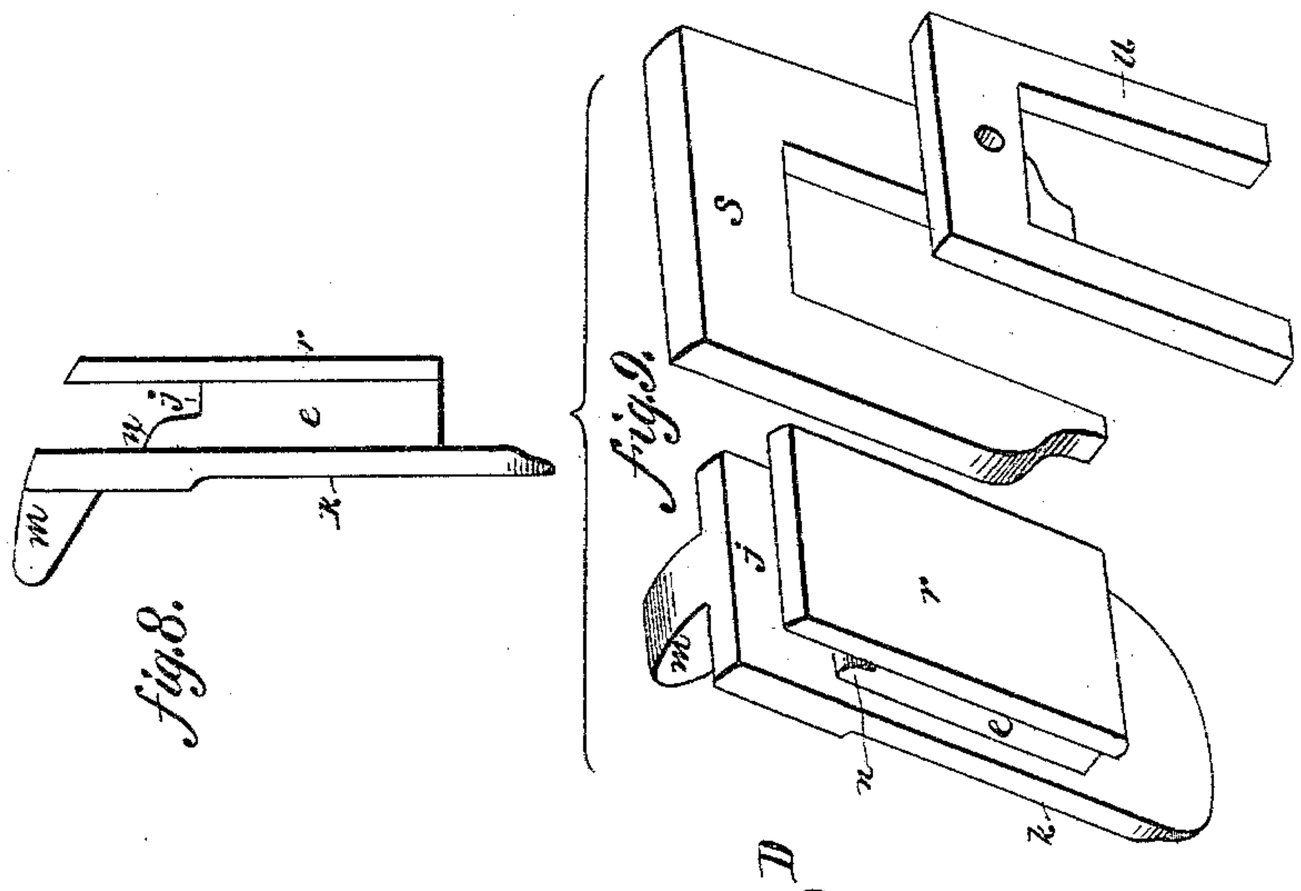
(No Model.)

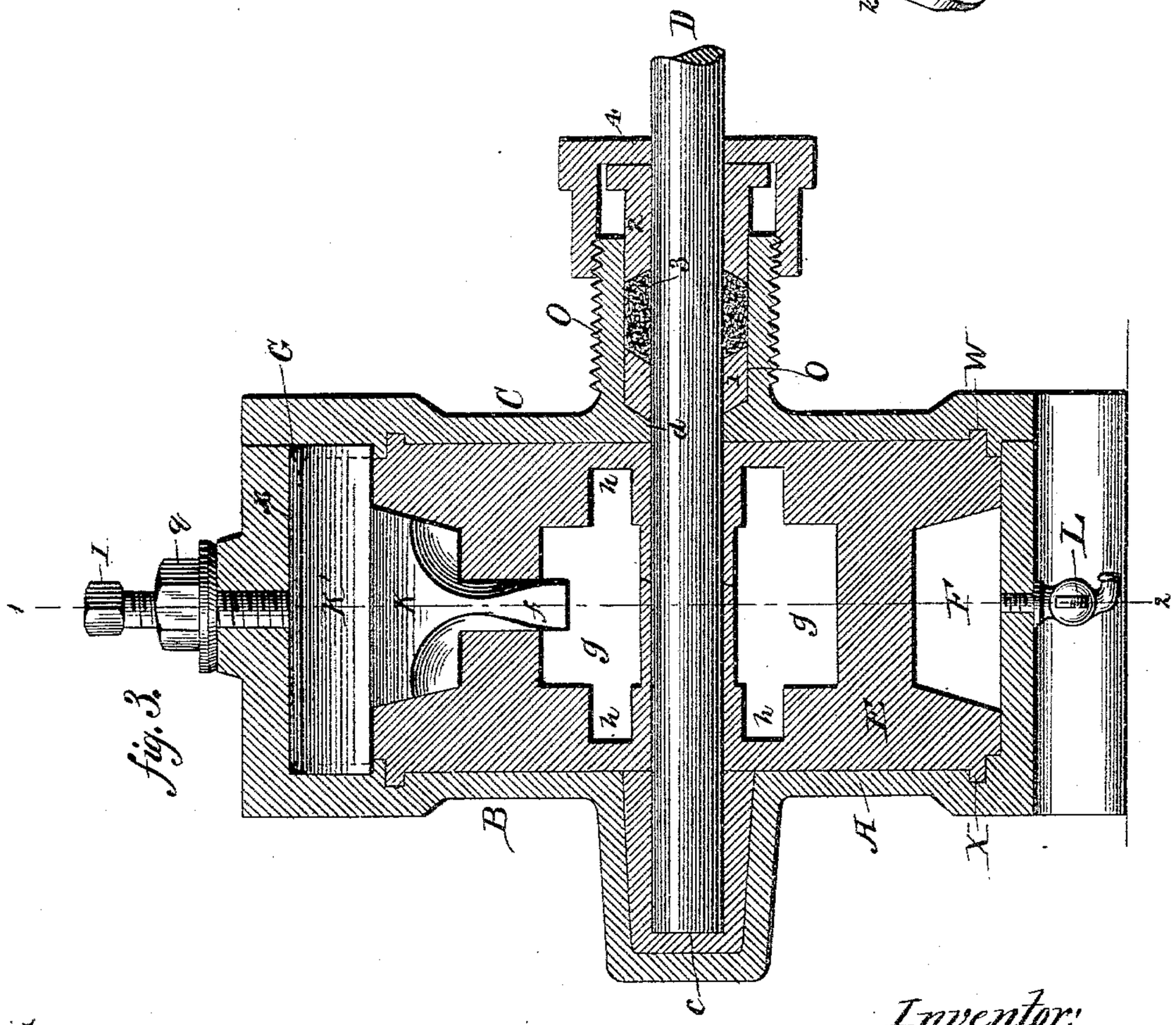
4 Sheets—Sheet 3.

# R. F. HASSINGER.

## ROTARY PUMP.

No. 319,093. Patented June 2, 1885.




Witnesses:
John G. Hinkel
L. E. Hanemann.

Inventor:
R. F. Hassinger
By Baldwin & Hopkins
Attorneys.

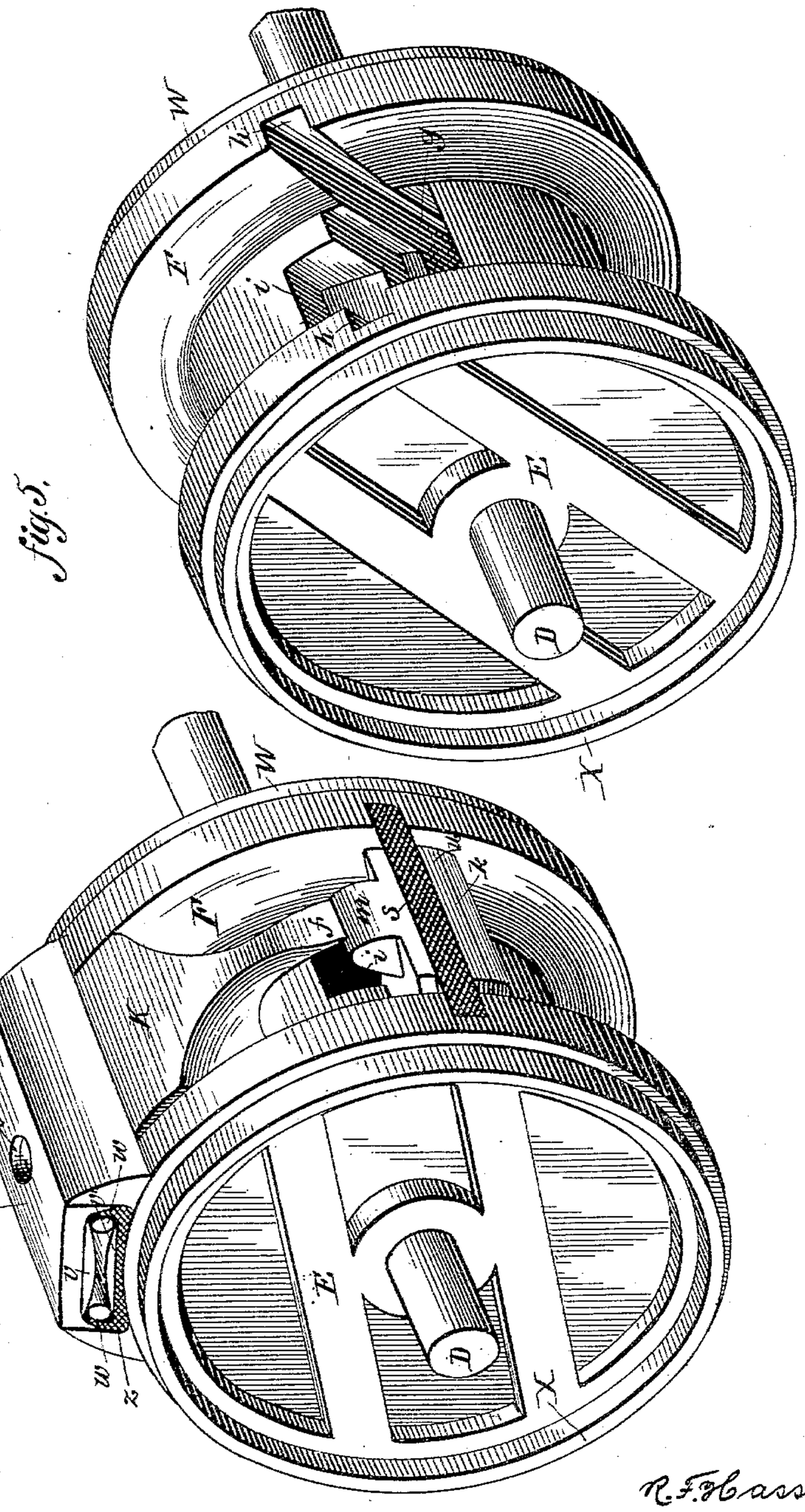
(No Model.)

4 Sheets—Sheet 4.

# R. F. HASSINGER.

## ROTARY PUMP.

No. 319,093. Patented June 2, 1885.




Witnesses:
John G. Hinkel
H. C. G. Fanmann.

R. F. Hassinger,
Inventor
By Baker & Truman
Attorneys.

# UNITED STATES PATENT OFFICE.

REUBEN F. HASSINGER, OF ADAMSBURG, PENNSYLVANIA.

## ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 319,093, dated June 2, 1885.

Application filed July 16, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, REUBEN F. HASSINGER, a citizen of the United States, and a resident of Adamsburg, in the county of Snyder and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

This invention is an improvement in rotary suction and force pumps in which is employed an annularly grooved or channeled revolving piston-carrier arranged within an air-tight casing, and provided with spring-actuated pistons sliding in suitable chambers or pockets formed in the piston-carrier, and adapted to be reciprocated back and forth therein and across the path of its encircling groove or channel, all as fully set forth hereinafter, the design of the pump being such, however, that it may also be used as a motor when properly connected and supplied with a suitable motive fluid.

The objects of the invention are to make the pump universally applicable for hand as well as power purposes under high or low speed; to avoid difficult packings and the annoyances resulting therefrom; to make the parts easily adjustable to compensate for wear without the necessity of removing the casing or otherwise dismembering the pump; to simplify the construction and operation so as to obtain an even and easy action free from the jerky motion common to pumps of this kind, and, withal, to furnish a pump which, while possessing great durability, is at the same time cheap of production.

To these ends the invention consists in the peculiar construction and arrangement of the parts of the pump, as will be more particularly described hereinafter, whereby its efficiency is greatly increased and the amount of friction of its parts diminished to a minimum, thus insuring an easy and uniform action of the pump, while at the same time a steady and strong flow of water is obtained.

In the drawings, Figure 1 is an exterior side view of a pump embodying my invention. Fig. 2 is a central cross-section on the line 1 2 of Fig. 3. Fig. 3 is a longitudinal central section on the line 3 4 of Fig. 1, the cam-block being shown in full lines. Fig. 4 is a perspective view of the cylindrical piston-carrier and the related parts, the outer casing being removed. Fig. 5 is also a perspective view of the cylindrical piston-carrier alone. Fig. 6 is a plan view of the cam-block. Fig. 7 is a perspective view of one of the pistons. Fig. 8 is an edge view of the body-piece of the piston, and Fig. 9 is a perspective view showing the parts of the piston in detail.

A represents the outer casing of the pump, which consists of an approximately cylindrical-shaped shell cast in one piece with a back plate, B, and having a removable front plate, C, which is secured to the main portion of the casing by bolts *h'* or other fastenings. At the bottom, and also formed in one piece with the casing, are legs, which support the same in an upright position, while near the upper edge, and at opposite sides of the casing, the latter is extended to constitute inlet and outlet branches *a b*. Turning in bearings *c d* in the outer plates or heads, B C, of the casing is a shaft, D, passing centrally through and fixedly secured to a cylindrical piston-carrier, E, which latter is provided with an annular bevel-edged or inwardly-converging groove, F, and two or more tangentially-arranged piston-chambers, *g*. Between the inlet and outlet branches *a b* of the casing the latter is enlarged to form a chamber, *x*, in which is adjustably supported the hub K' of a cam-block, K, provided with arms *f f'*, which latter project across ports $x^2$ $x^3$ in the casing A, said parts communicating with the branches *a b*. The sides of the body portion of the cam-block K are beveled to correspond to the sides of the groove F in the piston-carrier E, and the cam-block fits snugly into the bottom of said groove, as shown in Fig. 2. The under sides of the arms *f f'*, beginning at their point of near contact with the bottom of the groove F, are curved or inclined to the points, while their upper sides conform to the curve of the inner circular side of the casing A. The arms *f f'* are narrow, as shown in Figs. 4 and 6, and obstruct only a small portion of the inlet and outlet ports $x^2$ $x^3$. The piston chambers or pockets *g* in the piston-carrier E are each of a rectangular shape in cross-section, as shown best in Fig. 3, formed at the sides to constitute comparatively deep guide-grooves *h*, which extend to the periphery of the piston-carrier in the side walls of the annular groove F, as shown in Figs. 4 and 5. At one side of each chamber *g*, and forming

part thereof, is a recess, *i*, located centrally in the bottom of the groove F. Each chamber thus described is a separate and distinct pocket in the piston-carrier, having its length a longitudinal line parallel with a plane of tangents and located between said plane and the plane of diameters parallel with the said plane of tangents and at such proportional distances as may be desirable. These chambers or pockets open out to the periphery of the annular groove and outer circumference of the piston-carrier only at the advancing end of said pockets. This causes the spring-actuated pistons to move ahead or in advance of the pockets, and not to drag after. The said pistons, issuing through the open end of the piston-pockets, project forwardly across the said peripheral groove in line of chords of said piston-carrier, as described above. Each pocket thus described, being arranged longitudinally parallel between planes of parallel tangents and diameters parallel to each other, should be as deep as possible, so long as by opening out only at the advancing end it remains properly a pocket, having its longitudinal dimension in depth of the pocket and in line of chords in the said piston-carrier. By the arrangement of the tangential pockets and pistons, the pistons have a decidedly longer bearing, and are much less liable to become jammed in the pockets or impaired by wear, and reciprocate therein more freely. This is evident, because the radial piston is pressed against the sides of the pocket, and by reason of which the friction and wear are greatly increased; but these defects are still greatly augmented by the pistons being arranged in lines of chords like mine, but where the pistons are dragged after instead of being pushed in advance of the pockets, as in mine, where the rotary motion of the piston-carrier is the reverse with reference to the open end of the pocket. When the pump is in motion and the lip *m* of the piston reaches the arm *f* of the cam-block, it is pushed back into its pocket by almost or altogether direct pressure upon the end of the piston, having little or no side pressure upon the walls of the pockets. I regard this as one of the distinguishing and characteristic features of my pump.

For want of a term more clearly expressing my arrangement of the pockets and pistons, I employ the term "tangential." This term throughout the description and claims is to indicate, as above, pistons reciprocating and projecting forwardly across the annular groove F in a plane parallel with and located between planes of tangents and diameters parallel with each other, and at such distances, respectively, as may be desired.

Fitting loosely in each chamber *g* is a piston, *k*, which is guided therein by the grooves *h*. In the inner end of each piston is an opening, *p*, into which extends one end of a spiral spring, *l*, while the opposite end of said spring fits over and is held in place in said chamber by a pin, *t*, projecting from the bottom thereof.

To prevent the passage of water from one side of the piston-carrier E to the other through the chambers *g* therein, the latter do not extend entirely through the piston-carrier, but each is of such a depth that when the piston *k* is forced therein to the extent of its inward movement its outer edge will be flush with the bottom of the groove F, and when in this position the spring *l* is compressed within the opening *p* in the piston *k*. Each piston *k* is provided on one side with a projecting lip, *m*, which sinks in the recess *i* in the chamber *g* when the piston is forced into the latter. The pistons *k* consist each of a substantially rectangular body portion, *r*, of cast or other metal, with side grooves, *e*, and top cross-groove, *j*, a piece of packing material, *s*, approximating a U shape, and a metal key, *u*, of the same shape, as shown in Fig. 9. The U-shaped packing-piece *s* is of such a size as to fit tightly into the grooved portion of the body *r* and project considerably beyond its outer edges, and is held in its proper position in the grooves *e j* by the key *u*, which is forced into place in said grooves after the packing is placed therein, and the parts are then secured in their proper relative position by a screw, *y*.

As before stated, the guide-grooves *h* in each piston-chamber *g* extend to the outer circumference of the piston-carrier and into the side walls of the annular groove F in the piston-carrier E, and are of such a depth that the edges of the packing-block *s*, projecting beyond the sides of each of the pistons *k*, extend into said grooves to guide the piston in its reciprocating movements, and also prevent the passage of water from one side of the piston to the other. The body of the piston *k* is of the same width as the chambers or pockets *g*, and preferably about the same width as the narrowest part of the peripheral groove F, while the packing-piece *s* is considerably wider than the said groove at its widest points, and thus projecting or extending considerably beyond the sides of the annular groove into the guide-grooves *h*, so as to prevent any leaking at these points, increasing its efficiency in proportion to the pressure to be overcome.

By the peculiar construction of each chamber *g* and piston *k* it is impossible for the water in the groove F to pass into said chamber *g* in advance of the piston *k* when the latter is thrown outward under the action of the spring *p*, and then to return to said groove F behind the piston *k*, for as soon as the latter encounters the resistance of the water in its front it is pressed so closely against the rear wall of the chamber *g* and the guide-grooves *h* as to cut off all communication through said chamber. When the piston *k* is thus pressed backward by the resistance of the water in advance of it, it will be seen that the projecting edges of the packing-block *s* are in like

manner forced against the sides of the guide-grooves *h* with the effect just described. In this manner any leakage from one side of the piston-carrier E to the other through the piston-chamber *g* and guide-grooves *h* is prevented. The arms *f f'* of the cam-block K are joined at their inner extremities by the hollow hub K', which is of an approximately U shape, and fits nicely in the chamber *x*, formed in the upper portion of the casing A, and is adjustably held therein by a supporting-screw, I, passing through the top of said chamber *x*, and also through a threaded opening, *o*, in the top of hub K'. The screw I carries a nut, *q*, the turning of which serves to lift the cam-block K within the chamber *x* and compress packing-strips *o' o'* G between the hub K' of said cam-block and the casing, forming a complete packing between the hub and the casing. In a chamber, N, within the hub K', is arranged an abutment or packing-block, M, which fits tightly into and against the sides and bottom of the groove F in the piston-carrier E, and thus it, together with the packing above it and that between the casing and the cam-block, shuts off all communication between the inlet and outlet ports $x^2$ $x^3$ at the top of the casing A. Within said chamber N, above the block M, and extending entirely across the piston-carrier E, is placed a strip, *z*, of any suitable packing material, with upwardly-turned ends, as shown in Figs. 2 and 4. Above the strip *z* are two metal plates, *v* and *v'*, each having one flat and one convex face, and so arranged that said convex faces are opposite and toward each other. Between the convex faces of these plates *v* and *v'*, and near the outer edges thereof, are interposed metallic cylindrical rods *w w*. By this construction, when the screw I is brought to bear forcibly upon the center of the upper plate, *v*, within the hub K', the plates *v v'* approach each other, and the cylinders *w w* are forced apart and thus spread the packing-strip *z* within its chamber to make a perfectly-tight joint. By the continued downward movement of the screw I the parts arranged above the packing-block M are brought to bear thereon, and force the same down into the groove F, so that as said block M wears away by its contact with the surfaces of the beveled-edged or inwardly-converging groove F its wear and also that of the strip *z* and the entire packing above the block M are alike compensated for. In addition to the screw, a spring may be interposed between the screw and the upper plate, *v*, in order to secure a more even tension.

To provide a yielding bearing for the hub K' of the cam-block within the chamber *x*, and at the same time prevent the passage of water between the upper surface thereof and the roof of said chamber, in addition to the strips *o' o'*, I interpose between the two parts at this point a strip, G, of packing material. This strip G is considerably longer than the width of the hub K', so that its ends may be turned down to close the open ends of the chamber N formed within said hub, and thus also prevent the passage of water between the outer casing and ends of hub K' and into said chamber N. The edges of the hub K' are slightly cut away at *n* to receive the downturned ends of strip G.

To prevent leakage between the heads B C of the casing A and the piston-carrier E, I provide the ends of the latter each with an annular rib, X, fitting nicely into a corresponding groove, W, formed in said heads, and if the parts should work loose at these points suitable packing may also be supplied; but ordinarily, when the parts are nicely fitted together, packing is not necessary, as the construction described will be sufficient. The efficiency of this construction, however, may be greatly augmented by the use of thread-like annular grooves both in the cylinder-heads and ends of the piston-carrier, forming a water-packing. The head C of the outer casing is provided with a stuffing-box, O, through which one end of the shaft D works, and surrounding the latter within said stuffing-box is a bevel-edged metallic sleeve or ring, 1, between which and a follower, 2, also having its inner edge beveled, is a packing, 3, which latter is compressed around shaft D by forcing the follower 2 inward by means of a screw-cap, 4. It will be seen that by the beveled edges of the collars 1 and 2 the packing is more tightly wedged against the shaft D than the inner wall of the stuffing-box O, so that as the packing wears away against the surface of the revolving shaft it can easily be tightened.

To prevent the water contained in the pump from freezing during cold weather, I provide the casing at its lowest point with an escape-cock, L, by which the water can easily be drawn off when the pump is not in use.

This pump is designed principally as a suction or force pump, or both combined; but it will be apparent that it may also be used as a motor when properly connected with a source of power—such as steam, compressed air, or other suitable medium.

In the use of the pump for ordinary purposes, the inlet branch *a* is connected in the usual manner with the source of supply, while the outlet branch *b* is provided with a spout, R, or a hose or other connection may be attached directly to the threaded end of said outlet branch *b*, depending of course upon the service desired. To the shaft D in this instance is secured a suitable handle or a pulley, by which the pump is put in operation. As the piston-carrier revolves in the direction of the arrows shown in Fig. 2, the pistons *k* are successively thrown outward under the action of the springs *l* as they pass from under the arm *f'* of the cam-block K opposite the inlet branch *a*, completely closing the channel F surrounding the piston-carrier E. As the piston-carrier E continues to revolve, a sucking action takes place behind the piston *k*, thus drawing

the water in through the inlet branch *a*, and as the succeeding piston passes from under the arm *f'* of the cam-block it forces forward the water which has already entered the channel F of the pump, while at the same time drawing the water in from the rear. The piston *k*, upon reaching the arm *f* crossing the opening in the outlet-branch *b*, is by the contact of its lip *m* with the under surface of said arm forced into its chamber. It will be seen that the principal part of the pressure brought to bear on the piston *k* by its contact with the arm *f* is exerted on the lip *m*, so that the latter takes up the greater part of the wear at this point, and thus protects the packing *s*. As the piston *k* passes from under the cam-block K on the opposite side, it moves outward until it closes the channel F, and the operation above explained is repeated. By the construction set forth I obtain a steady and uniform flow of water without the necessity of an air-chamber, and the consequent loss of force and speed common to other pumps, especially to all oscillating pumps, the advantage of which will be the more striking the deeper the well is. I at the same time avoid the occasional shocks and jerky motion usually incident to pumps of this character.

From the peculiar construction of the piston-carrier and pistons it is apparent that the leakage or backflow of the pump is smaller in proportion as the height increases to which the water is to be raised.

When it is desired to use the pump as a motor, the shaft D is provided with a suitable driving-pulley, which is connected in the usual manner to the object to be driven. In this instance the motive fluid is admitted to the pump in the same manner as that before described in its use for suction and force purposes. As the motive fluid enters the pump and passes around through the channel F until the outwardly-thrown pistons *k* are reached, the piston-carrier E is made to revolve, thus imparting motion to the shaft D, from which the power is conveyed in the manner indicated.

Without limiting myself to the exact construction and arrangement of parts described and shown and covering the principles contained in the invention,

I claim—

1. A pump provided with a cylindrical casing having inlet and outlet ports, and a recess formed between said ports by an upward extension of the casing, and a cylindrical piston-carrier provided with an inwardly-converging peripheral groove and tangential sliding pistons, and a cam-block with narrow arms crossing said ports, approximately fitting and adjustably supported within the said recess and the said peripheral groove, substantially as described.

2. A pump provided with a cylindrical casing having inlet and outlet ports, and a recess formed between said ports by an upward extension of the casing, and a cylindrical piston-carrier provided with an inwardly-converging annular groove, and tangential sliding pistons projecting forwardly across said groove, and a cam-block having a hollow body portion approximately fitting and adjustably supported within said recess and the said peripheral groove, and terminating in narrow arms crossing said ports, and an adjustable packing-block fitting and closing the said recess in the cam-block and the said groove between said ports, substantially as described.

3. A pump provided with a cylindrical casing having inlet and outlet ports, a cylindrical piston-carrier provided with an inwardly-converging peripheral groove, and tangentially-arranged piston-chambers with guide-channels extending to the edges of the outer walls of said groove, and a cam-block provided with an upwardly-extending hollow body portion adjustably fitting and supported within a recess in said casing between said ports, and a packing-block fitting adjustably within said hollow portion of the cam-block and closing said peripheral groove, and a screw for forcing said cam-block and packing into said groove, and spring-actuated pistons sliding and fitting within said chambers and provided with side extensions fitting said guide-channels, substantially as and for the purpose set forth.

4. A piston-carrier having an annular groove with beveled sides, and tangentially-arranged piston-chambers with guide-channels extending to the edges of the outer walls of said groove, in combination with spring-actuated pistons sliding and fitting within said chambers, and each having side and end grooves, and a packing-block arranged within said grooves and projecting beyond the body of the piston, the side extensions fitting and sliding in said guide-channels, substantially as and for the purpose set forth.

5. The combination of the hollow body of the cam-block with the packing-block M, packing-strip *z*, shaped as shown, and metal plates *v v'*, each having approximately-convex surfaces, and the metallic cylinders or rods *w w*, interposed between the said convex surfaces and the upturned sides of strip *z*, and means for compressing said parts within the hollow cam-block, substantially in the manner and with the effects specified.

6. The chamber or recess in the top of the casing between the ports, in combination with the body portion of the cam-block K', packed therein by interposing and arranging the packing-strips *o' o'* G between the said cam-block and the roof of said recess, and compressed by means of the screw I and the nut *q*, forming a convenient and effectual packing, substantially in the manner and for the purpose specified.

7. The combination, in a rotary pump, of the casing having a chamber arranged between the inlet and outlet ports by an upward extension of said casing, and a revolving piston-carrier provided with a wedge-shaped peripheral groove and sliding pistons, and a cam-block provided with tapering arms connected

by an upwardly-extended hollow body portion, K′, fitting into said chamber and packed therein by compressing between it and the roof of said chambers the packing-strips *o′ o′* G by means of screw I and nut *q*, and the packing-block M, packing-strip *z*, plates *v v′*, and metallic cylinders or rods *w w* within said cam-block and upon the periphery of the said piston-carrier, by the means supporting the said cam-block within said recess and the said peripheral groove, substantially as described.

8. The revolving chambered piston-carrier provided with pistons, each having side and end grooves, and a U-shaped packing consisting of one piece, and a U-shaped key, *u*, fitting said side and end grooves, and means for securing the parts together, substantially as described.

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

REUBEN F. HASSINGER.

Witnesses:
DAVID REICHLY,
G. M. SHINDEL.