No. 631,691. Patented Aug. 22, 1899.

A. BLOT.

ROTARY MOTOR WITH CONJUGATE HELICES.

(Application filed Apr. 12, 1898.)

(No Model.) 3 Sheets—Sheet 1.

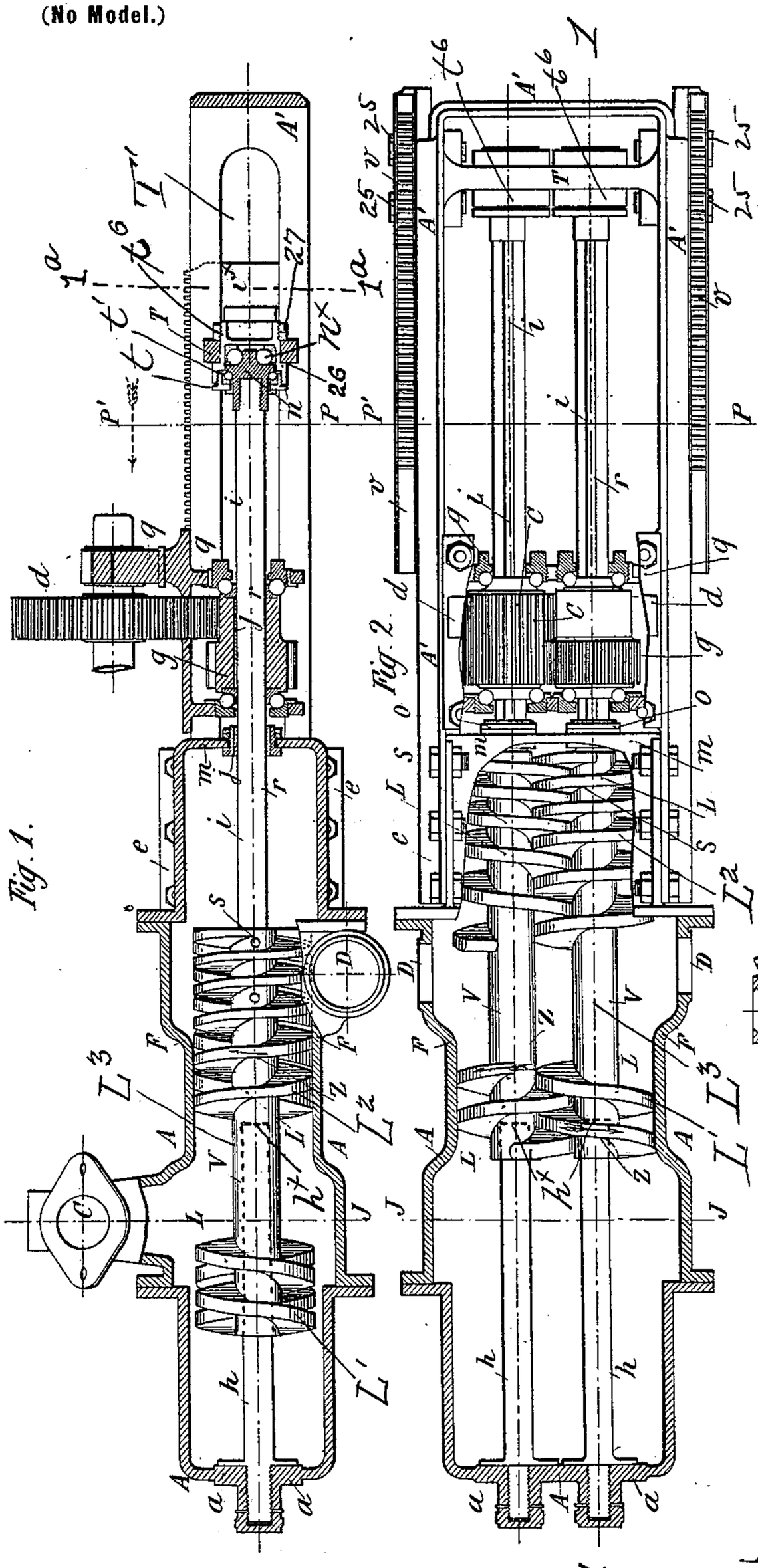

Fig. 1.

Fig. 2.

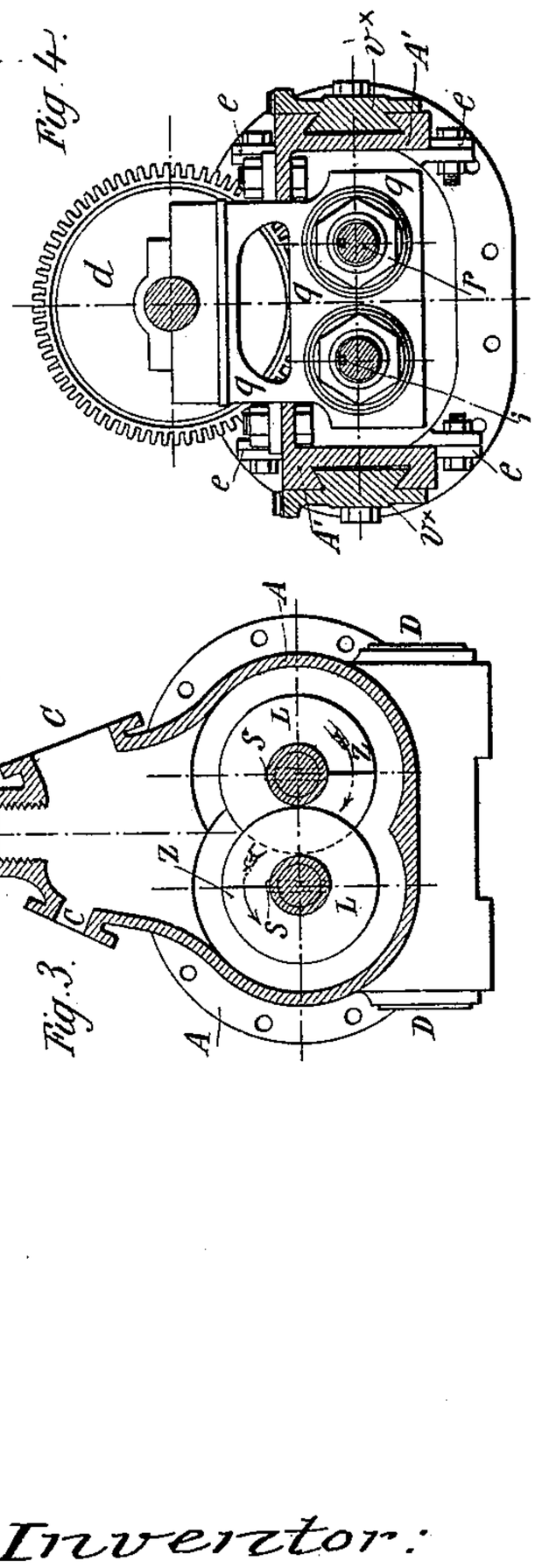

Fig. 4.

Fig. 3.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 1a

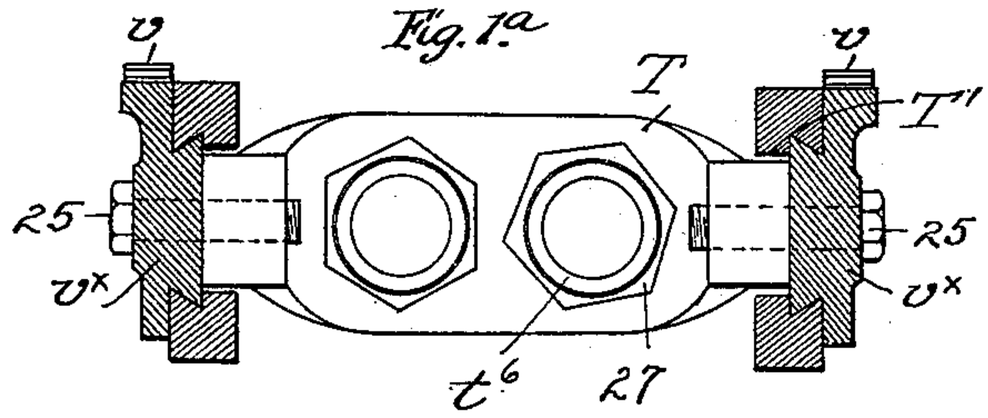


Fig. 7

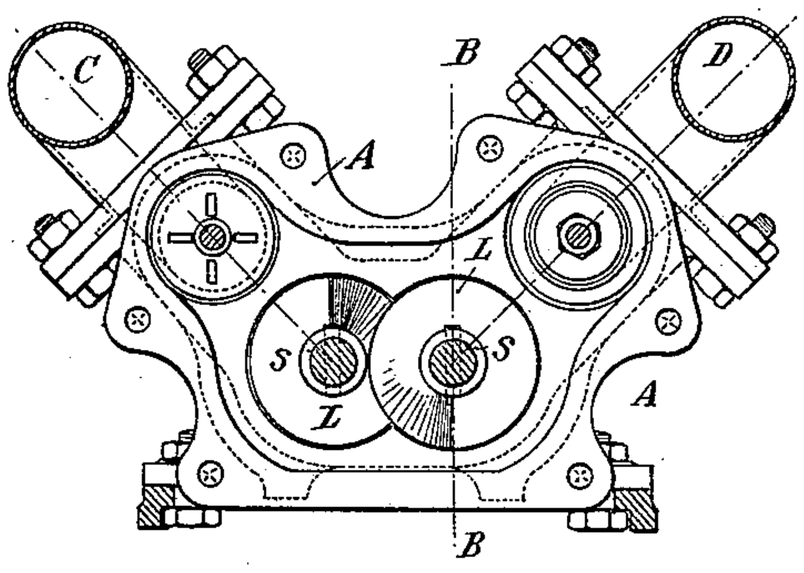


Fig. 10.

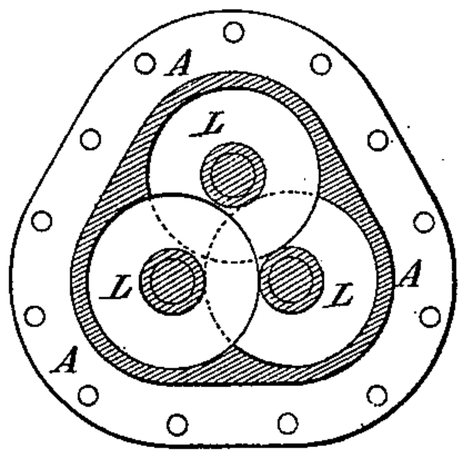


Fig. 8.

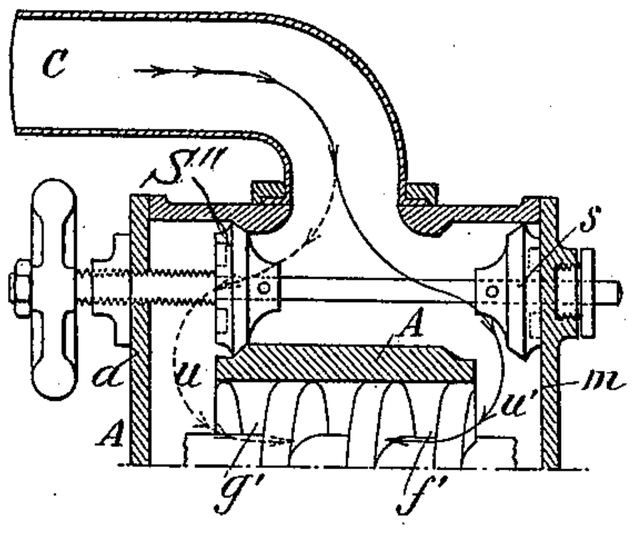
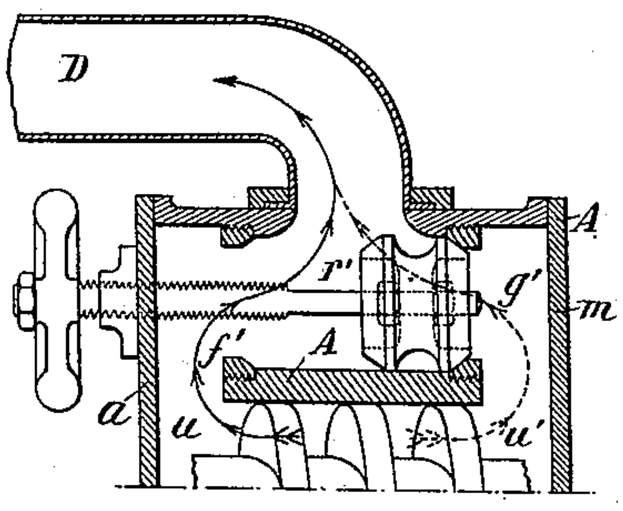


Fig. 9.



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No. 631,691. Patented Aug. 22, 1899.

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(Application filed Apr. 12, 1898.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

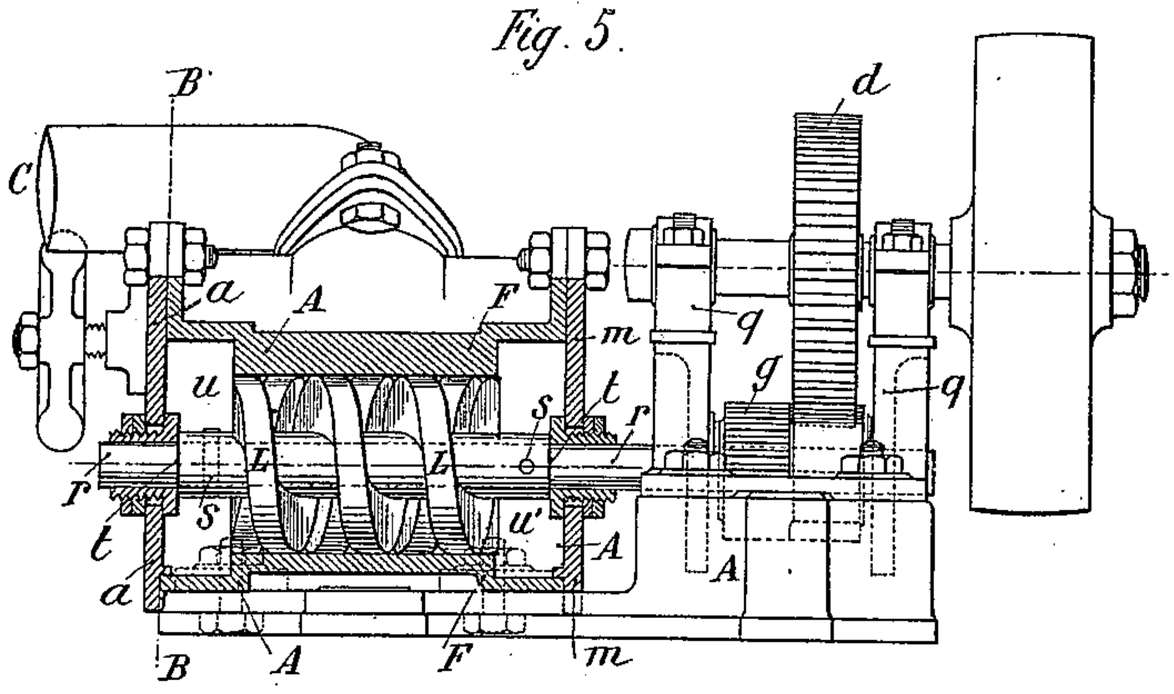
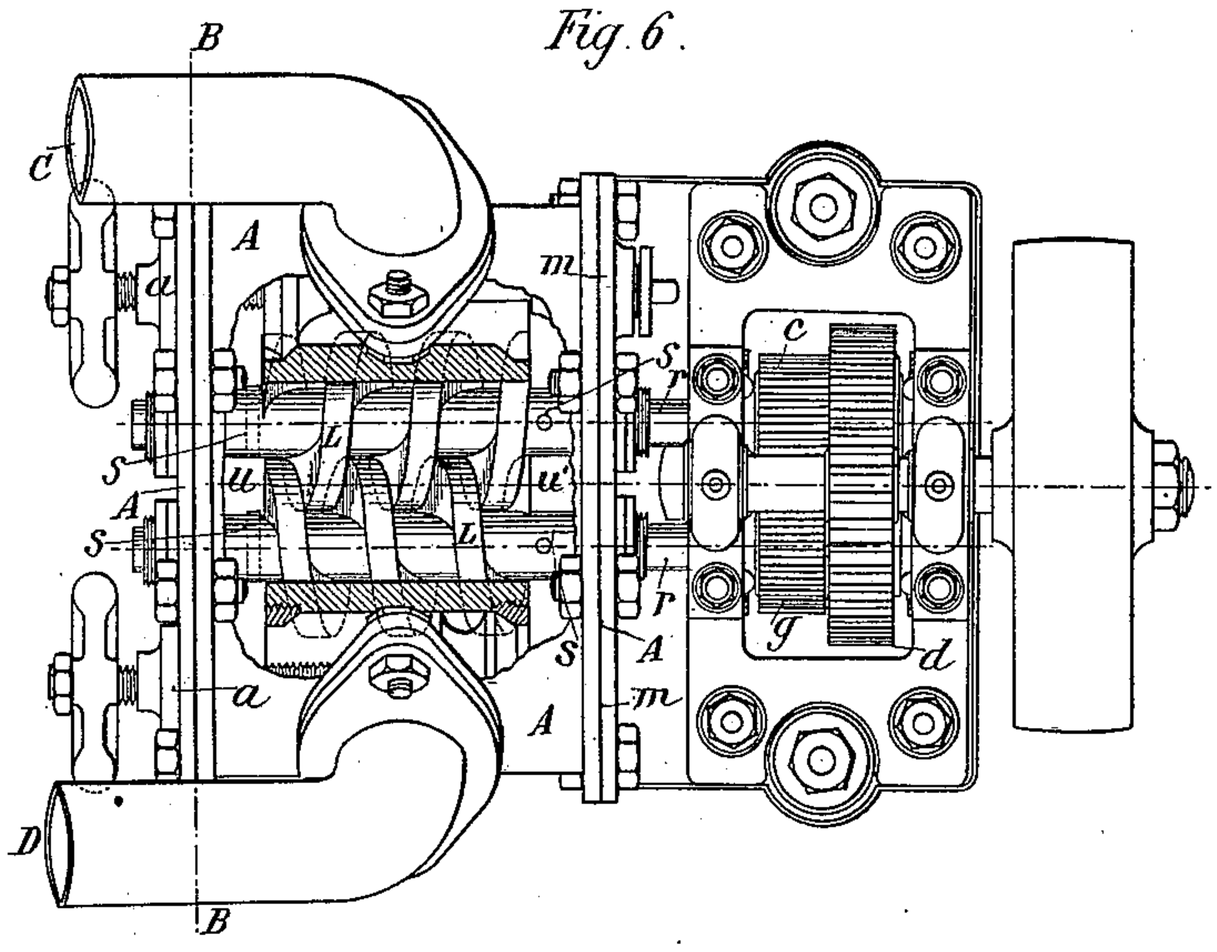


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALPHONSE BLOT, OF PARIS, FRANCE.

ROTARY MOTOR WITH CONJUGATE HELICES.

SPECIFICATION forming part of Letters Patent No. 631,691, dated August 22, 1899.

Application filed April 12, 1898. Serial No. 677,369. (No model.)

To all whom it may concern:

Be it known that I, ALPHONSE BLOT, residing at No. 40 Rue des Martyrs, Paris, in the French Republic, have invented certain new and useful Rotary Motors with Conjugate Helices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

If one placed inside a cylinder a screw or helix with coils or spires the exterior diameter of which should be practically equal or very slightly inferior to that of the said cylinder and caused a fluid in motion or under pressure to enter the cylinder, the main part of the motive energy of the fluid would be unutilized. The fluid, in fact, after having acted on the first coil or spire of the screw or helix would simply follow along the free space between the internal surface of the cylinder, the surface of the screw in contact therewith and its axis or bottom of the thread, and escape at the other end of the cylinder, producing but an insignificant amount of effective work. Now I have invented a motor in which I utilize completely the action which a fluid under pressure or in motion can exert on a screw. I attain this by employing, instead of a single helix or screw, two or several conjugate helices or screws incased in one and the same sheath, which obviously surrounds all. The coils or spires of each helix or screw are interlocked or engaged in the intervals left between each other by the successive spires of the neighboring conjugate helix, and these screws are parallel, so as to have no point of contact between them. Thus interlocked they present perfect resistance to deviation of the fluid mass under pressure or in motion and receive all its energy for transformation into motive power. In short, in the motor which forms the subject of the present application for a patent the conjugate screws or helices act as organs of transformation in the place of such organs as piston and crank, turbine, paddle, &c.

The motor which I have invented is characterized in particular by the arrangement of a "working chamber," into which, by the aid of a special sliding carriage, one can introduce at will the different portions of helices or screws of which the pitches are interrupted and variable and which permits of varying the speed of the motor and of reversing the motion by introducing into the said compartment portions of helices coiled in opposite directions.

My invention is illustrated in detail in the accompanying drawings.

Figure 1 is a longitudinal vertical section on line 1 1 of Fig. 2 with parts in elevation. Fig. 1^a is a detail view of a section on line 1^a 1^a of Fig. 1. Fig. 2 is a plan view, partly in section. Fig. 3 is a cross-section on line J J of Fig. 1. Fig. 4 is a cross-section on line P P′ of Fig. 1, looking from the right. Fig. 5 is a side elevation, and Fig. 6 is plan view, of a modification, partly in section. Figs. 7, 8, and 9 are detail views of Figs. 5 and 6. Fig. 10 is a detail of a modification.

A A′ is a frame comprising a body or conduit A, surrounding the group of helices or set of screws L and fitting closely onto the exterior outline thereof, the part A′ of this frame serving more generally as support for the bearings of the axles of the said screws and the toothed wheels *g* and *o*, by which the motion is transmitted to the cog-wheel *d*, mounted on the driving-axle. The fluid entering the conduit by the orifices C escapes, after having operated the screws, by the orifices D. The narrow part A F of the conduit constitutes what I call the "working chamber." It is in this compartment that the action of the fluid on the helices or, vice versa, of the helices on the fluid will be produced and manifested by a rotation of the axles of the said screws. In this chamber the conduit fits very closely, with or without contact, according to the nature of the fluid, to the outline of the exterior cylindric parts of the helices. In the rest of the conduit the helices can turn freely, not being subjected to the action of the fluid.

In the lid or cover of the conduit A two sockets *a a* each receive a rod *h*, the end of which is screwed into the said socket. These rods serve as guide and pivot for the bores or hollow axles of the screws L, into which they extend, as indicated in dotted lines in Figs. 1 and 2, to the point $h^{\times}$. The rods *h* are themselves hollow and can serve as a vehicle or receptacle for a lubricating substance to

grease the helices. The other end of the boss of the helix is keyed, by means of keys *s s*, onto an axle *r*, which is prolonged outside of the said screw, the fore end being screwed into a head *n*, capable of turning on balls in an abutment-slide T. This last can receive a longitudinal movement on the frame A′ by means of the guide-block $v^{\times}$, which carries a rack which can be caused to move mechanically or by hand by any suitable device. This slide T consists of a plate or bar extending across from one side of the frame A′ to the other. The sides of the frame are slotted, as shown in Figs. 1 and 1ª, at T′, and portions of the slide extend into these slots, where connection is made by screw-bolts 25 with blocks $v^{\times}$, carrying racks *v*. The slide T is formed with openings, in which are seated casings t^6. These have a shoulder 26 resting against the face of the slide, and nuts 27 hold the casing in place. There are two of these casings—one for each shaft—and ball-bearings $n^{\times}$ are held by the casings t^6 and lie between the said casing and the heads *n*. Ball-bearings *t′* are also arranged between the head and caps *t*, which are screwed into the front of the casings t^6.

Axles *r* carry, respectively, the two pinions *g* and *o*, of similar dimensions. These pinions are keyed on the axles, or they are furnished with a key *j*, which fits into a groove *i* of this axle. This latter device, which is that which I have represented in Figs. 1 and 2, enables longitudinal movement with the sliding carriage T of the screws L, leaving the toothed wheels *g* and *o* fixed, which are only moved by the rotary motions of the screws and axles *r*, on which these last are keyed. Gearing the wheels *g* and *o* assures parallelism of motion of helices L, which thus turn without their coils ever having the least point of contact. One of the wheels *g* or *o* will communicate motion to the wheel *d*, keyed on the driving-axle, intended to transform into motive power the effective work furnished it by the fluid and special organs of transformation which I have just described.

q is a bearing for the driving-axle. This bearing can be fixed to the frame A′ of the motor, brackets forming one with the base of this bearing and can receive ball-bearings for the toothed wheels *g* and *o*, Figs. 1 and 2.

The helix can be interrupted on a part V of its length of axle in order to form a neutral zone. When this zone is passed in the narrow part A F, the fluid entering by the orifices C will flow away by the openings D without working the helices. The helix thus divided into two parts L′ L^2 by a neutral zone L^3 will be able to have spires coiled in opposite directions on the two parts, as represented in Figs. 1 and 2. The result is that the direction of rotation of the driving-axle will be reversed, according as by movement of the sliding carriage T the fore or hind part of the screws is engaged. The pitch of the screw instead of being regular can be accelerating in accordance with a fixed law, and one can vary the speed of the motor by introducing into the narrow part A F a portion of the screws with more or less quick pitch.

In the example of Figs. 5 to 9, by which I have represented a rotary motor with two helices of constant pitch—that is to say, a motor with constant speed susceptible of acting as a pump—the same letters as in Figs. 1 to 4 indicate similar organs. In this example a compartment *u* is located at one end of the narrow passage A F, and a second compartment *u′* is located at the other end of said passage. The ends of the compartments are closed by the plates *a* and *m*.

Figs. 8 and 9 are sectional views of modifications of means by which the fluid is directed to either one or the other of the compartments *u u′*. In Fig. 8 the valve S′ is open and the valve S″ closed, so that the fluid enters at the right by way of the compartment *u′*, as shown by the arrow. In Fig. 9 a single valve is used, as at *r′*, and this is in position to direct the fluid to the compartment *u*.

Fig. 10 represents the position the helices or screws might occupy in the working chamber of a motor with three helices or screws.

I claim—

1. A rotary motor comprising a casing having a working chamber, and a shaft having screws or helices thereon with a neutral zone between them said shaft being adjustable to bring either helix or screw into the working chamber, substantially as described.

2. In combination, the casing having the working chamber and a shaft therein having helices or screws coiled in opposite directions and with a neutral zone between a part of the screw or helix having a variable pitch, and the said shaft being adjustable to bring either screw into the working chamber, substantially as described.

3. In combination, the casing having a working chamber, the two shafts extending therethrough, conjugate screws having a variable pitch, parts of said screws being coiled in opposite directions, and means for adjusting the shafts to bring the different parts into the working chamber, substantially as described.

4. In combination, the casing having the working chamber, the shaft therein having the screw or helix thereon, and means for moving the shaft longitudinally, said means consisting of a cross-head or sliding carriage to which the shaft is connected and the racks connected to the cross-head, whereby different parts of the screw may be located in the working chamber.

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

ALPHONSE BLOT.

Witnesses:

EDWARD P. MACLEAN,

ANDRÉ MOSTICKER.