(No Model.)

F. SCHRÖDER.

ROTARY MOTOR OR PUMP FOR STEAM, WATER, OR COMPRESSED AIR.

No. 493,844. Patented Mar. 21, 1893.

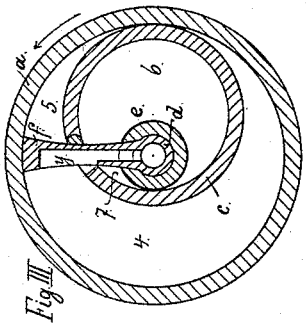

Fig III.

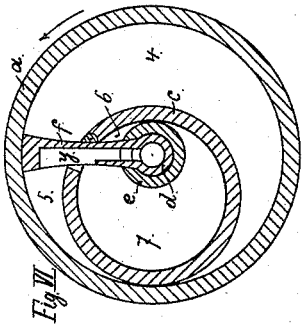

Fig III.

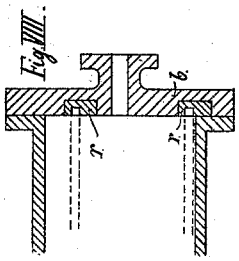

Fig IIII.

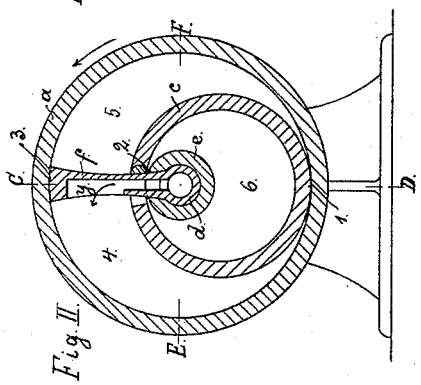

Fig II.

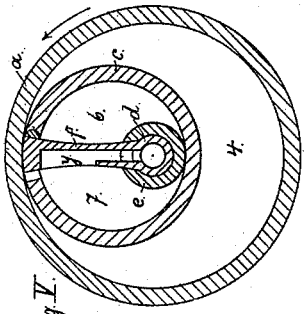

Fig V.

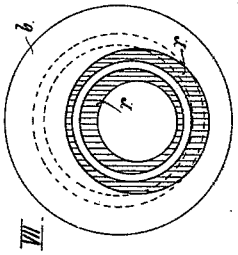

Fig III.

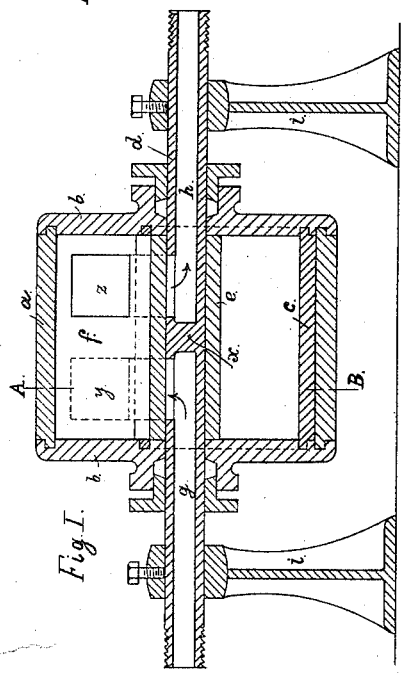

Fig I.

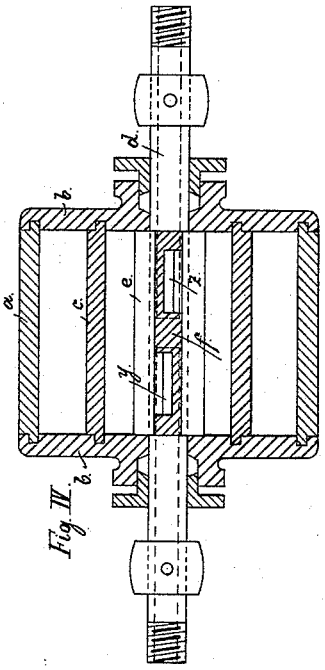

Fig III.

Witnesses:

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per

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UNITED STATES PATENT OFFICE.

FERDINAND SCHRÖDER, OF PRITZWALK, GERMANY.

ROTARY MOTOR OR PUMP FOR STEAM, WATER, OR COMPRESSED AIR.

SPECIFICATION forming part of Letters Patent No. 493,844, dated March 21, 1893.

Application filed May 6, 1892. Serial No. 432,041. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND SCHRÖDER, a subject of the King of Prussia and German Emperor, and a resident of Pritzwalk, Germany, have invented a Rotary Motor or Pump for Steam, Water, or Compressed Air, of which the following is a specification.

My invention, as hereinafter particularly described, is a rotary motor or pump, in which by an alternate extension and reduction of the working spaces, the sucking and the forcing of the machine will be effected.

In the accompanying drawings, the invention is shown in Figures I to VIII. Fig. I shows a longitudinal section on the line C—D of Fig. II. Figs. II, III and V, VI show cross-sections on A—B of Fig. I in four different positions. Fig. IV shows a section on E—F of Fig. II; and Figs. VII and VIII show the device for adjusting the cylinder *c*.

The machine or pump consists of two principal parts: first, an outer cylinder *a* with the front sides *b b*, and with an inner cylinder *c* which is guided in annular grooves as shown in Figs. VII and VIII on the front sides *b*, eccentrically to the axis of the outer cylinder, so that the inner cylinder with its outer surface fits closely and tightly to the inner surface of the outer cylinder; second, a stationary hollow shaft *d*, of which the channels *g* and *h* are separated from one another by a cross-piece *x*. On this shaft a cylinder *e* and a wing *f* are provided. The shaft *d*, cylinder *e*, and wing *f* are united fast to one another. Through the wing *f* a canal *q* is made from the one side into the passage *g*, and from the other side, a passage *z* is conducted into the passage *h* of the shaft *d*, as shown in Figs. I and IV. The outer cylinder *a* turns centrally on the hollow shaft *d*, and is made tight on the shaft in the front sides by means of stuffing boxes. The inner cylinder *c* is slit for the passage of wing *f* and is made tight to the wing in the slit on the side of the space 5, Fig. II.

In order to avoid, chiefly in the position shown by Fig. III, any cramping of the wing on the cylinder *e*, and thus to allow the cylinder *c* always to slide uniformly up and down on the wing, and not to cause any noise even at a quick motion, the flanks of the wing must be bent in on both sides. The shaft *d* has its fast bearings on two standards *i*, *i*, or on a frame of any suitable form, so as not to allow a turning of the shaft.

If the above described parts are combined as shown in Figs. I and II of the drawings, then at the points 1, 2 and 3 a tightening will be effected, and in the interior of the pump will be formed two spaces, 4 and 5, of equal capacity, and the space 6. If now the outer cylinder *a* with the inner cylinder *c* is turned in the direction of the arrow for forty-five degrees, so that Fig. II will become transformed into Fig. III, then space 4 has extended itself, and space 5 has reduced itself. The space 6 has also reduced itself, and space 7 has been formed. The spaces 4 and 7 during this occurrence have sucked gas or liquids through the canal *y*, while the spaces 5 and 6 have forced away their contents through canal *z*. If the cylinder *a* is turned further forty-five degrees, so as to produce Fig. V, then the space 4 has reached its greatest capacity, and space 5 has disappeared; the spaces 6 and 7 have reached the same capacity, consequently, a further sucking in spaces 4 and 7 through canal *y* has taken place, while space 5 has delivered its whole contents through canal *z*, and space 6 continues to force away its contents through canal *z*. In the position, Fig. V, a change of the spaces 4 and 5 will take place, for, at the further turning of the cylinder *a* for forty-five degrees into the position, Fig. VI, the space 4 which up to the position, Fig. V, has reached its largest capacity, enters into communication with the canal *z*, and now forces away through the same the volume sucked in through canal *y*. Space 5 in Fig. VI has forced away its contents through canal *z*, and now commences to suck again through canal *y*. In Fig. VI, the space 6 has almost disappeared, and space 7 has always continued to become larger. If now by further turning for forty-five degrees a full rotation of the outer cylinder has been completed, then again, the position Fig. II will be reestablished, in which position the space 6 has disappeared, and the space 7 has reached its largest capacity. In the position of Fig. VI, the space 4 which up to the position of Fig. V had obtained its largest contents, enters into communication with the canal *z*, and by the same forces away the volume sucked

through y. 5 in the position of Fig. VI has its contents forced away through z, and from there commences to suck again through y. In Fig. VI the space 6 has almost disappeared, and 7 has gradually become larger. If now a whole rotation be accomplished by further turning for forty-five degrees the outer cylinder a, then again will result the position shown in Fig. II, in which 7 has disappeared, and 6 has obtained its largest capacity. It thereby follows that at each rotation of the machine all spaces which form themselves anew will fill with gas or liquid sucked through the canal y; and all spaces which diminish and finally disappear will force away their contents through the canal z at the change of spaces 6 and 7 in Fig. II, the spaces 4 and 5 will reach their greatest efficiency, whereby the dead play in both positions will be avoided. If in consequence of wear and tear or of an inexact execution of the annular guiding-groove provided in the front sides b for the cylinder c, a tightening in the contact surfaces 1 and 2, Fig. II, should not take place, and thereby the effects of the machine be lost or diminished, then, in the manner illustrated in Figs. VII and VIII this inconvenience may be remedied by setting into the front sides b the guide-ring r which contains the annular groove for the cylinder c. This groove is made for some millimeters eccentrical, so that by turning the ring r, the cylinder may be adjusted afterward to a tight contact.

This machine may also be employed as a motor for steam, water and compressed air, if the sucking end g of the hollow shaft d is brought into communication with the relative conduit. The same effects may be obtained by the described machine, if the shaft d is rotating with the wing f in the cylinder a.

I claim—

In a power machine or pump for steam, water or compressed air having rotating cylinders, the combination of an outer cylinder a turning round a hollow shaft d, with an inner cylinder c which is guided eccentrically in the front sides b of the outer cylinder and is adjustable by means of rings r provided with an eccentrical groove, and which with its outer surface closes tightly to the inner surface of the outer cylinder a, and to the outer surface of the cylinder e, and with a stationary hollow shaft d divided by a cross-piece x in two hollows g and h, and being provided with a stationary wing f entering through a slit of the cylinder c, and with two canals y and z, of which canals, on the one side y is in communication with the hollow g, and on the other side, z is in communication with the hollow h of shaft d; substantially as set forth.

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

FERDINAND SCHRÖDER.

Witnesses:

HANS BERNHARDT.

EMIL BERGER.