(No Model.)

F. CLOSS.

ROTARY PUMP AND ROTARY MOTOR.

No. 592,237. Patented Oct. 26, 1897.

Fig. 3.

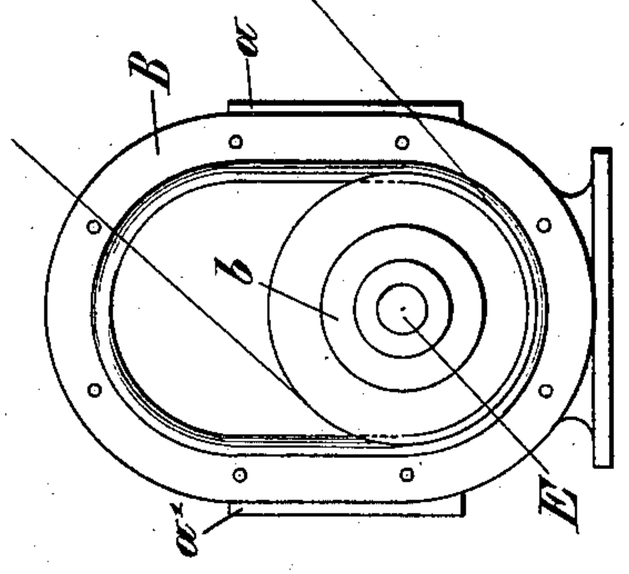


Fig. 6.

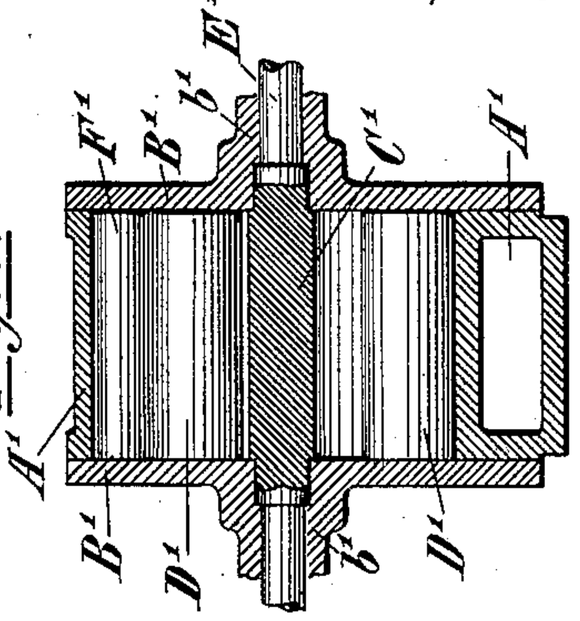


Fig. 2.

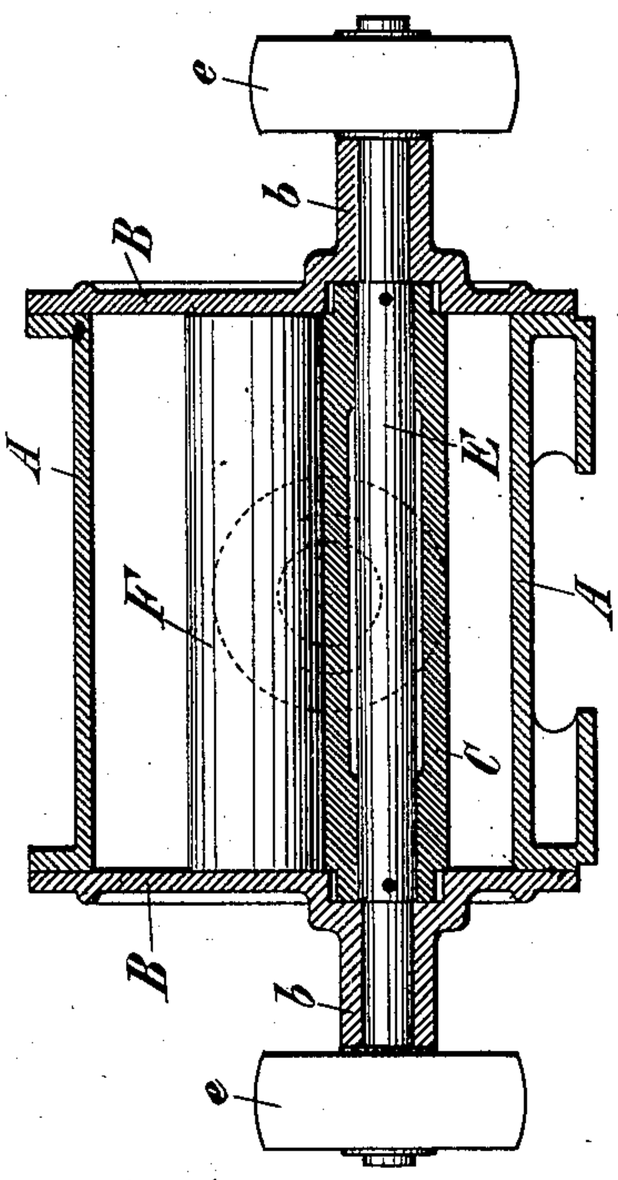


Fig. 4.

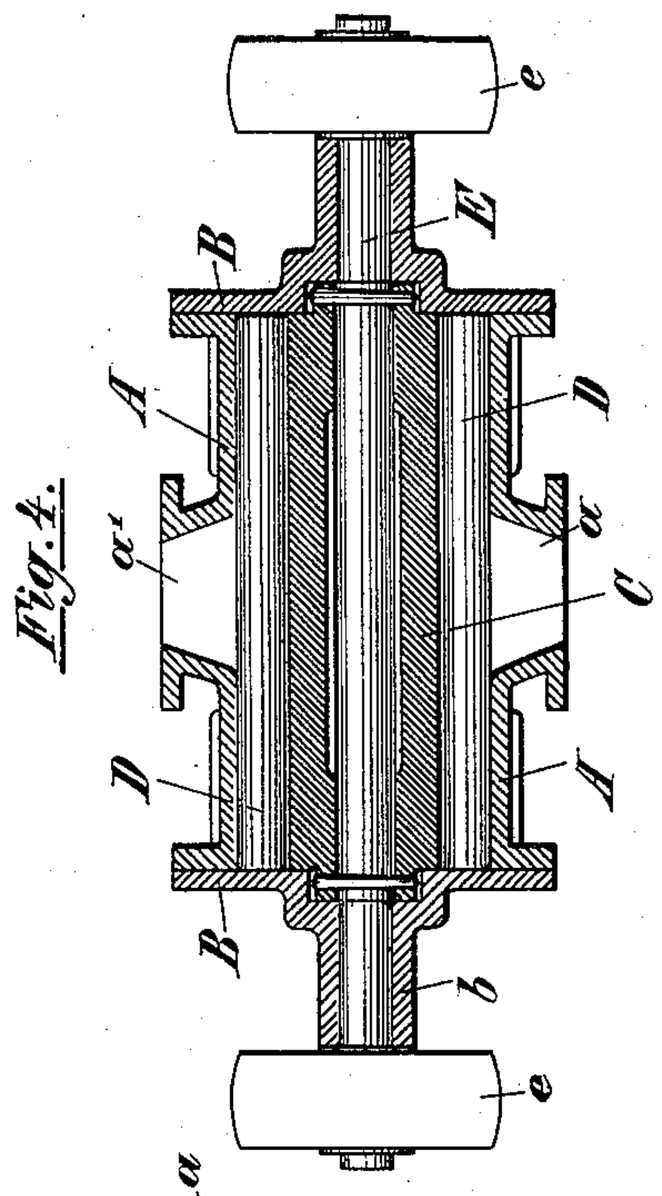


Fig. 1.

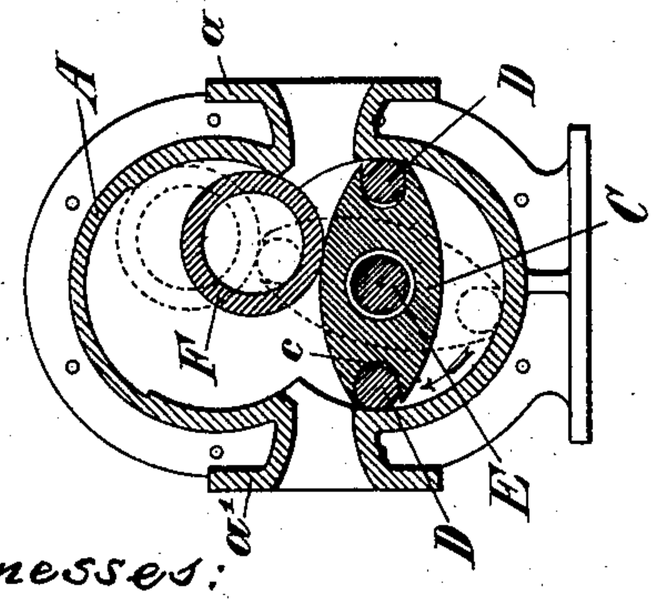
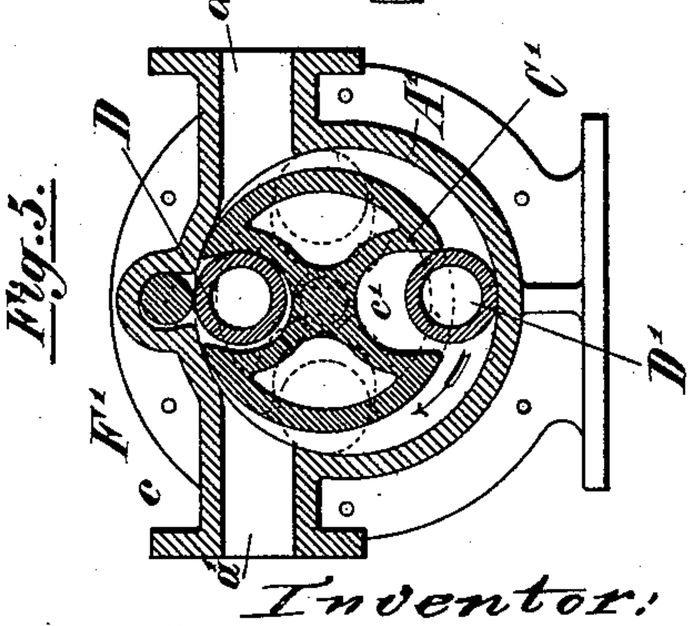


Fig. 5.



Witnesses:
M. C. Massie.
H. Mitchell.

Inventor:
Friedrich Closs,
by Munn & Co
Attorney.

UNITED STATES PATENT OFFICE.

FRIEDRICH CLOSS, OF BOEBLINGEN, GERMANY.

ROTARY PUMP AND ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 592,237, dated October 26, 1897.

Application filed December 14, 1896. Serial No. 615,614. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH CLOSS, of Boeblingen, Würtemberg, German Empire, have invented new and useful Improvements in Rotary Pumps and Rotary Motors, of which the following is a specification.

The subject of the present invention is a special self-acting packing for vane-pumps for gases and liquids, as well as for rotary-vaned steam-engines and the like, formed by means of rollers loosely located in the ends of the vane.

In the accompanying drawings is shown in Figures 1 to 4 a vane-pump in which the vane-axis lies centrally in the vane-chamber, while Figs. 5 and 6 show a pump or rotary steam-engine whose vane-axis is arranged to lie eccentrically in the vane-chamber.

In the pump illustrated in Figs. 1 to 4, Fig. 1 represents a vertical cross-section, Fig. 2 a vertical longitudinal section, Fig. 3 a front view, and Fig. 4 a horizontal section, of the pump. Fig. 5 is a transverse section, and Fig. 6 a longitudinal section, of a pump having the vanes disposed eccentrically in the vane-chamber.

The central line of the axis E of the vane C of the pump coincides with the central line of the lower circular hollowed-out part of the pump-casing A and is placed in the journals *b* of the covers B, where it may, if necessary, be packed by means of stuffing-boxes. At both ends of the vane C, in recesses *c* in the same, rollers D are laid loosely, which by the rotation of the vane in consequence of the centrifugal force, as well as through the resistance of the material to be pumped, will be thrown outward, pressing strongly on the wall of the pump-casing and rolling along upon the same.

In the upper part of the casing A, lying upon the vane C, and pressed against the vane C and against one side of the wall of the upper casing by the resistance in the pressure-chamber, is placed a roller F, which on account of its greater diameter is constructed advantageously as a hollow roller, as shown, and which automatically provides the packing between the pressure-chamber and suction-chamber in each portion of the vane C.

The vane C, as well as the rollers D and F, fit exactly between the two covers B of the pump.

The pump operates in the following manner: Assuming that it rotates in the direction indicated by the arrow in Fig. 1, the liquid, air, or the like enters through the short pipe *a* into the pump and discharges from the same through the short pipe *a'*. Since in the pressure-chamber of the pump obviously a pressure greater than in the suction-chamber always exists, the roller F is continually pressed firmly against the vane C, as well as against one side wall in the upper part of the casing A. In a similar manner the two rollers D through the pressure of the fluid will be pressed automatically on one side against the rear arm of the recess *c* in the vane and on the other side against the vane-casing A. The rollers D thereby completely pack against the casing-wall and in the recess of the vane. In a similar manner the roller F continually packs against the vane C and one side of the upper casing.

Since in each revolution of the vane C its two vane ends, together with the rollers D, pass under the roller F, the forward arm at the vane-recess *c* is somewhat thickened, as shown at *c'*, and constructed to extend nearly to the casing-wall for the object of producing a smooth movement during said passage.

In addition, for the purpose of preventing the throwing out of the rollers D during the tour of the upper vane-chamber, the arms of the recess *c* overlap the rollers D upon their outer sides.

Since the rollers D and F rotate together the friction is exceedingly small and the efficiency unexpectedly high.

Previous trials of such a pump, used as a vacuum apparatus, have given a nearly complete vacuum of two cubic meters on the mercurial column.

The effective work in a water-pump amounted to 97.5 per cent of the theoretical estimates.

The fluid enters and leaves the pump without a shock. In the pumping of air or gases this is obviously true to a still greater extent.

Figs. 5 and 6 of the drawings illustrate two

different vertical sections through a vane-pump with a vane C′ lying eccentrically to the casing A′, which, however, is packed on the outside in a manner similar to the previously-described pump. The recesses *c′* in the vane C′ have here a greater radial depth, and the rollers D′ are made larger, because the rollers have to equalize the eccentricity between the vane and casing. (See Fig. 5.) The packing between the suction-chamber and the pressure-chamber results here in the same manner through a loosely-lying roller F′, that runs upon the vane C′, or at times upon the rollers D′, and produces a complete packing. In the same manner the said rollers D′, having their greater portions hollow, pack in the recesses *c′* of the vane C′, and against the wall of the casing A′.

The same construction as that of the pump, Figs. 5 and 6, is applicable also, with advantage, as a rotary steam-engine, hydraulic motor, and as a working cylinder for compressed air, gas, or petroleum motors.

Both kinds of pumps may be adapted to work in either direction of rotation.

I claim—

In a rotary pump, the combination with the cylinder having inlet and outlet ports on its opposite sides, a rotary vane mounted in the cylinder between said ports and to one side of the line of the same, said vane having longitudinal recesses in its edges, rollers mounted loosely in said recesses and bearing against the wall of the cylinder, and a valve-roller resting on the upper side of the vane.

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

FRIEDRICH CLOSS.

Witnesses:

AUGUST DRAUTZ,

CHRISTIAN BAUER.