

No. 715,513.

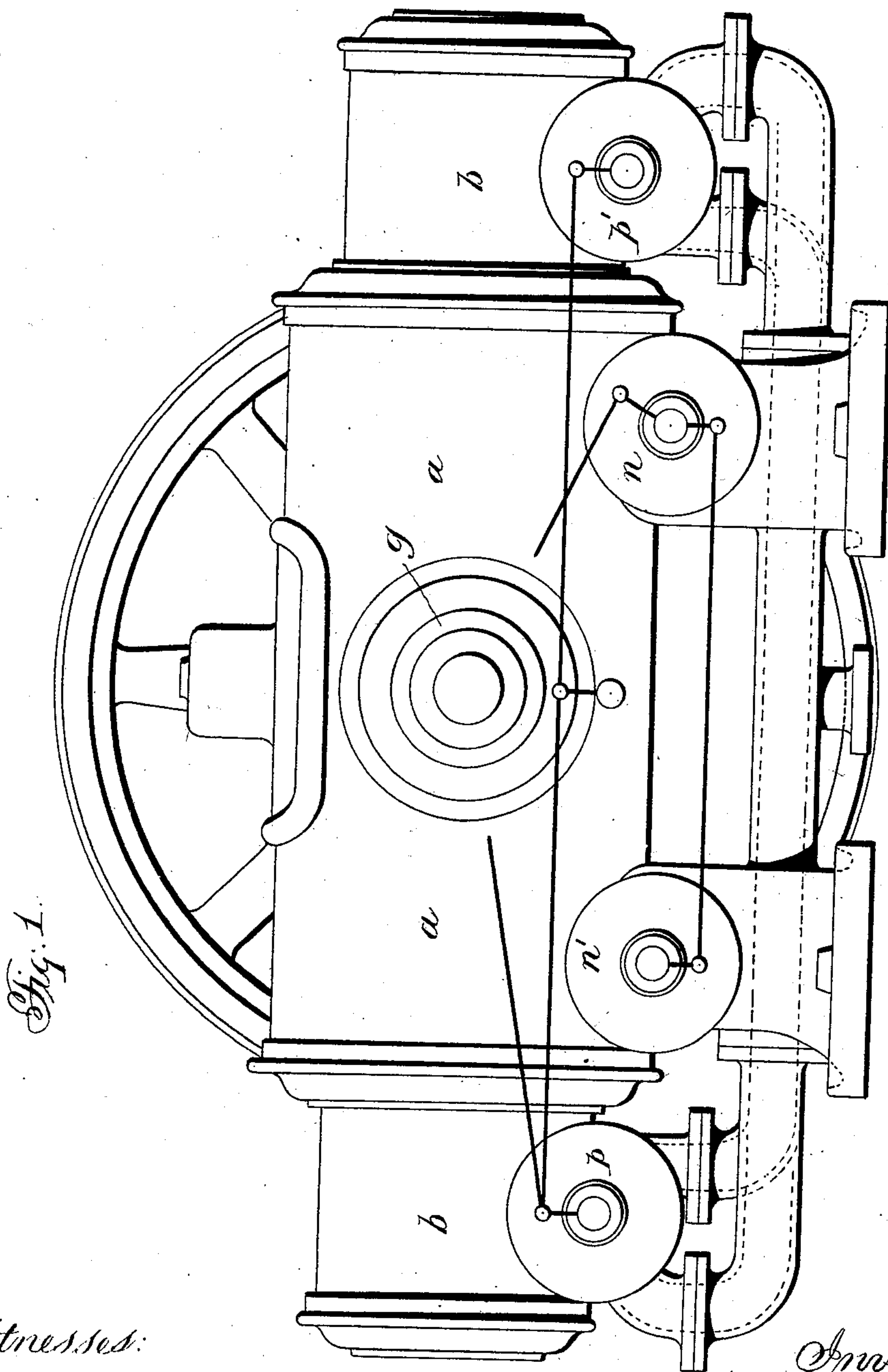
Patented Dec. 9, 1902.

H. ROMANSKI.  
FLUID PRESSURE ENGINE.

(Application filed Apr. 24, 1902.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:  
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Fig. 2.

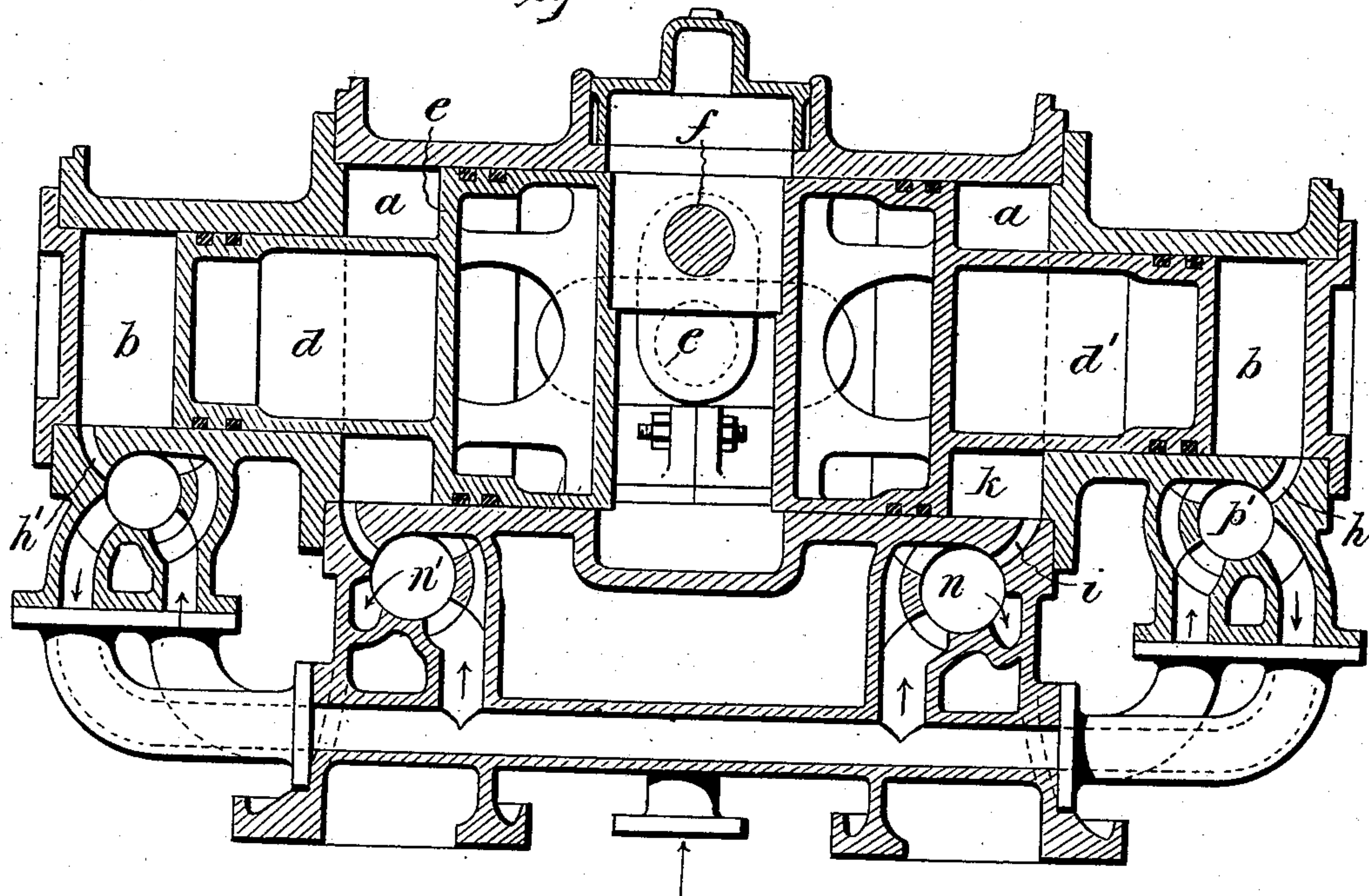
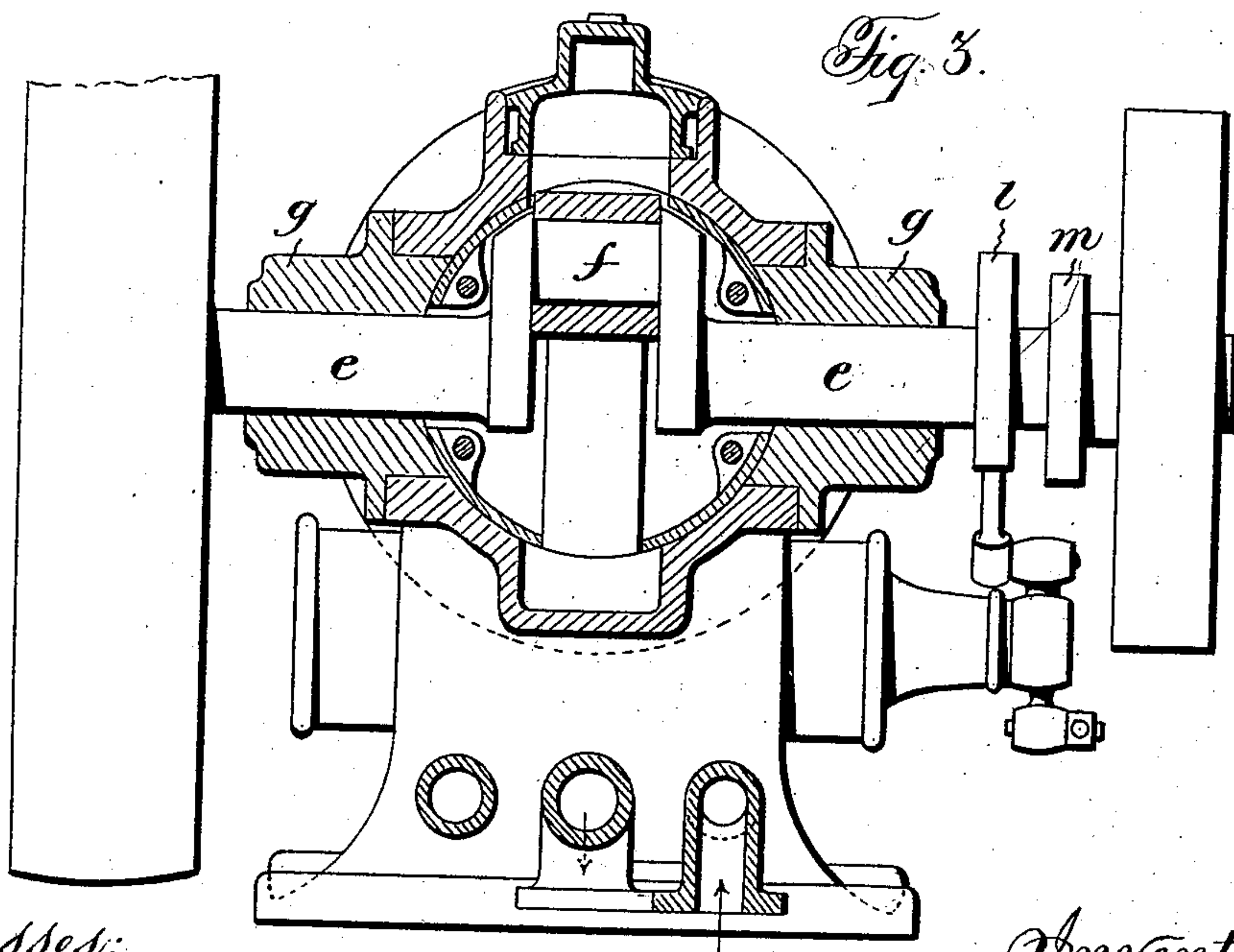


Fig. 3.



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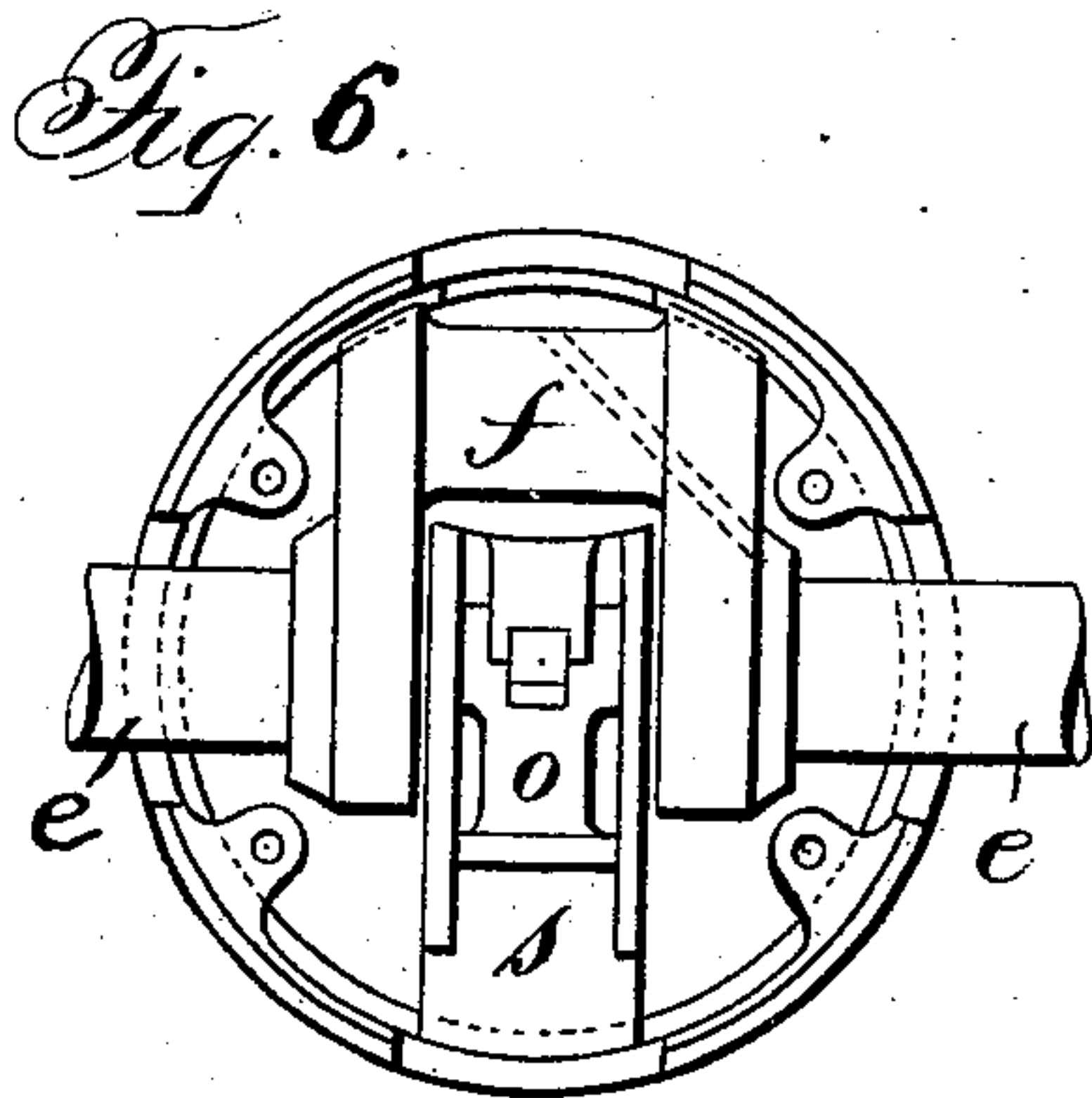
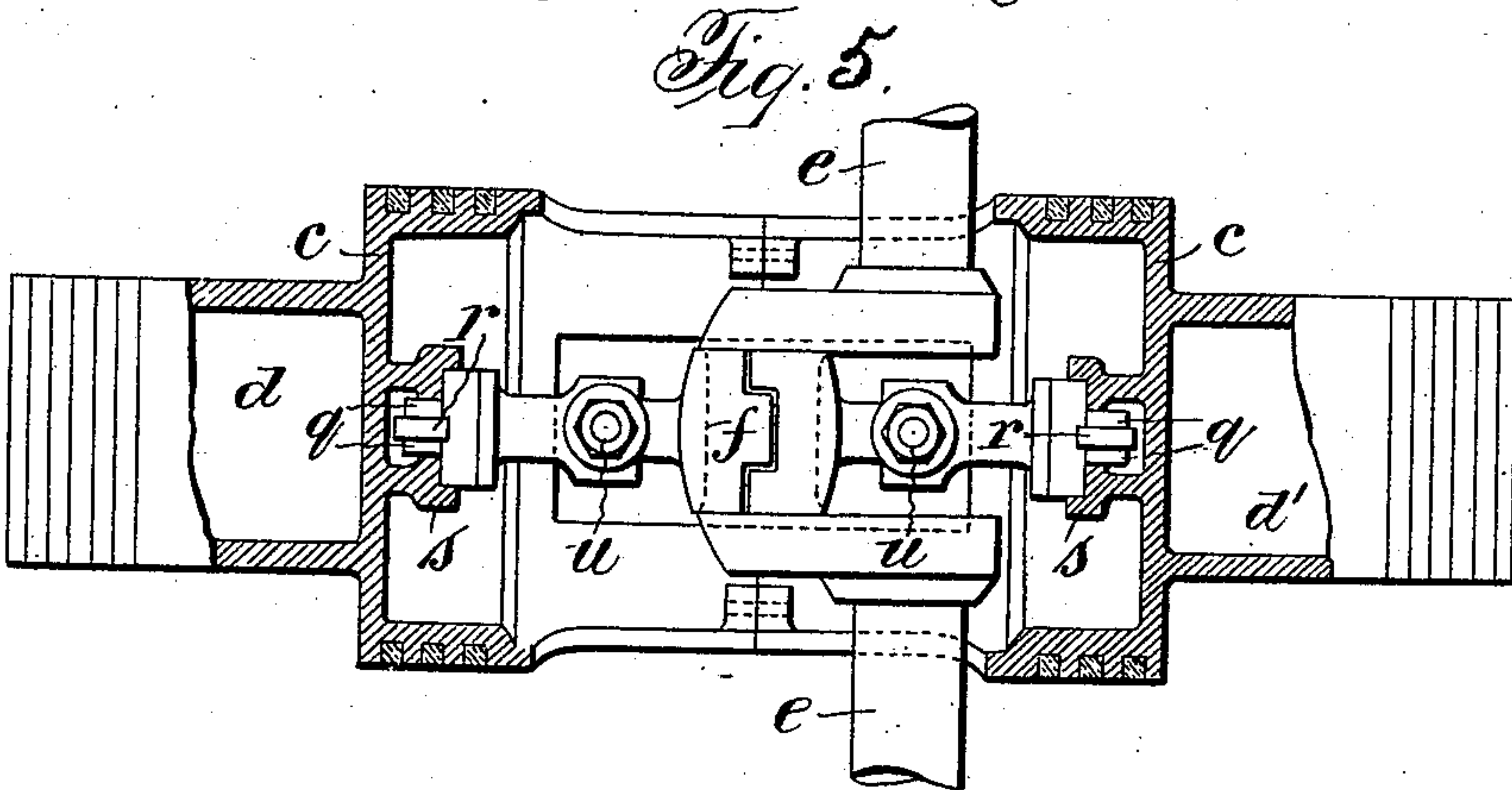
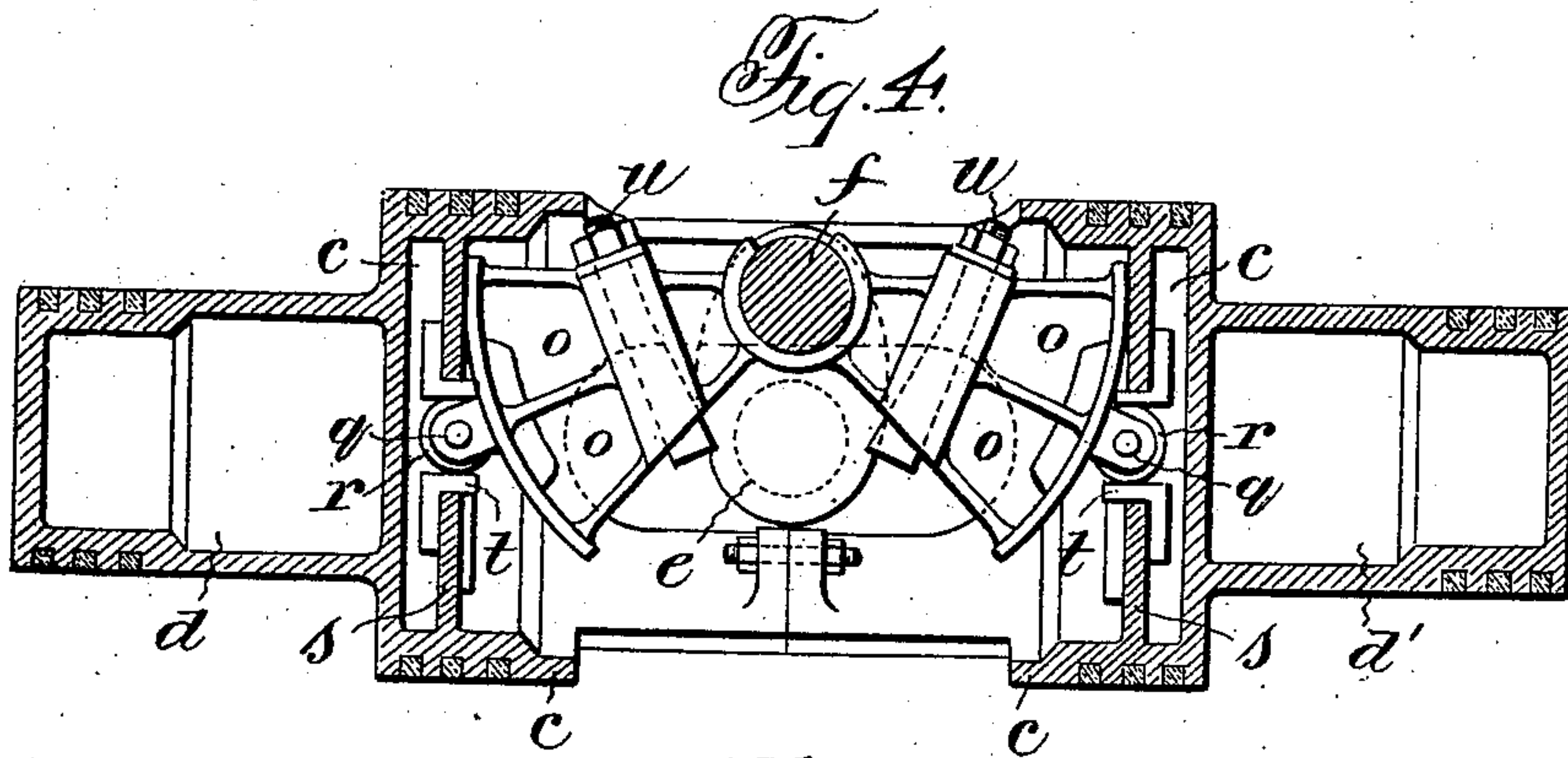
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

HERMANN ROMANSKI, OF ZWICKAU, GERMANY.

## FLUID-PRESSURE ENGINE.

SPECIFICATION forming part of Letters Patent No. 715,513, dated December 9, 1902.

Application filed April 24, 1902. Serial No. 104,563. (No model.)

*To all whom it may concern:*

Be it known that I, HERMANN ROMANSKI, a subject of the Emperor of Germany, residing at Zwickau, Saxony, Germany, have invented certain new and useful Improvements in Fluid-Pressure Engines, of which the following is a specification.

The subject of this invention is an improved high-speed compound engine for steam, air, and the like, in which engine the low-pressure piston is made in the form of a crank-chamber, which is kept free from steam and is at the same time used as an oil-chamber.

Compared with engines of similar construction heretofore known my improved engine possesses the advantage that a greater throw of the crank is obtained by means of the steam-free chamber in the hollow low-pressure piston, while perfect lubrication is insured by employing the said steam-free chamber as an oil-chamber. Thus the friction of the driving-gear is considerably reduced, which has for its result great certainty of working and high efficiency.

In the accompanying drawings I have shown how my said invention can be conveniently and advantageously carried into practice.

Figure 1 is a partly-diagrammatic side elevation, Fig. 2 a longitudinal section, and Fig. 3 a partial transverse section, showing one form of my improved engine. Figs. 4 and 5 are longitudinal sections, taken at right angles to each other, of a hollow stepped piston having my improved crank driving-gear applied thereto, the crank being shown in different positions in the two figures; and Fig. 6 is an end view looking from the inside of one-half of the said piston and driving-gear.

As shown, the engine consists of the low-pressure cylinder *a*, to which adjoins at each end on the longitudinal axis a high-pressure cylinder *b*, which is made in two parts. In the chamber formed by the high and low pressure cylinders works a cross-shaped piston *c*, of which the stepped ends *d* and *d'* form the two-part high-pressure piston and the larger middle part forms the low-pressure piston, which is also made in two parts. Through the low-pressure cylinder *a* and through the steam-free chamber of the hollow low-pressure piston *c* passes the crank-shaft *e*, of which the crank-pin *f* and its driving mechanism

move in the said low-pressure piston. The shaft itself moves in bearings *g* at the side. The hollow low-pressure piston *c* at the same time forms the oil-chamber, from which the crank-pin and its driving mechanism are lubricated. The oil can be kept in this chamber for a long time, since it is entirely shut off from the steam by a series of packing-rings arranged at each end *b* of the low-pressure piston.

Cock valve-gearing is employed for the distribution of the steam. The valve-gear is actuated by eccentrics *l* and *m*, which are fixed on one end of the crank-shaft *e*, extending out from the interior of the low-pressure cylinder, the eccentric *l* actuating the low-pressure valves *n* and *n'* and the eccentric *m* the high-pressure valves *p* and *p'*.

The method of operation is as follows: The steam passes through the valve *p'* and port *h* into the high-pressure cylinder *b* and acts on the high-pressure piston *d'*. The combination-piston consequently moves to the left, while at the same time the four valves are moved. The steam in front of the part *d* of the piston is simultaneously forced out through the port *h'* and the valve *p* and passes through the valve *n* and port *i* to the low-pressure piston *k*. The crank-pin *f* is arranged in the hollow low-pressure piston *b b* in such a manner that a longer crank can be employed than heretofore. This is effected by means of two oppositely-working presser-pieces *o o*, formed with half-bearing bushes and arc-shaped rolling surfaces. These pieces *o o* are radially adjustable by means of screw-keys or cotters *u u*. One or two pairs of hinge-forks *q q* are cast in the middle of the said arc-shaped rolling surfaces, and in these forks turn rollers *r r*, which serve for guiding the rolling arcs. For this purpose roller-tracks *s s*, which are formed in the interior of the low-pressure piston on both sides, are provided with perpendicularly-arranged guideways *t t* for the rollers *r r*. By means of this driving-gear increase in the efficiency and in the certainty of working is obtained, while in addition the adjustment and the placing in position and dismounting of the presser-pieces through the opening or openings in the piston are much simplified. When crank driving-gear of this kind is to



be mounted in the piston, it is only necessary to introduce the arc-shaped presser-pieces *o o*, with the forks *q q* cast thereon, together with the rollers *r r*, into the guideways *t t* to place the half-bearing bush on the crank-pin *f* and to connect the two parts together by means of the screw-keys or cotters *u u*, which take up lost motion between the crank-pin and the piston.

10 What I claim is—

1. The combination in a fluid-pressure engine, of a cylinder of larger diameter in the middle and smaller diameter at each end, a piston of larger diameter in the middle and smaller diameter at each end to fit said cylinder, a crank-shaft mounted in said cylinder and extending through the larger part of said cylinder, and presser-pieces, having arc-shaped surfaces bearing on the ends of said larger part of the piston, in engagement with said crank-shaft, substantially as described.

2. The combination in a fluid-pressure engine, of a cylinder of larger diameter in the middle and smaller diameter at each end, a piston of larger diameter in the middle and smaller diameter at each end to fit said cylinder, a crank-shaft mounted in said cylinder and extending through the larger part of said cylinder, presser-pieces, having arc-shaped surfaces bearing on the ends of said larger part of the piston, in engagement with said crank-shaft, ports for the passage of steam to and from the ends of the parts of said cylinder of smaller and larger diameter respectively, valves controlling said ports, and gearing arranged externally to said cylinder and connecting said crank-shaft and said valves, substantially as described.

3. The combination, in a fluid-pressure engine, of a cylinder, an elongated hollow piston in said cylinder, packing at the ends of said piston, a crank-shaft mounted in said cylinder and extending through said piston between said packing, presser-pieces having bearings for receiving the crank-pin of said crank-shaft, arc-shaped rolling surfaces on said presser-pieces, tracks on the interior of said piston to coact with said rolling surfaces, rollers pivotally mounted on said presser-pieces, and guideways in said piston to receive said rollers, substantially as described.

4. The combination, in a fluid-pressure engine, of a cylinder, an elongated hollow piston in said cylinder, packing at the ends of said piston, a crank-shaft mounted in said cylinder and extending through said piston between said packing, presser-pieces having bearings for receiving the crank-pin of said crank-shaft, arc-shaped rolling surfaces on

said presser-pieces, means comprising cotters for radially adjusting said presser-pieces, tracks on the interior of said piston to coact with said rolling surfaces, rollers pivotally mounted on said presser-pieces and guideways in said piston to receive said rollers, substantially as described.

5. The combination in a fluid-pressure engine of a cylinder of larger diameter in the middle and smaller diameter at each end, a piston made of larger diameter in the middle and smaller diameter at each end to fit said cylinder, packing at the ends of the larger and smaller parts of said piston, a crank-shaft mounted in said cylinder and extending through the larger part of said piston between said packing, a space in the interior of the larger part of said piston, presser-pieces arranged in said space and having bearings for receiving the crank-pin of said crank-shaft, arc-shaped rolling surfaces on said presser-pieces, tracks on the interior of said piston to coact with said rolling surfaces, rollers pivotally mounted on said presser-pieces, and guideways in said piston to receive said rollers, substantially as described.

6. The combination in a fluid-pressure engine of a cylinder of larger diameter in the middle and smaller diameter at each end, a piston made of larger diameter in the middle and smaller diameter at each end to fit said cylinder, packing at the ends of the larger and smaller parts of said piston, a crank-shaft mounted in said cylinder and extending through the larger part of said piston between said packing, a space in the interior of the larger part of said piston, presser-pieces arranged in said space and having bearings for receiving the crank-pin of said crank-shaft, arc-shaped rolling surfaces on said presser-pieces, tracks on the interior of said piston to coact with said rolling surfaces, rollers pivotally mounted on said presser-pieces, guideways in said piston to receive said rollers, ports for the passage of steam to and from the ends of the parts of said cylinder of smaller and larger diameter respectively, valves controlling said ports, and gearing arranged externally to said cylinder and connecting said crank-shaft and said valves, substantially as described.

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

HERMANN ROMANSKI.

Witnesses:

PAUL WOLF,  
J. E. COOMBS.