

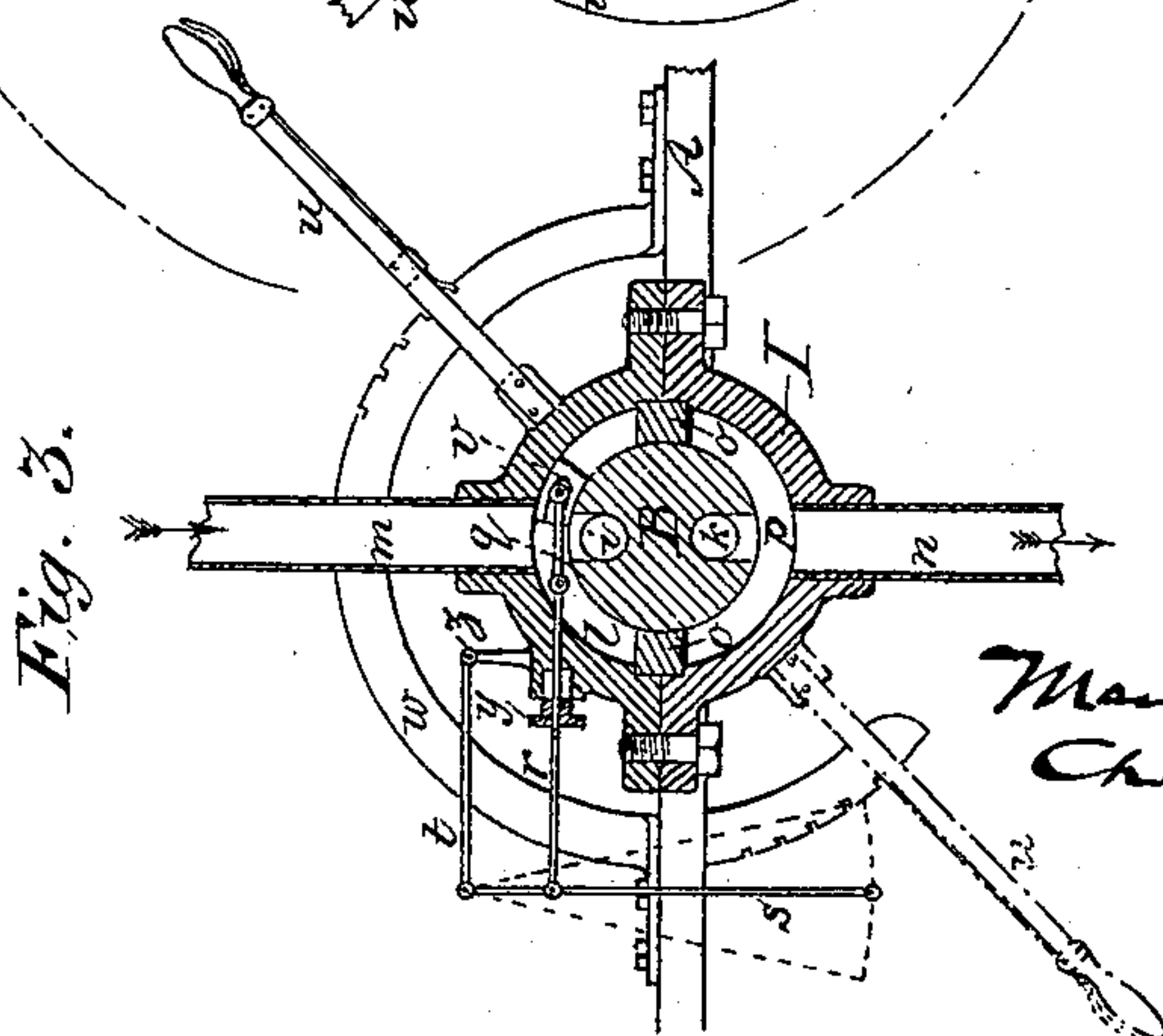
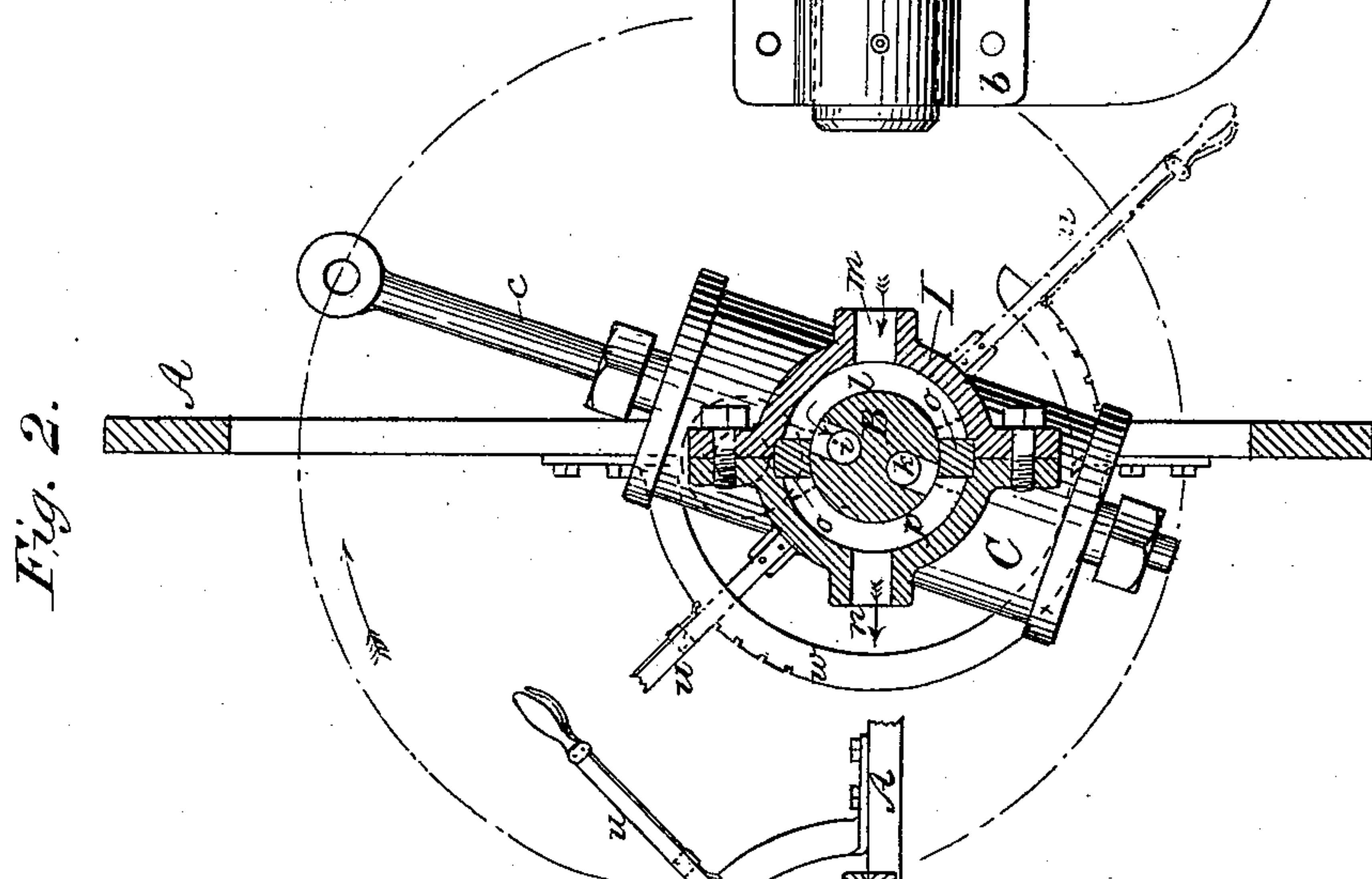
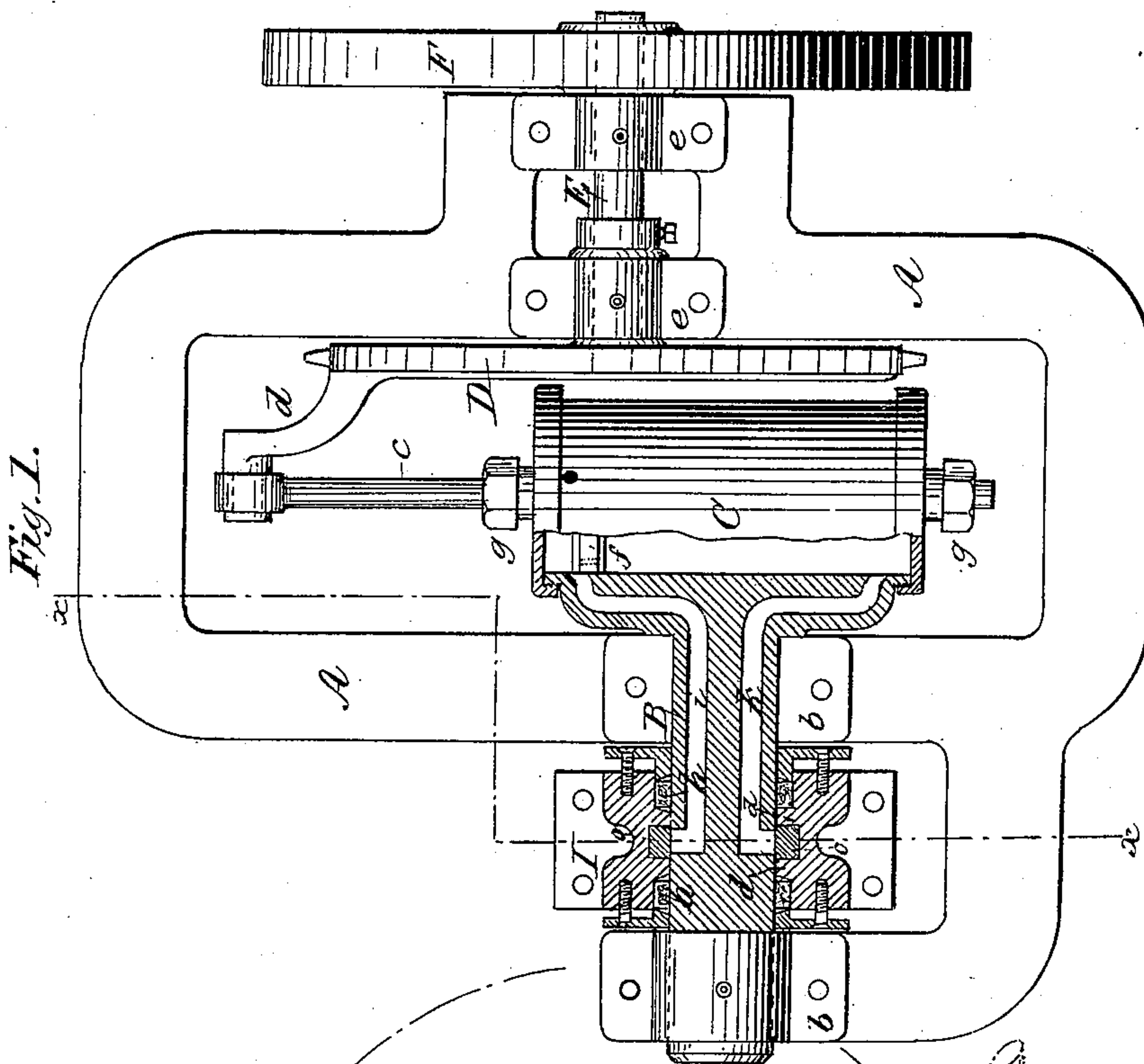
No. 618,453.

Patented Jan. 31, 1899.

M. F. COOMES & C. RICE.
ROTARY RECIPROCATING ENGINE.

(Application filed Feb. 7, 1898.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

MARTIN F. COOMES AND CHAUNCEY RICE, OF LOUISVILLE, KENTUCKY.

ROTARY RECIPROCATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 618,453, dated January 31, 1899:

Application filed February 7, 1898. Serial No. 669,398. (No model.)

To all whom it may concern:

Be it known that we, MARTIN F. COOMES and CHAUNCEY RICE, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Rotary Reciprocating Engines; and we 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.

Our invention relates to rotary reciprocating engines; and its objects are to produce an engine of simple construction, easily manipulated, and which may be quickly started, reversed, or stopped, which is not liable to get out of order and can be manufactured at a moderate expense, which can be automatically regulated by the admission of more or less steam, compressed air, or other motive power, and which can be readily adapted to the driving of bicycles or similar vehicles, as well as machinery of all kinds.

With these objects in view our invention consists in the peculiar construction of certain details and arrangement of parts, as more fully described hereinafter and specifically pointed out in the claims, reference being had to the accompanying drawings and to the letters thereupon marked.

Like letters indicate similar parts in the different figures of the drawings, in which—

Figure 1 represents a plan view of our improved engine, partly in section, the adjustable collet being in the position shown in Figs. 2 and 3. Fig. 2 is a cross-section on the line *x x* of Fig. 1, the cylinder being off the dead-center. Fig. 3 is a view of the collet-valve in cross-section, showing also the slide-valve.

In the said drawings, A represents a frame of simple construction, upon which the engine is mounted and which may be secured to suitable brackets arranged on a bicycle. On this frame the cylinder C, having a trunnion B, is journaled in the bearings *b b* on one side, while on the other side is the shaft E in journals *e e* and provided with a sprocket-wheel D or its equivalent and, if desired, a balance-wheel F upon its outer end. The piston-rod *c* is attached at its upper end by arm *d* to wheel D and at its lower end to piston *f*, and it passes

through stuffing-boxes *g g* in both cylinder-heads. Cylinder C is hung on trunnion B eccentrically to shaft E, and therefore in making a complete revolution the piston is being forced downward while the upper part of the cylinder is moving to the lower part of the circle (indicated by the dotted line in Fig. 2) and is being forced upward while the upper part of the cylinder is moving to the upper part of said circle.

I is a movable and adjustable collet, made in two pieces and clamped around the trunnion between bearings *b* and *b*, having two internal shoulders or collars *d* and *d*, bearing on the trunnion. On the outer sides of the collars are the packings *h* and *h*, which are held in place and compressed by the usual glands, as shown. The groove between collars *d* and *d* is divided into two parts by the abutments *o* and *o*, one being the steam-chest or steam-chamber *l*, into which the live steam enters through the inlet *m*, and the other (marked *p*) being the exhaust-chamber, from which the exhaust-steam passes through the outlet *n*. When the inlet and outlet are to be connected to fixed steam-pipes, flexible joints will of course be used. The collet I, with its collars *d d* and abutments *o o*, constitute the collet-valve. The ports *i* and *k* in the body of the trunnion open at one end into the collet-groove and at the other into the two ends of the cylinder. Abutments *o o* may be varied in width, as indicated by dotted lines in Fig. 2, whereby the steam may be made to enter the ports earlier or later in the stroke, and thus vary the lead of the engine, and whereby the cut-off may act earlier or later and the expansive force of the steam be thus varied. The collet is moved on the trunnion and adjusted by the hand-lever *u*, secured to its outer side and having a spring-detent which engages with one of the series of notches in the segment-plate *w*, which is bolted to frame A, and by this arrangement the collet-valve may be moved in one direction or the other and to any suitable extent and the engine thus started, stopped, or reversed, as desired. When the cylinder is off the dead-center and port *i* is in steam-chamber *l*, as shown in Fig. 2, upon steam being admitted the cylinder revolves in the direction shown

by the arrow. When the collet is so moved that port *k* is in the steam-chamber, the cylinder revolves in the reverse direction.

To automatically regulate the amount of steam admitted to the steam-chamber and the point at which it is cut off from the ports, a slide-valve *v* is placed in the steam-chamber, as shown in Fig. 3, said valve bearing on the trunnion and collet on either side and extending entirely across the chamber. A suitably-jointed rod *r* passes through stuffing-box *y* and is attached at one end to valve *v* and at the other to lever *s*, which is jointedly attached at one end to rod *t*, fastened to fulcrum *z* on the collet, and at the other end to a suitable governor. As the engine moves faster or slower the movements of the slide-valve are correspondingly varied.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination of the cylinder, the trunnion on which the cylinder is hung, the movable collet bearing on the trunnion and having a steam and an exhaust chamber, and the ports connecting the ends of the cylinder with the steam and exhaust chamber, substantially as described.

2. The combination of the cylinder, the trunnion on which the cylinder is hung, the movable collet-valve bearing on the trunnion, the steam-ports connecting the ends of the cylinder and the collet-chambers, and the adjusting-lever and notched segment-plate, substantially as described.

3. The combination of the cylinder, the movable collet having an internal groove di-

vided into two parts by suitable abutments, and the trunnion provided with steam-ports connecting the cylinder and groove, substantially as described.

4. The combination of the cylinder, the collet having an internal groove provided with abutments, the trunnion provided with steam-ports connecting the cylinder and groove, and the slide-valve in the steam-chamber attached to suitable jointed rods passing through the collet and adapted to be controlled by a governor, substantially as described.

5. The combination of the cylinder hung upon a trunnion provided with the steam-ports *i* and *k*, the adjustable collet-valve bearing on the trunnion and provided with the steam and exhaust chambers *l* and *p*, and the driving-shaft located eccentrically to the trunnion and connected to the piston-rod, substantially as described.

6. The herein-described rotary reciprocating engine, having on one side a trunnion provided with steam-ports and on the other an eccentrically-located shaft provided with a sprocket-wheel to which the piston-rod is attached, in combination with an adjustable collet-valve bearing on the trunnion, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

MARTIN F. COOMES.
CHAUNCEY RICE.

Witnesses:

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CHAS. A. ROSS.