

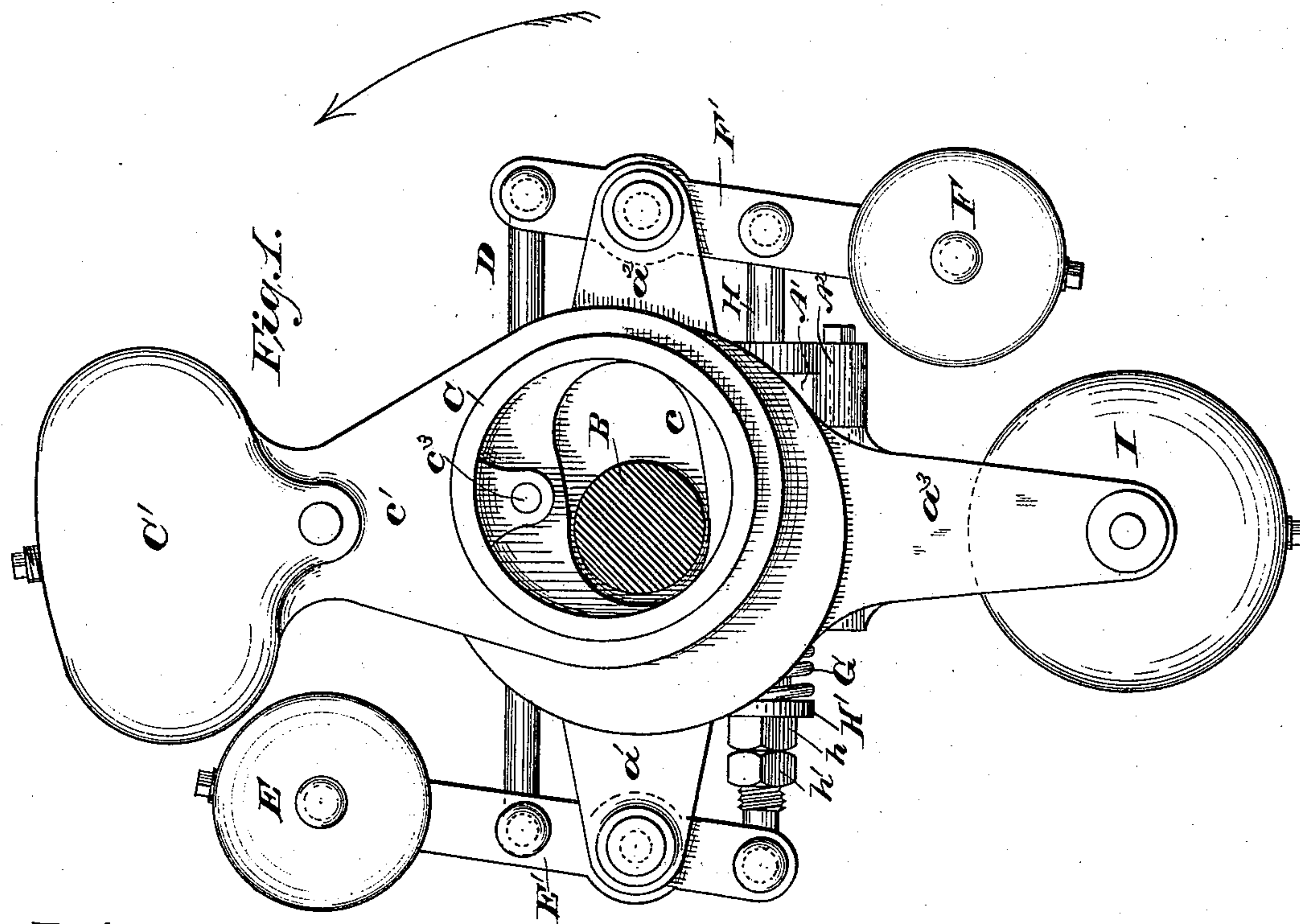
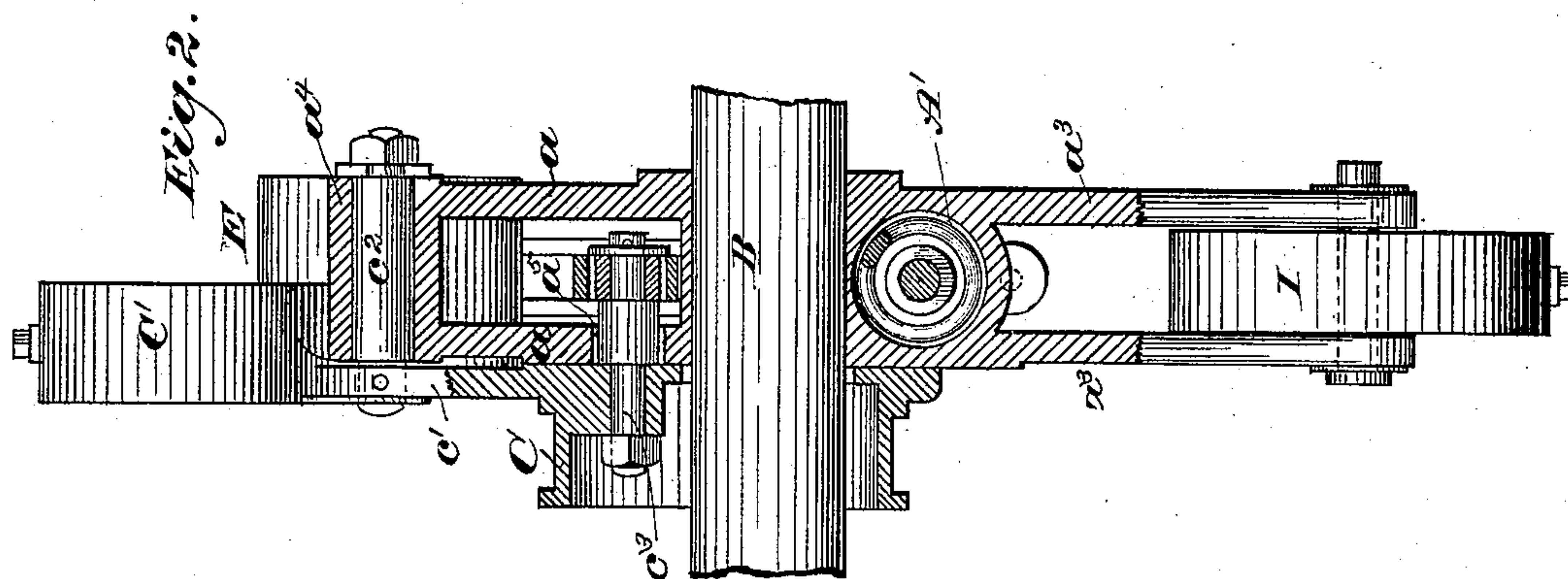
(No Model.)

3 Sheets—Sheet 1.

E. PENNEY.
SPEED GOVERNOR.

No. 322,637.

Patented July 21, 1885.



Witnesses:

E. J. Walker
J. P. Howenstein Jr.

Inventor:

Edgar Penney
by his attorney
P. J. C. C.

(No Model.)

3 Sheets—Sheet 2.

E. PENNEY.
SPEED GOVERNOR.

No. 322,637.

Patented July 21, 1885.

Fig. 3.

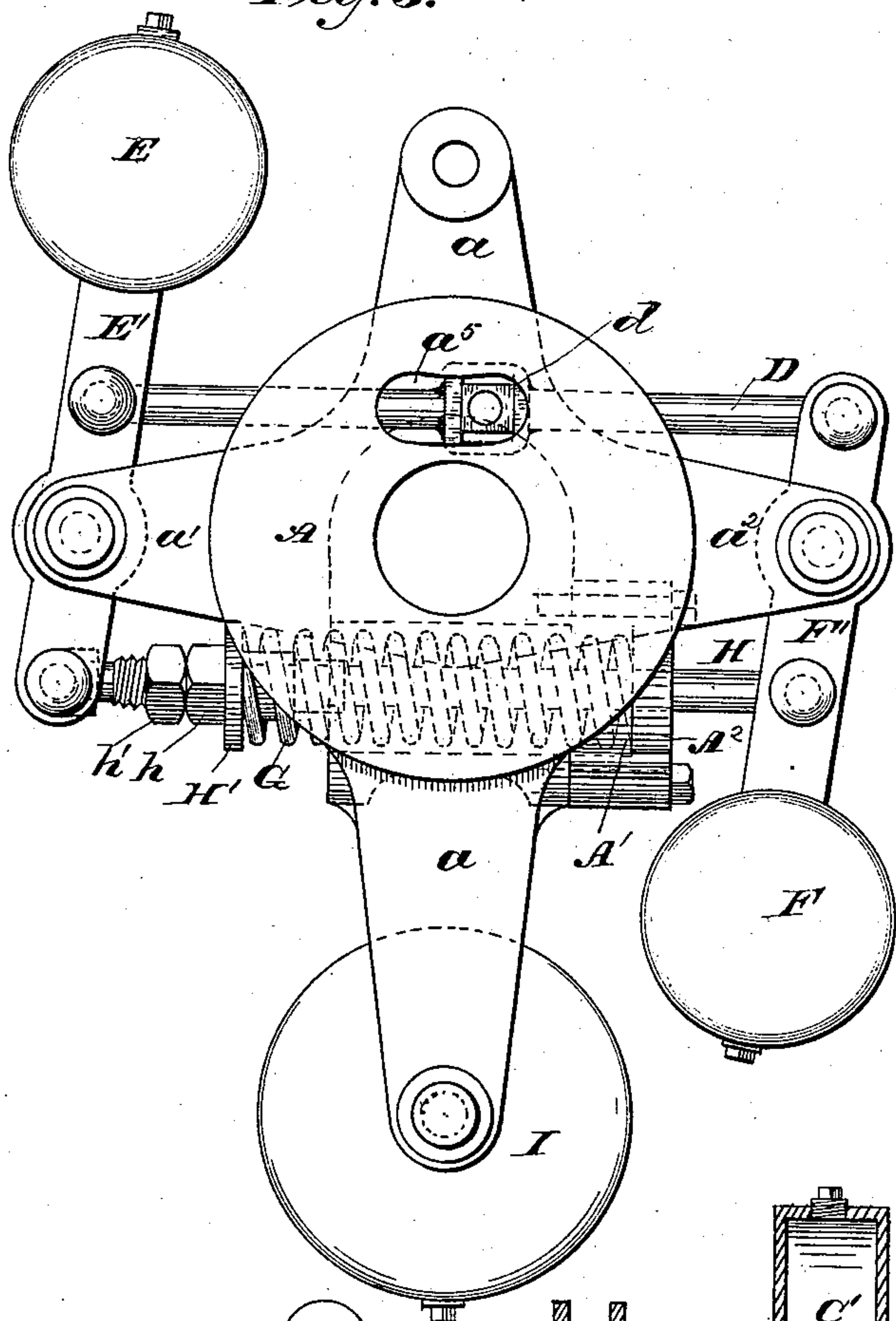


Fig. A.

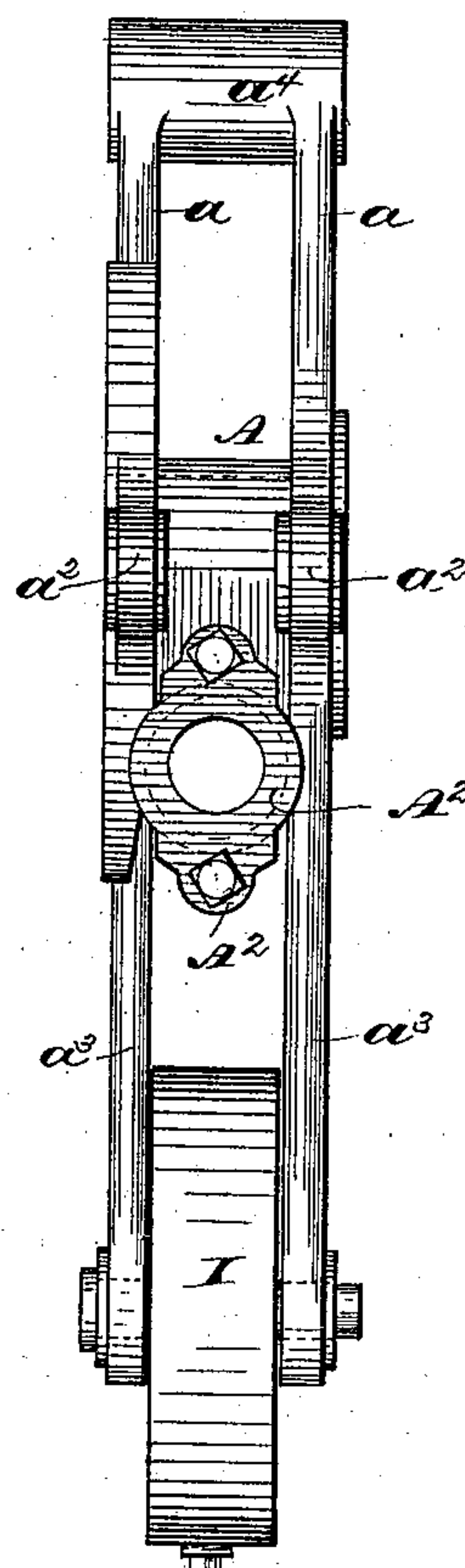


Fig. 5

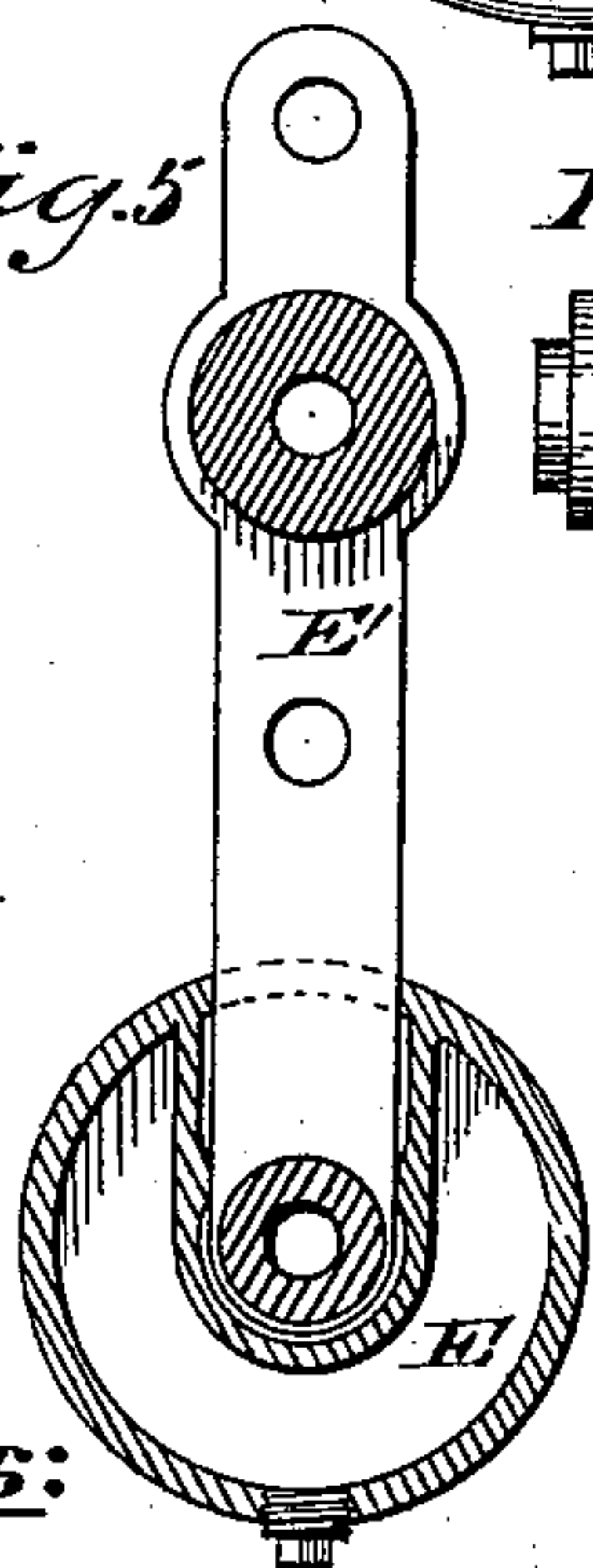


Fig. 7



Fig. 6

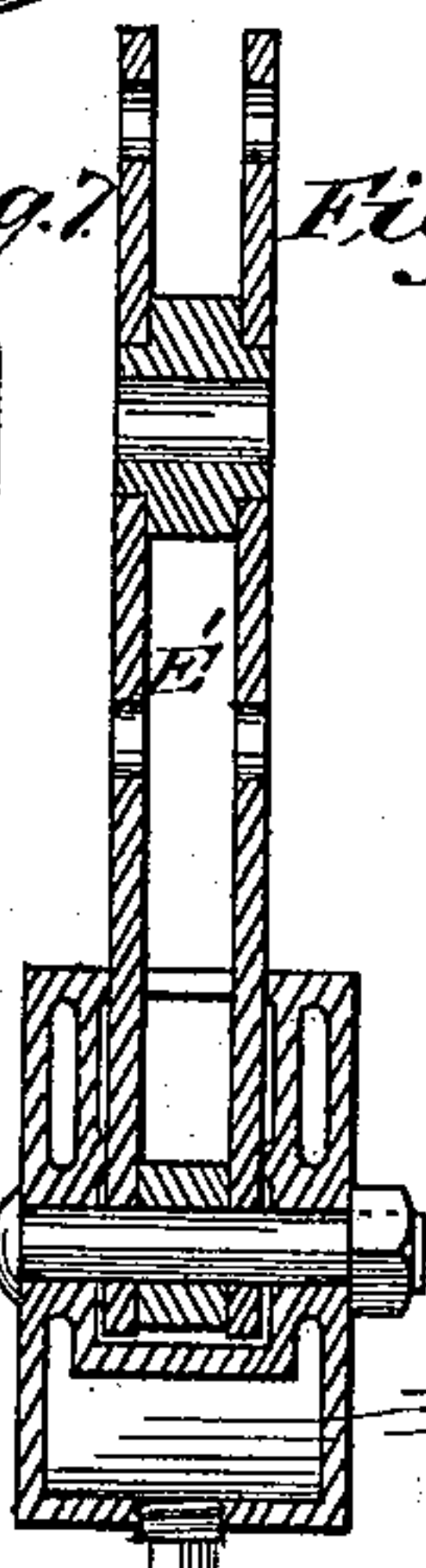


Fig. 8.

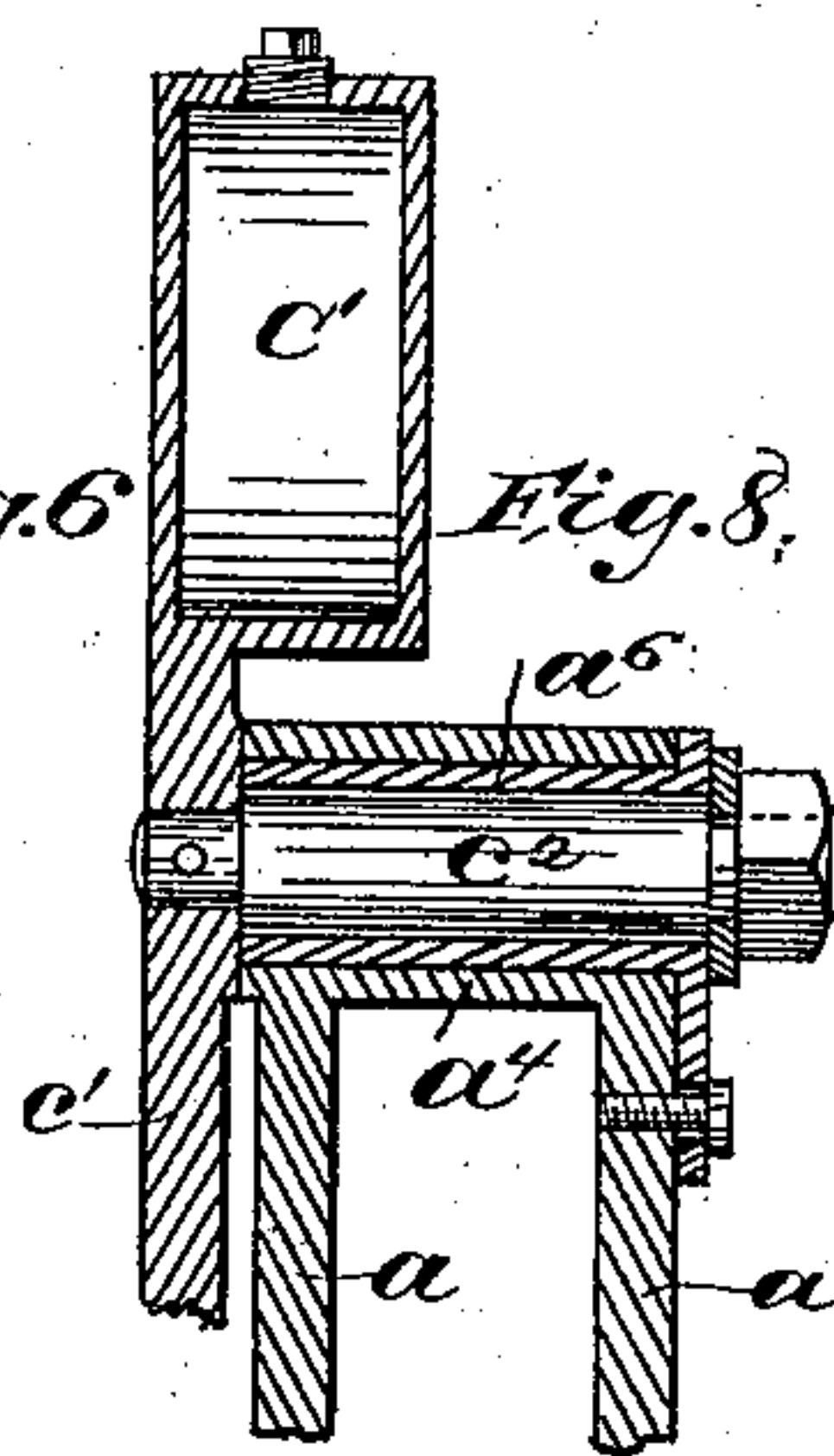
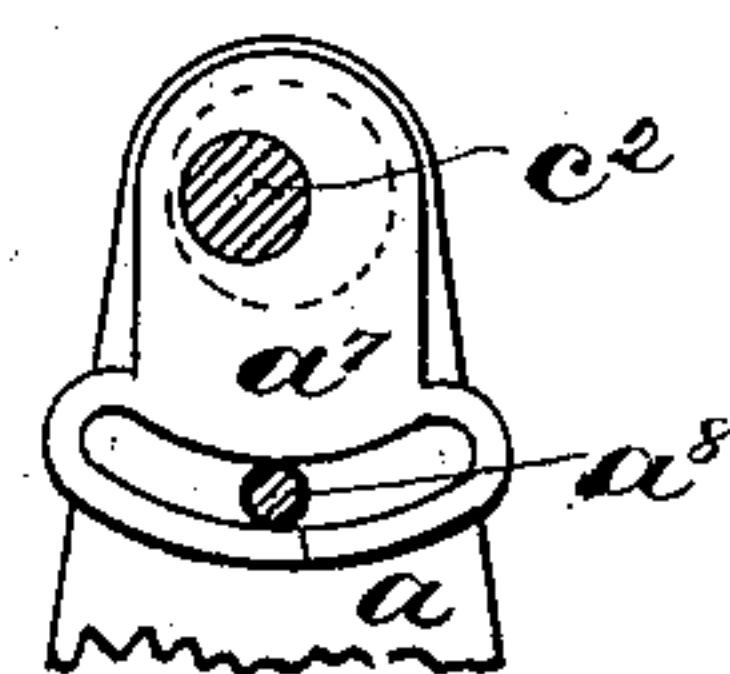


Fig. 9.



Witnesses:

E. J. Walker
J. T. Howenstein Jr.

Inventor.

Inventor.
Edgar Penney
by his attorney
R. E. C. C.

(No Model.)

3 Sheets—Sheet 3.

E. PENNEY.
SPEED GOVERNOR.

No. 322,637.

Patented July 21, 1885.

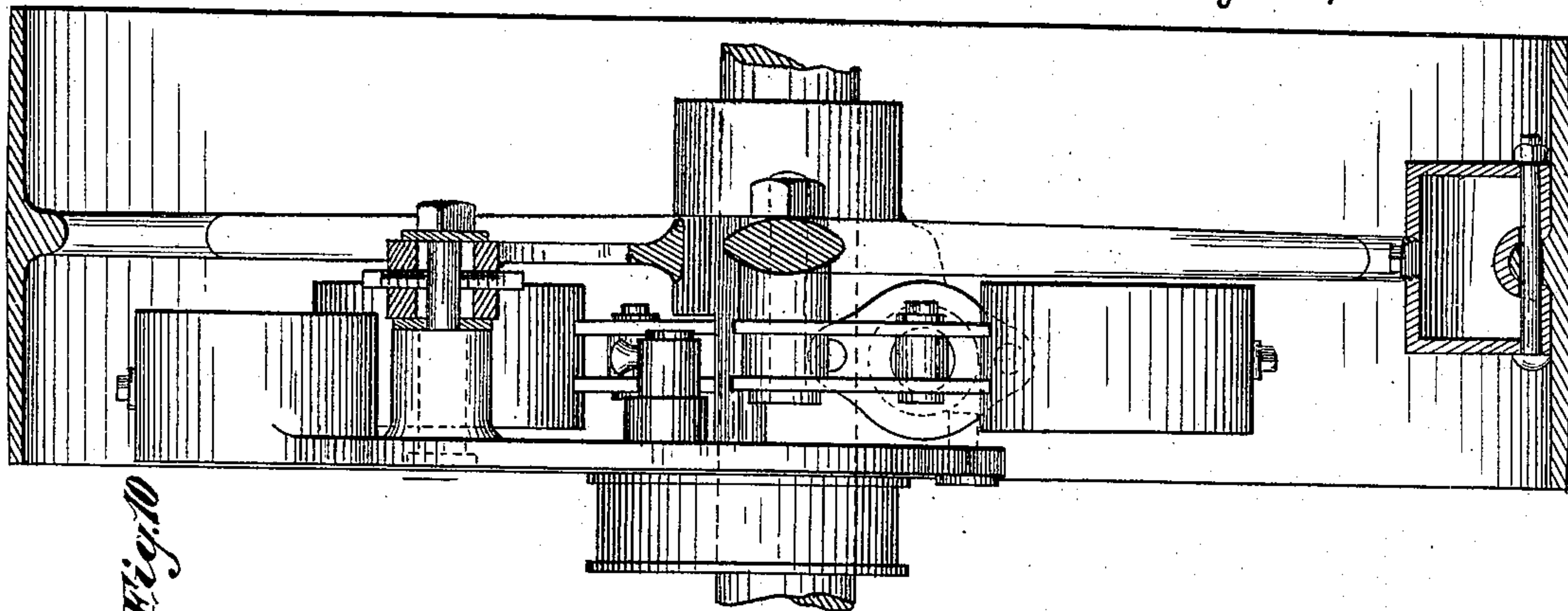


Fig. 10

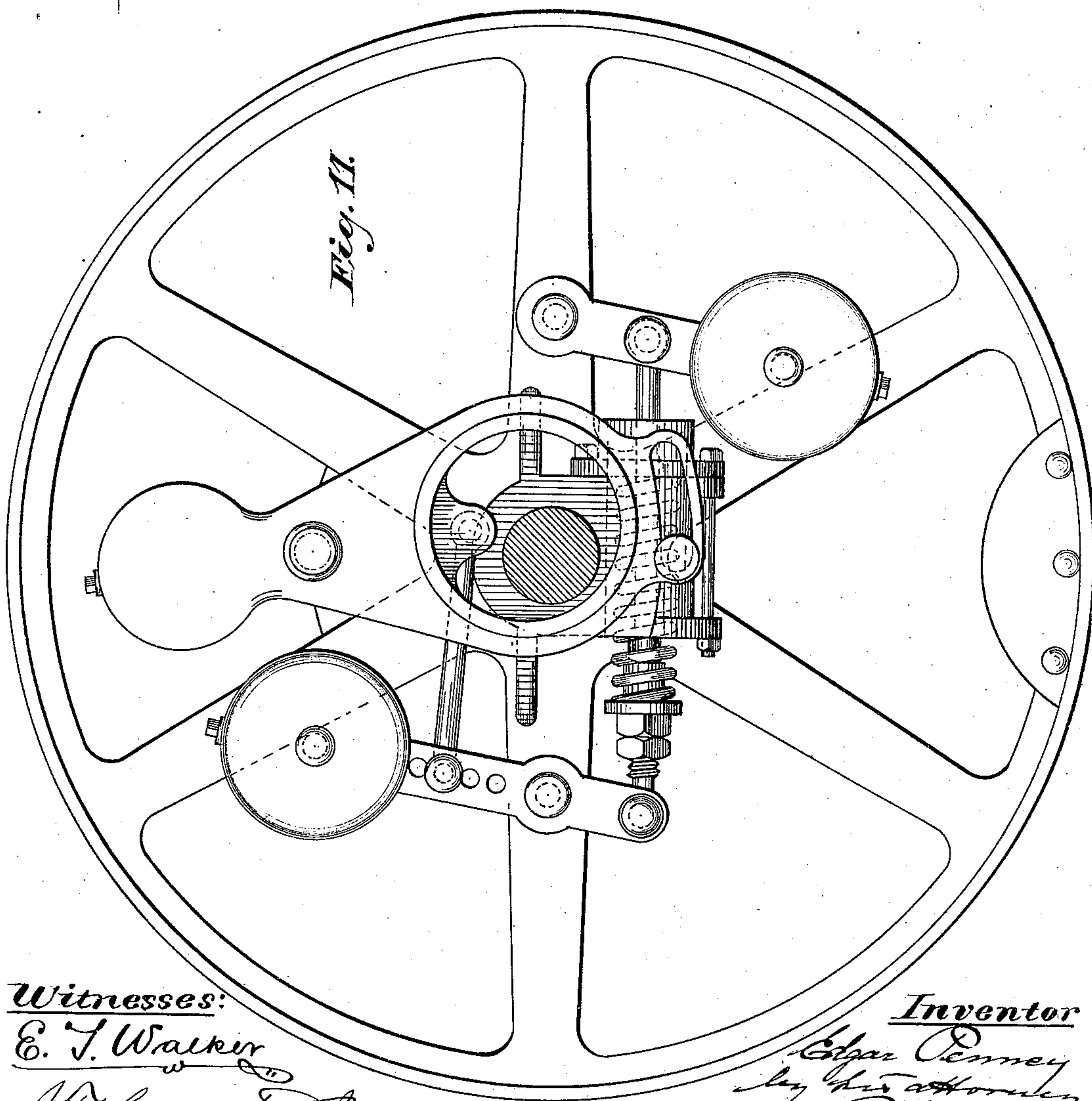


Fig. 11

Witnesses:

E. J. Walker

J. B. Brown

Inventor

Edgar Penney
by his attorney
J. B. Brown

UNITED STATES PATENT OFFICE.

EDGAR PENNEY, OF WAYNESBOROUGH, PENNSYLVANIA.

SPEED-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 322,637, dated July 21, 1885.

Application filed March 31, 1885. (No model.)

To all whom it may concern:

Be it known that I, EDGAR PENNEY, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Speed-Governors; 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.

This invention relates to centrifugal speed-governors which are arranged upon the driving-shaft of the engine in conjunction with a shifting eccentric, the position of which is varied by the governor to maintain a uniform speed notwithstanding variations in the steam-pressure or in the load put upon the engine.

The object of my improvement is to provide a centrifugal governor of this type possessing stability and sensitiveness in a marked degree, and which may be readily adjusted to operate properly, whatever power may be required of the engine, and whether the engine is to run in one direction or the other.

The various parts of my invention are pointed out specifically in the claims at the close of this specification, and their practical application can be understood from the following general description.

Figure 1 represents a front elevation of my improved speed-governor, showing the shifting eccentric. Fig. 2 represents a cross-section of the same. Fig. 3 represents a front elevation of the governor, the shifting eccentric being omitted. Fig. 4 represents a side elevation of the spider for carrying the various active parts. Figs. 5, 6, 7, 8, and 9 illustrate various details hereinafter more specifically alluded to. Fig. 10 represents a front elevation, and Fig. 11 a side elevation, showing some parts in section, of some modifications in the construction and application of my improved speed-governor.

The same letters of reference indicate identical parts in all the figures.

I will first describe the form of my invention illustrated in Figs. 1 to 9, inclusive. A refers to a frame or spider on which all the active parts of the governor are mounted, and which is in turn mounted on the engine's

main or crank shaft B, secured thereto by set-screws to provide for and facilitate adjustment. The spider has four pairs of arms, a , a' , a'' , a''' , each pair projecting at right angles to the adjacent pairs. The members of each pair of arms are parallel to each other and in the same axial plane. The eccentric C is suspended by a pivot-stud, c^2 , on its arm c' from the hub a^4 , which unites the outer ends of the arms a . The eccentric has an elongated aperture, c , for the crank-shaft B, so that it may be swung crosswise of the shaft, within given limits, to vary its eccentricity and the travel of the valve it controls. The eccentric thus suspended on one side of the spider carries at a point between its pivot-stud c^2 and the crank-shaft a stud, c^3 , which projects through an aperture, a^5 , in the adjacent face of the spider, and by a square swiveling block, d , journaled on its outer end, engages a guide-eye formed on the shifter-rod D. The extent to which the eccentric can be shifted crosswise of the crank-shaft is limited by the length of aperture a^5 in the spider. The position of the eccentric is governed through the medium of the shifter-rod by the centrifugal balls E and F and the antagonistic spiral spring G. The balls are carried on the long arms, pointing in opposite directions, of levers E' and F', fulcrumed, respectively, on the arms a' and a'' of the spider. The shifter-rod D is pivoted at its ends to the levers E' and F' at points equidistant from their fulcra. The spring G is arranged in a barrel, A', formed on the spider, and encircles a coupling-rod, H, which connects the levers E' and F' on the side of the crank-shaft opposite to that where the shifter-rod is hitched to them, the coupling-rod being connected at points equidistant from the fulcra of the levers. A cap, A², adapted to be applied to either end of barrel A', is fastened against one end thereof, forming the permanent abutment for one end of spring G, the other end of which bears against a follower, H', mounted on rod H. The follower H' bears against a nut, h , locked by a jam-nut, h' , on a screw-threaded portion of rod H. Spring G is under compression normally, and its normal compression can be readily changed to suit circumstances by adjusting the nuts h h' . The ec-

centric is counterbalanced on its pivot-stud c^2 by a counter-weight, C' , the centrifugal balls counterbalance each other, and the entire governor, including the eccentric, is counter-
 5 balanced by the balance-weight I , carried on the arms a^3 of the spider. The balls E and F , as well as the weights C' and I , are preferably hollow, when each is provided with a hole,
 10 closed by a screw-plug, so that they may be loaded with shot to adjust their heft. The speed of the engine depends in part upon the tension of the spring and in part upon the weight of the centrifugal balls. I have ascer-
 15 tained that the best results as to uniformity of speed are obtained by preserving a certain ratio, determinable by trial adjustments for various speeds of any given engine, between the tension of the spring and the weight of the centrifugal balls. It is mainly for this
 20 reason that I provide for adjusting the weight of the centrifugal balls. The eccentric's counter-weight assists the centrifugal balls and the spring in maintaining uniformity of engine speed by its tendency to preserve its own velo-
 25 city under momentary changes in the speed of the crank-shaft, due to variations in the steam pressure or the load put upon the engine. Under an increase of speed of the crank-shaft this counter-weight C' lags behind
 30 somewhat for the time being, and causes a shifting of the eccentric, so as to decrease its eccentricity, and consequently cut off steam earlier, while under a decrease of speed of the crank-shaft the said counter-weight outruns
 35 the other parts somewhat for the time being, and shifts the eccentric so as to cut off steam later. This incidental function of the counter-weight C' is so desirable that I make its heft adjustable, as before described, so that it may
 40 be loaded, to foster this function, somewhat at the expense of its function or balancing the eccentric. The best practical heft of this counter-weight for any given engine and speed can be readily determined by trials. This
 45 speed-governor should be so applied to the crank-shaft of an engine that the eccentric will give the desired lead to the valve, and in shifting change the travel of the valve to cut off steam sooner or later. The lead may be
 50 practically constant for all points of cut-off; but means may be provided to vary the lead. For example, the pivot-stud c^2 of the eccentric may be journaled in an eccentric-eye of a cylindrical bushing, a^6 , in the hub a^4 of the
 55 spider, as shown in Figs. 8 and 9. By turning the bushing a^6 in one direction or the other, so as to move the eccentric in a direction radial to the arc in which it swings, the lead may be increased or decreased at pleasure.
 60 The slot a^5 and the guide eye of the shifter-rod are sufficiently wide to admit of such adjustments of the eccentric. The bushing a^6 , after adjustment, may be secured by a set-screw, a^8 , passing through a slot in a tail, a^7 , on said
 65 bushing. By circularly adjusting the governor on the crank-shaft a positive lead may be

obtained for the earlier points of cut-off and a negative one for the later points of cut-off, or vice versa.

The governor shown in the drawings is de-
 70 signed to run in the direction indicated by the arrow x in Fig. 1. To adapt it for running in the reverse direction, the levers carrying the centrifugal balls must be transposed, the shifter-rod and the coupling-rod reversed
 75 end for end, and the cap A^2 secured to the opposite end of barrel A' . The spider will also require a slight circular adjustment to get the proper lead.

The levers E' and F' may be constructed of
 80 two flat bars separated by distant pieces, as clearly shown in Figs. 5, 6, and 7, and enter sockets in the centrifugal balls, to be bolted thereto. The fly-wheel or pulley is pushed
 85 up close against the governor, if practicable, to act as a shield, and in that case the spider may be bolted to the arms of the wheel instead of being secured directly to the crank-shaft, suitable provision being made by slots for the
 90 bolts to permit of limited circular adjustments of the spider. In some cases the spider may be dispensed with and the active parts of the governor mounted on the fly-wheel or pulley, as shown in Figs. 10 and 11, which also illus-
 95 trate some modifications in the details of construction of some of the parts. The shifting range of the eccentric is here limited by a stop-pin secured to the fly-wheel and project-
 100 ing through a segmental slot in the eccentric. The shifter-rod is a mere link connecting the eccentric with only one of the centrifugal ball-levers, on which the link may be adjusted, moreover, to vary the shifting motion of the
 105 eccentric with reference to a given centrifugal or centripetal motion of the centrifugal balls. This adjustability also affords the opportunity to accommodate the governor to springs differing in temper. The pivot-stud of the ec-
 110 centric is supported by diametrically-opposite set-screws in a radial slot of the fly-wheel, so that the lead may be varied by adjustment of said set-screws.

The weight for counterbalancing the gov-
 115 ernor is applied to the rim of the fly-wheel or pulley.

The parts are so constructed and applied
 120 that only that part of the eccentric which is encompassed by the eccentric-strap projects beyond the rim of the wheel, the residue being shielded in a measure by the wheel.

I claim as my invention—

1. The combination, substantially as before
 125 set forth, of the shifting eccentric, the centrifugal balls with their levers, the shifter-rod, the coupling-rod, and the spring around said coupling-rod.

2. The combination, substantially as before
 130 set forth, of a centrifugal governor and a pivoted shifting eccentric provided with a counterbalance, the heft of which is adjustable.

3. In a centrifugal governor, the combina-
 135 tion, substantially as before set forth, of the

supporting-frame or spider having a spring-barrel, the spring, the reversible coupling-rod for the levers of the centrifugal balls, and the cap adapted to be applied to either end of said
5 spring-barrel.

4. The combination, substantially as before set forth, of the pivoted and counterbalanced shifting eccentric, the centrifugal balls with their levers, the shifter-rod, the coupling-rod,
10 and the spring around said coupling-rod.

5. The combination, substantially as before

set forth, of the pivoted and counterbalanced shifting eccentric, the centrifugal balls with their levers, the shifter-rod, the coupling-rod, the spring around said coupling-rod, and the
15 counter-weight for balancing the governor.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR PENNEY.

Witnesses:

GEO. H. RUSSELL,

ALF. N. RUSSELL.