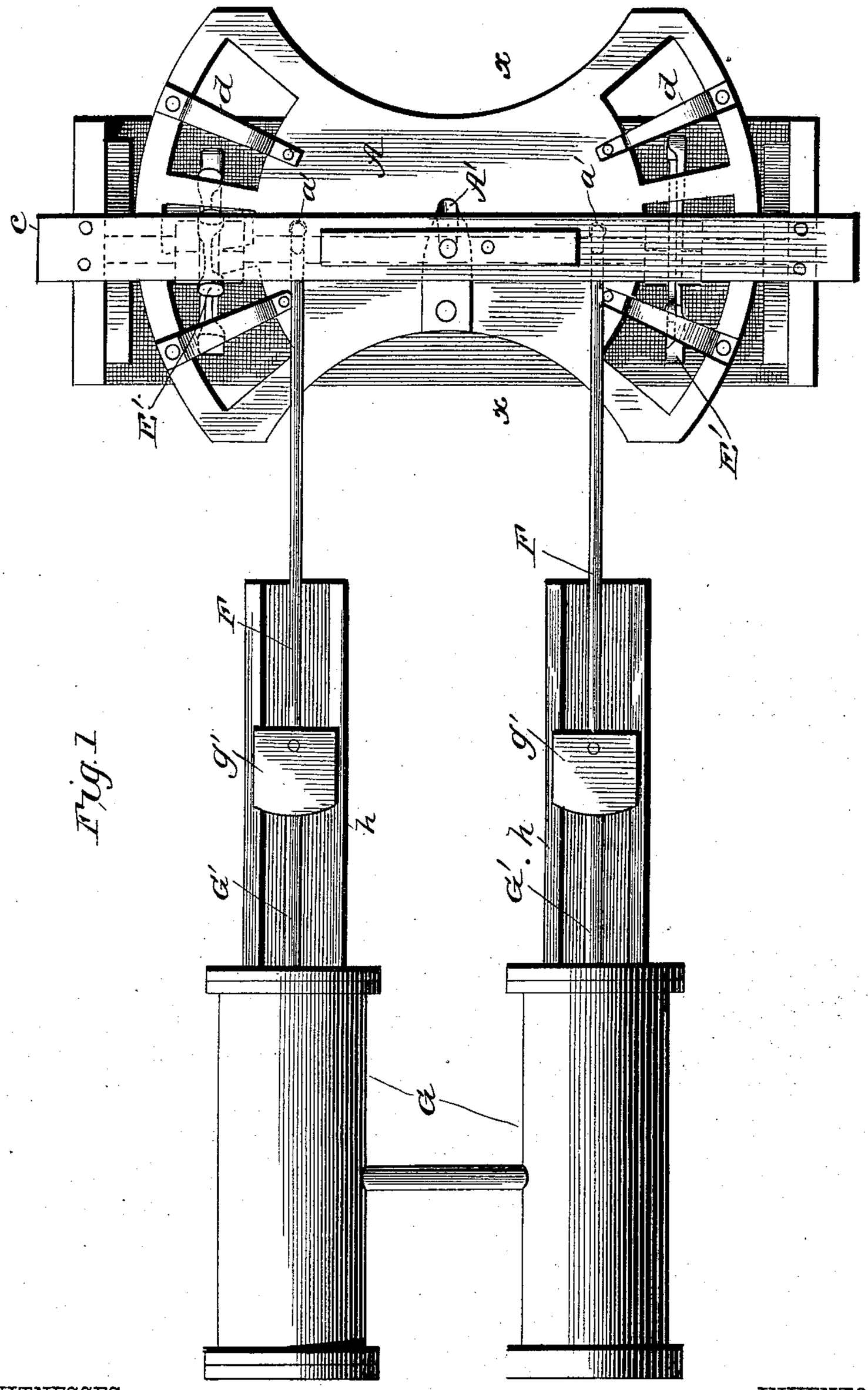
(No Model.) 3 Sheets—Sheet 1.

T. C. THOMAS.

MECHANISM FOR CONVERTING AND REVERSING MOTION.

No. 407,555. Patented July 23, 1889.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

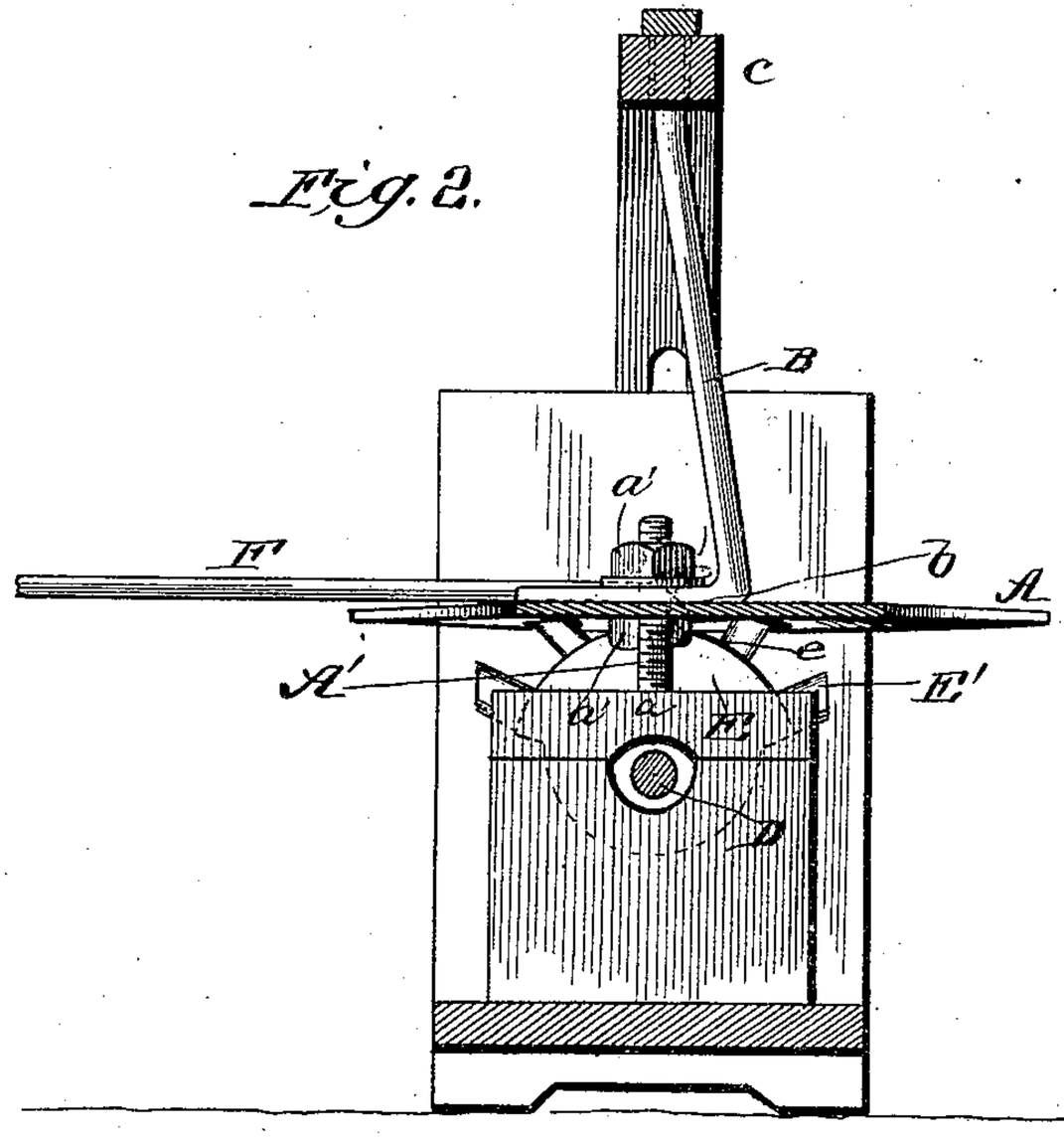

Fig. 3.

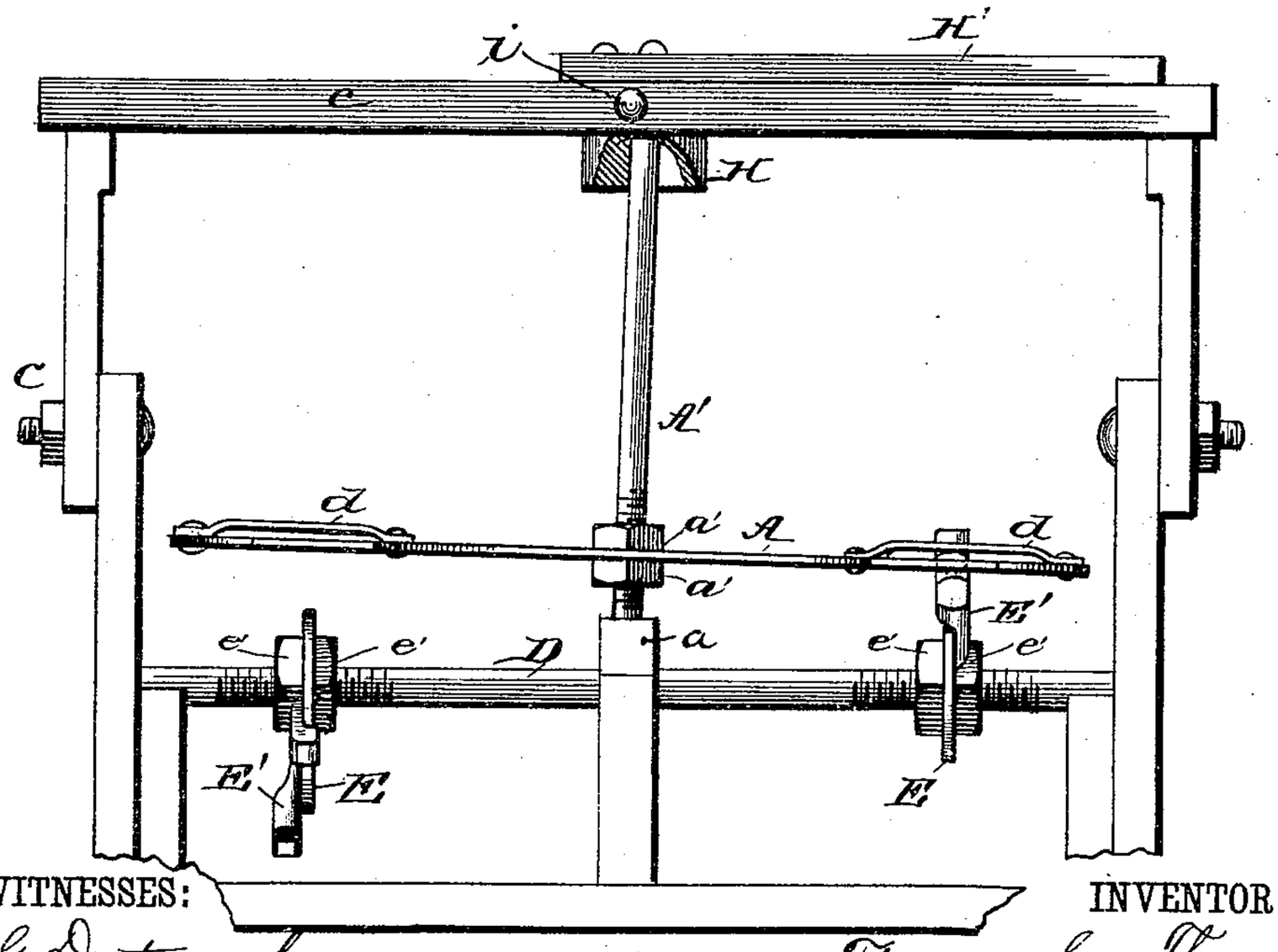

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Fig. 5.

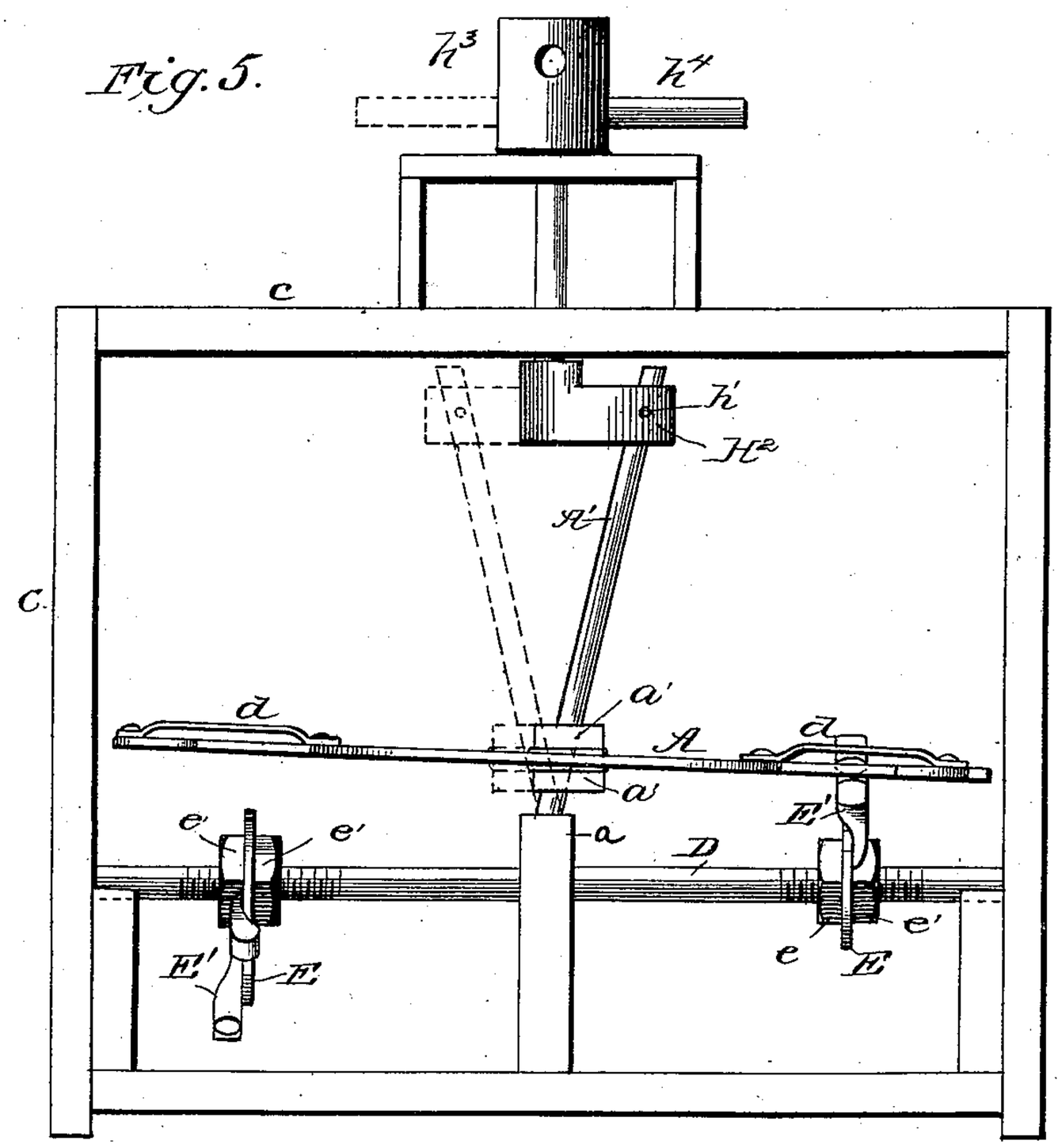


Fig. 6

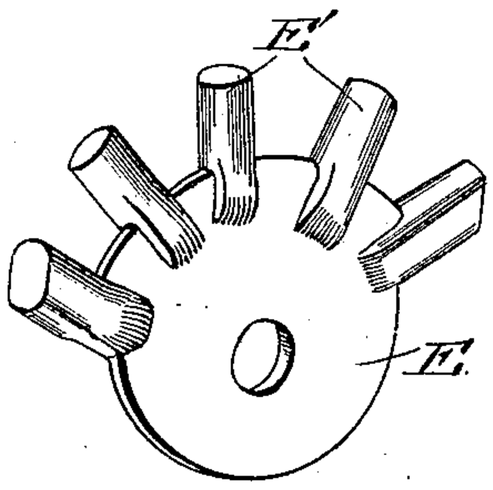
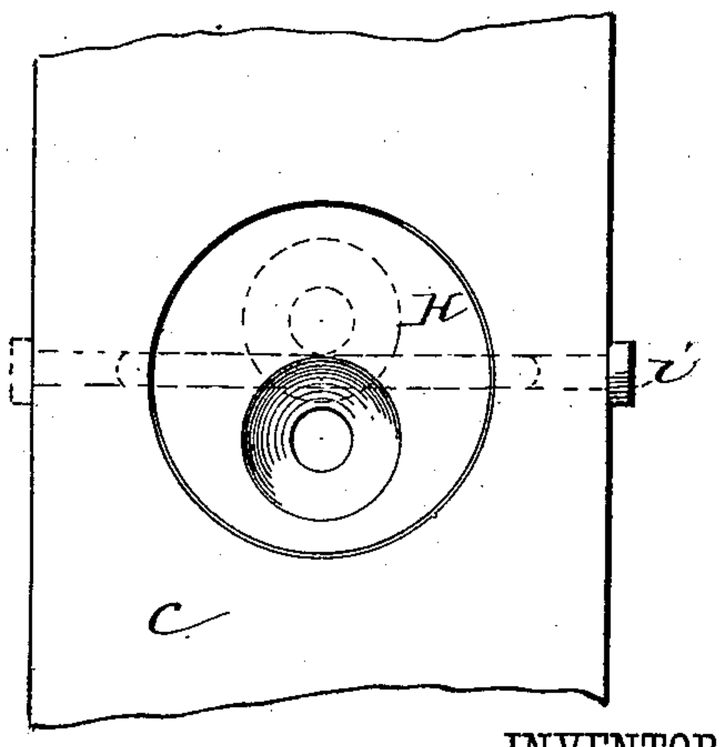


Fig. 7.

Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS COSLET THOMAS, OF SALT LAKE CITY, UTAH TERRITORY.

MECHANISM FOR CONVERTING AND REVERSING MOTION.

SPECIFICATION forming part of Letters Patent No. 407,555, dated July 23, 1889.

Application filed December 6, 1888. Serial No. 292,837. (No model.)

To all whom it may concern:

Be it known that I, THOMAS COSLET THOMAS, of Salt Lake City, in the county of Salt Lake, Utah Territory, have invented a new and useful Improvement in Mechanism for Converting and Reversing Motion, of which the following is a specification.

This invention has in view to provide for the ready conversion of reciprocating motion into rotary motion—as, for instance, to transmit the motion of an engine-piston to and for rotating a shaft whose motion may be utilized in driving machinery or a propeller. It is also adapted to effect the reversal of the resultant motion.

To these ends the nature of the invention consists of a centrally-pivoted oscillating toothed contrivance or plate having engagement with cogged or toothed segments or disks applied to a driving-shaft, and of means for reversing the rotary-motion shaft, substantially as hereinafter more fully set forth, and pointed out in the claims.

Figure 1 is a plan of my improved mechanism. Fig. 2 is a section on line *x x* of Fig. 1, looking to the left. Fig. 3 is a front elevation of a modified form. Fig. 4 is an inverted plan of the eccentric H, the frame being broken away, the full lines representing the eccentric in one position and the dotted lines another. Fig. 5 is a front elevation of another modification. Fig. 6 shows one of the toothed disks or segments. Fig. 7 is a detail of a pitman and its hook.

In the embodiment of my invention I employ an oscillating contrivance or plate A, which is centrally connected to and turns with a rock-shaft A′. The plate A is secured on the shaft A′ between nuts *a′*, screwed thereon, as shown in Figs. 2, 3, and 5. The shaft A′ bears at its lower end in a suitable support *a* and passes, as presently set forth, through the plate or contrivance A and through a horizontal plate-like arm or offset *b* of a rocking extension or upright B, the upper end of which bears in the top cross-bar *c* of the supporting-frame C, and which will be described farther on.

The shaft extension or upright B is inclined upward and inward from its offset or plate *b*, so as to cause its extreme upper end to stand about in alignment with the shaft A′, whereby it is adapted to effect the careening or slanting of the longitudinal or side edges of the plate A to bring either edge into such a position that it shall first engage with one or the other of the two series of teeth of the plate A, as is practiced in reversing the motion of the horizontal rotary shaft, as more fully hereinafter explained. This form of extension B is to be used where no reverse motion of the power-transmitting shaft D is required.

The oscillating plate A is provided with two series of radial teeth or cogs *d d*, each four (more or less) in number, which may be integral therewith, a series being arranged in each end. Either of two ways may be adopted to dispose the teeth or cogs *d d*—one, as shown, viz., to have the middle or intermediate teeth flush with the surface of the plate, while the end ones are in a plane above the plate. The other way to dispose the teeth or cogs is to have them all stand flush with the surface of the plate or contrivance. In that case, however, the last tooth of each series of the teeth of the rotary shaft (hereinafter described) would be shorter than the other teeth thereof. The spaces of the last or end teeth of each series of teeth of the oscillating contrivance or plate A are wider than those of the intermediate teeth, to provide ample room in effecting the interchange of engagement of the series of teeth of the plate and the teeth of the rotary shaft.

D is a horizontal shaft suitably supported or journaled in the frame C and arranged about at right angles to and in the same vertical plane with the shaft A′, and may represent the axle of the driving-wheels of a locomotive, the rear axle of an ordinary wagon, or any shaft to be rotated to which it is desired to impart a rotary motion. Upon this shaft near its ends are secured, preferably, as shown, by jam-nuts *e′*, disks or segments E E, each of which is provided with a series of teeth or cogs E′ E′, arranged in the arc of a circle and adapted to engage with the teeth or cogs of the oscillating contrivance or plate A.

The segments or disks E E, with their teeth, are so arranged that just as the last tooth of one disk or segment is about to escape from one series of the teeth or cogs of the oscillating contrivance or plate A the first tooth of

the other disk or segment will begin to engage with the other or opposite series of the teeth of the oscillating contrivance or plate as the plate is moved first in one direction and then in the other, or is oscillated, whereby a continuous rotary motion is imparted to the driving-shaft D, as is desired.

It will be observed that the end ones of each series of the teeth of the shaft disks or segments E E are somewhat stouter than the intermediate ones and are beveled or inclined upon their outer free ends to permit of their ready engagement with and disengagement from the teeth or cogs of the oscillating contrivance or plate. The oscillating contrivance or plate A is also adapted, having two points a' a', for the application thereto of power, to permit of its being operated by either of two engine-pistons, or by two at the same time.

F F are connecting-rods or pitmen, each having one end provided with a hook, or made hook-shaped, as at *e e*, and either one engaged with the plate or contrivance A, or both may be engaged therewith at a' a', the hook or hooks *e e* entering an aperture or apertures in the plate. These hooks are curved or slightly bowed to permit the pitmen or connecting-rods to have the requisite amount of play at their points of connection with the plate.

The pitmen or connecting-rods F F are connected with cross-heads g', mounted to slide in ways on a support or guide *h*, suitably secured in position contiguously to engine-cylinders G, whose piston-rods G′ are connected to the cross-heads g'. Where a reversal of the motion of the shaft D is necessary, I employ the following mechanism:

H (see Figs. 3 and 4) is a socketed eccentric, which is let into a central aperture or opening in the top bar of the frame C, and to the upper end of which is secured a lever H′, which is adapted to effect the turning of the eccentric in the arc of a circle either to the right or left, and is capable of connection with said top bar of the frame C, the same having a pin-and-aperture connection *i* therewith. This arrangement permits of bodily elevating or depressing either one end or the other ends of the plate A, as is required at the outset, in first relatively adjusting the teeth of the disks or segments and those of the plate for proper engagement, which will now be described.

It will be seen that by removing the pin *i* and turning the lever H′ in one direction—say to the right—the eccentric H will be accordingly shifted, which will carry with it to that side the shaft A′, on which, between the ends thereof, the plate A is mounted, and consequently deflect the plate A, causing that end to stand the lower and have engagement with the teeth of the shaft disk or segment on that side, the opposite end of the plate standing out of engagement with the teeth of its segment or disk. The plate is now turned by imparting to the piston a half-stroke. The movement of the plate is at this point arrested, and the teeth or cogs of the disk or segment disengaged from the plate. The movement or adjustment previously imparted to the shaft A′ is reversed by moving the lever H′ of the eccentric H to the left directly in alignment with the top cross-bar of the frame C. The plate will be inclined or deflected in the reverse direction and the teeth of its opposite end be caused to have engagement with the teeth of the opposite shaft segment or disk. The plate is now again moved in the same direction by causing the piston to complete its stroke and then restored to its normal or original position. Therefore it will be seen that to reverse the shaft D it is only necessary to reverse the incline of the shaft A′, which has the effect to deflect or careen the plate, and thereby insure its engagement first with the teeth on the adjacent edge of the segment or disk opposite the elevated end of the plate. If, on the other hand, it is desired to impart an opposite rotation to the shaft D, just the reverse adjustment of the shaft A′ is resorted to, having the effect to deflect or careen the diagonally-opposite corner edge of the plate, when the teeth of the now inclined or careened edge of the plate will first engage with the teeth upon the adjacent edge of the opposite segment or disk.

As shown in Fig. 5, in lieu of the shifting eccentric H may be used a modified contrivance consisting of an eccentric H^2, applied to the upper end of the shaft A′ and adapted to have a pin-and-aperture connection h' with the latter to effect the retention of the same in their relatively adjusted positions. The eccentric lies in a horizontal plane. From its inner end projects upwardly a pivot arm or cylinder h^3, passing through the top cross-bar and a supplemental cross-piece of the frame C, and provided with a series of apertures in its side which receive a lever h^4 for its convenient manipulation.

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

1. The combination, in a mechanism for converting motion, of an oscillating contrivance or plate provided with series of radial teeth or cogs, one series at each end, with a shaft carrying segments or disks provided with teeth or cogs adapted to successively engage with the aforesaid series of cogs or teeth as the said contrivance or plate is oscillated, substantially as and for the purpose set forth.

2. The combination, in a mechanism for converting motion, of a centrally-hung plate provided with means for the application of power at each side of its axis and with series of cogs or teeth, one series at each end, with a shaft carrying segments or disks provided with cogs or teeth engaging successively with the aforesaid teeth or cogs as the said contrivance or plate is oscillated, substantially as and for the purpose specified.

3. The mechanism for converting and reversing motion, consisting of a plate fixed to a rock-shaft and provided with cogs or teeth, the intermediate ones being flush with the surface of the plate, while the end ones are in a plane above the surface of the latter, and a shaft carrying segments or disks provided with teeth or cogs engaging successively with the aforesaid cogs or teeth as said plate is oscillated, substantially as and for the purpose set forth.

4. The mechanism for converting and reversing motion, comprising an oscillating contrivance or plate, a rotary shaft, and reversing mechanism, said oscillating contrivance or plate and rotary shaft being adapted to intergear, and said reversing mechanism effecting the reversal of said rotary shaft, substantially as set forth.

5. The mechanism for converting and reversing motion, having an oscillating contrivance or plate intergearing with a rotary shaft and the reversing mechanism consisting of the eccentric applied to the upper end of the shaft-extension and provided with a reversing-lever, substantially as set forth.

6. The mechanism for converting and reversing motion, comprising an oscillating plate or contrivance provided at each end with a series of teeth or cogs, a rotary shaft provided with toothed segments or disks gearing with the aforesaid teeth, and the rock-shaft offset or inclined to careen the said plate, substantially as set forth.

7. The mechanism for converting and reversing motion, having the rotary shaft provided with the toothed segments or disks, the oscillating plate or contrivance having at each end a series of teeth or cogs gearing with the aforesaid teeth or cogs, the inclined rock-shaft to which said plate is secured, and the eccentric receiving the upper end of said shaft and provided with a lever having a pin-and-aperture connection with the top cross-bar of the supporting-frame, substantially as set forth.

8. The mechanism for converting and reversing motion, comprising the rotary shaft provided with segments or disks, the inclined oscillating plate or contrivance having a series of teeth gearing with the aforesaid teeth, the inclined rock-shaft having an adjustable bearing at its upper end and passing through the plate, substantially as specified.

THOMAS COSLET THOMAS.

Witnesses:

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SIDNEY W. DARKE.