

(Model.)

4 Sheets—Sheet 1.

J. H. EICKERSHOFF.
STEAM ENGINE VALVE GEAR.

No. 249,602.

Patented Nov. 15, 1881.

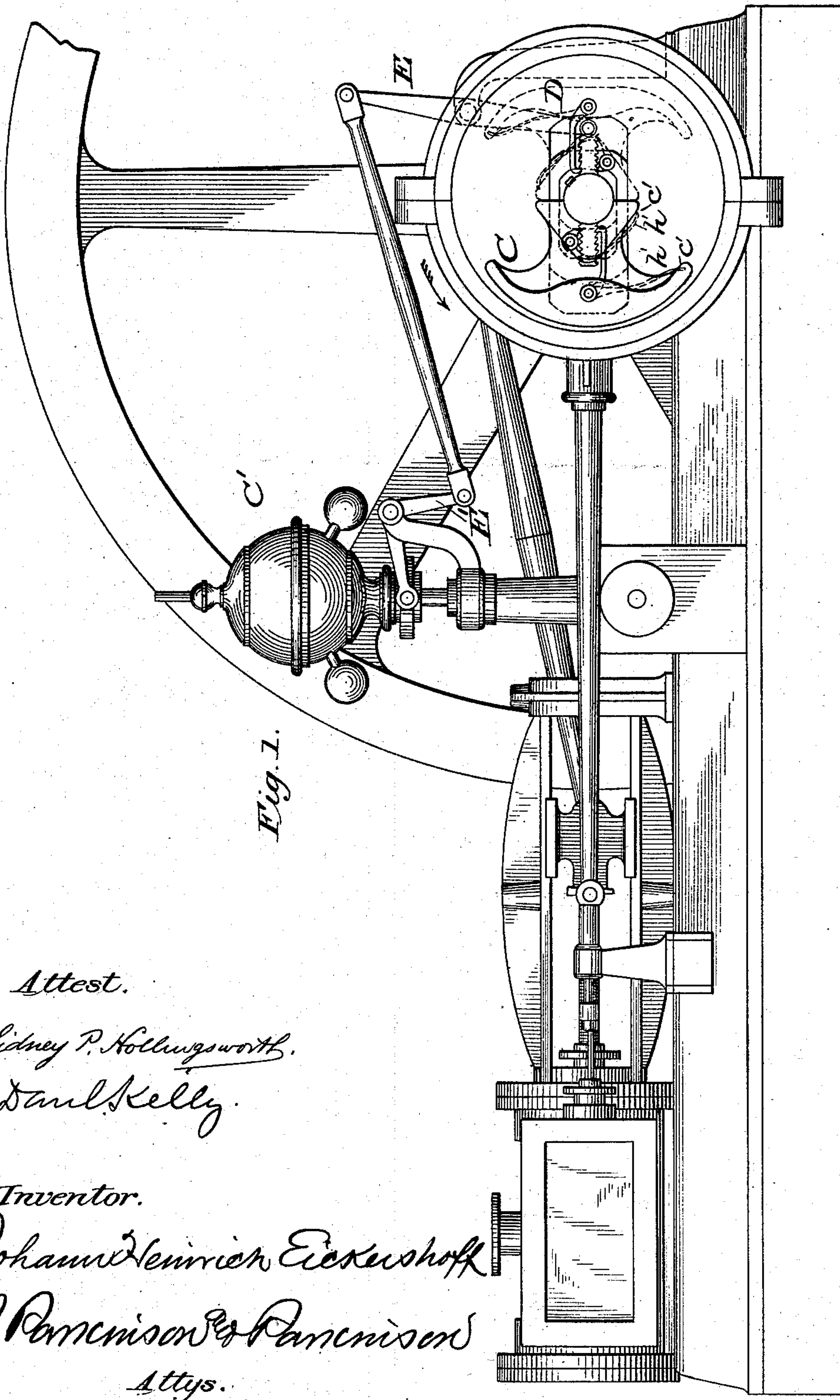


Fig. 1.

Attest.

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Per Panmison & Panmison
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(Model.)

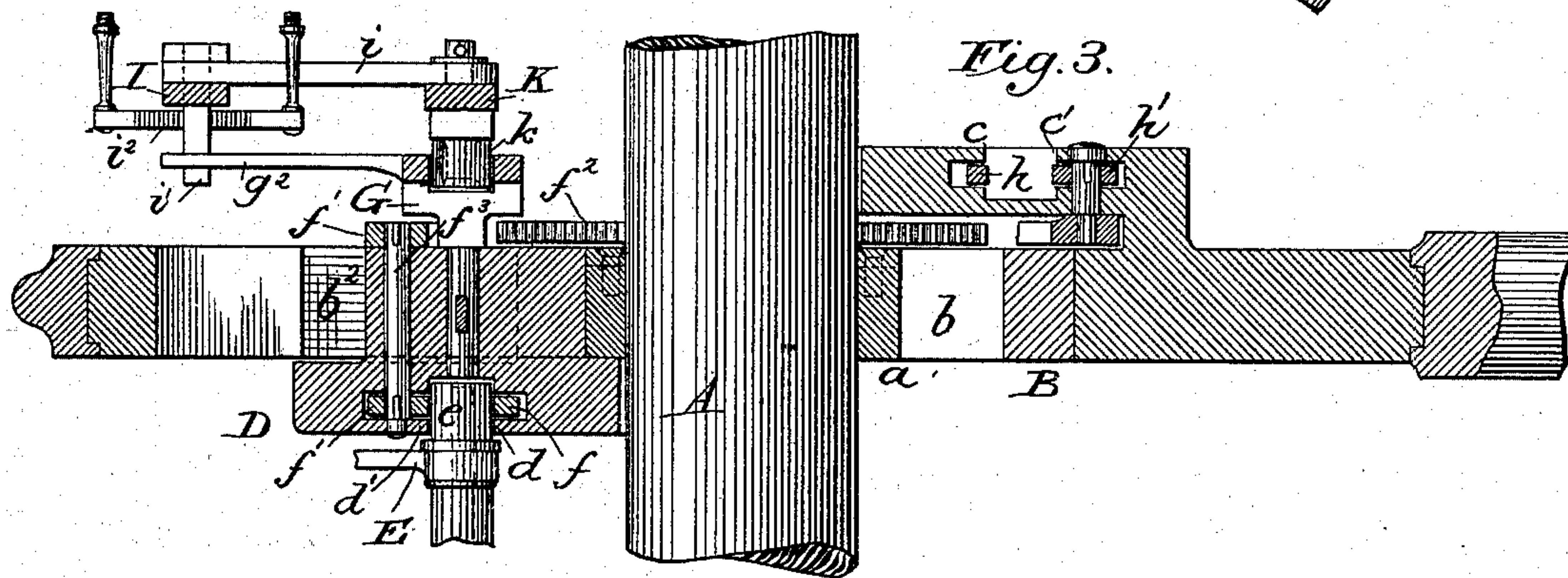
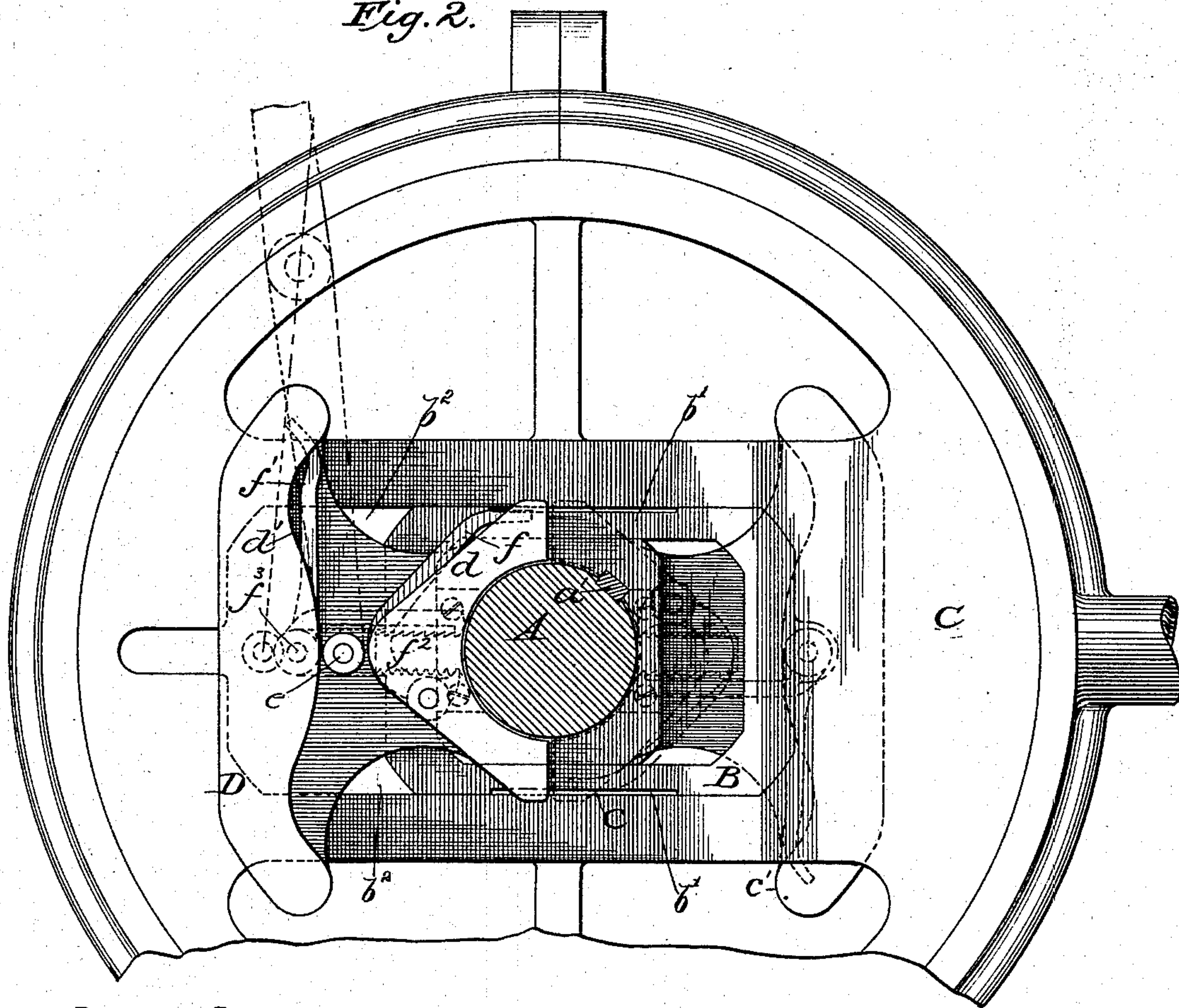
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Fig. 2.



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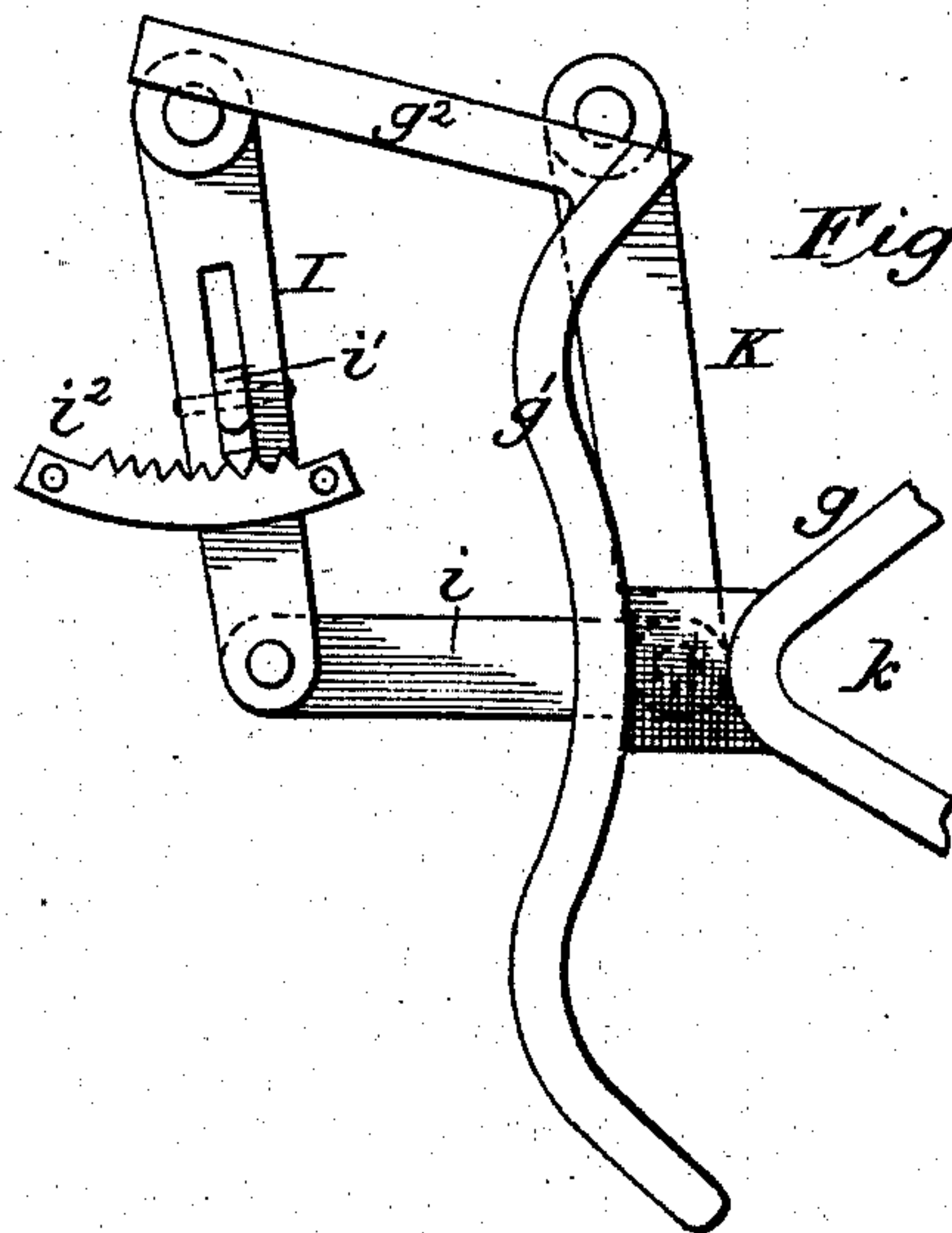


Fig. 4.

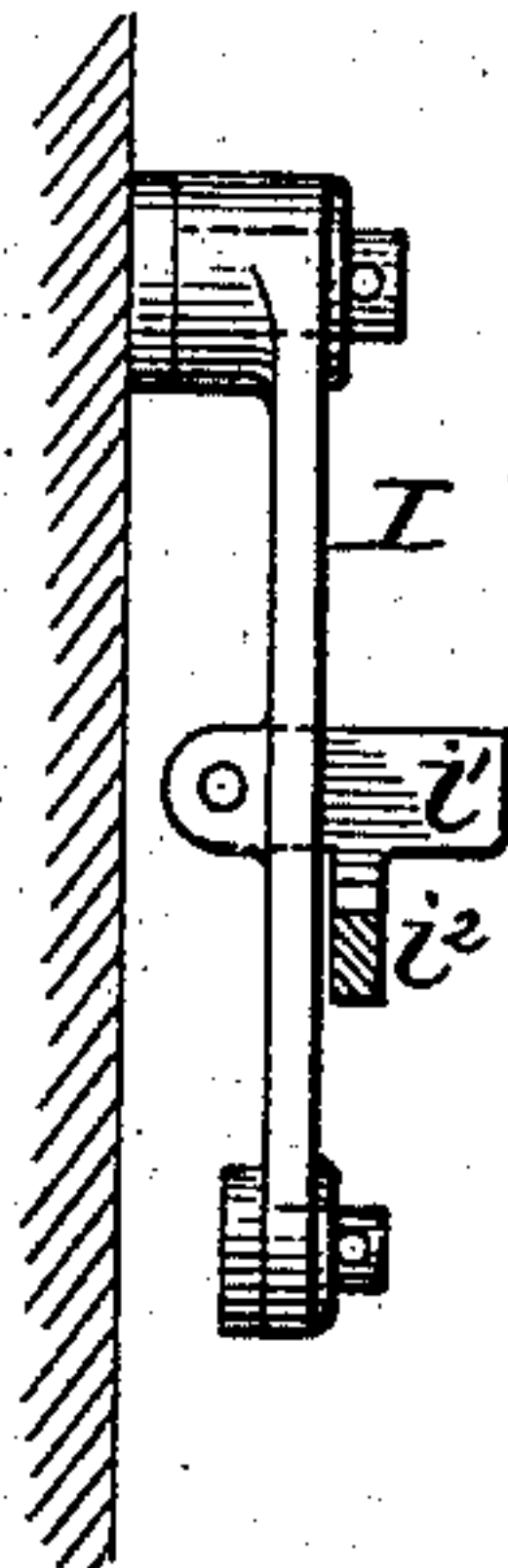


Fig. 5.

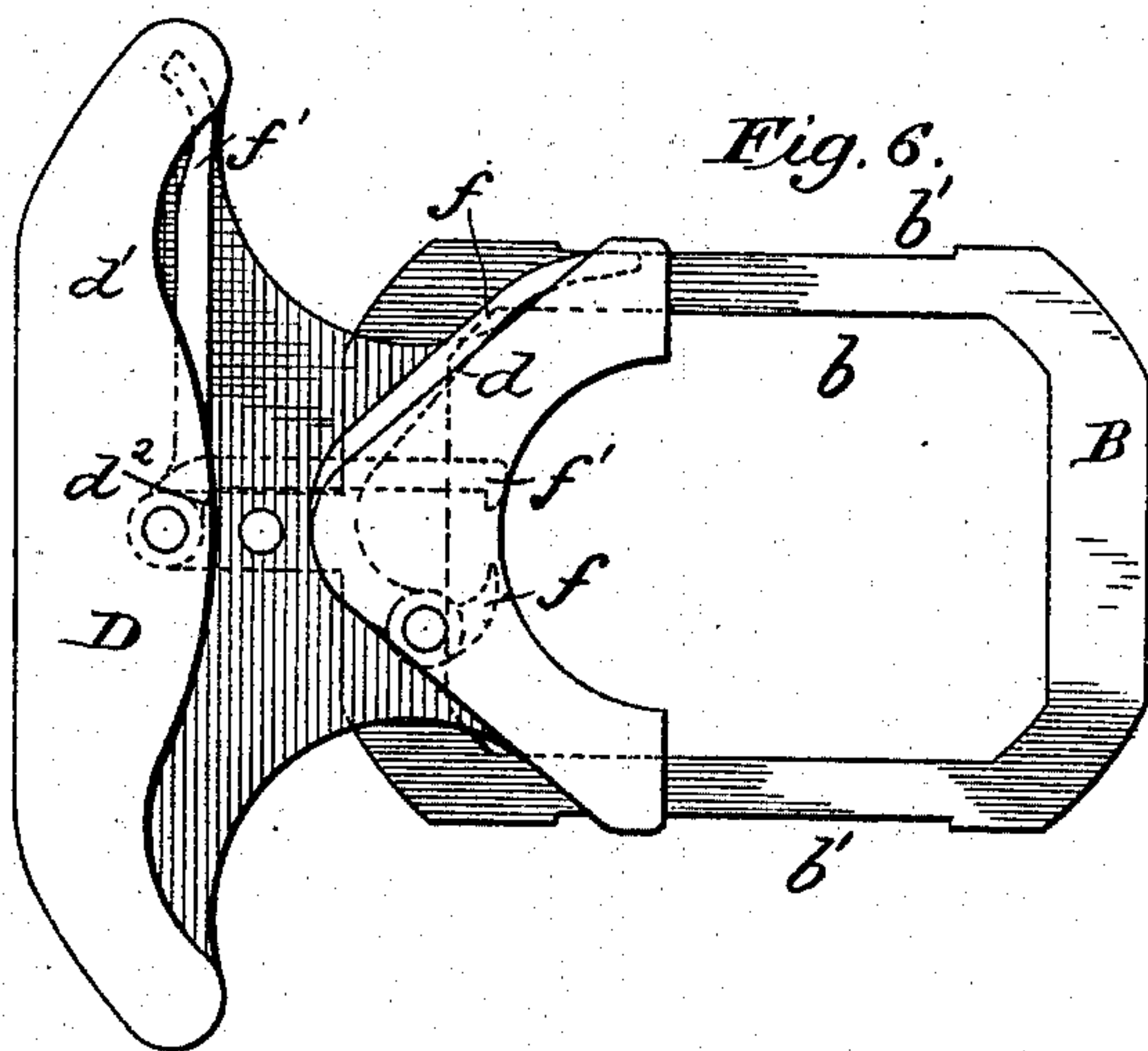


Fig. 6.

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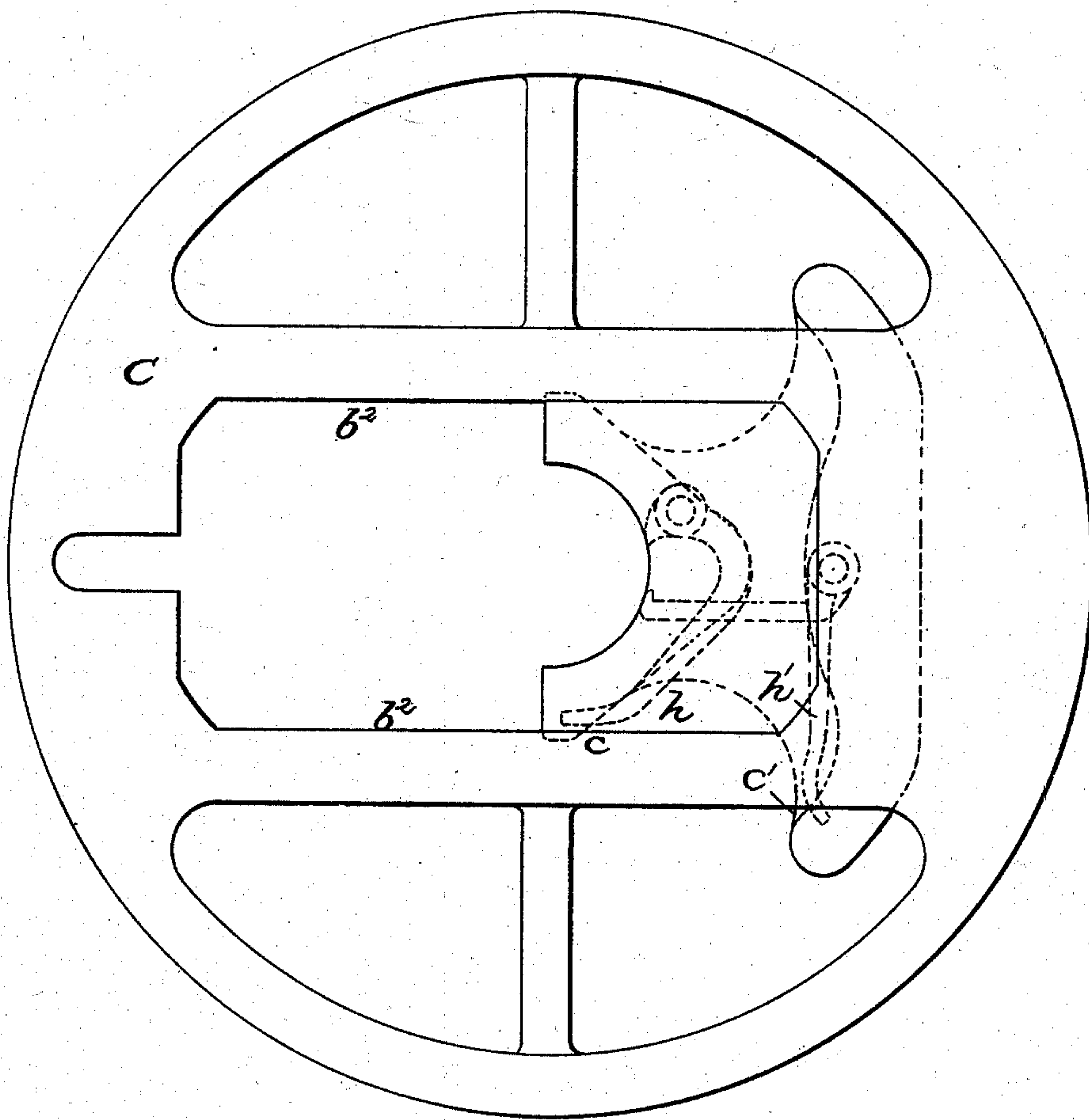
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Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHANN H. EICKERSHOFF, OF CINCINNATI, OHIO.

STEAM-ENGINE VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 249,602, dated November 15, 1881.

Application filed July 13, 1881. (Model.)

To all whom it may concern:

Be it known that I, JOHANN HEINRICH EICKERSHOFF, of Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Steam-Engine Valve-Gear, of which the following is a specification.

My invention relates to cut-offs for steam-engines, and more particularly to such as are controlled through the governor and caused to vary the supply of steam to the cylinder; and it consists in the combination, with an adjustable eccentric controlling the cut-off valve, and itself controlled as to its adjustment by the rise and fall of the governor, of a trip or locking device independent of and disconnected from said governor, to hold the eccentric in any given adjustment while the governor remains stationary, and in other combinations and details of construction hereinafter set forth.

In the drawings, Figure 1 is a side elevation of a steam-engine embodying my invention; Fig. 2, an enlarged view of the eccentric and its adjusting mechanism; Fig. 3, a diametrical section taken horizontally through the mechanism shown in Fig. 2. Figs. 4, 5, 6, and 7 are details.

Cut-off mechanisms have heretofore been made in a variety of forms and controlled in their action by the governor.

The object of this invention is, primarily, to accomplish this control by the direct action of the governor upon an adjustable eccentric driving the cut-off valve, so that with the rise and fall of the governor the eccentricity may be changed and the stroke of the valve lengthened or shortened. For this purpose it is necessary not only to provide means for the adjustment of the eccentric which will hold it firmly in position upon its shaft or axis when once adjusted, but also to make these means extremely sensitive to the action of the governor, so that any vertical motion of the latter will cause a corresponding adjustment of the eccentric. These acquirements are found in the construction which I have devised, and which I have hereinafter described as being the most desirable embodiment of my invention at present known to me.

Referring, now, to the drawings, A is the main shaft of an engine. Upon this is mounted

a rectangular block, *a*, made fast thereto by a key, *a'*. Instead, however, of making the block as a separate piece, which is only necessary where old machines are to be altered, the shaft itself may be squared to serve the purpose of the block.

B is a sliding piece or yoke, which receives the block *a* in the slideway *b* and plays back and forth thereon. This sliding piece supports also upon its exterior ways, *b'*, the eccentric proper, C, which is slotted for the purpose, as shown at *b²*, and otherwise has a peculiar construction. The slide B is formed integral with and fast to a heel-piece, D, having cam-ledges or shoulders *d d'*. The slide is caused to turn with the revolutions of the main shaft, and its cam-ledges or shoulders so made to flare away from each other at the mouth sufficiently to receive within them with certainty with every revolution the small roller *e*, journaled on the end of the lever E, pivoted to the frame and connected with the governor C' by means of a cranked lever, E', and intermediate link. Whatever may be the position of the governor at the moment, the roller will thus either pass through the neck *d²* without touching the cam-ledges, or will, according to the position of the governor, be brought in contact with the face of one or the other ledge, and thus tend to push it aside.

In openings or seats in the heel-piece are pivoted spring-pressed cranked dogs *f f'*. The pawl-arm of the dog *f* takes into a toothed rack on the under side of a bar, *f²*, rigid with the block *a*, while its tail part or arm is so arranged along the pivotal shaft *f³* and so bent as to rise alongside and be held normally slightly above the upper surface of the cam-ledge *d*. The pawl part of the dog *f'* takes likewise into a rack on the upper side of said bar, and its tail part or arm is brought alongside and normally pressed slightly in advance of the upper surface of the cam-ledge *d'*, such cam-ledges being slotted to permit the tail-pieces of their respective dogs to be pushed into them against the stress of their springs until they lie flush, or nearly flush, with the cam-surface. Supposing the governor to have moved so as to bring the roller upon the end of the bent lever in position to come in contact with the cam-ledge *d*, it will first strike the tail-piece of the

dog *f*, and pressing it down will raise the tooth at the other end from engagement with its rack, and then pressing upon the cam-ledge will push the sliding piece to the right, according to the shape of the flange, the teeth of the rack into which the other dog, *f'*, takes being for this purpose so set that the dog may ride over them in the motion of the sliding piece while taking into them to prevent its return. Should, however, the roller be so positioned as to come in contact with the cam-ledge *d'*, the dog *f'* will be raised from engagement with its rack, the slide-piece pushed in a contrary direction, and the other dog will in its turn ride over the rear faces of the teeth of the rack, into which it takes, and drop into them to prevent retrogression. When the roller reaches and passes through the neck *d*² the pressure upon the cam-ledge and the consequent movement of the slide-piece will cease. The dog which the roller has tripped will be released, and, urged by its spring, will engage with its rack, and the connection between the block or square *a* will thereafter be fast. The sliding piece has now moved to the right or left, as the case may be; but the eccentric proper, *C*, has been held fast with the block *a* by a similar arrangement of dogs and racks as the foregoing, and has not moved. The action of the governor has therefore been upon the sliding piece alone, and has only required sufficient force to move this sliding piece.

Projecting from or keyed to the heel-piece *D* is the arm or bracket *G*, which carries a skeleton cam-frame having cam surfaces or edges *g g'* similar to and parallel with the corresponding cam-ledges, *d d'*, on the heel-piece. This cam-frame has an offset or bent arm, *g*², and, being fast to the heel-piece *D* and the attached slide, accompanies the latter in its revolutions, and also in its adjustments.

Pivoted to the frame-work or casing of the machine, opposite to the skeleton cam-frame, are two parallel pendent links, *I* and *K*, connected at their bottoms by a cross-piece or link, *i*, so that they will move together and be mutually braced. A latch, *i'*, is pivoted in or upon the link *I*, or arranged to slide in a slot therein in such position as to take into the teeth of a rack-bar, *i*², fast to the frame-work of the machine, so as to lock the link-frame against movement. A roller, *k*, is journaled upon the forward end of the link *K* in such position as to enter between the cam-edges *g g'* of the skeleton-frame as it passes in its revolution. When the sliding piece is moved as above described the offset *g*² of the skeleton-frame will be brought into a path taking it against the latch *i'*, and it will raise this latch, releasing the links, and hold it raised until the roller has passed through the neck between the two cam-ledges of the skeleton-frame, when the latch will be released and drop into the toothed bar *i*² and again lock the link-frame against movement. In the interval, however, the action of the cam-edges upon the roller *k* has swung the links and the link-frame over and caused it to

take up a new position with the roller opposite to the roller on the bent lever of the governor, in which position it will be held until another rise or fall of the governor again causes its release and adjustment, as before.

The eccentric proper, *C*, is provided with cam ledges or shoulders *c c'*, similar to those of the heel-piece, only that they are on the reverse side of the eccentric and on the opposite side of the shaft or axle. In Figs. 2 and 3 of the drawings those already described are to the left of the shaft and in front, those upon the eccentric are to the right and behind. This arrangement brings the cam-ledge on the eccentric proper upon that side on which is found the link-frame and its roller, so that as the eccentric revolves the roller on the link-frame will be received between said cam-ledges. As already intimated, this eccentric is provided with cranked spring-dogs *h h'*, engaging with racks upon an arm from the block or square *a*, and the tail-pieces of these dogs or levers press up beyond the pivot and project above the sliding surface of its cam-ledges in like manner as in the sliding piece. Assuming the parts to be in the position represented in Fig. 2 of the drawings and moving in the direction indicated by the arrow, when the eccentric has made a half-turn, so as to bring that side which now lies to the right of the shaft near to the left, if the roller *k* has been moved in the immediately-preceding passage of the sliding piece by any adjustment of the latter, it will go against one or the other of the cam-ledges *c c'*, and being locked fast by the latch will depress the tail-piece of the dog, unlock it from the rack-bar on the block or square *a*, and push the eccentric along the sliding piece until it assumes a position thereon agreeing with the preceding adjustment of said sliding piece, and then escaping through the neck *c*², it will release the dogs and allow them to take into the rack-piece and lock the eccentric. The parts will now have been fully adjusted and locked in their adjusted positions, which will not change unless a change should take place in the position of the governor, since, in the further rotation of the eccentric, the cam-ledges of both slide and eccentric will be so located that the roller on the governor-lever and the roller on the link-frame will pass through their necks without tripping the dogs or pressing upon their inclined faces.

I claim—

1. In combination with an adjustable eccentric controlling the cut-off valve, and itself controlled as to its adjustment by the rise and fall of the governor, a trip or locking device independent of and disconnected from said governor, to hold the eccentric in any given adjustment while the position of the governor remains unchanged.

2. The combination of a yoke-block sliding upon a square upon the crank-shaft, an eccentric sliding upon said yoke-block, a pin controlled as to its position by the governor and taking into a cam on the yoke-block to adjust

the latter, a shiftable arm supported on the frame, normally locked, and positioned by the movement of said yoke-block, and a pin or roller carried by said arm and taking into a cam on the eccentric itself to move the latter positively upon the yoke-block.

3. In combination with an adjustable eccentric adapted to slide upon its axis of motion to change its eccentricity thereto, cams carried by the eccentric, a pin or roller on a lever controlled by the governor acting upon said cams to move the eccentric to one side or the other with the rise or fall of the governor, and locking mechanism which holds the eccentric in its adjusted position until again operated by another movement of the governor.

4. The combination of the shaft, the block or square *a* and its rack-arms, the yoke or sliding piece, with its cam-ledges and dogs, the skeleton cam-frame carried by said yoke, the link-frame, its roller and locking-latch, the eccentric, its cam-ledges and dogs, the lever *E* and its roller, with the governor connected with said lever by a bell-crank and pitman,

whereby a change in the position of the governor is caused to change the position of the eccentric and the shaft.

5. The combination of the cam-ledges and the yoke or sliding piece, the rack-arm on the block keyed to the main shaft, the spring-pressed dogs engaging with said rack-arm, and having their tail-pieces normally lifted above the surfaces of said cam-ledges, and the pin or roller on the controlling-lever or tripping-arm.

6. The skeleton cam-frame, formed, substantially as described, with an offset, in combination with the link-frame, its roller, and locking-latch, substantially as and for the purpose described.

7. The combination of the skeleton cam-frame, the link-frame and its roller and locking-latch, and the cam-ledges on the body of the eccentric.

JOHANN HEINRICH EICKERSHOFF.

Witnesses:

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DANL. KELLY.