

No. 693,372.

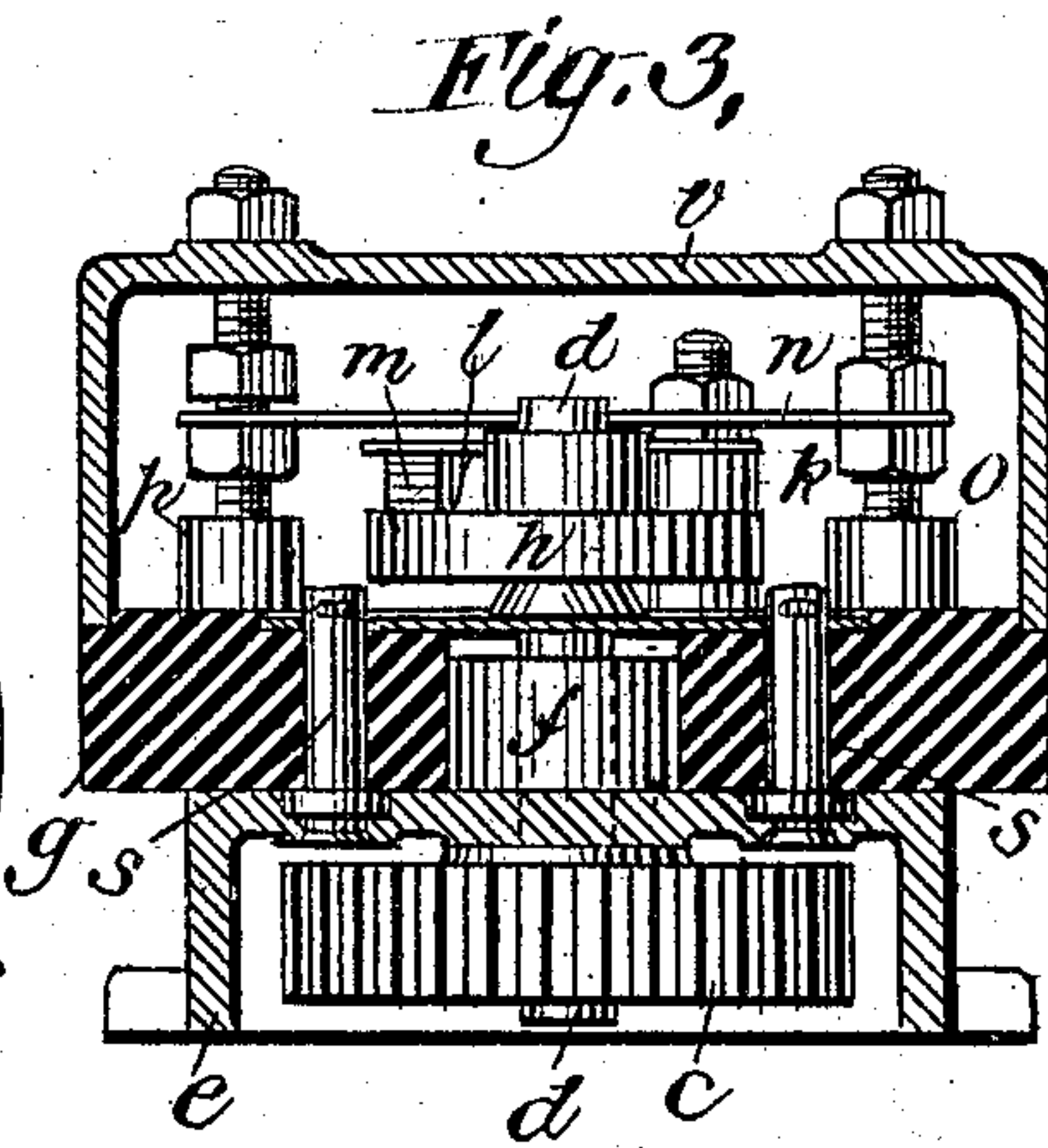
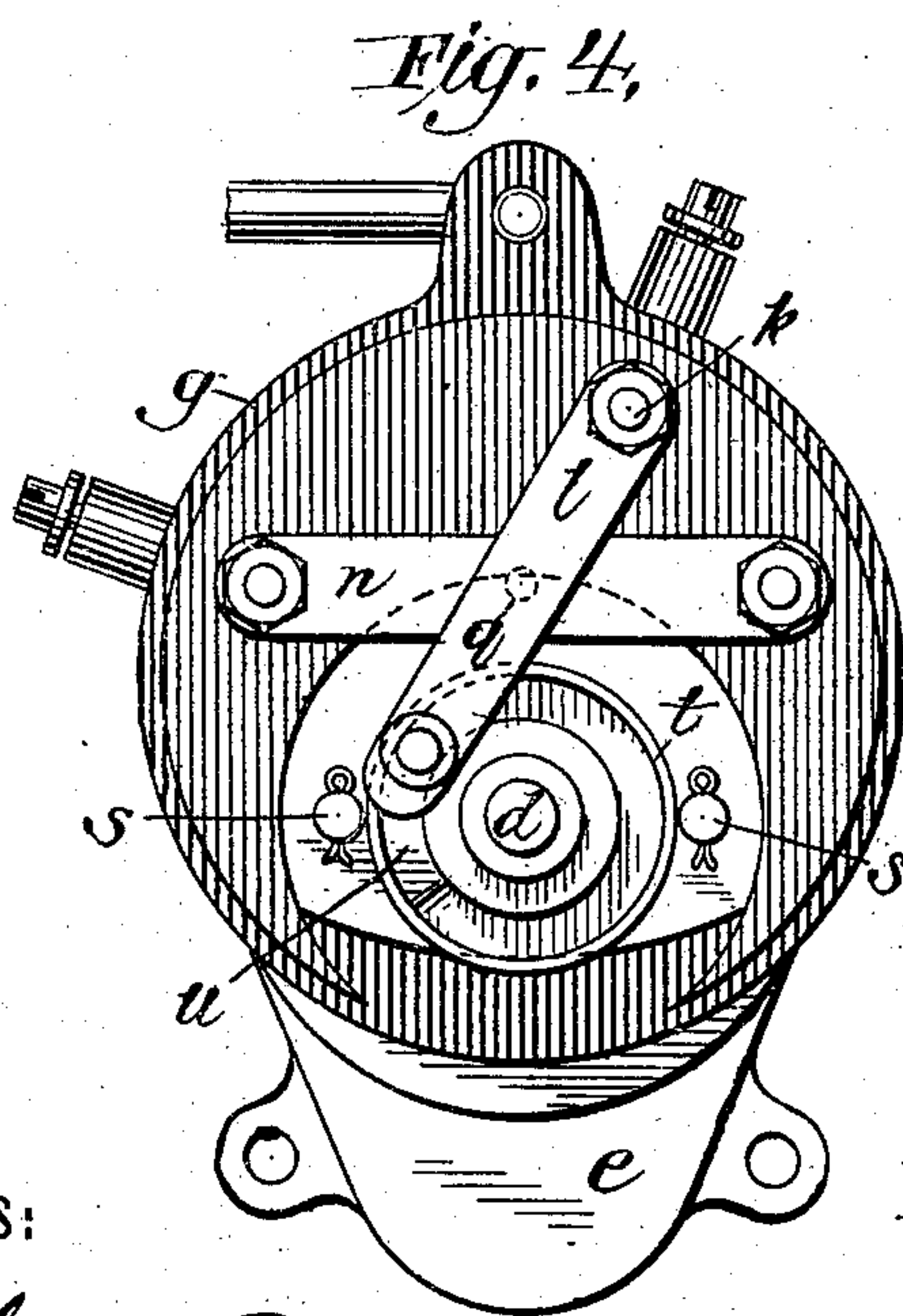
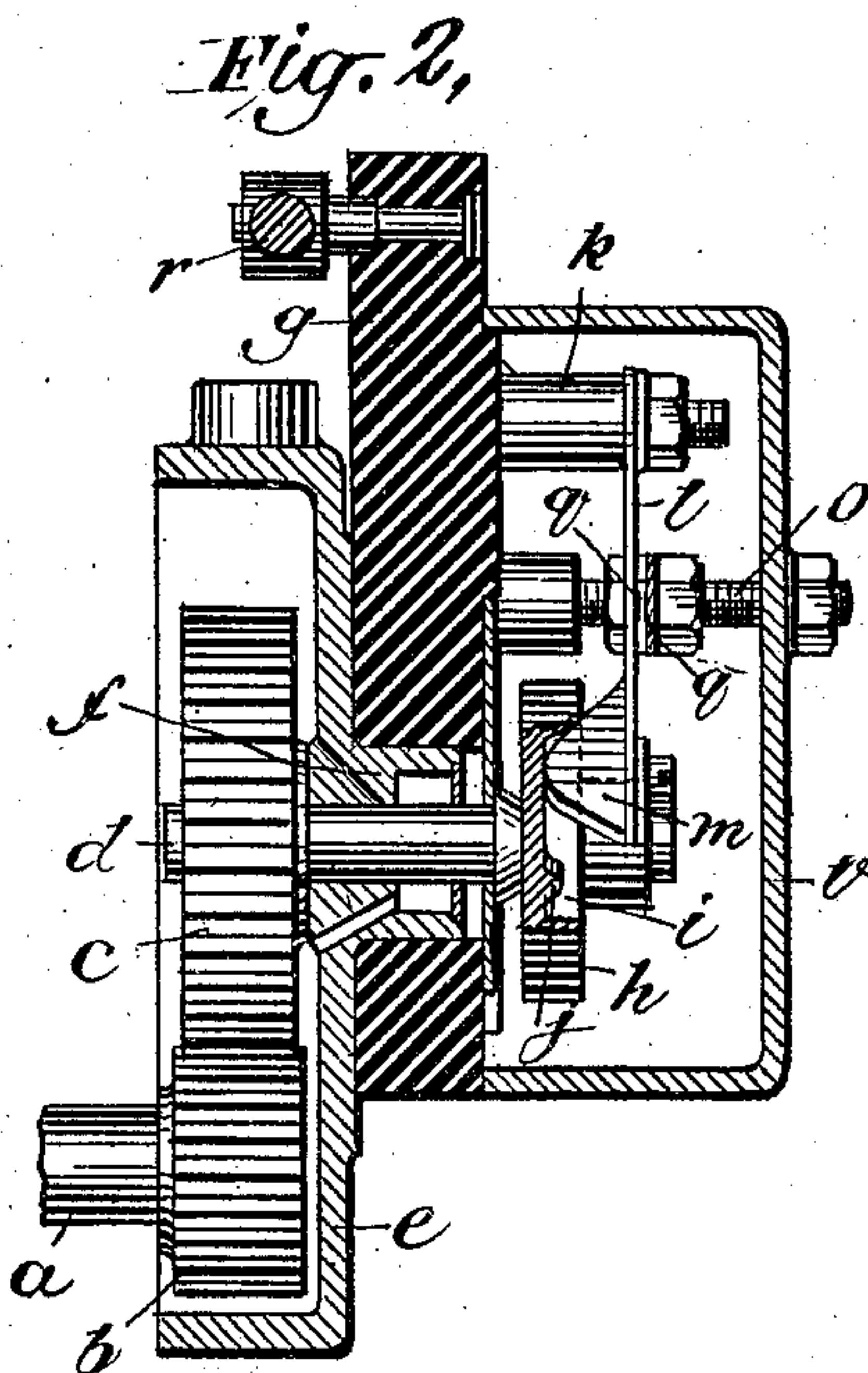
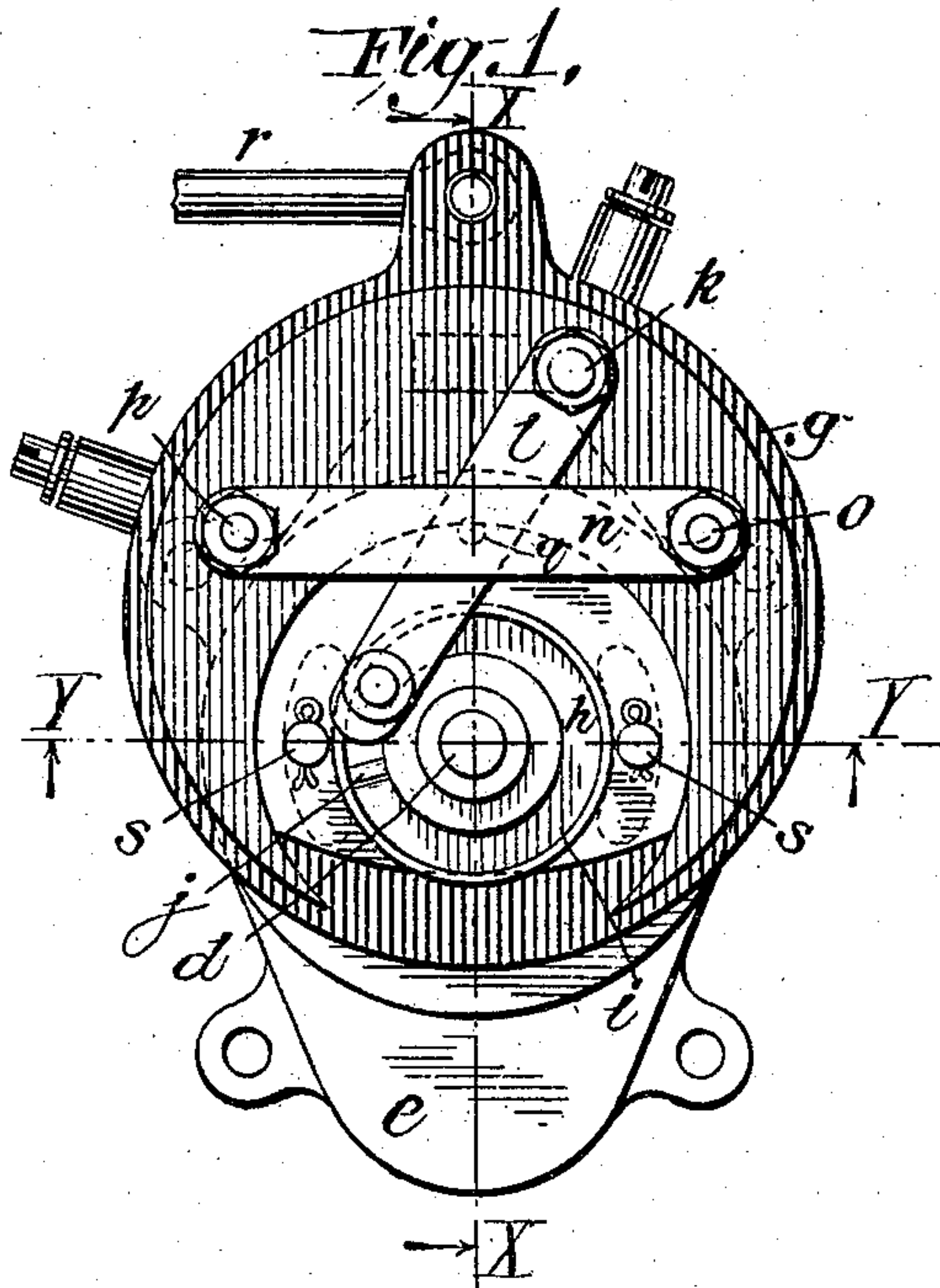
Patented Feb. 18, 1902.

F. E. CANDA.

CIRCUIT BREAKER FOR ELECTRIC IGNITERS FOR EXPLOSIVE ENGINES.

(Application filed Apr. 14, 1900.)

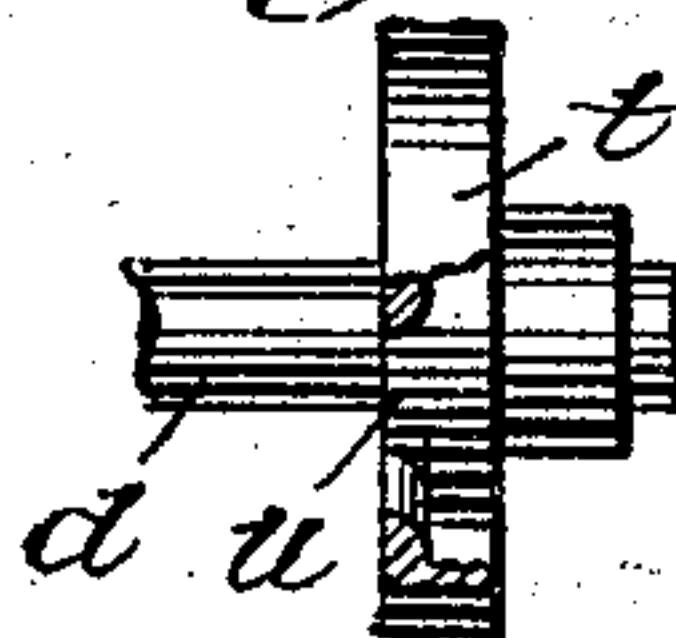
(No Model.)



WITNESSES:

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Fig. 5,



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FERDINAND E. CANDA, OF NEW YORK, N. Y.

CIRCUIT-BREAKER FOR ELECTRIC IGNITERS FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 693,372, dated February 18, 1902.

Application filed April 14, 1900. Serial No. 12,829. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND E. CANDA, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Circuit-Breakers for Electric Igniters for Explosive-Engines; 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.

My invention relates generally to the igniting mechanism of explosive or internal-combustion engines, and more particularly to the circuit-breaking devices employed in igniting mechanism of the so-called "jump-spark" type; and my invention consists in the novel construction of the operating-cam, in the novel construction of the circuit-interrupting devices operated by the cam, and generally in the novel combination, construction, and arrangement of the parts.

The objects of my invention are to improve the construction of circuit-breaking devices of the class described, to obtain each time the cam revolves a succession of sparks, to obtain thorough lubrication of the rubbing-surfaces of the cam and shoe, to cause the cam to retain the lubricant, and to make the device as simple, inexpensive, compact, durable, and reliable as possible. These objects are attained in the circuit-breaking device herein described and illustrated in the drawings which accompany and form a part of this specification, in which the same reference-letters indicate the same or corresponding parts, and in which—

Figure 1 is a side elevation of the circuit-breaker with the cover removed. Fig. 2 shows a vertical section of the circuit-breaker, taken on the line X X of Fig. 1 and looking in the direction of the arrows. Fig. 3 shows a horizontal section of the circuit-breaker, taken on the line Y Y of Fig. 1 looking in the direction of the arrows. Fig. 4 is a view similar to Fig. 1, showing, however, a slightly-different form of cam and a rearrangement of the contact-springs required by said cam; and Fig. 5 is a detail view of the form of cam shown in Fig. 4.

The drawings show the circuit-breaking device attached to the gear-case, which incloses

the gears by which the valve mechanism of an explosive-engine (not shown) is operated.

In the drawings, *a* designates the crank-shaft of the engine, and *b* and *c* gears by which the igniting device and valve-gear of the engine are driven, gear *b* being keyed to shaft *a* and gear *c* being keyed to shaft *d*. Said gears are inclosed by a case *e*, which may be secured to the engine-frame and in which shaft *d* is mounted.

Upon the boss *f* of case *e* is mounted a block *g*, composed of fiber or other suitable insulating material. This block carries the contact-springs hereinafter mentioned. Upon the shaft *d* is keyed a face-cam *h*, consisting of a disk having in one face a concentric groove *i*. At one point in this groove there is a projection or lug *j*, which serves to cause the vibration of the contact-springs hereinafter mentioned. A pillar *k* projects from the block *g*, and to it is secured a flat spring *l*, forming a follower for the cam *h* and carrying a shoe *m*, which works in the groove of the cam. Another spring *n* is located over the spring *l* and is secured at one end by means of adjustable clamping-nuts to a second pillar *o*. A third pillar *p* passes through an opening in the opposite end of spring *n* and is provided with nuts by which the amplitude of vibration of said spring may be adjusted. The springs *l* and *n* are provided with platinum contact-pieces *q*. Suitable binding-posts electrically connected to springs *l* and *n* are provided.

The operation of this circuit-breaking device is as follows: As the cam *h* rotates the lug *j* at one point in each revolution encounters the shoe *m* of the spring *l* and lifts said shoe and spring, causing the latter also to lift the spring *l* and bringing the contact-pieces *q* together. As soon as lug *j* has passed the shoe *m* the resiliency of spring *l* causes it to return to its former position and then to vibrate, the resiliency of spring *n* likewise causing it to do the same. The simultaneous vibration of these two springs causes their contact-pieces *q* to make and break contact in rapid succession a number of times each time the cam *h* sets them in vibration, thus producing a succession of brief and sharp sparks at the sparking terminals of the igniting mechanism, and if the first spark fails

to cause ignition one of the succeeding sparks will surely prove effective.

In order to vary the point of ignition in the engine-cylinder, the block *g* is movably mounted upon the boss *f*, and a rod *r*, which may be connected to a suitable operating-handle, (not shown,) is connected to the block for the purpose of moving it. The motion of said block *g* is limited by studs *s*, working in suitable slots in the block *g*.

Heretofore in circuit-breaking devices employing a cam and a spring-pressed shoe riding thereon difficulty has been experienced in maintaining proper lubrication between the cam and shoe. The shoe has usually been arranged to press against the periphery of the cam. When the parts are so arranged, the lubricant tends to run off from the cam. In the device herein described the spring-pressed shoe rides in a groove in the side of the cam, and this groove retains the lubricant placed therein. Smooth running of the circuit-breaking device without excessive wear is thereby insured.

If preferred, instead of employing a cam with a projecting lug *j* for operating the contact-pieces *I* I may employ a cam *h*, similar to cam *h*, but having a depression or orifice *u* instead of the lug. In such case the relation of the spring contact-pieces *l* *n* will be reversed, spring *l* being placed above spring *n*. The operation of this circuit-breaking device is the same as that of the device shown in Figs. 1, 2, and 3. The cam and vibrating contact-springs are inclosed by a cover *v*, held in place by suitable nuts.

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

1. In a circuit-breaker, the combination, with a cam adapted to cause vibration of a vibratory follower, and means for operating the cam, of a vibratory follower therefor, and a second vibrator adapted to be set in vibration by said follower when the latter is actuated, and to make and break contact with said follower in such vibration, whereby a succession of sparks may be produced, each time the follower is operated.

2. In a circuit-breaker, the combination, with a rotary cam adapted to cause vibration of a vibratory follower, and means for operating the cam, of two spring vibrators, one forming a follower for the cam and arranged to be set in vibration thereby, and the other adapted to be set in vibration by said spring-follower when so actuated, and to make and

break contact with said follower in such vibration, whereby a succession of sparks may be produced, each time the follower is operated.

3. In a circuit-breaker, the combination, with a rotary cam adapted to cause vibration of a vibratory follower and means for operating the cam of two intersecting leaf-springs one forming a follower for the cam and arranged to be set in vibration thereby, and the other adapted to be set in vibration by said first spring when it is so actuated, and to make and break contact therewith in its vibration, whereby a succession of sparks may be produced, each time the follower is operated.

4. In a circuit-breaker, the combination, with a rotary cam adapted to cause the vibration of a vibratory follower, and means for operating the cam, of a pivoted support, a vibratory follower for the cam, carried by said support, and a second vibrator adapted to be set in vibration by said follower when the latter is actuated, and to make and break contact with said follower in such vibration, whereby a succession of sparks may be produced, each time the follower is operated, and means for moving said support about its pivot, thereby varying the point at which the follower is operated.

5. In a circuit-breaker, the combination, with a rotary cam having a groove adapted to receive a shoe of a follower, said cam being arranged to actuate such follower, of a spring-follower, provided with a shoe riding in such groove, and means, operated by said follower when set in motion by said cam, for controlling an electric circuit.

6. In a circuit-breaker, the combination, with a rotary cam having in one side a face-groove adapted to receive a shoe of a follower, said cam being adapted to cause vibration of such follower, of a vibratory follower having a shoe riding in said groove, and a vibrator adapted to be set in vibration by said follower when the latter is actuated, and to make and break contact with said follower in such vibration, whereby a succession of sparks may be produced, each time the follower is operated.

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

FERDINAND E. CANDA.

Witnesses:

E. H. TUCKER,
A. H. PERLES.