

(No Model.)

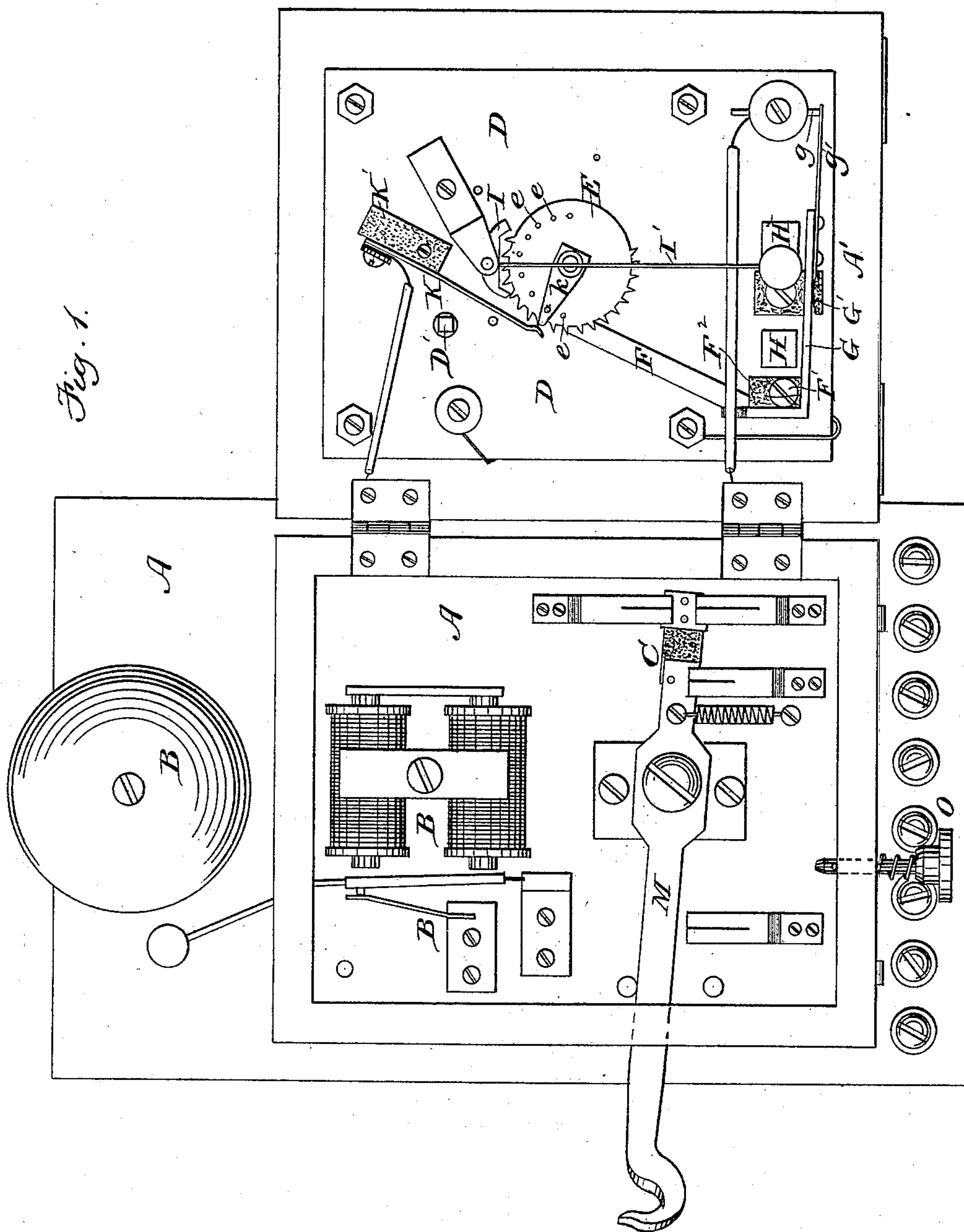
4 Sheets—Sheet 1.

E. DAVIS.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

No. 391,839.

Patented Oct. 30, 1888.



Witnesses.  
John M. Tuohay.  
A. L. White.

Inventor.  
Edmund Davis.  
By Wright & Brown.  
Atty.

(No Model.)

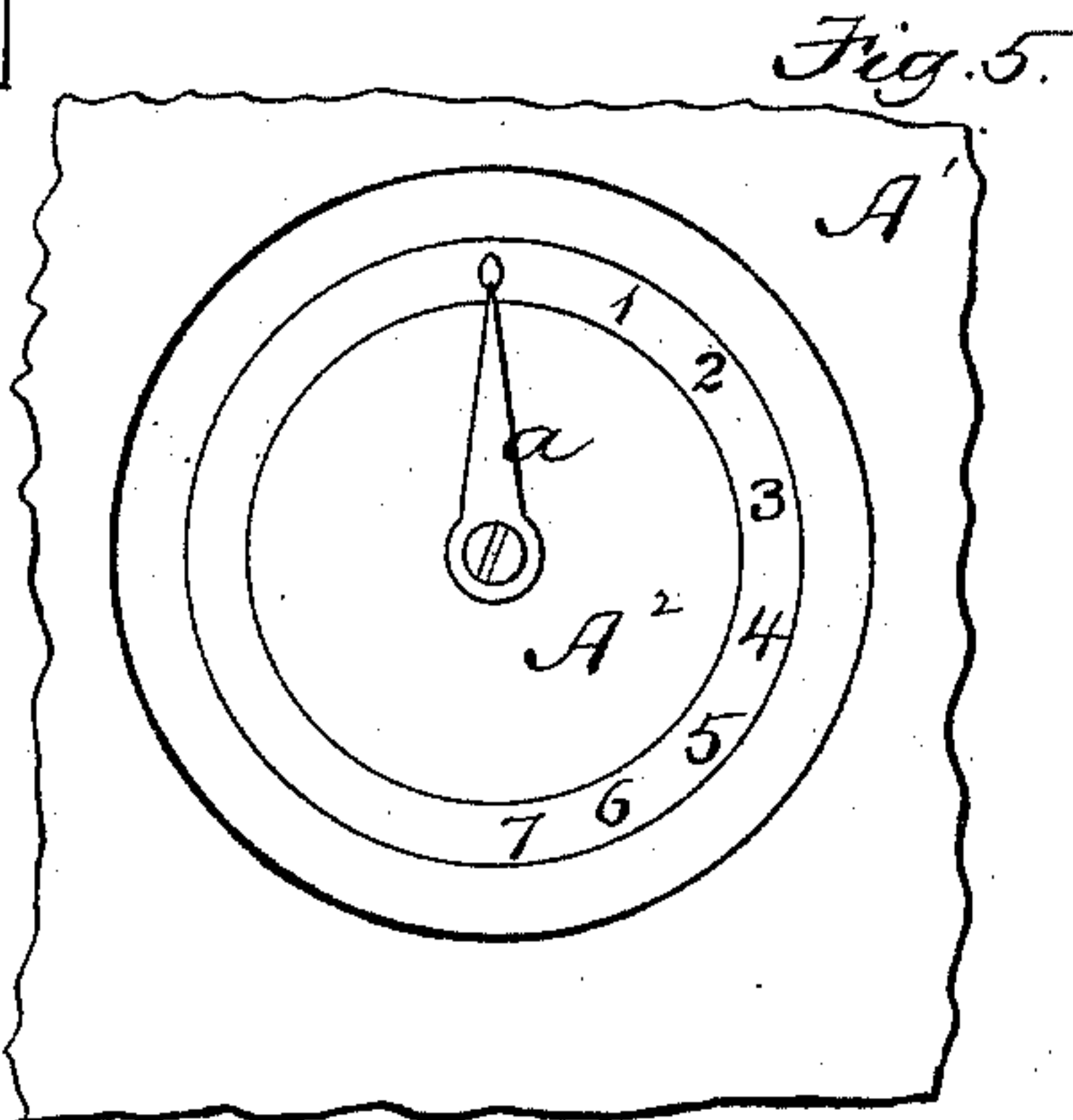
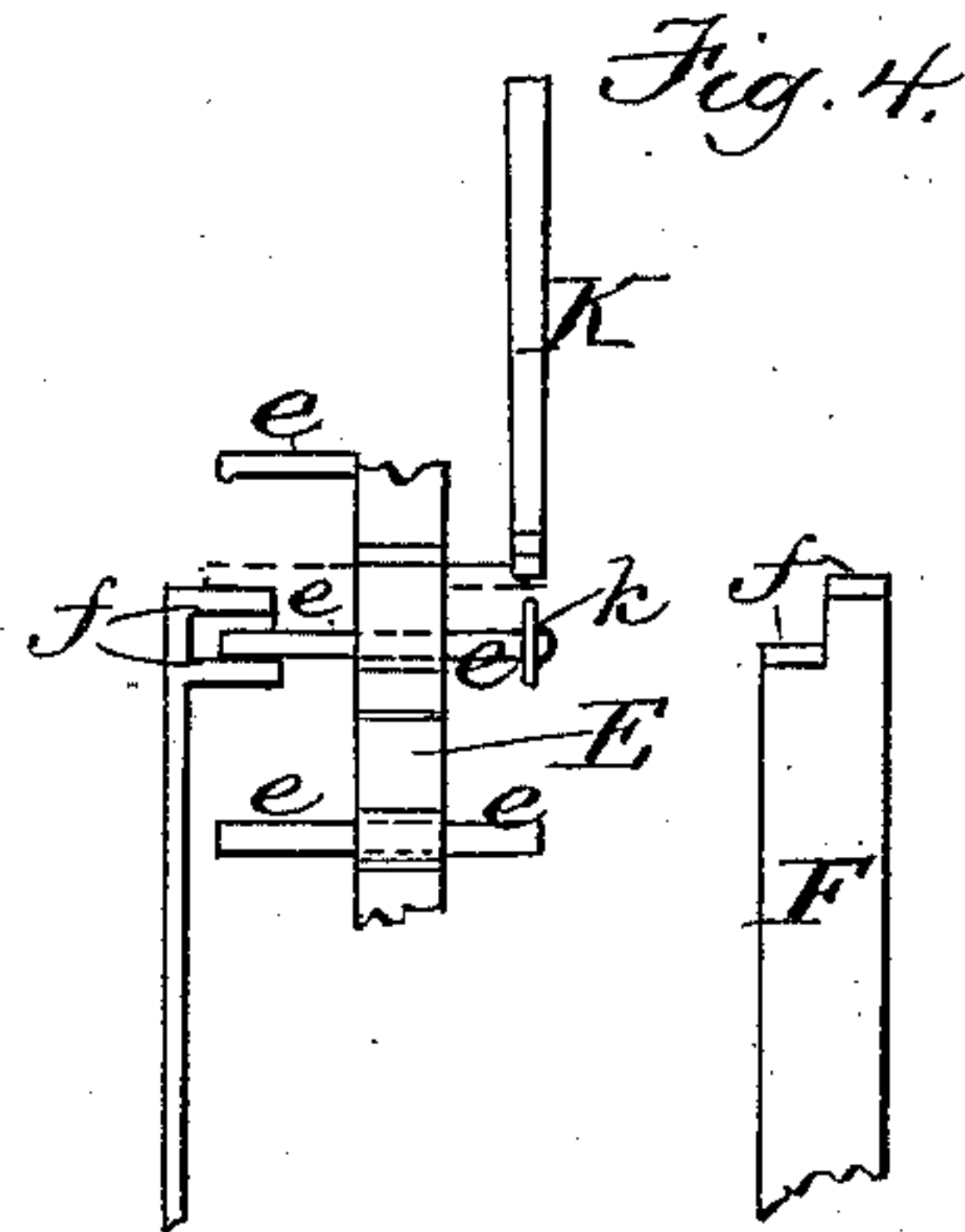
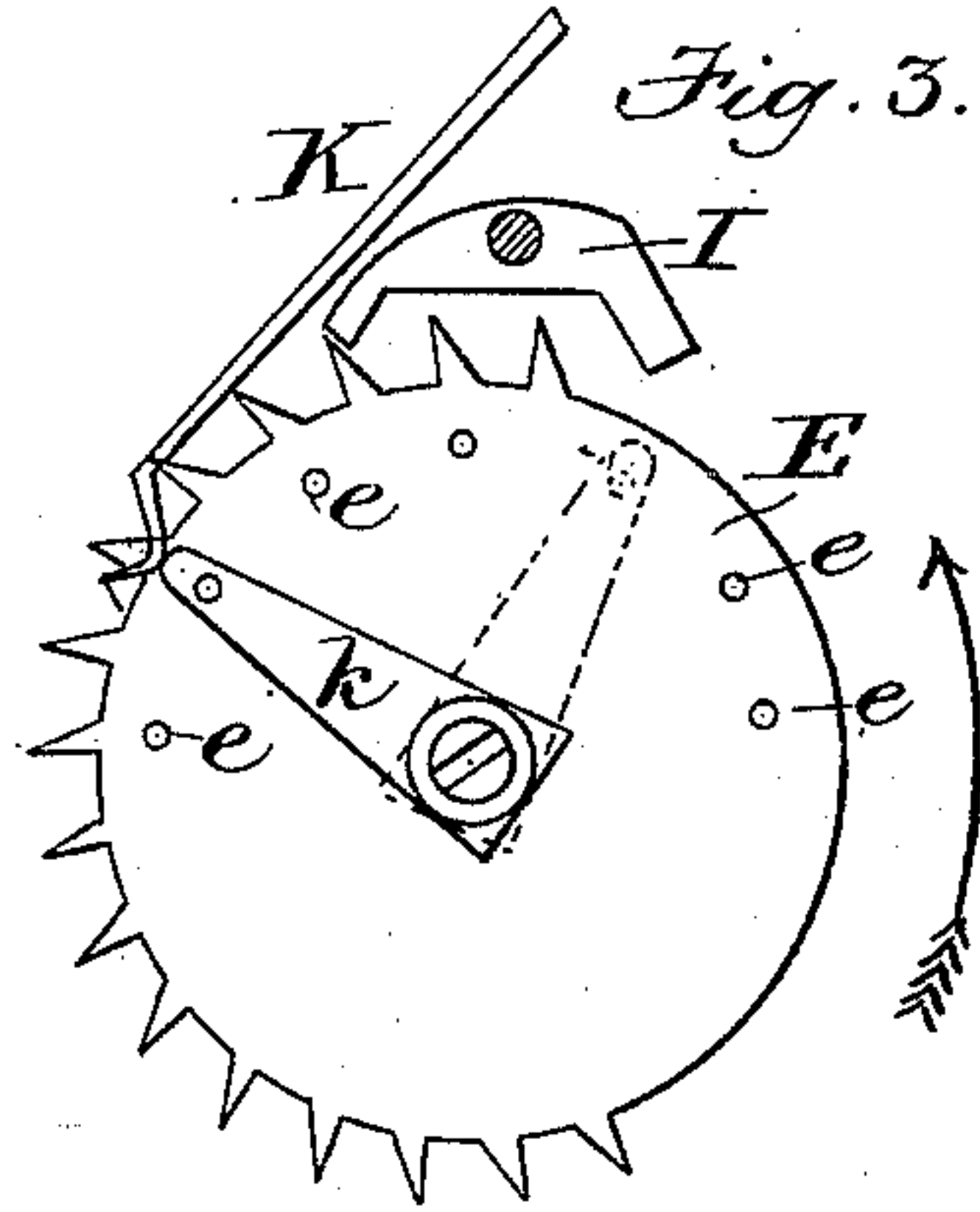
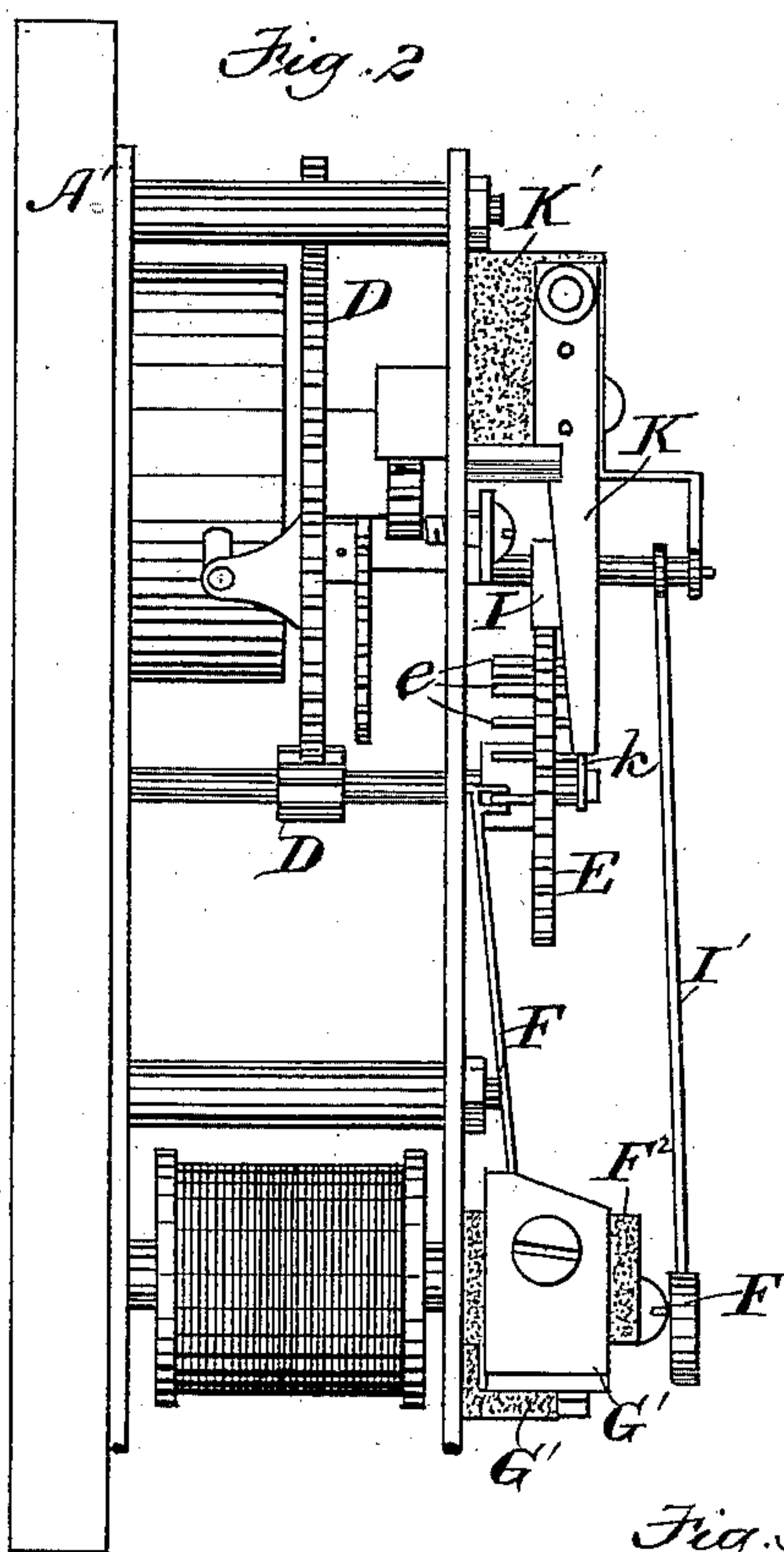
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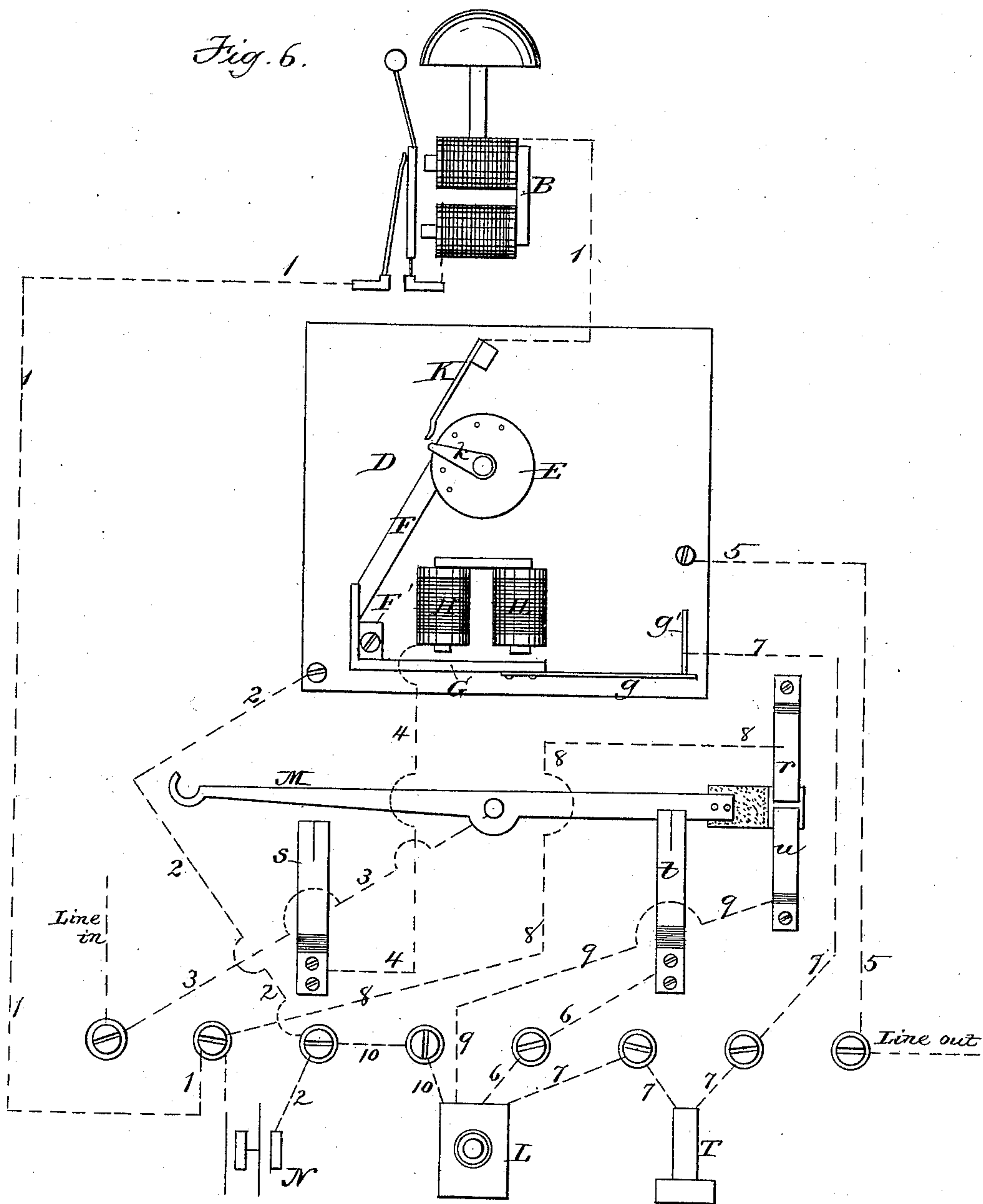
Edmund Davis,  
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Witnesses.  
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A. L. White.

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(No Model.)

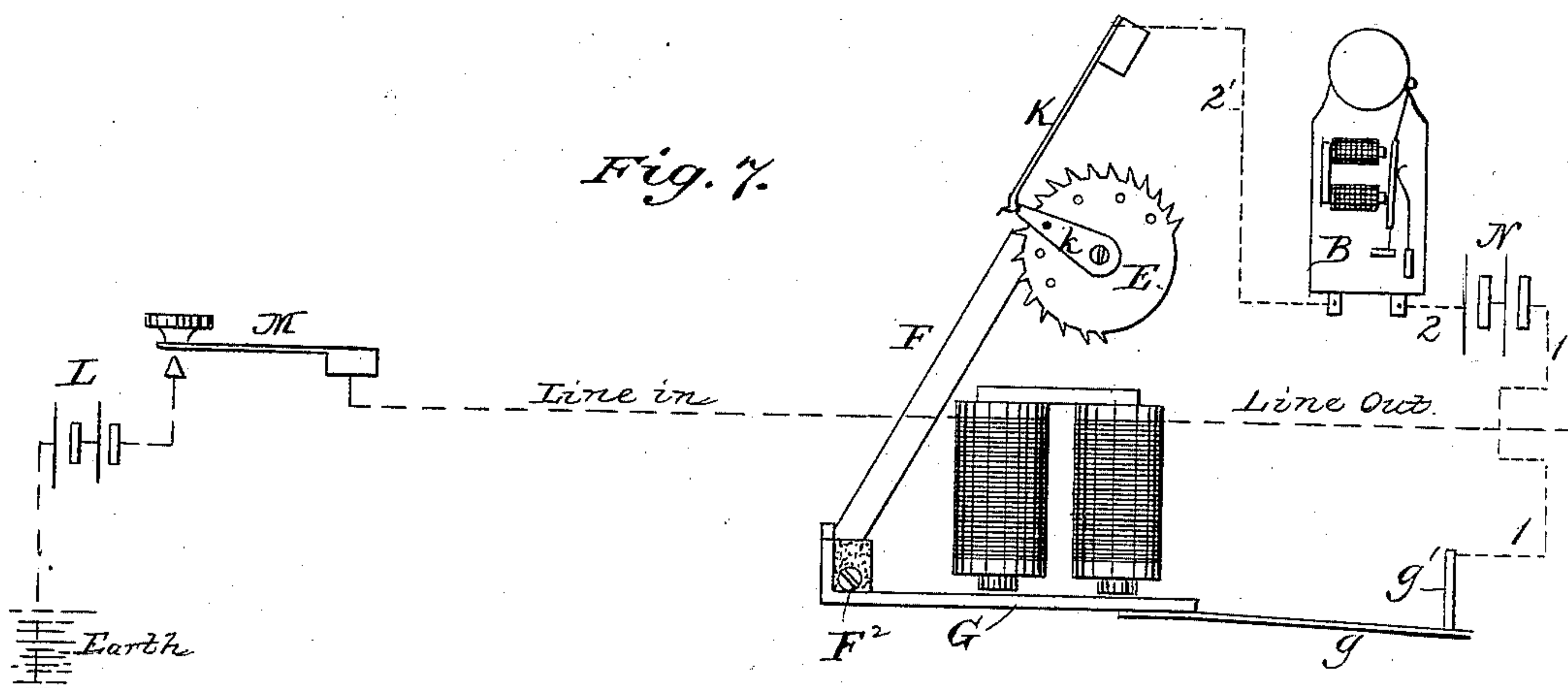
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E. DAVIS.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

No. 391,839.

Patented Oct. 30, 1888.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

EDWARD DAVIS, OF BOSTON, ASSIGNOR OF ONE HALF TO E. B. WELCH,  
OF CAMBRIDGE, MASSACHUSETTS.

## INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 391,839, dated October 30, 1888.

Application filed January 18, 1884. Renewed January 24, 1885. Again renewed August 21, 1885. Again renewed March 22, 1886.  
Serial No. 196,197. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD DAVIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Individual Signaling Apparatus, of which the following is a specification.

My improvements relate to that class of individual telephone calls in which a circuit-wheel arranged at a definite point in its rotation to close the local circuit of a bell and battery is actuated by a mechanical motor and controlled by an electrically-vibrated escapement.

My invention relates to improvements in unisoning such apparatus and in the circuit-closing and secrecy-switch devices, and are set forth in the following specification and accompanying drawings.

Figure 1 is a front elevation of the apparatus with the lid of the containing-box opened. Fig. 2 is a side elevation of the parts attached to the lid of the box as viewed from the left in Fig. 1. Figs. 3, 4, 5 are detached views. Figs. 6 and 7 are diagrams of connections.

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

In Fig. 1, A is the containing-box, and A' its lid, hinged as shown. B is a common vibrating bell; C, a gravity-switch, as ordinarily used. Attached to lid A' is a spring-motor, D, wound by applying a key to the squared end of shaft D'. This motor may be of any well-known form and requires no description, its only office being to give motion to a circuit-wheel, E, secured to an arbor of said motor, as shown. Circuit-wheel E is formed of ebonite or other insulating material and has a number of pins, *e*, through said wheel and projecting on both sides. The parts of pins *e* projecting toward the left in Fig. 2 are engaged by two pawls, *f f*, carried by a lever, F, pivoted at F', all so arranged that the vibration of said lever in a plane parallel with the plane of rotation of wheel E will allow said wheel to advance step by step in a well-known manner. An armature, G, secured to lever F, is arranged to be actuated by electro-magnet H, placed in the main circuit, thereby vibrat-

ing escapement-lever F. A flat spring, *g*, secured to armature G, by pressure against an insulated pin, *g'*, serves to both retract said armature and to put it into electrical connection with said pin. Lever F and armature G are insulated by making their pivot-block F<sup>2</sup> and wheel E of ebonite, also, as the upward motion of said armature is limited by the poles of magnet H, a strip of paper or similar substance is pasted on armature G, and its downward motion is limited by an ebonite block, G'.

The periphery of the wheel E is partially cut into escape-teeth, engaging escapement I and attached pendulum I' in such manner that when wheel E is uncontrolled by escape-lever F, as will be hereinafter described, it will revolve with a rapidity controlled by the escapement I and its pendulum. On the opposite side of wheel E from escapement F, secured to and turning freely upon the shaft of said wheel, is a switch, *k*, which may be moved to rest upon any one of the pins *e*, a slight indentation in said switch serving to hold it in engagement with either pin. A spring, K, secured to an insulating-block, K', is arranged to make contact with the free end of switch *k*, as shown in Figs. 1 and 3.

The series of pins *e* and the series of escape-teeth of wheel E do not extend entirely around said wheel. When the switch *k* and spring K are in contact, the pin *e*, upon which said switch rests, is in contact with that pawl *f* which it engages when armature G is attracted by magnet H.

Having described the more important mechanical devices, I will now describe the connections and operation of the same, reference being had to diagram, Fig. 6.

This apparatus may be worked on an open or closed circuit, as desired, in either case the main-office apparatus being a battery and a key or other device for transmitting electric impulses. The spring-motors in all the stations being wound and the switch *k* set upon a different pin *e* in each, the exchange operator wishing to call a subscriber will do so by series of makes and breaks at the key in said exchange, differing in number according to the



office to be called, concluding by closing the circuit as long as he desires to ring the call-bell. Telephone T, Fig. 6, being upon the hook of gravity-switch M, the electric impulses will pass by "line in," wire 3, gravity-switch M, spring s, wire 4, magnet H H, frame D, and thence by wire 5 to line out. The effect of this in the called office will be to vibrate armature G and lever F, thereby allowing circuit-wheel E to advance step by step and stop with switch *k* and spring K in contact, armature G being attracted. This closes a local circuit of vibrator-bell B and battery N, said battery being preferably the ordinary battery used in connection with the transmitter, as shown. The current passes from battery N by wire 1 through bell B to spring K, switch *k*, frame D, and wire 2 to battery. On the cessation of the line-current sent from the exchange, armature G will be released, and wheel E will thereupon advance a half-step, thereby breaking the circuit between switch *k* and spring K, when the bell will cease to ring. This leaves that pin *e* on which switch *k* is resting in engagement with the second or lower pawl of escapement F, as shown in full lines in Fig. 4, and therefore in electrical connection therewith. If now the called subscriber takes his telephone off the hook, a line-current would then pass through the apparatus as follows: Line in, wire 3, switch M, spring *t*, wire 6, telephonic transmitter L, wire 7, and telephone T to pin *g'*, thence by spring *g*, armature G, lever F, pin and switch *k*, frame D, wire 5, line out. The speaking apparatus will be thus in circuit, while the signal apparatus and magnet H will be cut out; but if at any office not called the telephone be removed from its hook, as there is in such office no connection between lever F and switch *k* through the pin *e* on which said switch rests, such removal of the telephone will break the line, and the person thus removing his telephone could overhear nothing, thus insuring secrecy to the called office. By arranging magnet H so that it will be cut out on the removal of the telephone from its hook I make it possible for the exchange to connect two subscribers on the same circuit. The exchange will first call one of the subscribers, who, by taking his telephone from the hook, will keep his circuit-wheel stationary while the other wheels on the line are moved to connect said subscriber with the desired office.

I provide two ways of calling the exchange from a subscriber's office. If the line be a closed-circuit system, merely removing the telephone from its hook and then depressing and releasing said hook a certain number of times will cause a number of breaks that will carry the caller's circuit-wheel (and those of all others on the line) to the point of circuiting his telephone. If the circuit be an open one, I provide a push-knob, O, projecting downward through box A, as shown in Fig. 1, and so arranged that a series of pushes on the same will vibrate armature G mechanically

until his telephone is circuited, when a magneto or other means may be employed to signal the exchange.

In Fig. 6 wires 8 9 10 and springs *r u* are merely to connect battery N to the primary coil of transmitter L in the usual manner.

Of course the switches *k* are so placed that the call-bell can only ring in one office at a time.

As the successful working of this apparatus depends upon starting from a fixed point and in unison with others upon the circuit, I accomplish such unisoning by the following devices: The series of pins *e* extends only partially around the wheel E, as hereinbefore stated, and are intended to correspond in number with the offices on the circuit, so that after the wheel has moved far enough to disengage the last pin, which will be done by a series of makes and breaks at the exchange on the conclusion of a message, it will be uncontrolled by escapement F and will revolve slowly, being controlled by escapement I I' until the first pin engages one of the pawls of escapement F, and this will occur in all the offices on the line which will be brought to unison. As the escape-teeth on wheel E are useless while the same is controlled by lever F, they are cut away for a space corresponding to that occupied by pins *e*. By making switch *k* movable the call may be changed at any time to a new number. As usual in this class of signals, I fix an indicating-hand, *a*, on the shaft of wheel E, which traverses a dial, A<sup>2</sup>, Fig. 5, on the front A' of box A. The wheel E is moved so rapidly that although the bells in all the offices are circuited once in each revolution of said wheel, yet they will not ring unless the wheel is stopped, as hereinbefore described.

I am aware that a mechanically-rotated circuit-wheel controlled by an escapement electrically actuated by impulses from a central station and arranged to close the local circuit of a bell and battery has been before patented, and I therefore do not broadly claim such devices; but

What I do claim, and desire to secure by Letters Patent, is—

1. A circuit-wheel constantly urged by mechanical means to revolve in the same direction, in combination with an electrically-actuated escapement, whereby it is controlled during a fractional part of a revolution, and another escapement operated by said wheel, whereby its motion is governed as to speed during the remainder of its revolution.

2. A circuit-wheel composed of insulating material, conducting-pins *e* set therein, and a switch, *k*, pivoted upon and carried by said wheel and adapted to removably rest upon one of said pins.

3. A circuit-wheel composed of insulating material, conducting-pins *e* set therein, a switch, *k*, pivoted upon and carried by said wheel adapted to removably rest upon the wheel and one of said pins, and a fixed contact-point, K, with which said switch engages



at a definite point in the revolution of said wheel, and thereby closes the local circuit of a bell and battery.

4. A circuit-wheel composed of insulating material, pins *e*, secured in and projecting upon both sides of the same, a switch, *k*, resting upon one of said pins and its contact *K*, and an insulated and electrically-actuated escapement engaging said pins and its connections, whereby a local circuit of a bell and battery is closed through said escapement, pins *e*, switch *k*, and its contact *K*.

5. An electrically-actuated armature, *G*, actuating an escapement, a spring-extension thereof, *g*, and an insulated pin, *g'*, against which the free end of said spring rests, and electrical connections therefor, whereby said spring serves both by its resiliency to normally control said armature and by its conductivity to complete a circuit composed in part of said spring, pin, armature, and escapement.

6. The combination, with an electric circuit connecting several subscribers, of two or more individual call devices, each consisting, essentially, of a power-driven circuit-wheel and double escapement therefor, a switch on the circuit-wheel, and circuits and connections, substantially as described, including signal and telephone instruments, the arrangement being such that any one of the signals at the subscriber's station may be sounded to the exclusion of the others, and the telephone-instruments may be brought in the circuit and the signal simultaneously cut out, thereby constituting a secrecy-switch between the subscribers, as set forth.

7. In an individual telephone-call, a circuit-wheel composed of insulating material, conducting-pins projecting therefrom, an electrically-actuated escapement engaging said pins, and connections through one of said pins, the escapement, and a telephone, whereby the telephone can be circuited only when said pin is engaged by one of the pawls of said escapement, and whereby any attempt to use the telephone when said pin is not engaged by said escapement will break the line-circuit.

8. The combination, in an individual telephone-call, of a motor-driven circuit-wheel, a

double escapement engaging said wheel, a magnet for operating said escapement, and circuits and connections, substantially as described, including a signal-bell and telephone-instruments, the arrangement being such that when the circuit-wheel is held on one part of the escapement the circuit is through the signal-bell, and when held on the other part of the escapement the circuit is through the telephone-instruments, as set forth.

9. The combination, in an individual telephone-call, of a power-driven circuit-wheel, a double escapement engaging said wheel, and a magnet for operating said escapement, an adjustable switch on the circuit-wheel, and circuits and connections, substantially as described, including a bell and telephone-instruments, the arrangement being such that the circuit-wheel will be rotated step by step by makes and breaks in the line until the desired contact is reached, when the circuit will be closed through the signaling-instruments of the desired station sounding the alarm, and upon breaking the circuit the telephone-instruments will be automatically brought into line to the exclusion of the signaling-instruments.

10. The combination, in an individual telephone-call, of a power-driven circuit-wheel, a double escapement engaging with said wheel, a magnet for operating said escapement, a gravity-switch, and circuits and connections, substantially as described, including the operating-instruments, the arrangement being such that the desired station may be brought into the circuit, the signal operated, and the telephone-instruments included in the circuit, while at the same time other stations upon the same line may be called and connection established between them, in the manner set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of January, 1884.

EDWARD DAVIS.

Witnesses:

C. F. BROWN,  
A. L. WHITE.