

(No Model.)

3 Sheets—Sheet 1.

S. R. LINVILLE.

TIME CUT-OUT FOR ELECTRIC SERVICE SYSTEMS.

No. 480,369.

Patented Aug. 9, 1892.

Fig. 1.

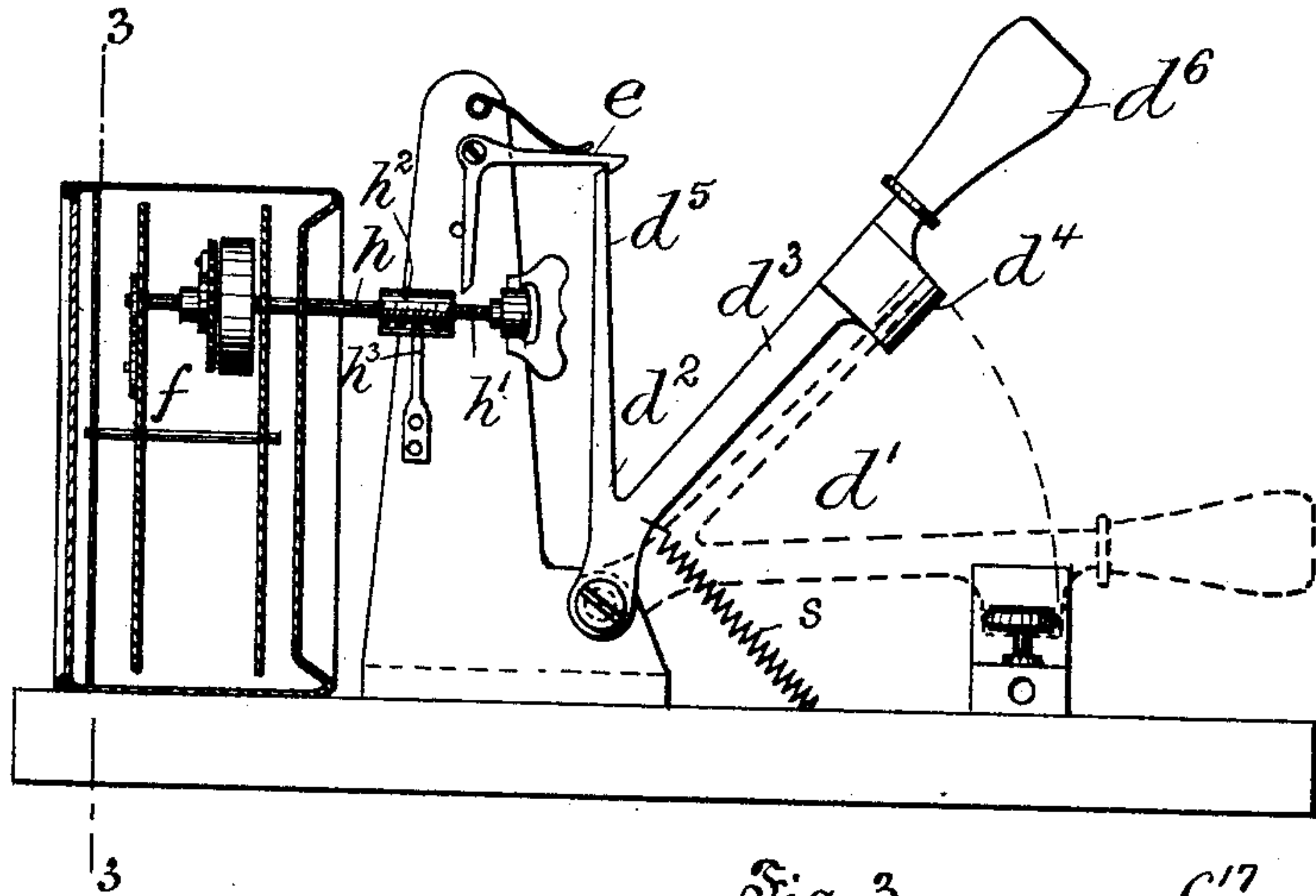


Fig. 2.

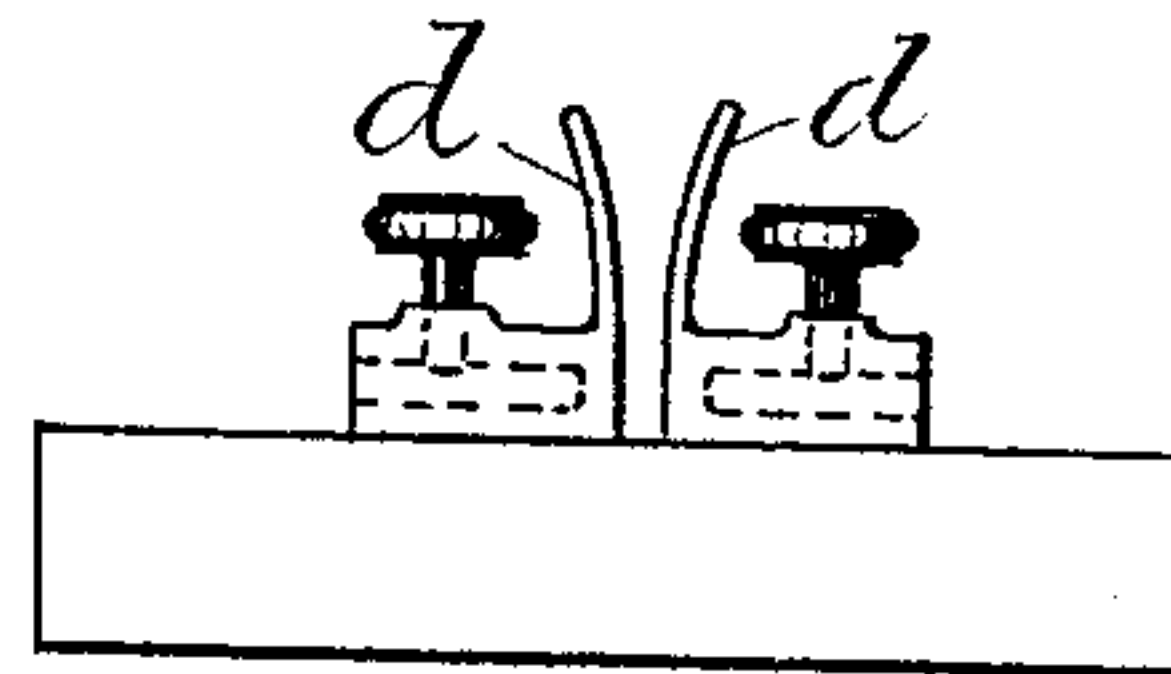


Fig. 3.

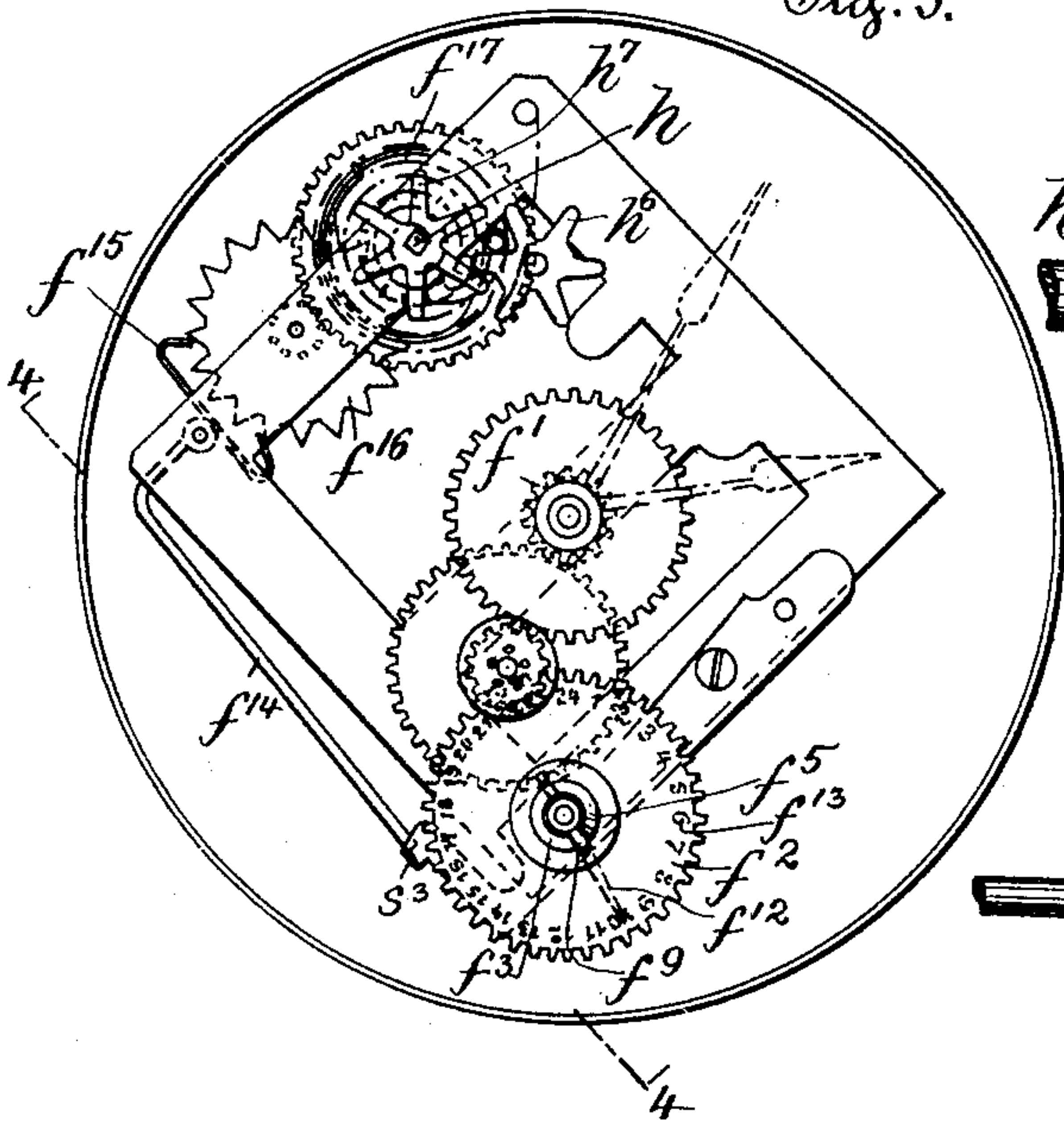
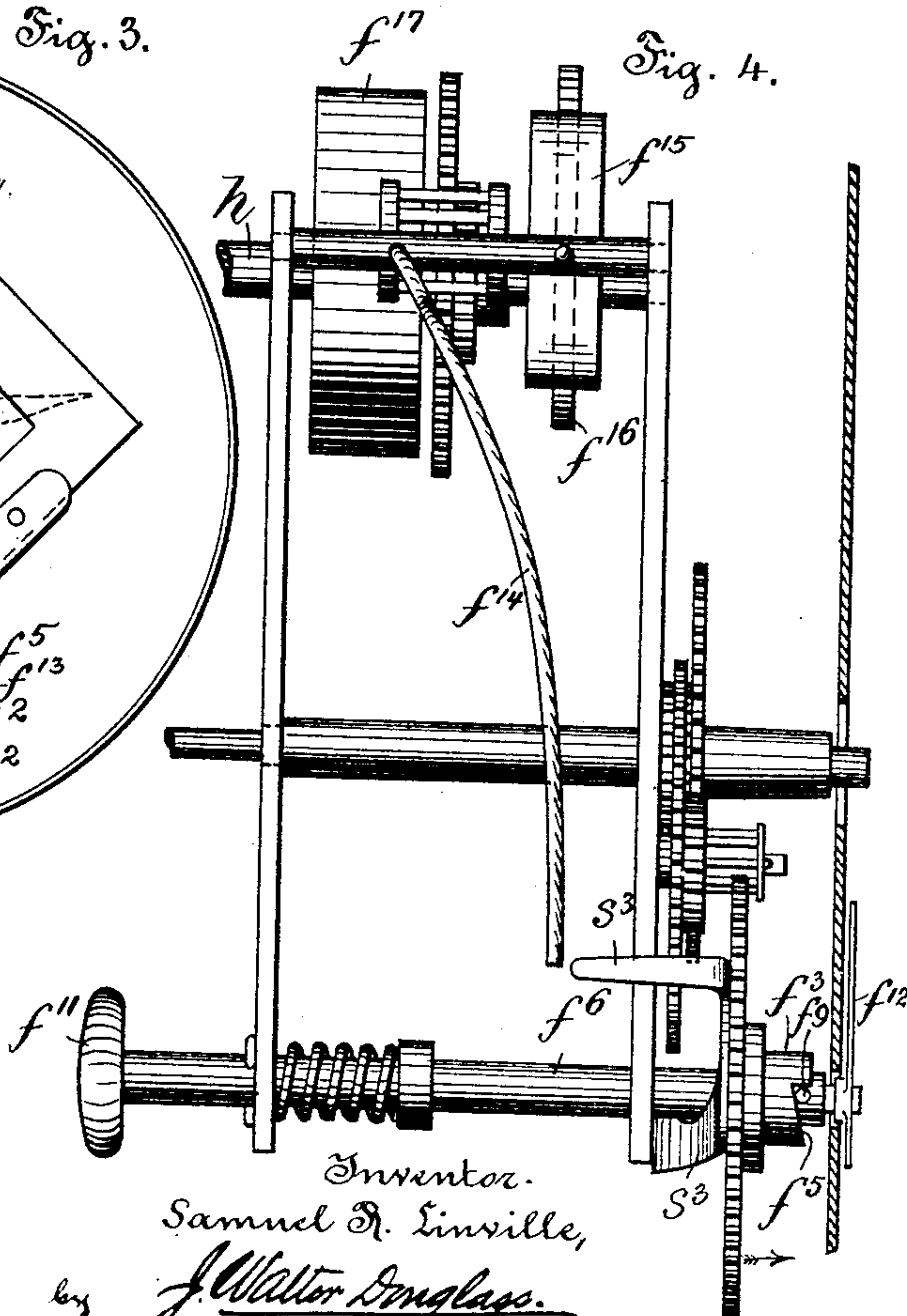


Fig. 4.



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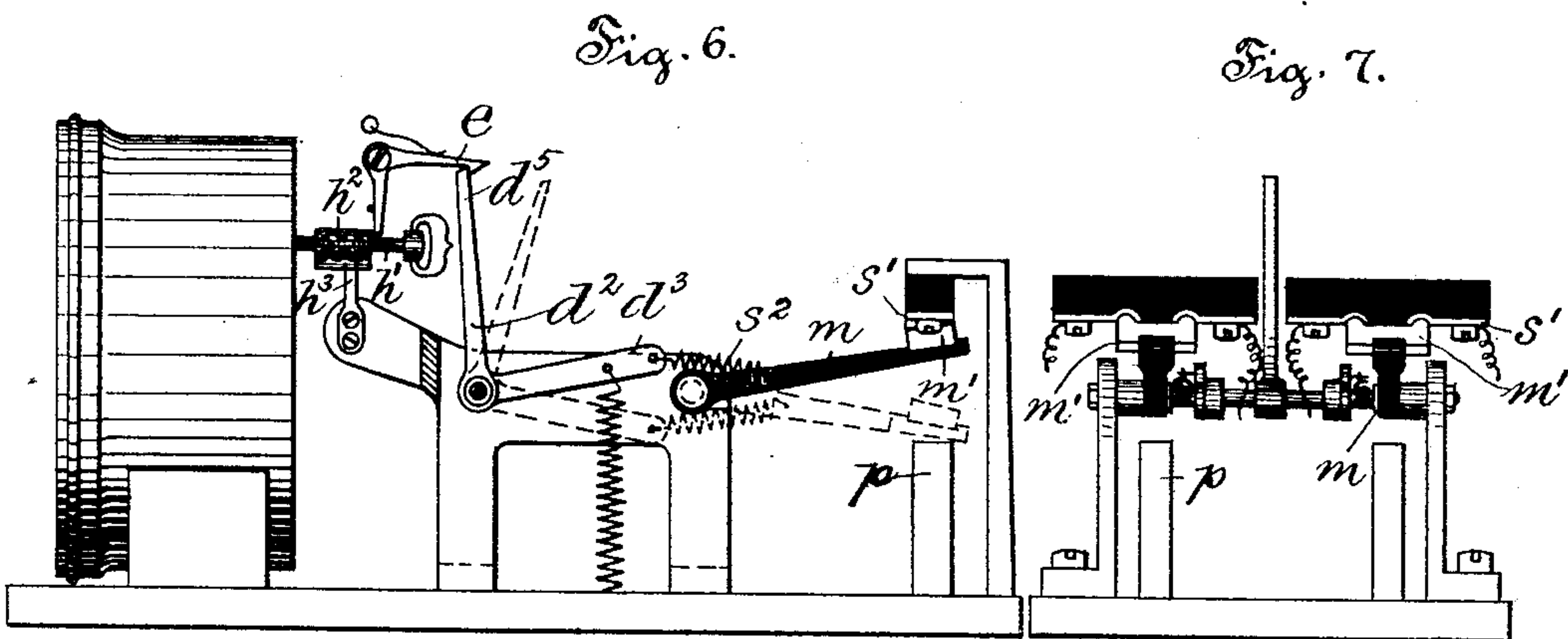
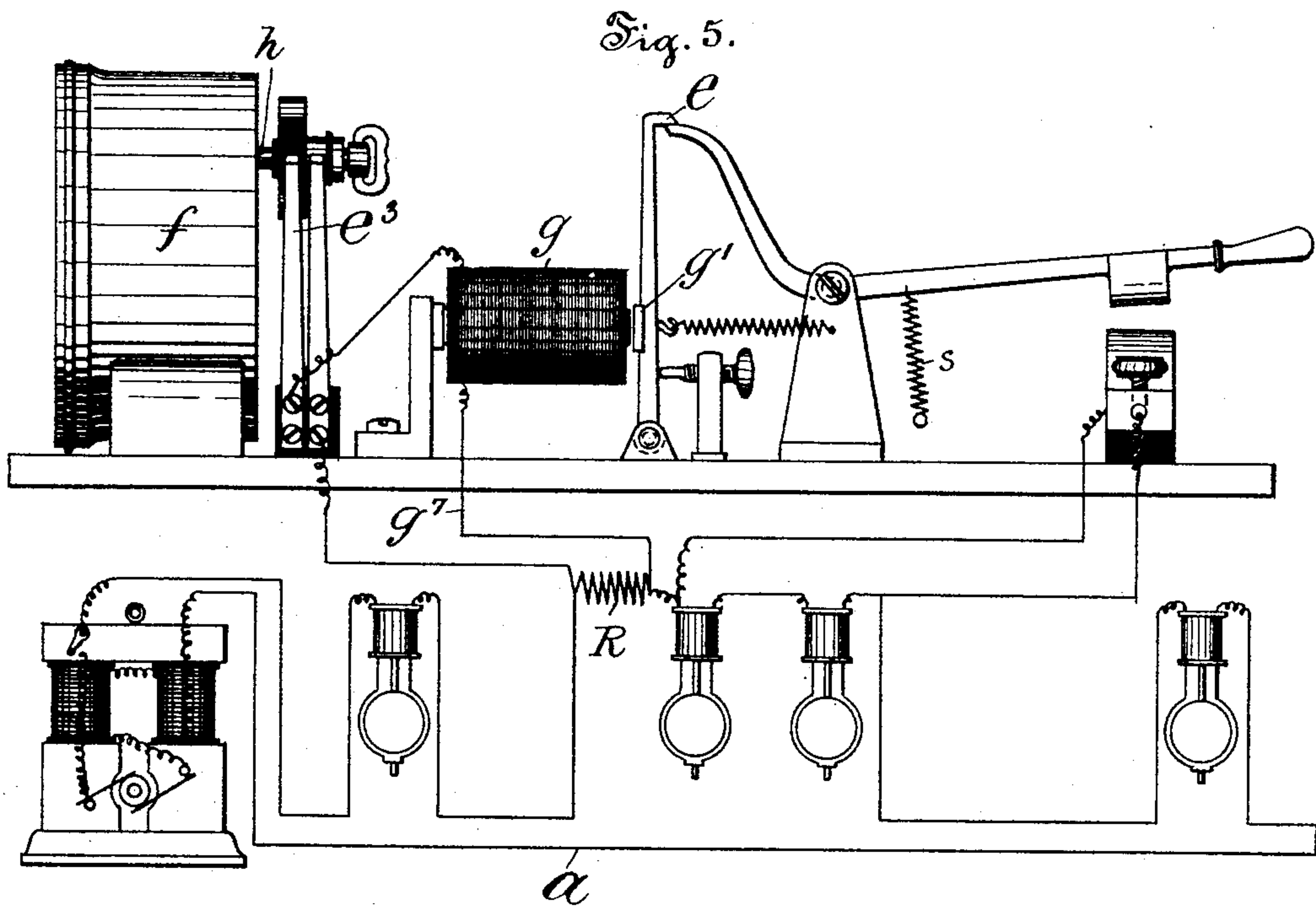
by J. Walton Douglass. att'y.

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(No Model.)

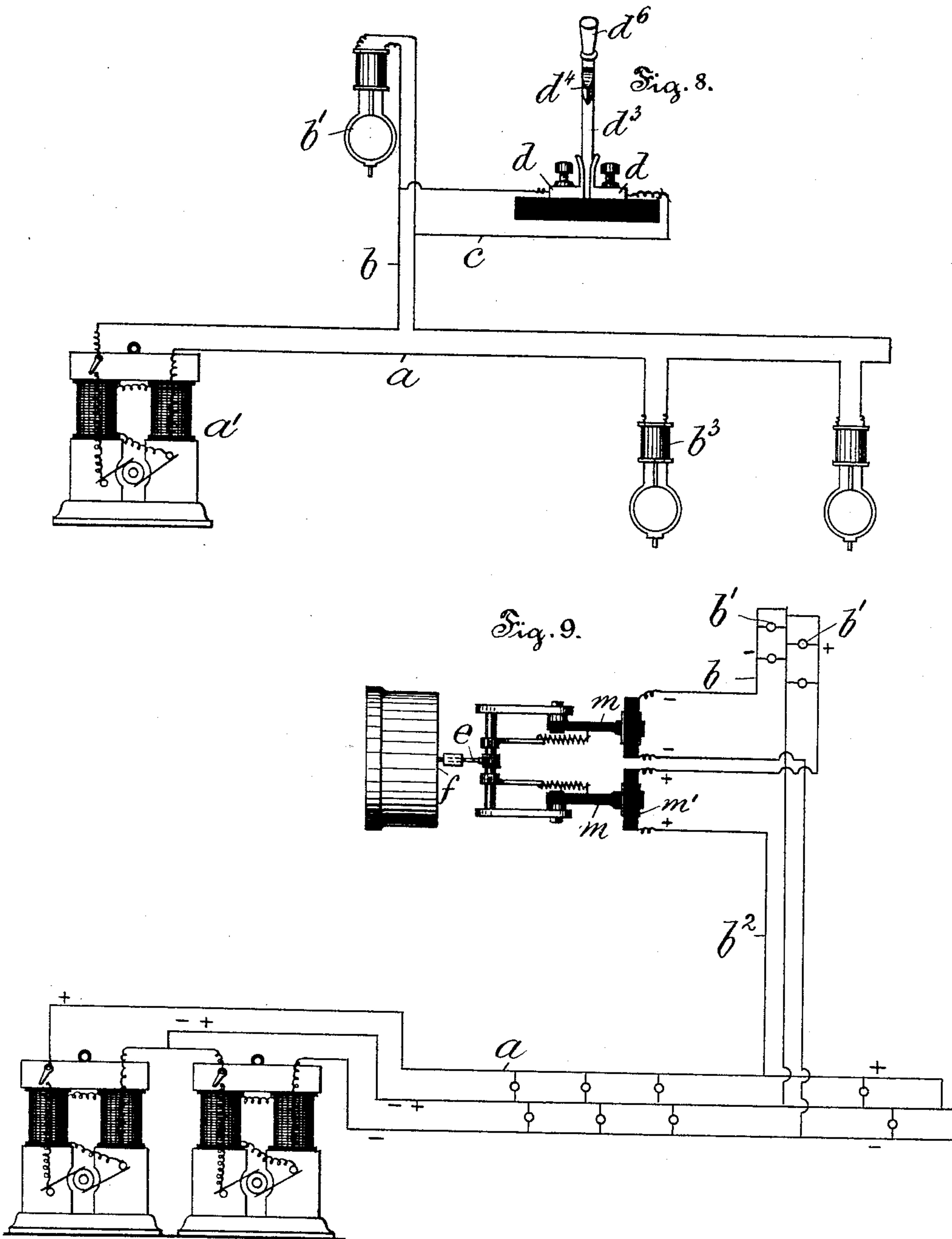
3 Sheets—Sheet 3.

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TIME CUT-OUT FOR ELECTRIC SERVICE SYSTEMS.

No. 480,369.

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UNITED STATES PATENT OFFICE.

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TIME CUT-OUT FOR ELECTRIC-SERVICE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 480,369, dated August 9, 1892.

Application filed March 29, 1892. Serial No. 426,873. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL RUSH LINVILLE, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Time Cut-Outs for Electric-Service Systems, of which the following is a specification.

The principal objects of my invention are, first, to provide simple, compact, efficient, and comparatively inexpensive apparatus for automatically cutting one or more lamps or other electrical appliances out of a main circuit at a required time without in any wise interfering with other lamps or apparatus included in the main circuit, and, second, to provide means capable of being manually set during the day, so as to automatically short-circuit the lamps or other apparatus in circuit in a store or other building at a required time in the evening.

My invention consists of a time-controlled switch for automatically short-circuiting or breaking a lamp, motor, or other translating device circuit at a required time.

My invention further consists of a main circuit, a service-circuit, and a time-controlled circuit for shunting the main circuit to cut out the service-circuit.

My invention further consists of the improvements hereinafter described and claimed.

The nature, scope, and objects of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a side elevation of a time-controlled switch embodying features of my invention. Fig. 2 is a front elevation of the right-hand end of Fig. 1. Fig. 3 is a front view of so much of a timepiece or clock as is necessary to illustrate the mechanism for releasing the switch at the required time. Fig. 4 is a section drawn to an enlarged scale and taken on the line 4 4 of Fig. 3. Fig. 5 is an elevational view showing an electro-magnet and circuit-closer interposed between the clock and switch and adapted to operate the latter and also illustrating diagrammatically circuit connections therefor. Fig. 6 is a side view of a time-controlled switch adapted for

use in connection with the so-called "Edison" or other incandescent-lamp circuits and embodying features of my invention. Fig. 7 is a front view of the right-hand end of Fig. 6. Fig. 8 is a diagrammatic view of circuits adapted for employment in connection with the time-controlled switch illustrated more especially in Figs. 1 and 2; and Fig. 9 is a similar view of the Edison or other incandescent-lamp circuits arranged for employment in connection with the type of switch illustrated in Figs. 6 and 7.

Referring now to the drawings, and more especially to Fig. 8, *a* is the main circuit of a system of series distribution energized by a dynamo-electric machine or other electric generator *a'*. *b* is a service-circuit branching off from the main circuit *a* and including translating devices, as lamps *b'*, that may be located in a store, dwelling, or other structure. *c* is a time-controlled circuit, which when closed serves to shunt the service-circuit *b*, and thereby cut out the translating device included therein. The respective terminals of the time-controlled or shunt circuit *c* are connected with the insulated spring-contacts *d*, Fig. 2, of the switch *d'*, Fig. 1, which may be located at a convenient point in the store, dwelling, or other structure containing the service-circuit *b*. *d*² is a bell-crank lever, one arm *d*³ of which is provided with an insulated conducting bridge-piece *d*⁴, adapted to contact with the spring-contacts *d* and close the time-controlled or shunt circuit *c*, and the other arm *d*⁵ is adapted to be engaged by a spring-trigger *e*. When the bell-crank lever *d*² is in the position illustrated by the dotted lines in Fig. 1, the time-controlled or shunt circuit *c*, of low resistance, is closed and the service-circuit *b*, of high resistance, is thereby deprived of current, so that the lamps *b'* are extinguished without in any wise interfering with the ordinary operation of the lamps *b* included in the main circuit *a*. The bell-crank lever *d*² may be shifted manually into the position illustrated by the full lines in Fig. 1 into engagement with the trigger *e* by means of the handle *d*⁶, and in such case the time-controlled or shunt circuit *c* is broken and the entire current of the main circuit *a* traverses the service-circuit *b*, and consequently causes the lamps *b'* to emit light in

the usual manner, it being understood that the bell-crank lever d^2 is solicited by gravity or by a spring s into the position indicated by the dotted lines in Fig. 1 and is restrained from such movement by the trigger e , so that when the latter is shifted the bridge-piece d^4 of the bell-crank lever d^2 automatically closes the time-controlled or shunt circuit c , and consequently extinguishes the lamps b' . The trigger e is shifted at any required hour by means of suitable clock mechanism f . It may be remarked that various clock mechanisms may be employed for this purpose. However, certain forms of such mechanisms as have been found practically efficient for such purposes will be hereinafter fully described.

By reference now to Fig. 5 use is made of an electro-magnet g and its armature g' for releasing the spring-trigger e . This electro-magnet is interposed in a circuit g' , derived from one of the conductors of the main circuits a , by the interposition of a resistance R , and this circuit g' is automatically closed by means of a circuit-closer e^3 , controlled by the clock mechanism f .

The invention is also applicable to two or three wire systems of multiple distribution, as will appear by reference to Fig. 9, in which a is the main circuit, b^2 is a branch circuit, and b is the service-circuit for energizing translating devices, such as incandescent lamps b' . This service-circuit may be automatically broken by means of clock mechanism f and a trigger e in substantially the manner hereinbefore described. However, in this instance, the switch is slightly modified.

In Figs. 6 and 7, m are insulated rocker-arms provided at their free extremities with insulated bridge-pieces m' , adapted to contact with conducting-strips s' , connected with the like terminals of the service-circuits, as illustrated in Fig. 9. In this instance the arm d^3 of the bell-crank lever d^2 is connected with the rocker-arms by a spring s^2 , so that when the bell-crank lever d^2 is released by the trigger e it causes the parts of the switch to be suddenly shifted into the position indicated by the dotted lines in Fig. 6, whereby the bridge-pieces m' are shifted out of contact with the conducting-strips s' into contact with the rest p , so that the terminals of the service-circuits are disconnected from each other, thereby resulting in the extinguishment of the lamps b' .

By reference now more particularly to Figs. 3 and 4 for a description of the clock mechanism f' is the pinion that actuates the hour-hand and causes the same to make two complete revolutions in twenty-four hours. This pinion f' also actuates the gear-wheel f^2 in such manner that the same is caused to make one revolution in each twenty-four hours. The hub f^3 of the gear-wheel f^2 is provided with a crown-cam f^5 and is afforded a slight range of end-play on its supporting-arbor f^6 . This arbor or arm f^6 is provided with a radial pin f^9 , that engages the crown-cam f^5 , and is

provided with a handle f^{11} for turning the arbor f^6 . f^{12} is an index connected with the front end of the arbor f^6 , which serves, in connection with a dial f^{13} , to enable the crown-cam f^5 to be so positioned as that the gear-wheel f^2 is afforded a range of end-play at the hour indicated by the index f^{12} . s^3 is a spring that is released by the endwise movement of the gear-wheel f^2 , and thus serves to release a lever f^{14} , controlling the anchor f^{15} of an escapement f^{16} , together with its complementary train of gears and propelling mechanism.

The operation of the hereinabove-described clock mechanism resembles in many respects the operation of an ordinary alarm-clock, with this exception, that the escapement is released once in twenty-four hours instead of twice in that period of time. h is an arbor, which serves as the means for winding up the spring f^{17} , operating the escapement f^{16} . It will of course be understood that this arbor h is rotated manually in one direction in winding up the spring f^{17} , and is automatically rotated in a reverse direction when the escapement f^{16} is released and the number of revolutions made by the arbor h in each instance are substantially equal. The shank h' of the arbor h is threaded, as illustrated in Figs. 1 and 6, for the reception of a nut h^2 , held against rotary motion by means of a feather h^3 , so that the automatic rotation of the spindle h causes the nut h^2 to be shifted endwise and thus releases the trigger e .

In the construction illustrated in Fig. 5 the automatic rotation of the spindle h is availed of for operating the circuit-closer e^3 , which in turn effects the release of the trigger e through the intervention of the electro-magnet g and its accessories. In this instance the rotary motion of the spindle h is limited by means of the so-called "stop-wheels" h^6 and h^7 , as illustrated in Fig. 3, whereby excessive rotation of the circuit-closer is with certainty prevented.

The mode of operation of the hereinabove-described apparatus is as follows: The switch is set to the position indicated by the full lines in Figs. 1, 5, and 6, and is retained in that position by means of the trigger e . The index f^{12} is then turned opposite the numeral upon the face of the dial f^{13} , that corresponds with or indicates the hour at which the lamps in a store or other building are required to be extinguished. When the required hour has arrived, the recess in the crown-cam f^5 arrives opposite the pin f^9 by the ordinary operation of the clock mechanism, whereupon the gear-wheel f^2 is shifted by the spring s^3 in the direction indicated by the arrow, with the result that the escapement-lever f^{14} is released. The movements of the escapement mechanism cause the arbor or spindle h to be rotated, thereby moving the nut h^2 outward until it trips the trigger e and causes the switch to extinguish the lamps, in the manner hereinbefore described.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made as to details without departing from the spirit thereof, and hence I do not wish to limit myself to the exact construction and arrangement as hereinbefore explained, nor as illustrated in the drawings, for carrying into effect the principles of my invention.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a time cut-out for electric-service systems, a service-circuit, a supply-circuit for energizing the service-circuit, terminals interposed in the supply and service circuits, a lever provided with an insulated conducting extremity adapted to engage said terminals and constitute a bridge for conveying the current between said terminals, a trigger normally restraining the lever from cutting out the service-circuit, and clockwork mechanism for tripping the trigger, substantially as and for the purposes set forth.

2. In a time cut-out for electric-service systems, a trigger, clockwork for tripping the same, a switch for cutting out the service-circuit, and a bell-crank lever connected with said switch and controlled by said trigger, substantially as and for the purposes set forth.

3. In a time cut-out for electric-service systems, a trigger, clock mechanism for tripping the same, a rocker-arm for operating a switch, and a bell-crank lever controlled by said trigger and operating said rocker-arm, substantially as and for the purposes set forth.

4. In a time cut-out for electric-service systems, a service-circuit, terminals, a lever provided with an insulated conducting bridge-piece tending to cut out the service-circuit, a trigger for engaging and restraining said lever, a clock-spindle and its complementary mechanism, and means interposed between said spindle and trigger for releasing the trigger, substantially as and for the purposes set forth.

5. In a time cut-out for electric-service systems, a circuit provided with terminals, a switch, as shown, for bridging the current across said terminals, a trigger for engaging said switch, and time mechanism for controlling said trigger and releasing said switch, substantially as and for the purposes set forth.

6. In a time cut-out for electric-service systems, a switch tending to cut out a circuit, a trigger for restraining said switch, a threaded clock-spindle and its complementary mechanism, a nut on said clock-spindle, and a feather engaging said nut, substantially as and for the purposes set forth.

7. In a time cut-out for electric-service systems, a clock provided with escapement mechanism, gears actuated by the clock and adapted to release the escapement mechanism, a service-circuit, and a switch controlled by the escapement mechanism and adapted to cut

out the service-circuit, substantially as and for the purposes set forth.

8. In a time cut-out for electric-service systems, a switch provided with a bridge-piece, as shown, a service-circuit, terminals, a source of electric energy, a trigger for engaging said switch, and time-registering mechanism for controlling said trigger and releasing the switch, substantially as and for the purposes set forth.

9. In a time cut-out for electric-service systems, a circuit and a generator, a switch tending to cut out the circuit, a trigger for restraining said switch, a time mechanism provided with a spindle and nut, and a feather for engaging said nut for releasing said trigger, substantially as and for the purposes set forth.

10. In a time cut-out for electric-service systems, a generator and service-circuit, a clock mechanism provided with an escapement, devices actuated by the clock mechanism and adapted to release said escapement, and a switch controlled by said escapement and adapted to close a shunt-circuit and interrupt said service-circuit, substantially as and for the purposes set forth.

11. In a time cut-out for electric-service systems, a time-controlled lever provided with an insulated conducting bridge-piece for breaking the circuit through a lamp, motor, or other translating device, a trigger engaging the lever, and clock mechanism for releasing the trigger, substantially as and for the purposes set forth.

12. A time cut-out for electric-service systems, comprising a time-registering apparatus, a cut-out-releasing device controlled by suitable power and adapted to be released at a determinate period by said time-registering apparatus, a trigger released by said releasing device, and a lever released by said trigger and provided with an insulated conducting bridge-piece, adapted to be included in and withdrawn from a circuit to make and break the same, substantially as and for the purposes set forth.

13. A time cut-out for electric-service systems, comprising electric generators, main and service circuits, a time-registering mechanism, a shunt-circuit around a resistance in the main circuit, magnetic devices, circuit-closing devices in said shunt-circuit released at a determinate period by the time mechanism, and a lever controlled by said magnetic devices and provided with a short-circuiting bridge-piece, substantially as and for the purposes set forth.

14. In a time cut-out for electric-service systems, a source of electric energy, a main circuit with translating devices included therein, a time-registering apparatus, a releasing mechanism controlled by suitable power and adapted to be set and to be released at a specific time by said time mechanism, in combination with a spring-actuated short-circuiting

switch, a trigger normally restraining said switch, and devices actuated by said releasing mechanism adapted to release said trigger, substantially as and for the purposes set forth.

15 5 In a time cut-out for electric-service systems, a time-registering apparatus, a main dynamo-circuit, service-circuits, translating devices, a shunt-circuit around a resistance
10 in the main circuit, a magnet included in said shunt, an armature and detent for said magnet, in combination with a spring-actuated

switch restrained by said detent and a power-impelled mechanism operating to close said shunt-circuit upon being released by said time-registering apparatus, substantially as
15 and for the purposes set forth.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

SAMUEL RUSH LINVILLE.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.