(No Model.)

E. SCHWEIZER.

4 Sheets—Sheet 1.

ELECTRIC CLOCK.

No. 504,095. Patented Aug. 29, 1893.

FIG. 1.

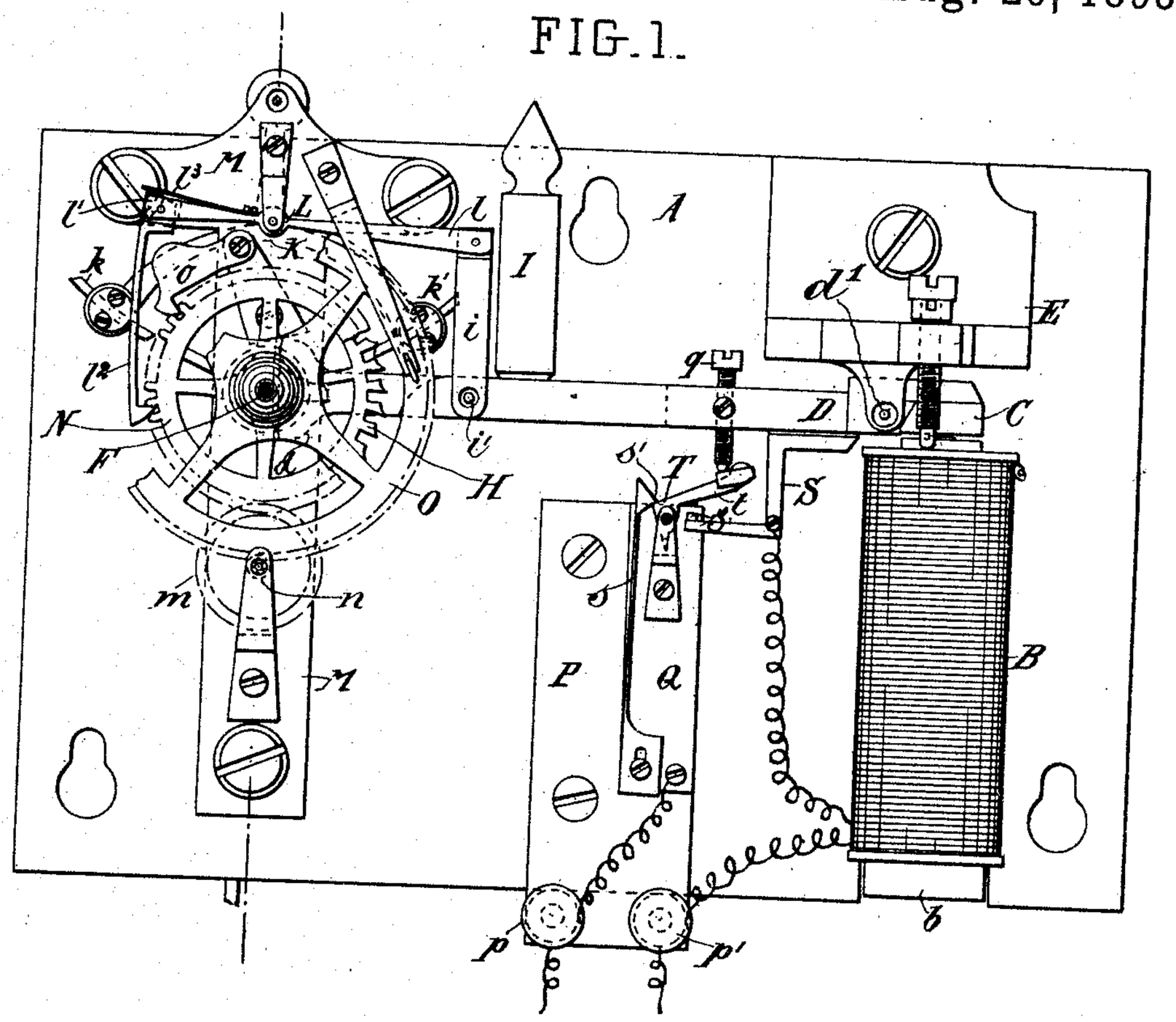
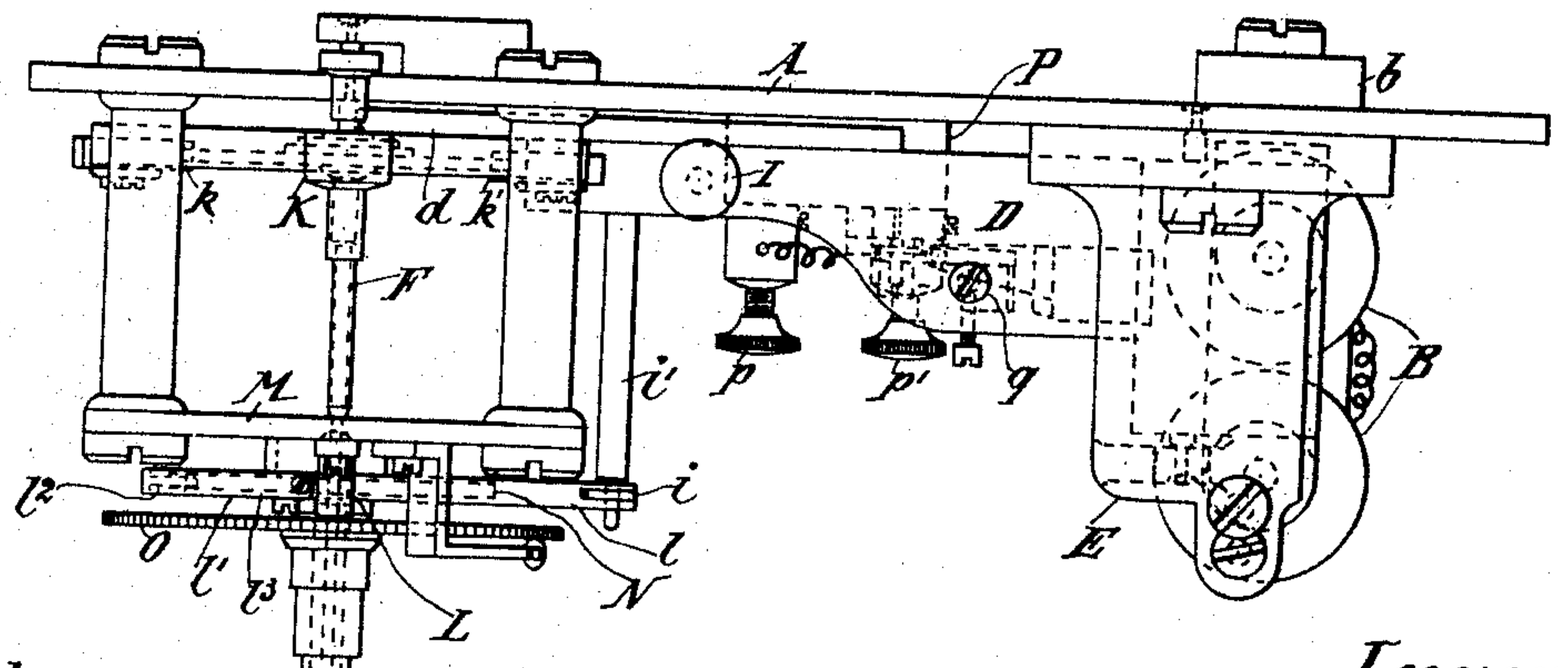


FIG. 2.



Witnesses:
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Herbert Blossom.

Inventor:
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by: Henry Connett.
Attorney.

(No Model.)

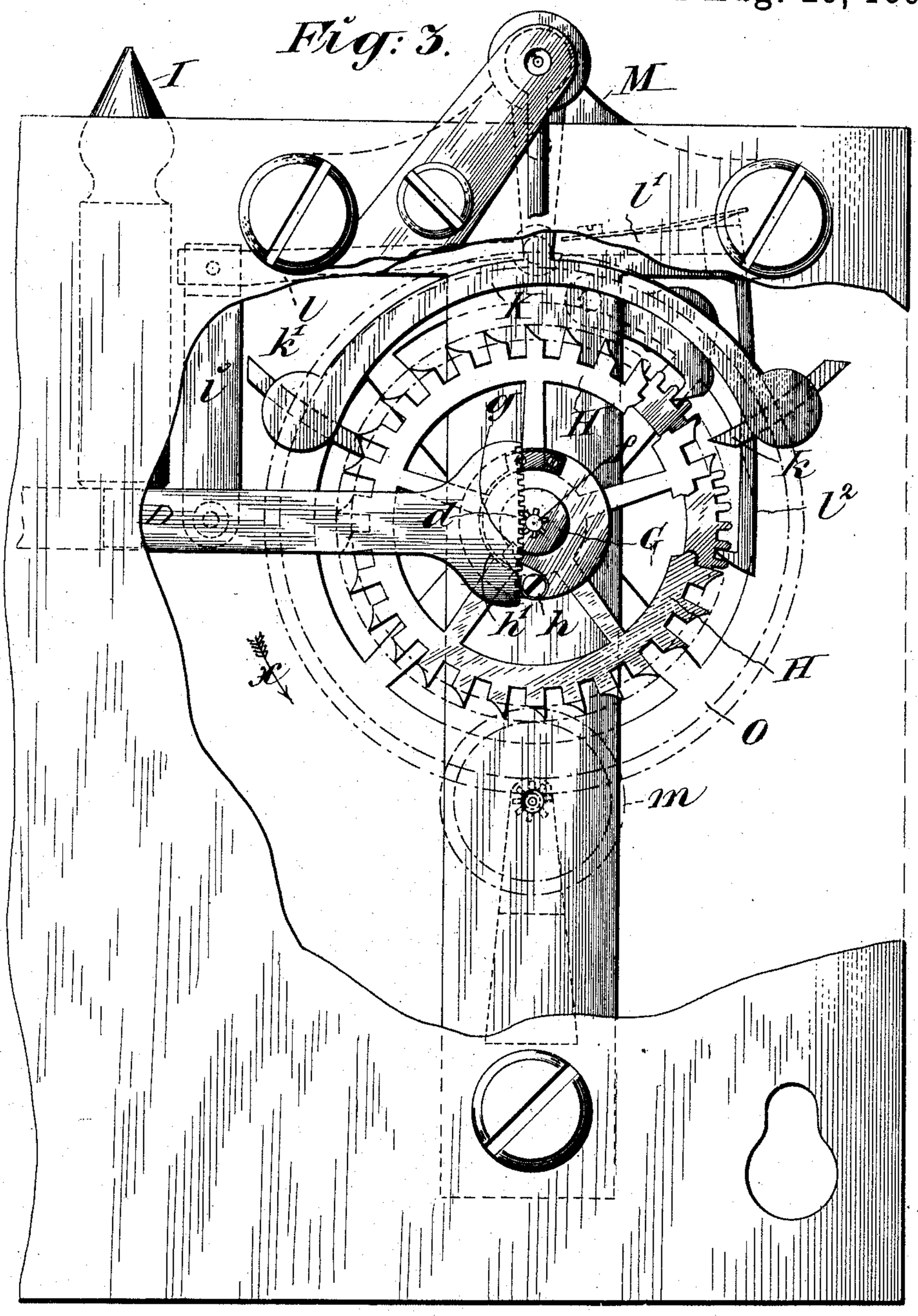
4 Sheets—Sheet 2.

E. SCHWEIZER.

ELECTRIC CLOCK.

No. 504,095. Patented Aug. 29, 1893.

Fig: 3.



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(No Model.)

4 Sheets—Sheet 3.

E. SCHWEIZER.

ELECTRIC CLOCK.

No. 504,095. Patented Aug. 29, 1893.

Fig. 4.

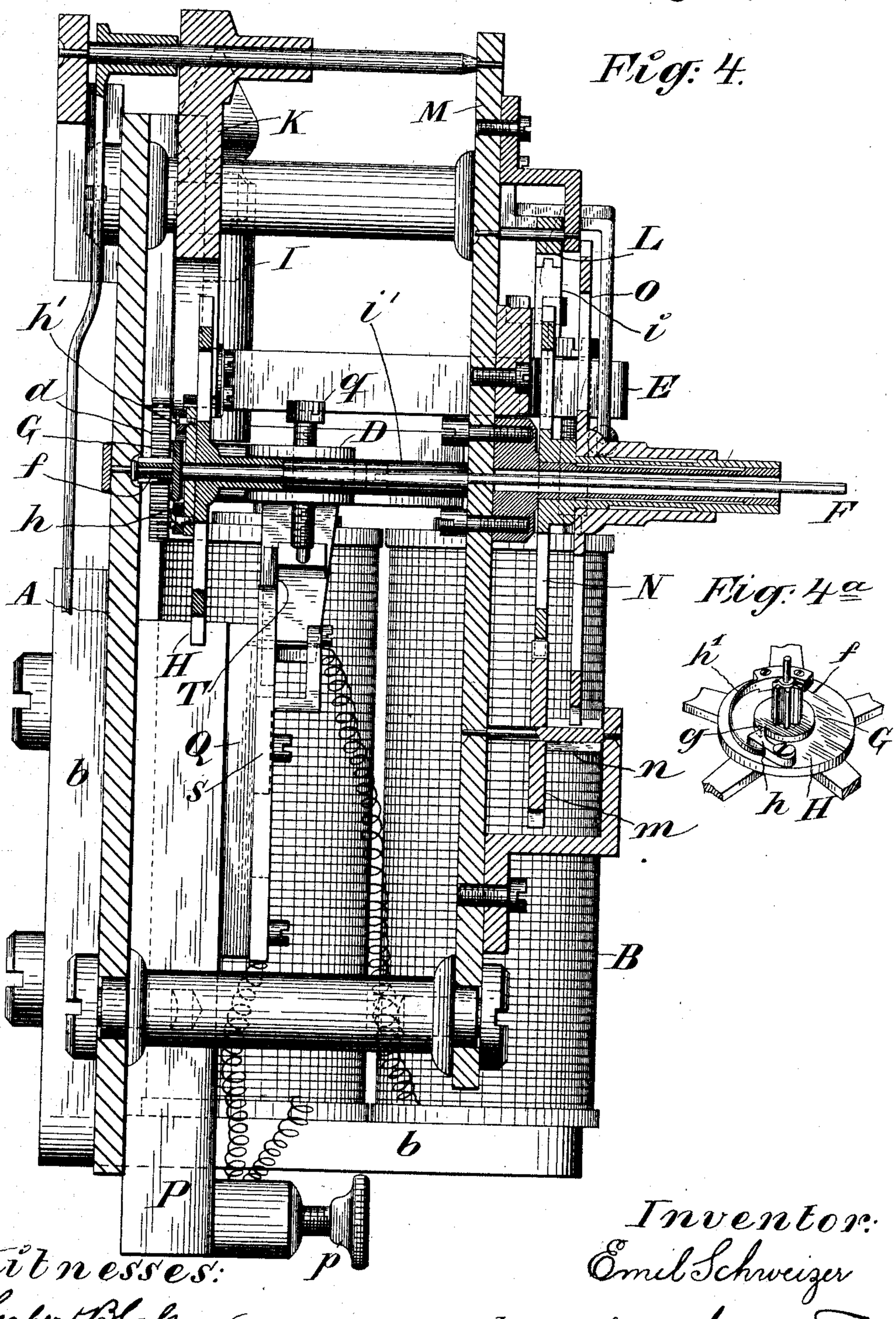

Fig. 4a.

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(No Model.)

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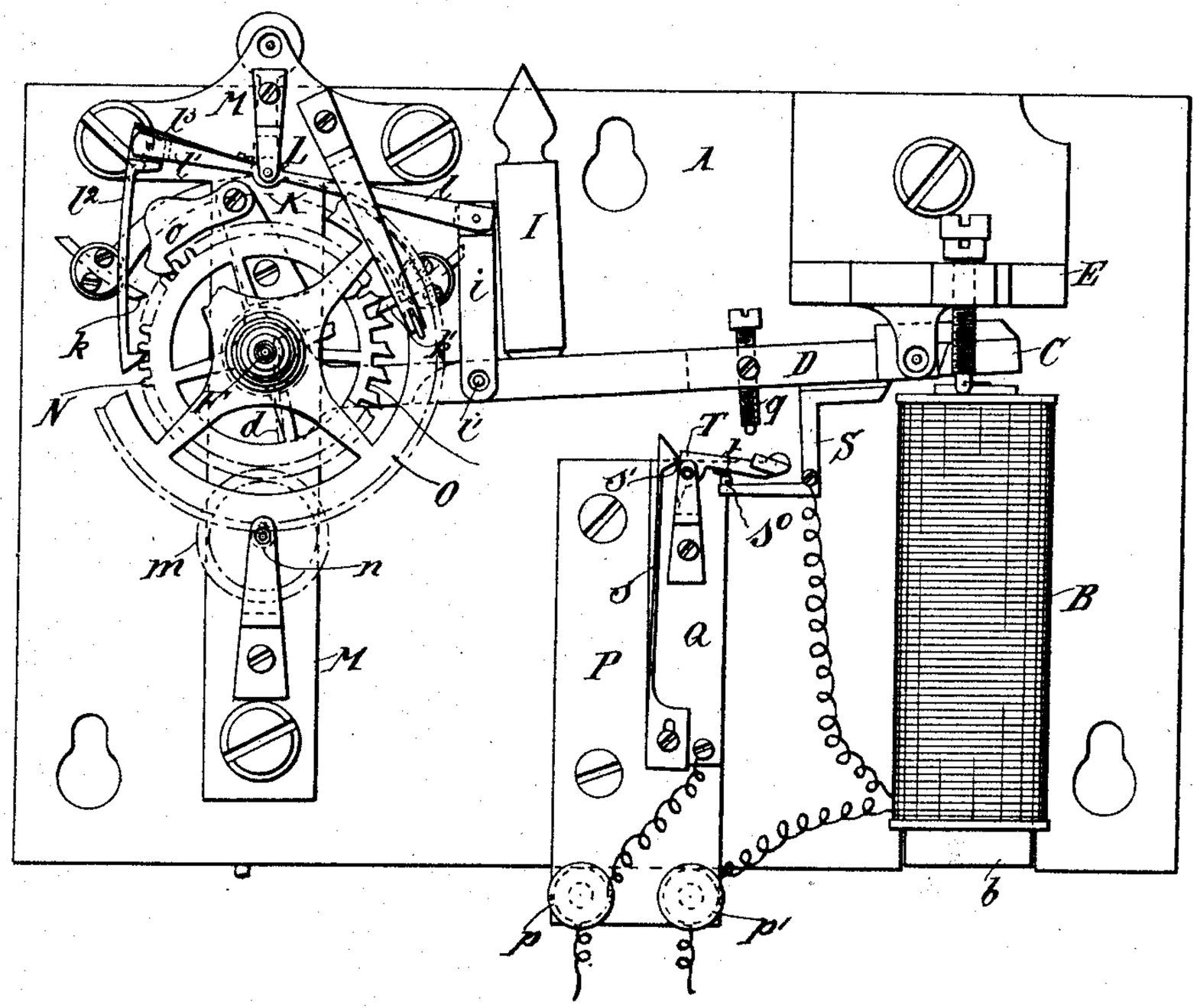
E. SCHWEIZER.

ELECTRIC CLOCK.

No. 504,095. Patented Aug. 29, 1893.

FIG. 5.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

EMIL SCHWEIZER, OF SUMISWALD, SWITZERLAND.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 504,095, dated August 29, 1893.

Application filed July 16, 1892. Serial No. 440,198. (No model.) Patented in Switzerland April 21, 1890, No. 2,115; in England April 28, 1890, No. 6,490; in Belgium April 30, 1890, No. 90,374; in Austria-Hungary September 18, 1890, No. 19,771 and No. 38,430, and in France May 5, 1891, No. 213,243.

To all whom it may concern:

Be it known that I, EMIL SCHWEIZER, a citizen of the Swiss Republic, and a resident of Sumiswald, canton of Bern, Switzerland, have invented certain new and useful Improvements in Electric Clocks, (for which patents have been granted in Switzerland, No. 2,115, dated April 21, 1890; in Austria-Hungary, No. 19,771 and No. 38,430, dated September 18, 1890; in Great Britain, No. 6,490, dated April 28, 1890; in Belgium, No. 90,374, dated April 30, 1890, and in France, No. 213,243, dated May 5, 1891,) of which the following is a specification.

My invention relates to the class of clocks operated through the medium of an interrupted electric circuit.

My clock has the following characteristics, namely: An electro magnet is mounted adjacent to the clock mechanism, and is in circuit with a generator. The armature is mounted on the shorter arm of an armature lever, the longer, weighted arm of which operates a spring hook pawl which engages the teeth of the minute wheel of the clock in such a manner that when the circuit is closed and the armature attracted, the hook pawl moves back over the teeth or a tooth of the minute wheel and engages the same at a new point, and when the circuit is broken, the weighted armature lever falls slowly and causes the hook pawl to rotate the minute wheel to a limited and measured extent. In order that the weighted armature lever may descend slowly, and the vibrations of the armature may occur at regular time-intervals, as once in each minute for example, I provide the longer, weighted arm of the armature lever with a curved rack which, when the circuit is closed and the armature attracted, rotates a pinion on the clock arbor, which pinion has a ratcheted connection with a verge (or escapement) wheel on the arbor the teeth of which wheel are engaged by the pallets of an anchor escapement. The weight drives the verge wheel, the rotation of which is regulated by the escapement and a pendulum, in the usual way. The weighted armature lever descends slowly as the verge wheel rotates, and at the end of one minute the weighted armature lever will have descended to its lowest point. In order to render the device automatic, a circuit breaker and closer is provided which is actuated through the medium of the vibrating movement of the armature lever; when the armature lever shall have descended to a certain point, the circuit will be closed through the medium of a device to be hereinafter described, and the instant the circuit is closed, the attraction of the armature throws up the weighted armature lever quickly, and the circuit is by this means again broken.

In the accompanying drawings which serve to illustrate a clock embodying my invention, Figure 1, is a front view of the clock mechanism. Fig. 2, is a plan view of the same. Fig. 3, is a rear view of the mechanism with part of the movement plate broken away. Fig. 4 is a sectional view on a larger scale taken on line 4—4 in Fig 1 and Fig. 4ª is fragmentary detail view in perspective that will be described. Fig. 5, is a view like Fig. 1 but showing the parts, in a different position.

A, is the movement plate, or base plate, on which the mechanism is mounted, and B, is an electro-magnet secured to plate A at its lower end through the medium of its pole-piece *b*.

C, is the armature, which is secured to the shorter arm of an armature lever D, pivotally mounted at *d*, one of the pivot screws being set in plate A and the other in the bracket E.

On the long arm of the lever D, is a weight I, or the lever is weighted in some manner equivalent to this.

On the clock arbor, F, is mounted the minute wheel N, the teeth of which are engaged by a hook pawl, l^2, pivotally coupled to one arm of a rock lever L. This pawl has at its heel or butt a square, l', on which bears a spring, l^3, which keeps the hook of the pawl in engagement with the teeth of wheel N. The other arm, *l*, of the rock lever L, is coupled by a link *i*, to the lever D, at i'.

Fig. 1 shows the armature C drawn down on the pole of the magnet B; this breaks the electric circuit, and the weighted lever D falls. The descent of lever D acts through link *i*, lever L, and pawl l^2, to rotate the minute wheel N to the calculated extent, as one tooth

for example. The minute wheel N, drives the hour wheel O, through intermediate wheels *m* and *n*, in the ordinary, or in any well known way. When the armature C, is attracted by the magnet B, the effect is to cause the hook pawl l^2 to move back over the teeth, or over a tooth, on the minute wheel N, and the latter is stopped against rotation when the hook pawl moves back, by a stop-pawl *o*.

When the circuit is broken, in order that the weighted lever D may descend slowly—indeed, in order that it may require one minute for its descent and thus advance the minute wheel slowly during the minute,—I employ the mechanism I will now describe with especial reference to Figs. 3, 4 and 4ª. On the end of the longer arm of the lever D, is a curved rack, *d*, which gears with a pinion *f*, loose on the arbor F. This pinion is connected to a volute cam disk, G, which has a shoulder *g*. Fixed on the arbor F, is a verge wheel H, and on the face of this wheel, adjacent to the disk G, is a pawl *h*, which is held against the scroll-like periphery of the disk G by a spring *h'*. When the lever D, is uplifted, as seen in Fig. 1, the end of the pawl *h* bears or abuts against the shoulder *g* on the periphery of the disk G, and when the lever D, is freed by the breaking of the circuit, the lever descends, rotates the pinion *f* and disk G, and through the abutting pawl *h*, rotates the verge wheel H. But the rotation of the verge wheel is regulated by an anchor escapement K, pivotally mounted in a bracket M, and provided with pallets *k* and *k'*, which engage the teeth of the verge on opposite sides. There will be a pendulum connected with the escapement, in the usual way, but this I have not shown.

I will now describe the means employed for breaking and closing the electric circuit. The wires from the generator are clamped by binding posts, *p* and *p'*, in a plate P, of insulating material secured to plate A. A wire from post *p*, is electrically connected with a metal plate, Q, on plate P, and a wire from post *p'* connects with the coil of magnet B, and the other end of this coil connects electrically with a bracket S, mounted on but insulated from the longer arm of the armature lever D. In this lever is set a screw *q*. Mounted pivotally on the plate Q, and in electrical contact therewith, is a contact lever, *t*, which has a square or angular heel, T, near the pivot point. On the plate Q, is mounted a spring *s*, which has an angular head, *s'*, adapted to bear on the heel of the lever *t*. When the lever *t*, is pushed upward to a certain extent, the angular head on the spring *s*, acts on the angular heel T of the lever *t*, to throw the latter up to the position seen in Fig. 1, which shows the circuit broken between a contact point, s°, on the bracket S, and the contact lever *t*. When the lever *t*, is pressed or pushed downward to a limited extent, the spring *s* acts in the same manner to throw the lever *t* down and close the circuit by putting the lever into contact with the point s°, as seen in Fig. 5.

In the working of the device, when the circuit is closed (as in Fig. 5) the attraction of armature C causes the longer arm of lever D to rise, carrying with it the bracket S, and when it has risen to a certain point the bracket S will have pushed the lever *t* upward far enough for the head of spring *s* to act and throw it up to the position seen in Fig. 1, when it will bear against the screw *q*. There should be insulating material either on the screw *q* or lever *t*, to prevent electrical contact between them when in this latter position. As the longer, weighted arm of lever D descends, the screw *q* pushes the lever *t* down until the spring *s* acts to throw it down again to the position seen in Fig. 5. Thus the circuit is broken and closed automatically and at regulated intervals, say one minuse for example. When the circuit is closed and the magnet excited the lifting of the weight will be effected almost instantaneously.

The part *q*, in the lever D, is here shown as a screw, as this renders it convenient for adjustment; but it is not essential that this feature shall be adjustable.

I have referred to the longer arm of the lever D as weighted and this is the preferred construction; but a spring is an obvious equivalent for a weight for depressing said arm. It is also obvious that, while the engagement of the hook-pawl l^2 with the minute wheel H directly, is the most simple construction, the hook-pawl might engage a ratchet wheel or toothed wheel which was itself geared to the minute wheel. These slight variations are too obvious to require illustration and would not depart essentially from my invention as shown.

Having thus described my invention, I claim—

1. In an electric clock, the combination with an electro-magnet, its armature mounted on the shorter arm of the armature lever, the said lever having its longer arm weighted, the wheels which operate the clock hands, mechanism intermediate the weighted arm of the armature lever and said clock wheels, whereby the descent of said lever rotates said wheels, and a circuit breaker and closer, of the escapement K, the verge wheel H, bearing a pawl *h*, the scroll disk G, loosely mounted concentric with the wheel H and engaged by the pawl *h*, the pinion *f*, connected to the disk G, and the rack *d* on the armature lever in gear with said pinion.

2. In an electric clock, the combination with an electro magnet, its armature mounted on the shorter arm of the armature lever, the said lever having its longer arm weighted, an escapement mechanism which retards the descent of the weighted armature lever, and a circuit breaker and closer, of the minute wheel N, the hook pawl l^2, engaging the teeth of said minute wheel and coupled to one arm of

a rocking lever L, and a link *i*, which couples the other arm of said lever L to the weighted arm of the armature lever.

3. In an electric clock, the combination with an electro-magnet, a circuit of which the coils of said magnet form a part, the armature mounted on the shorter arm of the armature lever, and the said lever, of an automatic circuit breaker and closer comprising a contact lever, *t*, in the circuit and having an angular heel T, a spring *s*, having an angular head *s'*, bearing on the angular heel of the lever *t*, and operating as described, a contact bracket S, carried by the longer arm of the armature lever and adapted to take under the lever *t*, said bracket being in circuit, and a part *q*, carried by the armature lever and arranged over the lever *t*, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EMIL SCHWEIZER.

Witnesses:
GEORGE GIFFORD,
AMAND RITTER.