(No Model.)

3 Sheets—Sheet 1.

W. W. ESTABROOK.

AUTOMATIC CIRCUIT MAKER AND BREAKER.

No. 389,799. Patented Sept. 18, 1888.

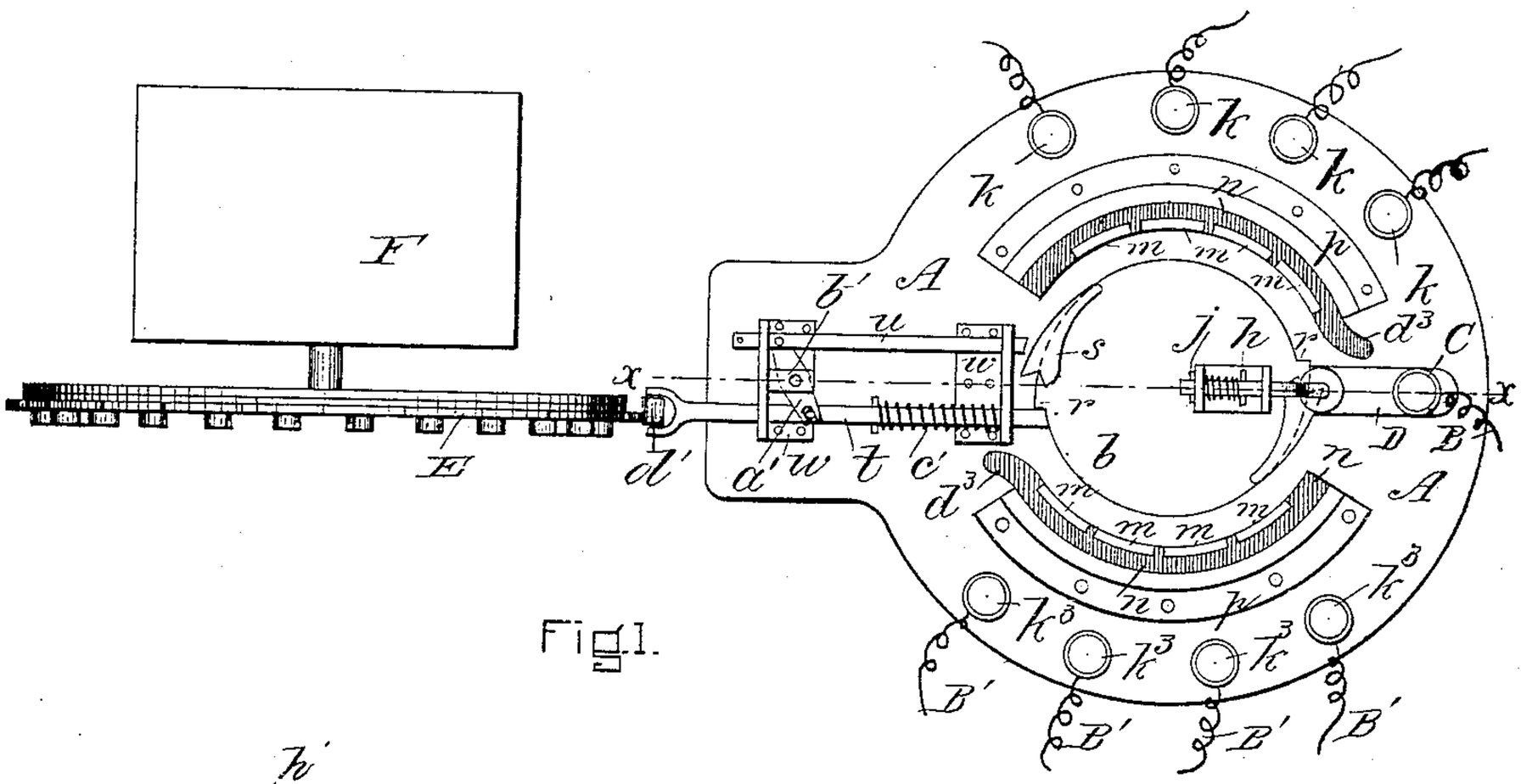

Fig. 1.

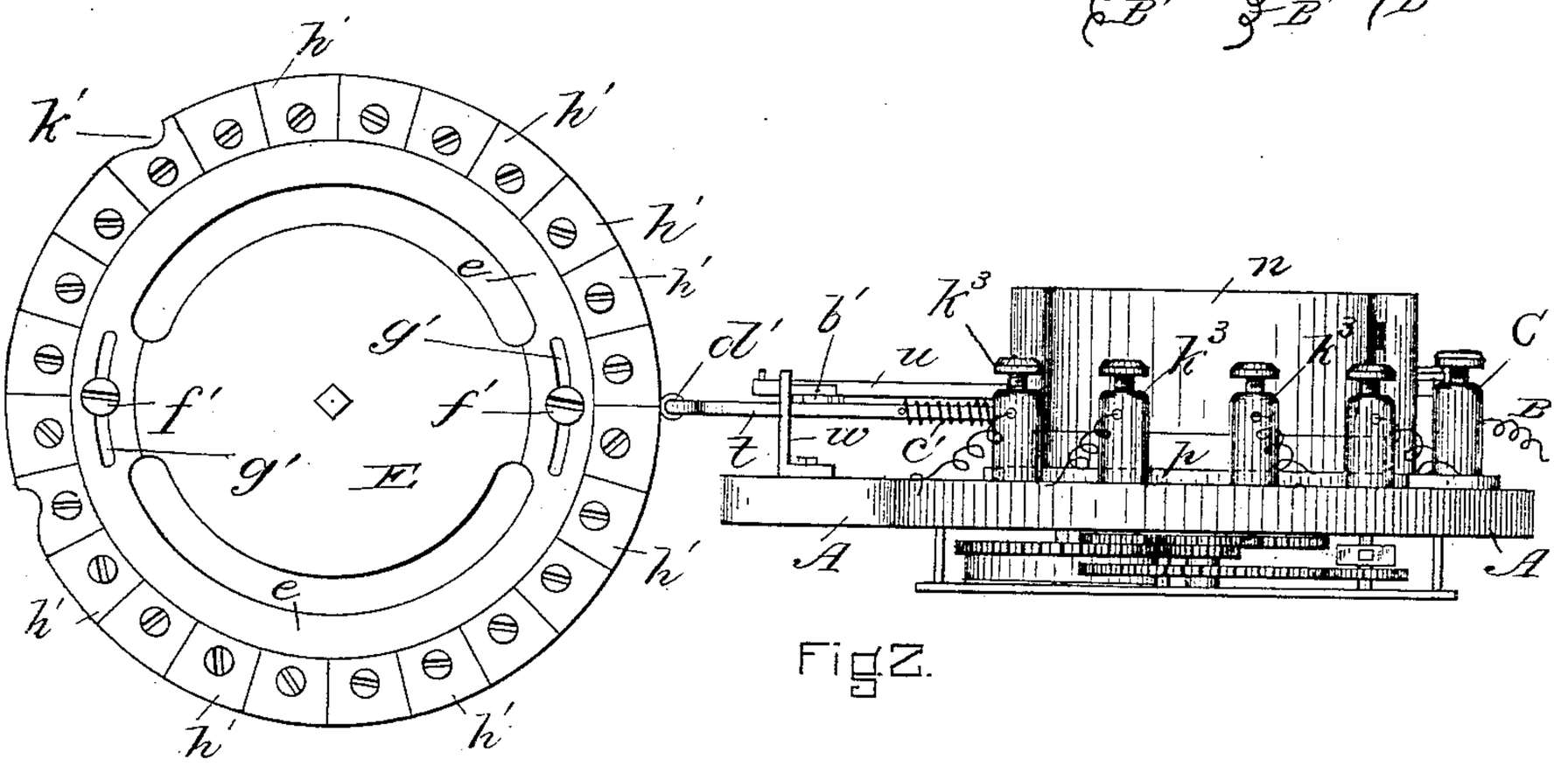

Fig. 2.

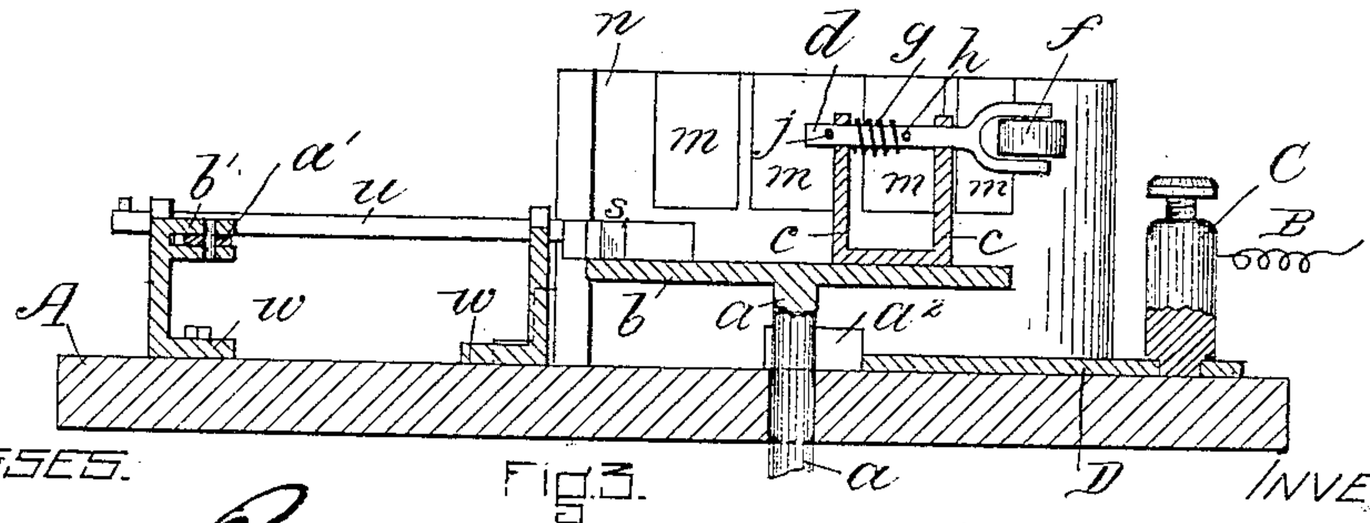

Fig. 3.

WITNESSES.

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(No Model.)

3 Sheets—Sheet 2.

W. W. ESTABROOK.

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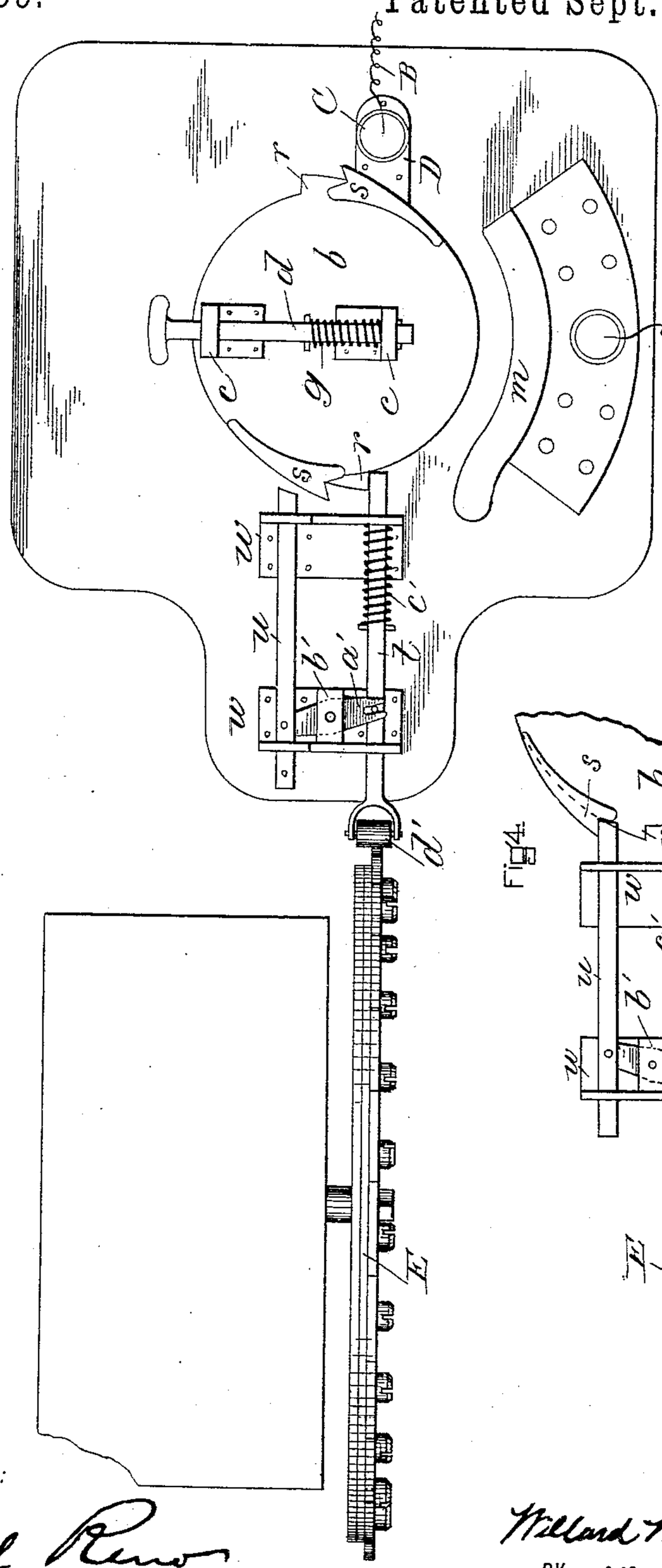

Fig 4

Fig 7

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(No Model.)

3 Sheets—Sheet 3.

W. W. ESTABROOK.

AUTOMATIC CIRCUIT MAKER AND BREAKER.

No. 389,799. Patented Sept. 18, 1888.

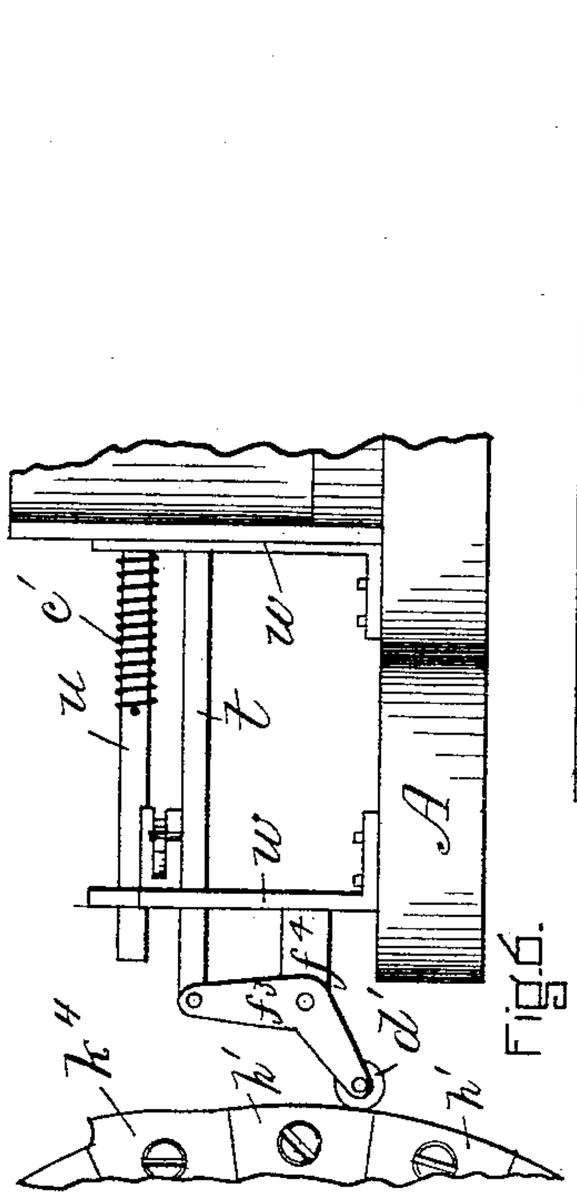


Fig. 6.

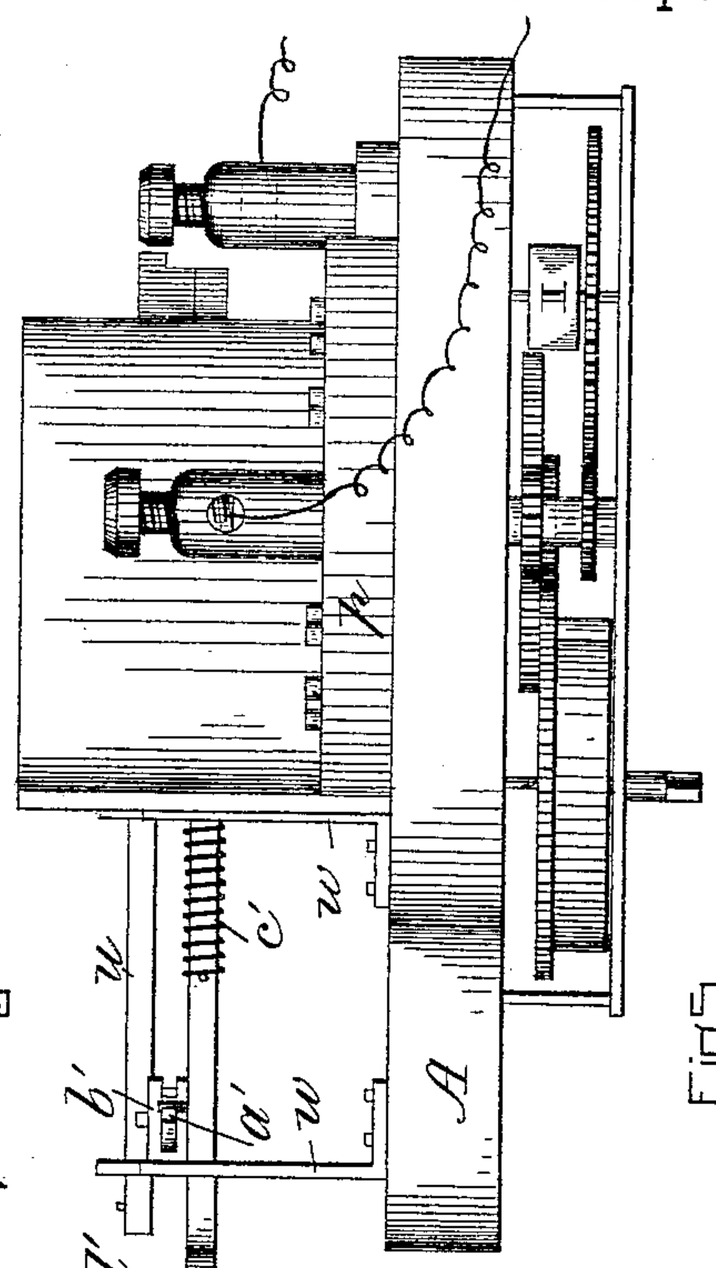
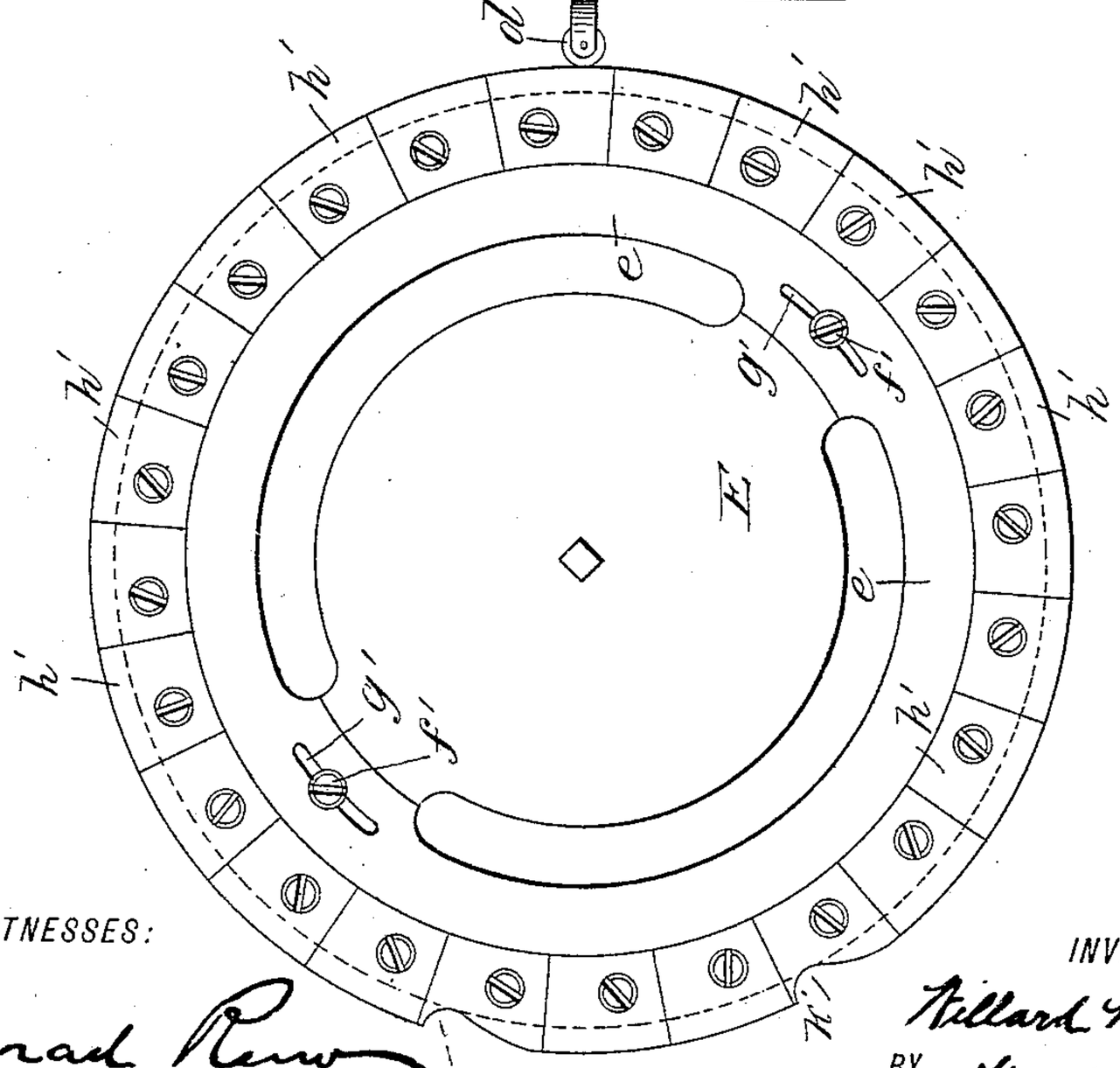


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLARD W. ESTABROOK, OF BOSTON, MASSACHUSETTS.

AUTOMATIC CIRCUIT MAKER AND BREAKER.

SPECIFICATION forming part of Letters Patent No. 389,799, dated September 18, 1888.

Application filed May 23, 1888. Serial No. 274,773. (No model.)

To all whom it may concern:

Be it known that I, WILLARD W. ESTABROOK, of Boston, county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Automatic Circuit Makers and Breakers for Electric Circuits, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof, in which—

Figure 1 is a plan view of the circuit maker and breaker and showing the clock mechanism which governs its operation in side view. Fig. 2 is a side view showing the clock mechanism in plan view. Fig. 3 is a section on line *x x*, Fig. 1. Fig. 4 is a plan view of the mechanism as arranged for electric-lighting circuits, and Fig. 5 is a side view of the same. Figs. 6 and 7 are details showing modifications of the stop-bolt mechanism.

The object of my invention is the construction of a simple and effective device by means of which an electric circuit or current may be automatically made or broken at a given time or times; and it consists of a revolving plate which itself forms, or which carries, one of the contact devices and a stationary piece which forms the other member of the contact device, said moving or revolving plate being actuated by a spring or similar device to cause it to revolve, and being controlled in its revolution so as to stop or release it at any desired point by means of stops which are actuated at a given time or times by clock mechanism, all as will be hereinafter more particularly set forth.

Throughout the accompanying drawings like letters of reference indicate like parts.

A represents a base piece or bed, which is preferably of wood or rubber and which serves to support the contact making and breaking device proper. An arbor, *a*, is journaled in the bed A, the lower end of said arbor projecting through the bed and being provided with a gear by which it is actuated, the gear being in mesh with a train of gears (see Fig. 2) driven by a spring in the well-known manner. This spring and train of gears may be substantially like those employed in clocks and similar spring-actuated devices. By means of this spring and train of reducing-gears the arbor *a* may be driven at a substantially uniform speed and the speed regulated, which, although not essential, is desirable.

At the upper end of the arbor *a* a plate, *b*, of metal, and preferably of circular shape, is provided. The plate *b* may be either integral with the arbor *a*, or may be secured thereto. On the plate *b* is mounted a small frame or support, (see Figs. 1 and 3,) which may be of any desirable form. As shown, it consists of two uprights, *c*, in the top of which is placed a sliding rod or bar, *d*, having a Y-shaped projection at its forward end, in which is journaled a roll, *f*. Between the uprights *c* a spiral spring, *g*, encircles the rod *d*, one end of said spring bearing against a pin, *h*, in the rod, (see Fig. 1,) and the other end against one of the uprights *c*. The spring *g* tends to project the rod *d* and its roll *f* outwardly away from the center of the plate *b*. A pin, *j*, Figs. 1 and 3, in the rod *d* prevents the rod from being projected outwardly out of its bearings, or farther than may be necessary. The roll *f* and its rod may be considered as the moving member of the contact making and breaking device, and are in electrical connection with the wire B by means of the binding-post C, strip D, spring a^2, arbor *a*, plate *b*, and support *c*. The spring a^2 is set in the strip D and bears at its free end against the arbor *a*.

The stationary member or members of the device are arranged, preferably, as shown in Figs. 1 and 2, when the mechanism is used for lighting and extinguishing gas, in which case it is desirable to make or break the circuit with several wires successively; but, as will be obvious, the number of wires connected is not material. The stationary member or members of the device are so placed in proximity to the revolving plate *b* as to be in the path of the roll *f* when the roll is carried around with the table or plate *b*. As the roll revolves with the plate, it strikes the stationary member of the device and is forced slightly backward against the pressure of the spring *g*, which then serves to keep the roll pressed against the stationary member and insure a good contact.

As will be obvious, the precise construction and connection of the stationary contact-pieces

are not material, as they may be made in several ways. In Figs. 1 and 2 I have shown a device connected with four gas-lighting wires and four extinguishing-wires. These contacts are constructed as follows:

k are binding-posts, to which the lighting-wires are secured. These posts have electrical connection with the plates *m*, which are mounted in a curved strip, *n*, of insulating material, such as rubber, which is secured in place on the bed A by means of a flanged brace, *p*, (see Fig. 1,) the flange of the brace being secured by screws or otherwise to the bed A. The end d^6 of each of the rubber pieces *n*, with which the roll *f* first comes in contact, is slightly curved outwardly, as shown in Fig. 1, in order that as the plate *b* revolves the roll may be gradually forced back into line with the face of the contact-pieces *m* without danger of stopping the revolution of the plate *b*.

The lighting-wires are arranged on one side of the bed A and the extinguishing-wires B′ are arranged on the other side thereof, in connection with the binding-posts k^3, so that a half-revolution of the plate *b* throws the roll *f* in contact with the lighting-wires, while the next half-revolution brings it in contact with the extinguishing-wires, and when the plate *b* is at rest the roll lies between the stationary contacts and the circuit is broken.

It will be clear that by revolving the plate *b* at given times the lights may be lighted or extinguished. To accomplish this result the plate *b* is provided with two projections at either side. One set of these projections is formed by an open notch or shoulder, *r*, in the periphery of the plate *b*, and the other by pieces *s*, which are secured on top of the plate *b* near the edge and project beyond the same. At one side of the plate *b* and between the stationary contacts two parallel slide-bolts, *t u*, are mounted in supports *w*, which are secured to the bed A. The bolt *t* is lower than the bolt *u*, (see Fig. 2,) and when projected toward the plate *b* is in the path of the projection *r* on the plate. The stop-bolt *u* when projected toward the plate *b* is in the path of the projection *s* on the plate. The stop-bolts *t u* are connected by means of a lever, *a′*, which is centrally pivoted to a projection, *b′*, secured to one of the supports *w*. (See Figs. 1 and 2.) The ends of the lever *a′* are slotted to receive pins on the stop-bolts, and it will be clear that as the stop-bolt *t* slides in one direction the stop-bolt *u* will by means of the lever *a′* be moved in the opposite direction. A spiral spring, *c′*, encircling the stop-bolt *t*, is placed between a pin in the bolt and the inner support, *w*, and this spring tends to throw the stop-bolt *t* away from the revolving plate *b*.

The outer end of the stop-bolt *t* is Y-shaped as shown in Fig. 1, and carries a roll, *d′*. The roll *d′* is, by means of the spring *c′*, held against the periphery of the disk E. The disk E is placed on the arbor which carries the hour-hand of a clock of common construction, the clock being represented by the oblong figure at F, Fig. 1, and the gear which drives the arbor being changed in order that the arbor may revolve once in twenty-four hours instead of twice. This, for obvious reasons, is preferable.

The disk E consists of a central portion carrying a circular piece, *e*, set into its face and secured thereto by means of set-screws *f′*, which pass through slots *g′*, and which permit of the movement or adjustment of the piece *e* on the disk. The periphery of the circular piece *e* is provided with a series of plates, *h′*, secured thereto by screws, or in other suitable manner, to permit of their being changed from one point to another on the periphery. The pieces *h′* are preferably twenty-four or more in number, depending somewhat on the size of disk used, to allow at least one for each hour of the day. If, now, it is desired to light or extinguish the gas at a given, hour a depression or notch, such as is shown at *k′*, Fig. 2, is cut at that part of the periphery of the disk E which passes the roll *d′* at that hour. The spring *c′* forces the roll into the depression, thus freeing the inner end of the stop-bolt *t* from the shoulder *r* of the plate *b*, thus releasing the plate and allowing it to revolve and contact to be made. When the stop-bolt *t* moves away from the plate *b*, the stop bolt *u* moves toward the plate *b* in position to strike the projection *s* when the plate has made nearly half a revolution. Thus one of the sliding stop-bolts is always in the path of one of the projections on the plate *b*. By this means the plate *b* is stopped with certainty at the desired point and held until the further movement of the disk E carries the roll *d′* out of the depression *k′*. As the roll *d′* moves out of the depression, the bolt *t* is projected into the path of the shoulder *r* of the plate *b*, and the bolt *u* is retracted, clearing the projection *s* and allowing the plate *b* to move through a short distance until the shoulder *r* comes in contact with the bolt *t*, as shown in Fig. 1. When the disk E has moved to the time when the lights are to be extinguished, the next depression in its periphery receives the roll *d′*, and the plate *b* is again released and allowed to make another half-revolution, making the extinguishing circuits and extinguishing the lights.

The pieces *h′* on the periphery of the disk E are preferably interchangeable, thus allowing those that have depressions or notches *k′* to be set at any point on the periphery. The pieces *h′* may be of metal, in which case the roll *d′* should be made of rubber or other insulating material, or the pieces *h′* may be of rubber, in which case the material of the roll is not important.

In the form of my device shown in Fig. 4 the construction is substantially the same; but the movable contact-piece which is carried by the plate *b*, instead of being provided with a roll like that shown at *f*, Figs. 1 and 3, is provided with a flattened end, which is curved on

its contact-face to correspond with the curve of the stationary contact. By this means a greater contact-surface is obtained, which is necessary in certain cases, as in electric lighting, especially if a current of great power is used.

Since contact requires to be maintained in electric lighting while the lights are on and is not momentary, as in lighting or extinguishing gas, the location of the contact on the plate *b* relative to the stops is changed. This, however, is not essential, the position of the contact on the plate being subject to change, as circumstances require.

It will also be obvious that the precise construction of the disk E is not material, so long as a disk is employed having depressions to allow the backward throw of the stop-bolt *t* at the desired times. The clock mechanism may also, as will be clear, be turned so as to bring the disk E into a plane parallel with that of the plate *b* without essentially changing my invention. Such an arrangement would require only a change in the position of the roll *d'*, as will be obvious.

If it be desired to make or break a circuit more than once within an hour, the disk E may be placed on the arbor of the minute-hand of the clock instead of on the arbor of the hour-hand.

The stop-bolt mechanism may be modified, as shown in Figs. 6 and 7, without effecting any material change in my device. In the modification shown in Fig. 6 the end of the stop-bolt *t* nearest the disk E is pivoted to a bell-crank lever, f^3, which is pivoted to a projection, f^4, from the support *w*, and the roll *d'* is mounted in the free end of the bell-crank lever. Instead of depressions *k'*, the plates *h'* are provided with projections like that shown at k^4, and, as the disk E revolves, the roll *d'* is forced back by the projection k^4, thus drawing the bolt *t* away from the plate *b* and releasing the plate. The spring *c'* may be either on the bolt *u* or it may be on the bolt *t*. In the latter case, however, its action will require to be the reverse of that in the construction shown in Figs. 1, 2, and 5.

In the modification shown in Fig. 7 the disk E is also provided on its periphery with projections instead of depressions, and the action of the bolts *t u* is reversed from that shown in Figs. 1 and 4, the bolt *u* being in contact with the projection *s* on the plate *b* at the times when, by the construction first described, the bolt *t* is in contact with the projection *r* of the plate *b*.

The whole mechanism may be inclosed in a case to preserve it from dust and the like, and to prevent unauthorized persons from meddling with the apparatus. In such case the winding-arbor of the spring mechanism which actuates the plate *b* may project through the case, so that the spring may be wound up without opening the case, and, in like manner, the winding-arbor of the clock may be connected by gears with an arbor extending through the case; or the clock may be wound by its own arbor by opening the case, the slots in the face of the dial E being directly in front of the winding-arbor of the clock, thus permitting the key to be placed on the arbor.

What I claim is—

1. An automatic circuit maker and breaker having one or more stationary members and having a moving member mounted on a revolving plate and sliding stop-bolts which engage with projections on said plate, and a disk on the hand-arbor of a clock, said stop-bolts being controlled by said disk, substantially as set forth.

2. In an automatic circuit maker and breaker, the combination, with the revolving plate *b*, provided with the projections *r s*, of the sliding bolts *t u* and their connecting-lever *a'*, pivoted between said bolts, whereby one of said bolts is always in the path of one of the projections on the plate to stop the revolution thereof, substantially as shown and described.

3. In an automatic circuit maker and breaker having one of its members mounted on a revolving plate, the combination, with said plate, of a contact-piece mounted thereon in sliding bearings and normally projected beyond the periphery of said plate by means of a spring, and a stationary contact-piece set in the path of said moving contact-piece and provided with an outwardly-curved end to receive the moving contact-piece, whereby the moving contact-piece as it revolves is forced back against the pressure of its spring and an operative connection of the contact-pieces insured, substantially as shown and described.

4. The combination, with the stationary and movable contact-pieces, of the plate *b* and its operating mechanism, and the disk E and its clock mechanism, said disk having a circular strip, *c*, adjustably secured thereto, and having on its periphery and projecting beyond the same a series of detachable pieces, *h'*, some of which are provided with depressions or projections by which the stop-bolts which control the movement of the plate *b* are actuated, substantially as shown and described.

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Witnesses:

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ROBERT WALLACE.