

(No Model.)

2 Sheets—Sheet 1.

B. F. MERRITT.
TELEGRAPH REPEATER.

No. 553,535.

Patented Jan. 28, 1896.

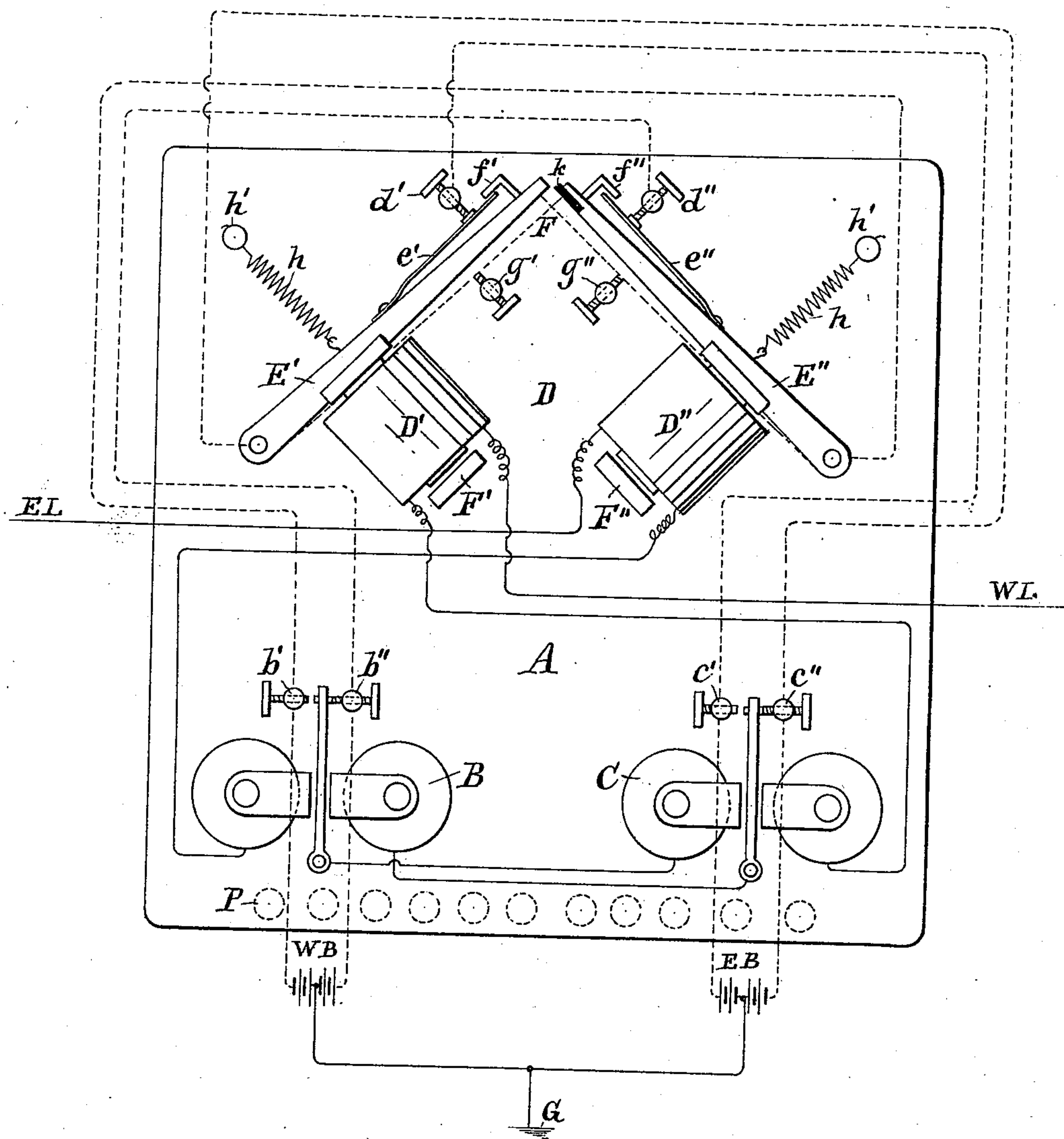


Fig. 1.

Witnesses:
A. S. Lamy
Mark W. Dewey

Inventor.
Benjamin F. Merritt
By *C. H. Duell*
his Attorney.

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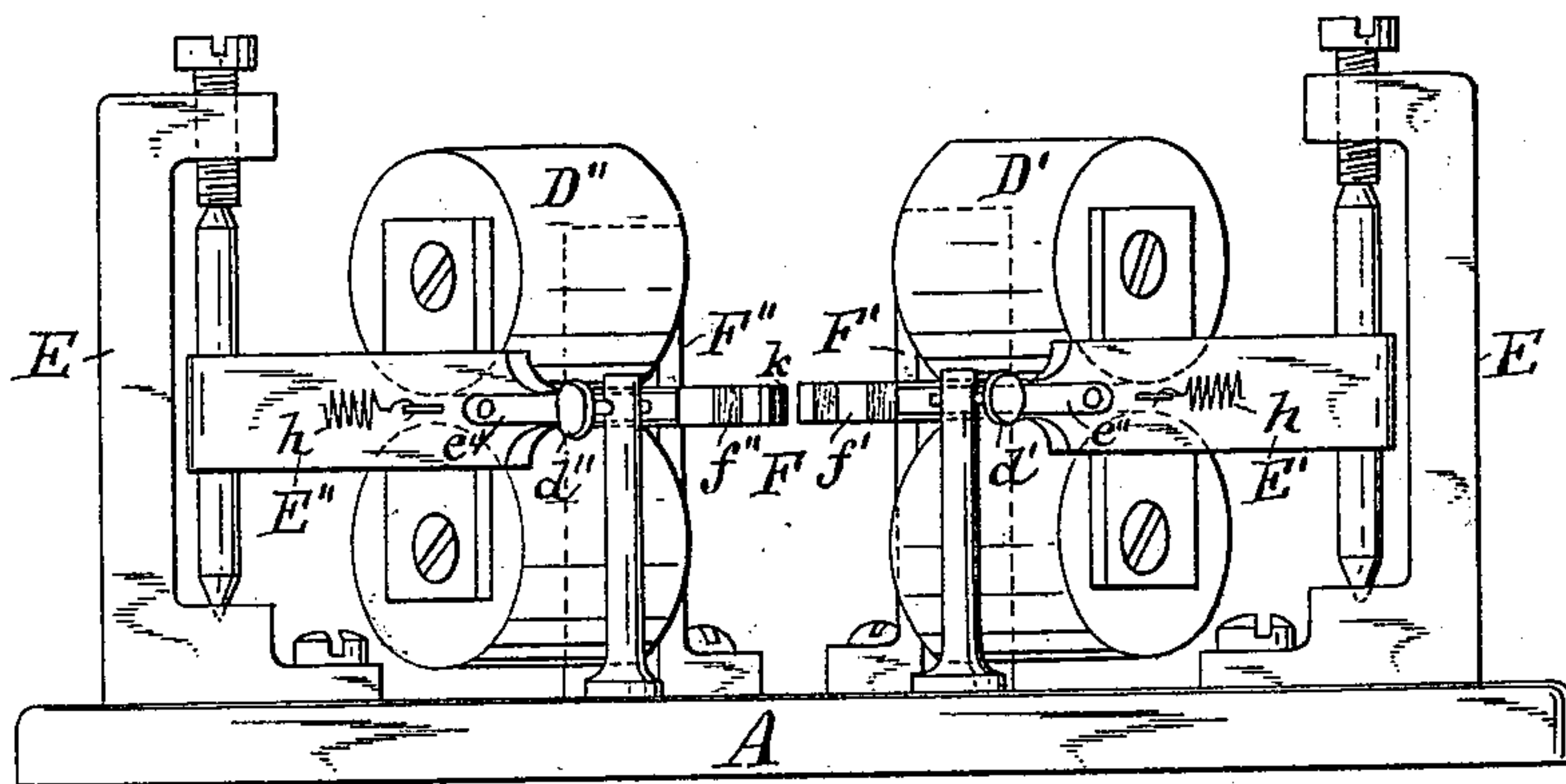


Fig. 2.

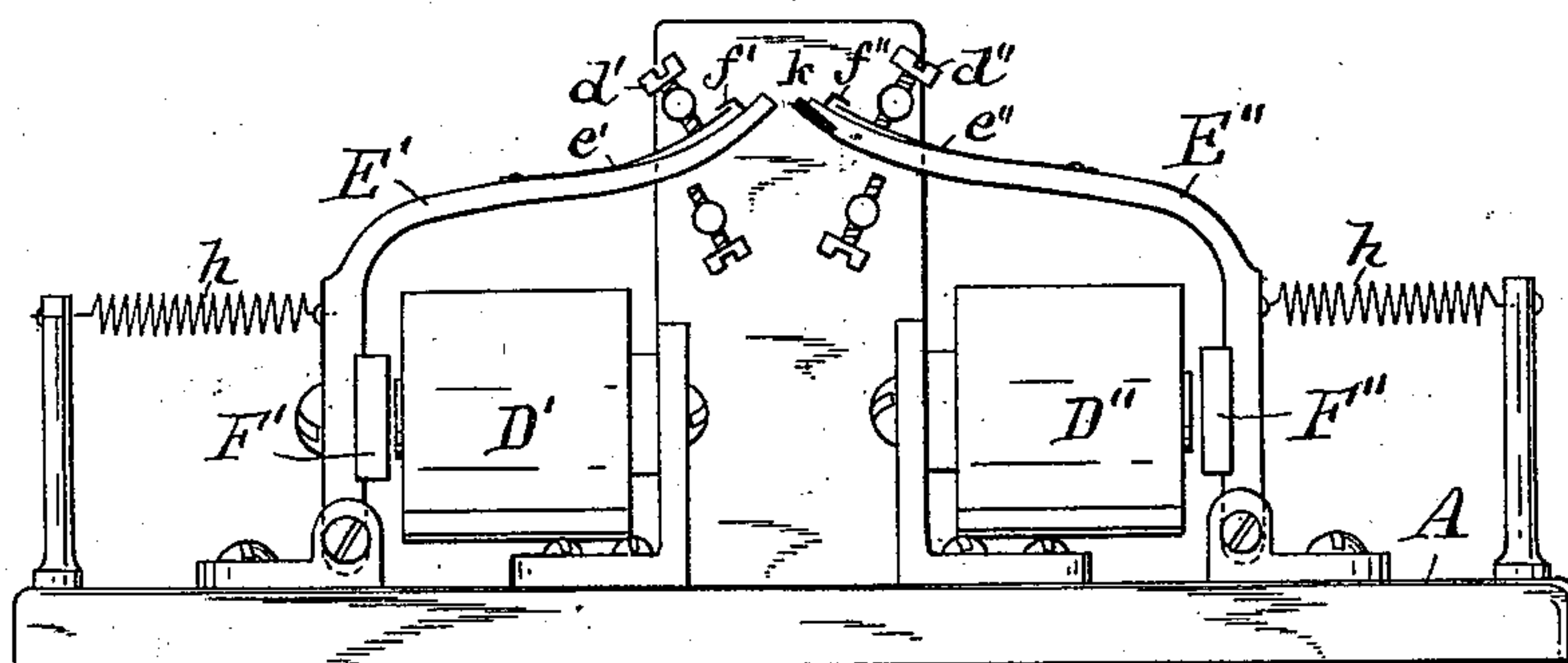


Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

BENJAMIN F. MERRITT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE CONSOLIDATED TELEGRAPH AND NEWS COMPANY, OF NEW YORK, N. Y.

TELEGRAPH-REPEATER.

SPECIFICATION forming part of Letters Patent No. 553,535, dated January 28, 1896.

Application filed May 20, 1895. Serial No. 549,864. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. MERRITT, of Newark, in the county of Essex, in the State of New Jersey, have invented new and useful
5 Improvements in Automatic Telegraph-Repeaters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to the class of tele-
10 graph-repeaters, which are employed at intermediate stations when messages are to be transmitted long distances, and the object is to provide a more simple and effective device for this purpose.

15 My invention consists in the combination, with a pair of polarized relays of any suitable and well-known form, of a pair of magnets having their coils in different circuits, armature-levers for said magnets arranged with
20 their free ends extending to an angle, insulated from each other and adapted to automatically interlock one with the other, and means carried by each of said levers to open and close electric circuits; and my invention
25 consists in certain other combinations of parts hereinafter described, and specifically set forth in the claims.

In the drawings hereto annexed and forming a part of this specification, Figure 1 is a
30 top plan view of my improved repeater, with its electric connections and sources of current. Fig. 2 is a side elevation of the instrument—the side on which the automatic interlocking relay is mounted—and Fig. 3 shows a modified
35 form of the interlocking relay.

Referring specifically to the drawings, A represents the board or base upon which the relays are mounted.

B and C are two polarized relays of any
40 suitable and well-known form not necessary to be herein fully described, and D is the automatic interlocking relay which I will now proceed to describe. The magnets D' and D'' of this relay are preferably suspended, as
45 shown in Figs. 1 and 2, by their yokes which are secured rigidly to the levers E' and E''. The said levers are each pivoted at one end to a support E, as shown in Fig. 2. Their opposite ends extend to an angle, preferably a
50 right angle, and the said ends lie in close

proximity to each other, so that when one is operated it moves into the path of motion of the other. Opposite the poles of the magnets D' and D'' are the armatures F' and F'' firmly
55 fixed to the base A. It will be obvious that with this arrangement both levers with their respective magnets cannot be operated or attracted toward their armatures at the same time.

e' e'' are limited spring-contacts mounted
60 on the levers. Said spring-contacts are limited by hooks f' and f'' and make contact with the screws d' and d''.

As a certain latitude is necessary in the operation of the locking-levers at the point F,
65 the contact between the levers E' and E'' and the screws d' and d'' cannot be made rigid, for if rigid the necessary lost motion at the point F would open the contact. In order that the contact may be kept closed while its
70 lever is locked, I provide the springs e' and e''. The said contacts can only be separated when a lever is unlocked, and only one lever can be unlocked at a time.

The end of one of the levers, as E'', is in-
75 sulated by any suitable means, as by a small block k of hard rubber or fiber, so that when one moves into the path of the other there will be no electrical connection between the
80 two.

The actuating-batteries W B and E B are connected with the polarized relays in the usual manner.

I will now trace the circuits or electrical
85 connections, which, for the sake of clearness, are not connected to the row of binding-posts P. (Shown in dotted lines.)

The circuit from the east line E L runs through the magnet D'' of the locking-relay to the magnets of the polarized relay B and
90 then to the armature of the polarized relay C.

The circuit from the west line W L passes through the magnet D' to and through the coils of the polarized relay C to the armature of the polarized relay B. The contacts e' d'
95 and e'' d'' are connected with the batteries E B and W B, respectively, through the points or stops for the levers of the polarized relays. Each set of contacts act as short circuits to the points of their opposite relay, or the relay
100

to which they are connected. The contacts $e'' d''$ short-circuit the points $b' b''$ and are connected to the poles of the west-sending battery W B, and the contacts $e' d'$ short-circuit the points $c' c''$ and are connected to the poles of the east-sending battery E B. The batteries are equally divided and their centers or neutral points are connected together and to ground at G.

The armature-levers of the polar relays may rest, when in their normal position, in contact with the stops b'' and c'' , as shown in Fig. 1 of the drawings.

The operation of the apparatus is as follows: When an impulse is sent on the east line E L, it first passes through the magnet D'' , energizing it and causing it to be attracted with its lever to its armature F'' . The movement of the lever E'' causes the spring e'' to break contact with the stop d'' and opens the short circuit from battery W B, allowing it to act and the relay B to be put in service. This movement of the lever E'' brings its end at point F under the end of the lever E' , so that it is impossible for its contacts $e' d'$ to open to break its short circuit. This locking action keeps the relay C and its attendant battery E B from acting. The current, after passing through D'' , passes through the coils of the polarized relay B, actuating its armature and applying the current of the battery W B with proper phases to the west line W L in the usual and well-known manner. The circuit E L, after passing through the polarized relay B, passes to the pivoted end of the armature of the polarized relay C, and through it to the stops c' or c'' and through the battery E B to ground G.

It will be obvious that during the operation described the battery E B is held constantly short-circuited by the contacts e' and d' .

When an impulse or a series of impulses is sent from the opposite direction or from the west line W L, the conditions and locking are reversed. The first impulse sent from either line determines the locking of the levers, and the levers so locked remain in this condition until the current ceases over the line.

$g' g''$ form stops for the inner sides of the levers E' and E'' , and $h h$ are springs to draw the magnets $D' D''$ from their armatures. The posts $h' h''$ for these springs are not shown in Fig. 2.

In the modified form of automatic locking-relay D shown in Fig. 3 the magnets $D' D''$ are secured rigidly to the base A, and the levers E' and E'' are secured to pivoted armatures $F' F''$. The magnets in this case are not set at an angle with relation to each other, but are arranged side by side and parallel with each other. The levers E' and E'' are, however, curved or bent so that their free ends are extended to substantially a right angle. The pivots of the levers extend horizontally in Fig. 3, while in Figs. 1 and 2 they extend vertically.

I do not limit myself to the precise form of construction shown and described herein, as it will be obvious that the details may be changed or modified without departing from my invention.

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

1. In a telegraph repeater, the combination with a pair of polarized relays, of an automatic locking relay having a pair of vibratory levers adapted to move one in the path of the other, a pair of batteries and connections, means carried by said levers to short-circuit the batteries, and contacts for the levers of the polarized relays in said connections, as and for the purpose set forth.

2. In a telegraph repeater, the combination with a pair of polarized relays, of an automatic locking relay having a pair of vibrating levers extending at an angle to each other and adapted to move their free ends one in the path of the other, a pair of batteries and connections, means carried by said levers to short circuit the batteries, and contacts for the levers of the polarized relays in the said connections, as and for the purpose set forth.

3. In a telegraph repeater, the combination with a base and a pair of polarized relays, of a pair of electro magnets, levers adapted to be operated by said magnets and to move one in the path of the other, limited spring contacts carried by said levers, stationary contacts to engage the spring contacts, a pair of batteries having their centers connected to ground and their poles connected to the contacts carried by the said levers, contacts for the armature levers of the polarized relays in the connections between the batteries and the first mentioned contacts, and line circuits passing through said magnets and the relays, as set forth.

4. In a telegraph repeater, the combination with a base and a pair of polarized relays mounted thereon, of a pair of electro magnets arranged at an angle to each other, levers secured to said magnets, stationary armatures secured to the base, yielding contacts for the levers, insulation on the end of one of the levers, stops to limit the movement of the levers, a pair of batteries connected to the yielding contacts through the contacts for the levers of the polarized relays, and the line circuits connecting the coils of the relays with the said magnets, as set forth.

5. In a telegraph repeater, the combination with a base, and a pair of polarized relays mounted thereon, of a pair of electro magnets, levers arranged at an angle to each other, operated by said magnets and adapted to interlock one with the other, spring contacts carried by said levers, stationary adjustable contacts to engage the spring contacts, hooks on the levers to limit the movement of the springs, a pair of batteries having their centers connected to ground and their poles con-

5 nected to the said levers, contacts for the levers of the polarized relays connected to the poles of the batteries, and the line circuits connecting the polarized relays with the magnets of the locking relay, as set forth.

10 6. In a telegraph repeater, the combination with a base and a pair of polarized relays mounted thereon, of a pair of electromagnets, arranged at an angle to each other, levers secured to said magnets, stationary armatures secured to the base, yielding contacts for the levers, insulation on the end of one lever to insulate it from the other, stops to limit the movement of the levers, springs to retract the magnets from their armatures, a pair of divided batteries having their neutral points connected to ground, connections leading from the poles of the batteries through the contacts of the levers of the polarized relays

to the yielding contacts, and the line circuits leading through the said magnets and the polarized relays, as and for the purpose described.

7. In an automatic relay, the combination of levers extending at an angle to each other and adapted to move one in the path of the other, insulation carried on the free end of one lever, spring contacts, stationary contacts, hooks on the levers to limit the movement of the springs, magnets to operate the levers, and battery connections controlled by the movement of the levers, as set forth.

In testimony whereof I have hereunto signed my name.

BENJAMIN F. MERRITT. [L. S.]

Witnesses:

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WOOLSEY CARWATE.