(No Model.)

M. THUM.

ELECTRIC CIRCUIT CONTROLLING DEVICE.

No. 473,594. Patented Apr. 26, 1892.

Fig. 1.

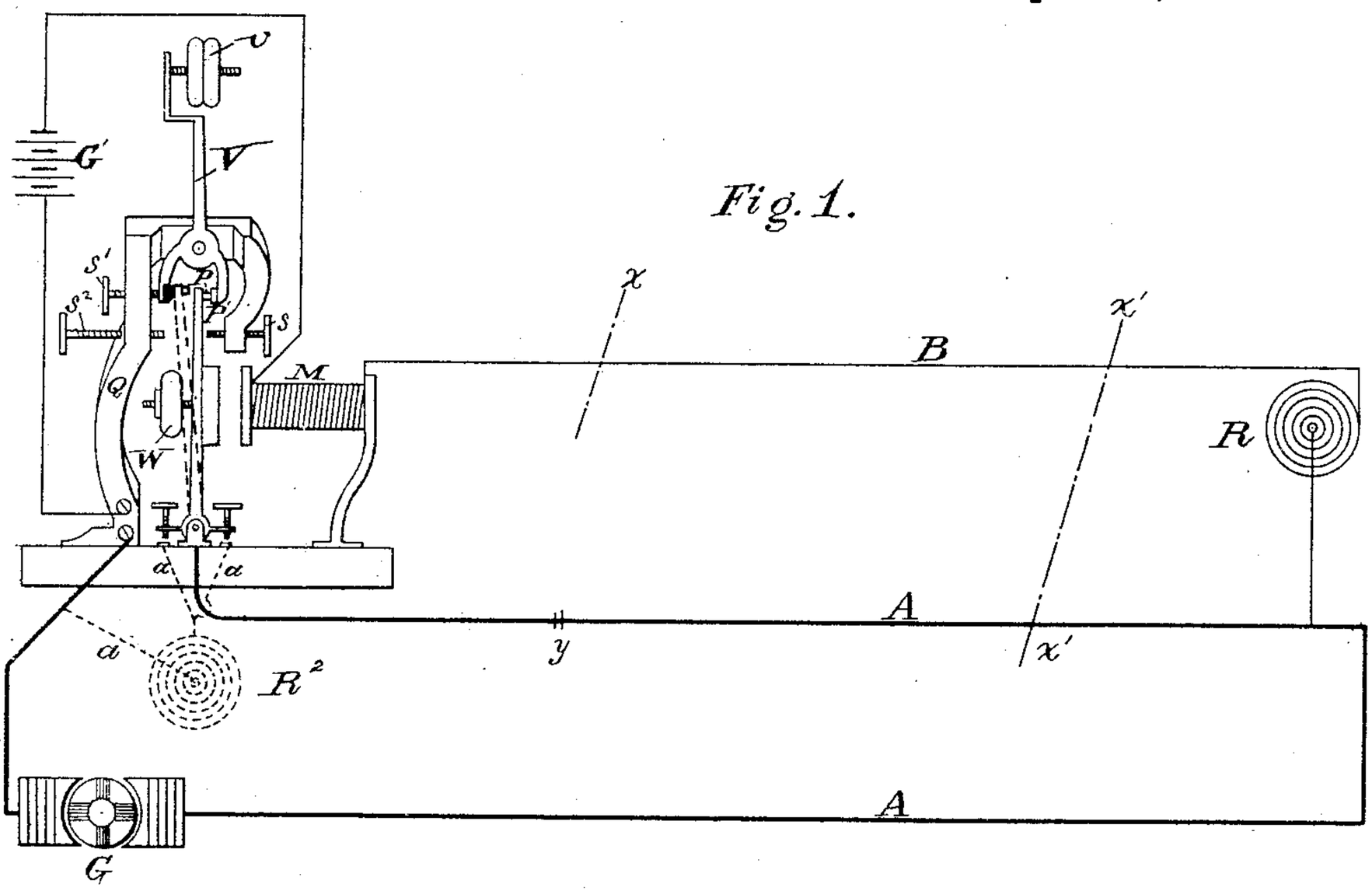
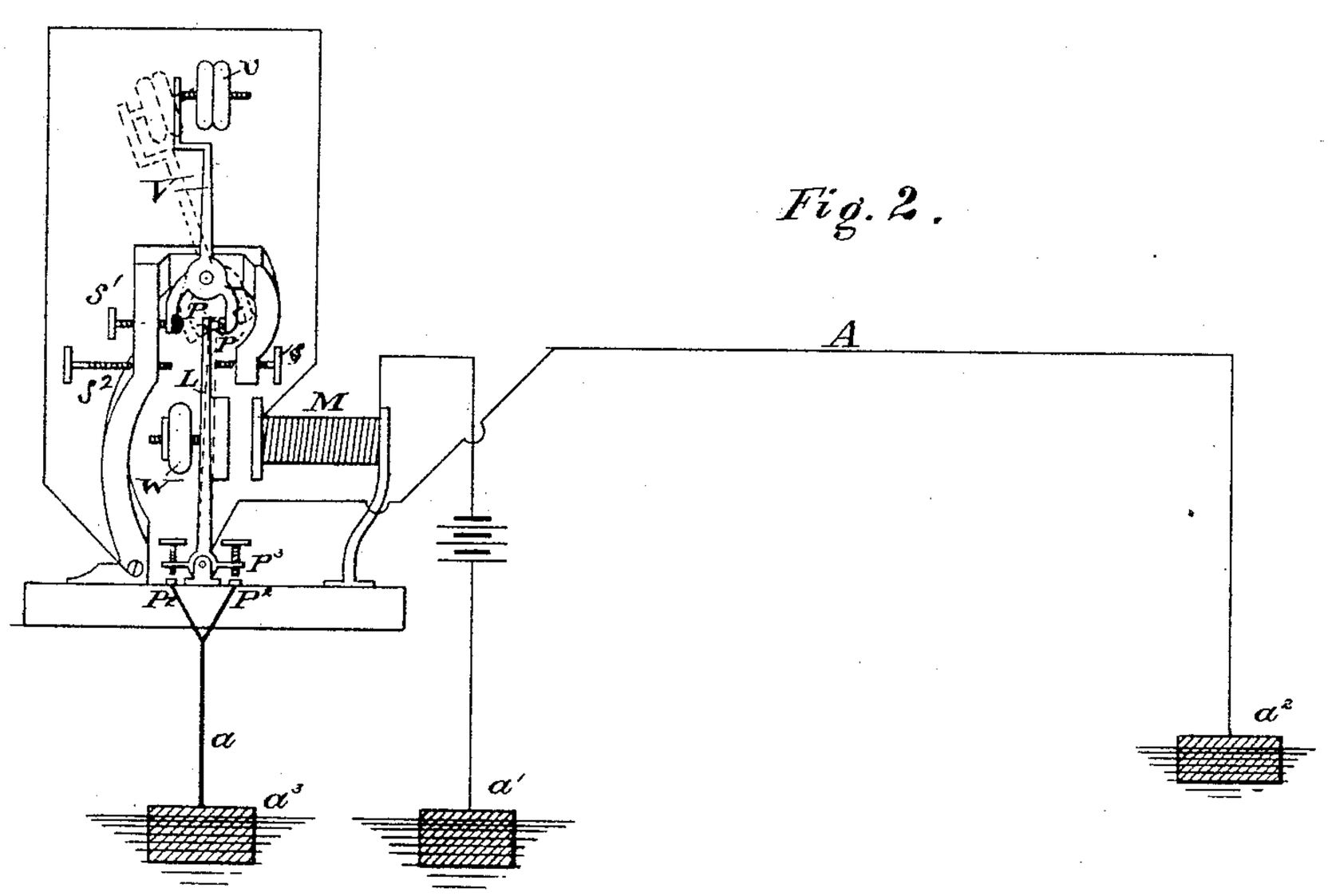


Fig. 2.



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UNITED STATES PATENT OFFICE.

MANDEVILLE THUM, OF LOUISVILLE, KENTUCKY.

ELECTRIC-CIRCUIT-CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 473,594, dated April 26, 1892.

Application filed June 5, 1891. Serial No. 395,264. (No model.)

To all whom it may concern:

Be it known that I, MANDEVILLE THUM, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Electric-Circuit-Controlling Devices, of which the following is a specification.

My present improvements relate to circuit-controlling devices by which the normal amount of current in an electric circuit may be maintained within certain limits or by which a signal is given, or the said circuit or another circuit automatically changed, as by wholly or partially interrupting it whenever the current is augmented above or falls below the predetermined normal limits.

My invention consists in the parts and combinations thereof hereinafter set forth and claimed.

In order to make the improvements clearly understood, I have shown in the accompanying drawings means for carrying them into practical effect, without, however, limiting the embodiment or application of the invention to the construction which, for the sake of illustration, I have delineated.

In said drawings, Figure 1 shows the application to the guarding of an electric circuit of a circuit-controlling device embodying my invention. Fig. 2 shows its application to a single electric circuit for the purpose of limiting the amount of current which can pass over the circuit.

Referring to the drawings, F indicates a suitable base, on which is mounted a frame Q. M is an electro-magnet, also fixed upon said base and having an armature D, carried by a lever L. The latter is pivotally mounted upon the base F at 1.

P is an electric contact connected with the armature, as by being attached to or formed with the lever L and consequently controlled as to its position by the magnet, the force of the latter depending upon the amount of current in its helix. P′ is a second contact in electrical connection with the frame Q and adapted to be engaged by the first contact when the lever L is in normal position under the attraction of magnet M. Means for forcing the lever L away from the magnet to separate said contacts is provided, such as a spring, the mere weight of the lever, or a weight W, which acts, upon the demagnetization of or predetermined decrease of the current around the magnet M, to throw the lever L into the position indicated in dotted lines in Fig. 1. I also provide a support tending to limit the movement of the armature in the direction of the magnet and adapted to resist the normal force of the latter—*i. e.*, any force which will be exerted while the current in the helix does not exceed the normal or predetermined limit and adapted to permit the movement of the armature upon the augmentation of such force above normal. I prefer to so arrange the contact P′ that the part which carries it will also serve as said support. The contacts are also separable upon the extreme movement of the armature toward the magnet. This is preferably effected by mounting the contact P′ and its support upon or forming them with a lever V, pivoted at O upon the frame Q. This lever is held by a spring or weight *v*, so that in the normal position of lever L the contact P′ will bear against contact P with sufficient force to hold the armature against the normal attraction of the magnet. If now the force of the magnet be abnormally augmented, the resistance of the support V will be overcome and the lever L attracted to the position shown in dotted lines in Fig. 2 against the insulating-stop *s*. The adjustment of the lever V and its weight *v* is such that this movement will carry the upper end of lever V past its point of equilibrium, and it will gravitate to a point beyond that to which the mere movement of the contact P would have carried it, thus separating the contacts P P′ and interrupting any electric circuit passing through them. In this situation the lever V may be utilized to maintain the extreme position of lever L, irrespective of continued attraction in magnet M, by bearing against the latter with an arm I, which is insulated from the contact P′ or formed of insulating material. *s′* is a stop which limits the movement of the lever V in the other direction. When the lever L is in the position shown in dotted lines in Fig. 1, the arm I serves as an insulating-stop for it. It may be desired to so adjust the instrument that the contacts P P′ will be separated and upon the augmentation of the current above normal, or,

on the other hand, only when the current is diminished below normal. The latter may be effected by screwing the stop *s* a sufficient distance inward to prevent the lever L from being attracted and moved toward the magnet. The former I effect by a stop s^2, which may be caused to engage the lever L and prevent its being forced by weight W into the position shown in dotted lines in Fig. 1. The change in the circuit A may be a decrease of its conductive capacity. Thus the current, instead of being interrupted, may be deflected through a branch circuit *a*, containing a resistance R^2, which limits the current which can pass over the circuit A without wholly interrupting it.

Referring to Fig. 1, the application of my invention to the guarding of an electric circuit is illustrated. A is the guarded circuit electrically connected with the contacts P P′ in the construction shown in this connection taking place through the media of frame Q and lever L, and G the generator for the same. B is the guard-circuit, arranged, preferably, in proximity to the circuit A, having a generator G′ and a resistance R and passing through the helix of magnet M. If the guard be broken at *x*, the lever L will fall into position shown in dotted lines in Fig. 1, breaking the circuit A at P P′. If the break occur at *y* in the guarded circuit, the current in circuit B will be augmented above the normal, and the levers L and V will take the position shown in Fig. 2, also breaking and rendering harmless the guarded circuit A. If a falling wire cross both conductors, as at *x*′, the current in circuit B will also be augmented by reason of the cutting out of resistance R with the same result. The lever L should have sufficient play to enable it to fall or be forced away from the magnet to such a distance or by such means that it cannot be attracted to its former position in case the circuit should be prematurely re-established at *x* or *y*.

In Fig. 2 is shown the application of the instrument to the guarding or controlling of the circuit which energizes the magnet. One end of the circuit is grounded at *a*′ and passes thence to the helix of the magnet M, thence through frame Q to the contact P′, through contact P and lever L to line, which is suitably grounded—say at a^2. The augmentation or diminution of the current in A beyond the predetermined limits will result in a break at P P′. The current thus interrupted may be in either case conducted to ground at a^3 by a branch *a* through one of its contacts P^2 and one of the contacts P^3, which are carried by the lever L, and one of which will be caused to touch one of the contacts P^2 by the movement of the lever.

It will be understood that I may employ the instrument above described to operate a local circuit, which latter through a magnet or other device operates to cause a desired change in a guarded circuit or to effect some other useful purpose.

What I claim is—

1. In a circuit-controlling device, the combination of an electro-magnet, an armature, and movable contact-point controlled by said magnet, a second contact adapted to be engaged by the first, means, such as weight W, for forcing said armature and point away from the magnet to separate said contacts, a support or weight, such as V, tending to restrain the movement of the armature in the direction of the magnet and adapted to resist the normal force of the latter and to permit the movement of the armature upon the augmentation of the force of the magnet, said contacts being also separable upon the extreme movement of the armature toward the magnet, substantially as set forth.

2. In a circuit-controlling device, the combination of an electro-magnet, an armature and movable contact-point controlled by said magnet, a second contact adapted to be engaged by the first, means, such as weight W, for forcing said armature and point away from the magnet to separate said contacts, a support or weight, such as V, tending to restrain the movement of the armature in the direction of the magnet and adapted to resist the normal force of the latter and to permit the movement of the armature upon the augmentation of the force of the magnet, said contacts being also separable upon the extreme movement of the armature toward the magnet, and a stop adapted to be adjusted to prevent the movement of the armature in one direction, substantially as set forth.

3. The combination of an electro-magnet, an armature-lever therefor carrying a contact, a second contact, such as P′, adapted to hold the armature against the normal force of the magnet, and a movable support, such as V, for said second contact for carrying it beyond the reach of the first contact upon the abnormal movement of the first contact toward the magnet, substantially as set forth.

4. The combination of an electro-magnet, an armature-lever therefor carrying a contact, a second contact adapted to hold the armature against the normal force of the magnet, means, such as a weight W, for forcing the armature away from the magnet and thereby separating the contacts upon the decrease of the force of the magnet, and a movable support for said second contact for carrying it beyond the reach of the first contact upon the abnormal movement of the first contact toward the magnet, substantially as set forth.

5. The combination of an electro-magnet, an armature-lever therefor carrying a contact, a second movable contact, a second lever carrying the latter, means, such as the weight *v*, for actuating the second lever to separate said contacts when the lever is moved beyond a predetermined point, and means for forcing the first lever away from the magnet to separate the contacts upon the decrease of the force of the magnet below normal, substantially as set forth.

6. The combination of the magnet M, the

armature-lever L, the contacts P P′, the supporting-lever V, carrying said contact P′, and a controlling means, such as weight *v*, whose lines of force are adapted to be changed from one side to the other of the lever-fulcrum by the movement of the lever, substantially as set forth.

7. The combination, with the magnet M, of the armature-lever L, the contacts P P′, the supporting-lever V, having the insulating-arm I and carrying said contact P′, and a controlling means, such as a weight *v*, whose lines of force are adapted to be changed from one side to the other of the lever-fulcrum by the movement of the lever, substantially as set forth.

8. The combination, with a circuit to be guarded and a guard-circuit, of a controlling device consisting of the combination of an electro-magnet, an armature, and movable contact-point controlled by said magnet, a second contact adapted to be engaged by the first, means for forcing said armature and point away from the magnet to separate said contacts, a support or weight tending to restrain the movement of the armature in the direction of the magnet and adapted to resist the normal force of the latter and to permit the movement of the armature upon the augmentation of the force of the magnet, said contacts being also separable upon the extreme movement of the armature toward the magnet, substantially as set forth.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

MANDEVILLE THUM.

Witnesses:
H. N. LOW,
WILLIAM L. ALLEN.