No. 654,848. Patented July 31, 1900.

W. M. SCOTT.

AUTOMATIC MAGNETIC CIRCUIT BREAKER.

(Application filed Jan. 5, 1898.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.

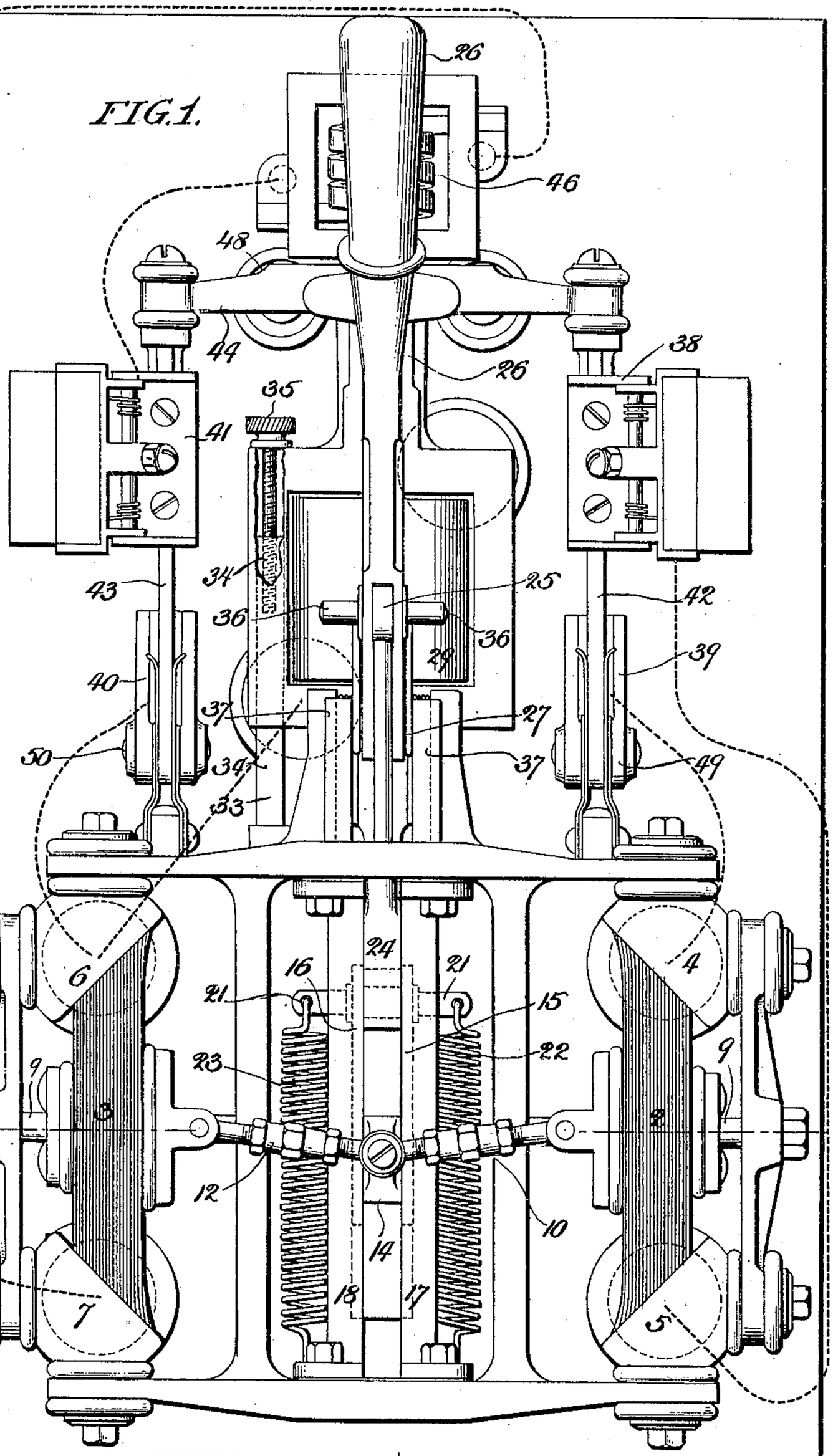

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FIG. 2.

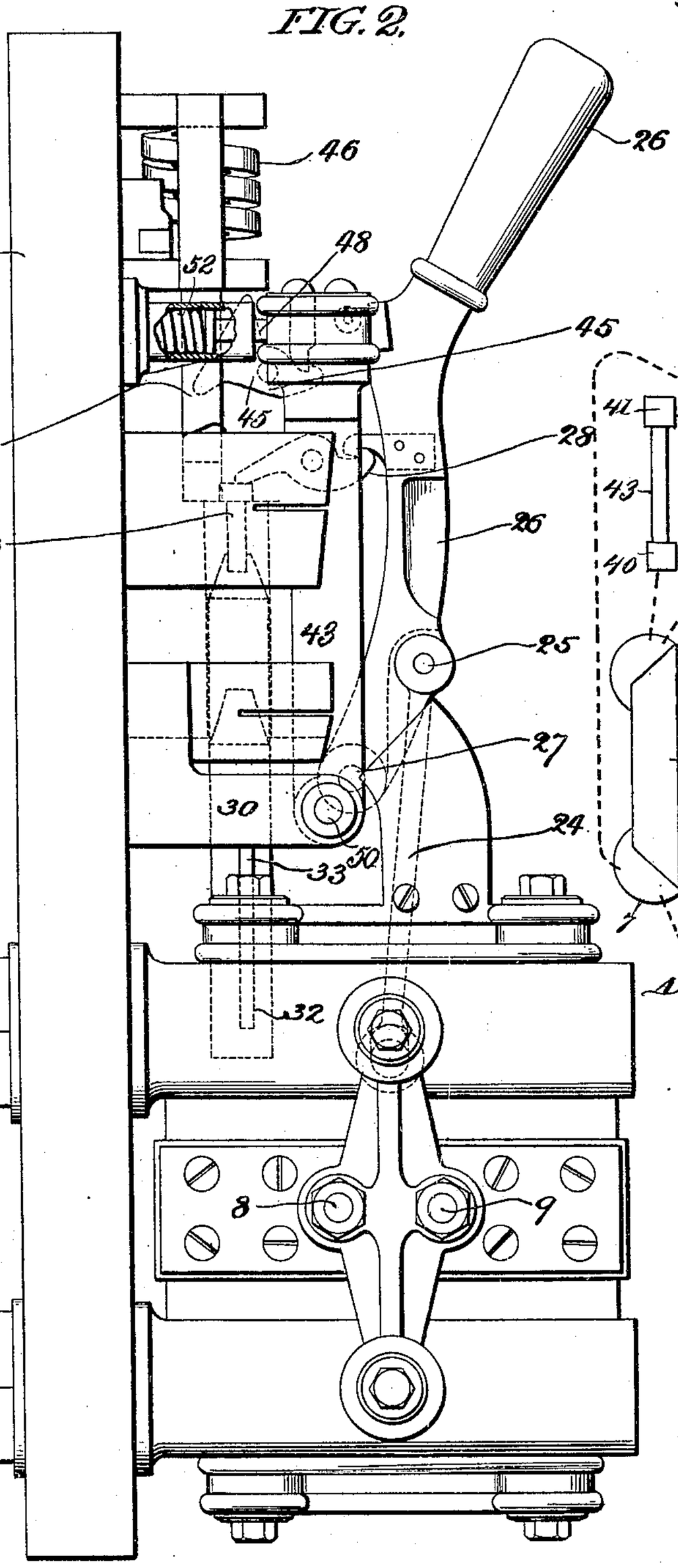


Fig. 5.

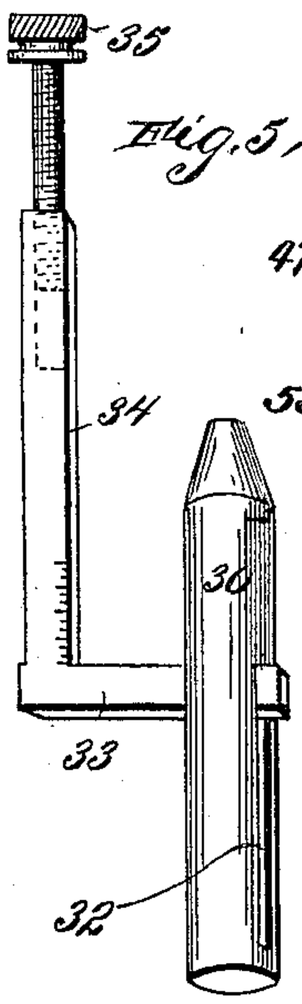
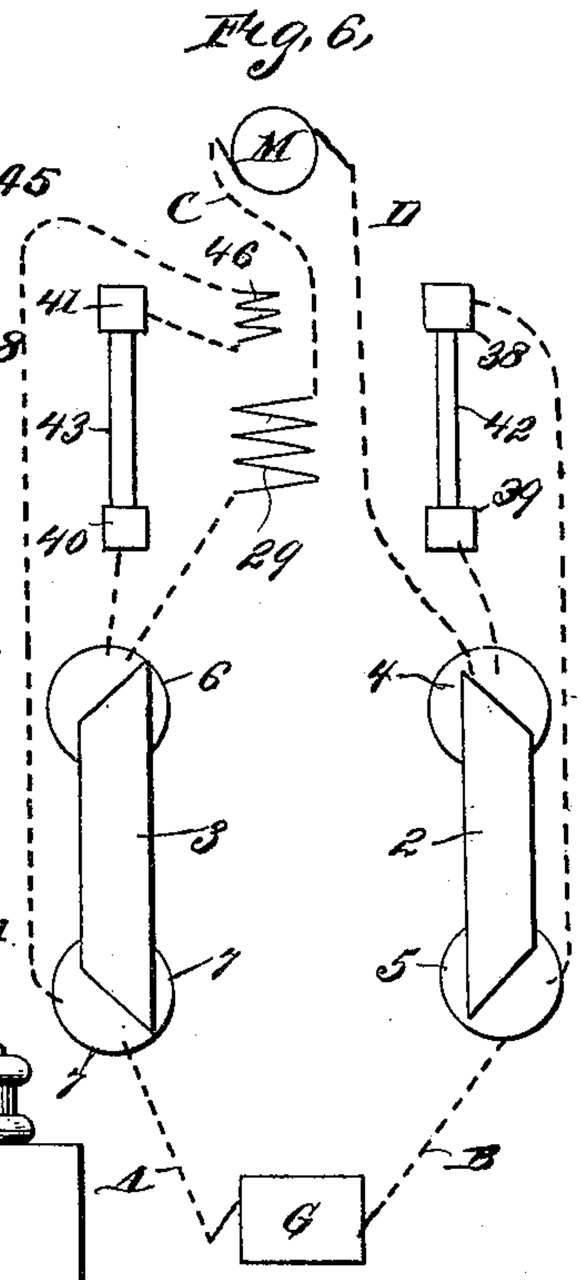


Fig. 6.



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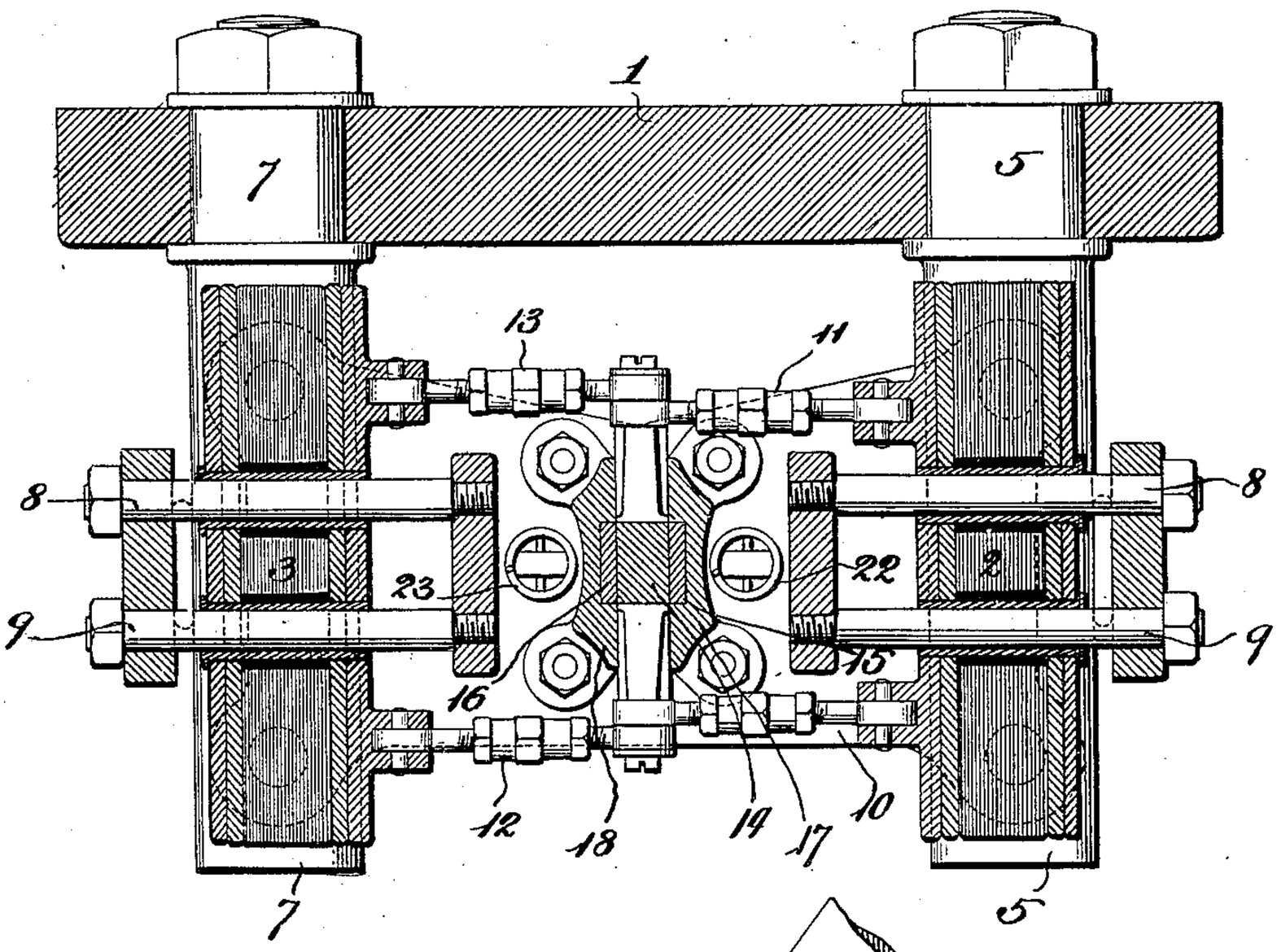
(No Model.) 3 Sheets—Sheet 3

FIG. 3.



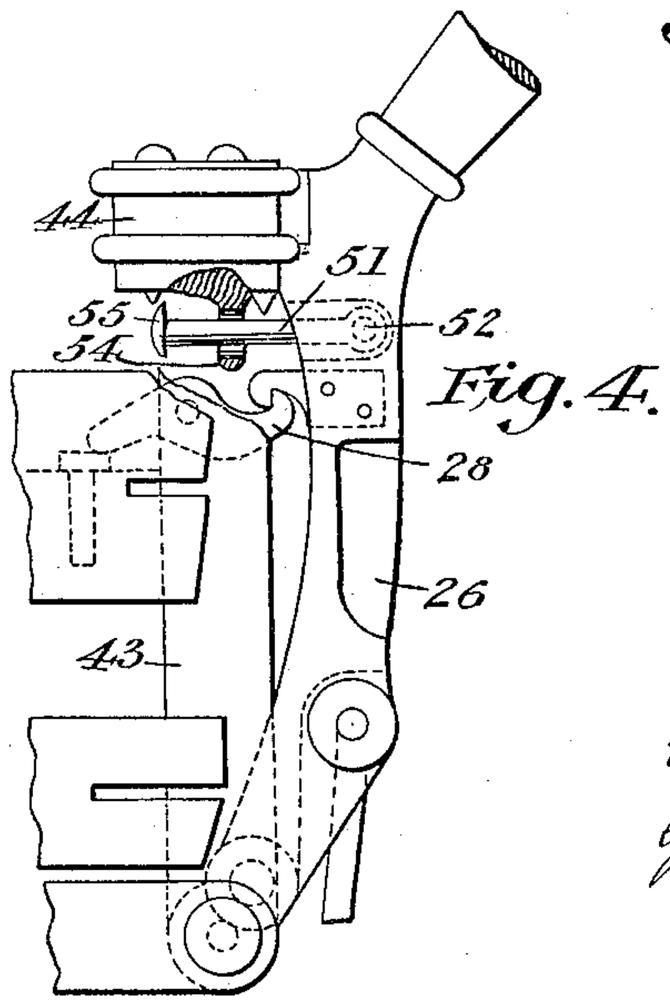


Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM M. SCOTT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE CUTTER ELECTRICAL AND MANUFACTURING COMPANY, OF NEW JERSEY.

AUTOMATIC MAGNETIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 654,848, dated July 31, 1900.

Application filed January 5, 1898. Serial No. 665,634. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. SCOTT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Automatic Magnetic Circuit-Breaker, of which the following is a specification.

My invention relates to improvements in circuit-breakers; and the object of my invention is to afford improved means of automatically opening an electric circuit upon the occurrence of a predetermined flow of current, a special feature of which consists in shunting the main switch of the circuit-breaker by a supplemental circuit-breaker adapted to protect the contacts of the main circuit-breaker at the instant of their separation. The contacts of the supplemental circuit-breaker are adapted to give a wide break and are so constructed as to be capable of separation without sustaining serious injury from arcing. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front view of my device, showing the paths of the current in diagram. Fig. 2 is a side view of the same. Fig. 3 is a horizontal section on the line *x x* of Fig. 1. Fig. 4 is a view in part section, showing means of communicating the movement of arm 26 to the yoke 44 of the movable contacts. Fig. 5 is a perspective view in detail of the movable core 30 and means for adjusting the same, and Fig. 6 is a diagrammatic view of the paths of the current.

Similar characters refer to similar parts throughout the several views.

The base upon which the instrument is mounted is of non-conducting material and is indicated by 1. The movable contact-pieces 2 and 3, which may be built up of thin sheets of spring metal or may be in any other suitable form having resilient or accommodating contact-surfaces, are adapted to contact with stationary contacts 4 and 5 and 6 and 7, respectively, and are adapted to slide upon and be guided by the rods 8 and 9 as they move toward and away from these stationary contacts. The rods 10 and 11 are each pivoted at one end to the movable contact 2 and at the other end to the sliding block 14. The rods 12 and 13 are each pivoted at one end to the movable contact 3 and at the other end to the sliding block 14, whereby the said movable contacts are adapted to be moved toward and away from their stationary contacts by the raising or lowering of sliding block 14, as hereinafter described. The sliding block 14 is secured to two plates 15 and 16, (shown in Fig. 3,) which are adapted to slide in grooves in the guides 17 and 18. The cross-rod 21, which passes through apertures in the upper ends of plates 15 and 16, is connected with the springs 22 and 23, which are suitably fixed at their other ends. It will be noticed that the tendency of said springs is to draw downward the plates 15 and 16 and sliding block 14 to cause the separation of the movable contacts 2 and 3 from their respective stationary contacts. The rod or link 24 is also connected with the cross-rod 21, the aperture in the said link 24, through which the cross-rod 21 passes, being of sufficient length to admit of play of said cross-rod 21 therein to permit of further outward movement of the handle-arm 26 after the cross-rod 21 has reached the limit of its downward travel. Said link 24 is pivoted at its other end at 25 to the handle-arm 26, said handle-arm being itself pivoted at 27 to a part of the stationary framework of the device. The handle-arm 26 when rotated to engage with the latch 28, to be hereinafter described, operates through link 24 to draw the sliding block 14 upward, causing the movable contacts 2 and 3 to move toward and contact with their stationary contacts. It is obvious that the force exerted upon the movable contacts 2 and 3 will increase as the rods 10, 11, 12, and 13 approach the same plane. Latch 28 (shown in Fig. 2) is adapted to restrain the said handle-arm 26 and maintain the engagement of contacts 2 and 3 with their stationary contacts. Back of the handle-arm 26 is a jacketed solenoid 29, one terminal of which is connected with the fixed contact 6 and the other terminal with the external circuit, said solenoid having a movable core 30, adapted to be actuated by it. This core normally rests upon bar 33, which

passes through slot 32 in said core. The said bar 33 is attached at right angles to the vertical rod 34, which passes through the magnetic jacket of the solenoid. A screw with the knurled head 35 is adapted to raise and lower the said rod 34 and bar 33 to obtain the required adjustment of the movable core 30. Graduations upon the lower end of the rod 34 afford means of ascertaining said adjustment. Above the core 30 is loosely seated in the top of the magnetic jacket the movable pin 53, adapted to be impinged by said core upon its actuation by the solenoid 29 upon the occurrence of a predetermined flow to transmit the blow of the core to the latch 28 to cause the release of the handle-arm 26 to effect the separation of the contacts 2 and 3 from their stationary contacts.

In shunt to the main breaker just described I introduce a switch or supplemental circuit-breaker. In the specific device shown in the drawings I use a supplemental automatic magnetic circuit-breaker. The stationary contacts are shown at 38, 39, 40, and 41. The movable contacts or bridges adapted to contact with 38 and 39 and 40 and 41, respectively, are shown at 42 and 43. The movable contacts or bridges 42 and 43 are yoked to the cross-piece 44 and have coaxial pivots at 49 and 50. The cross-piece 44 is provided with a suitable catch adapted to engage with the latch 45, adapted to restrain the said bridges 42 and 43 against the force of spring-pistons 48. The jacketed solenoid 46 is adapted to actuate the movable core 47 to actuate the latch 45. The core 47 is provided with a slot of length sufficient to permit of preliminary movement of said core before actuating the latch 45, the tail of which projects into said slot.

The operation of such a device as above described would be as follows: Referring to Fig. 6, the circuit-breaker being closed—that is, 2 bridging 4 and 5 and 3 bridging 6 and 7—the current passes through conductors A and B into 7 and 5, respectiveiy, and out through C and D. Coil 46, in series with switch 43, forms a supplemental circuit between 6 and 7. The contact 38 is electrically connected with contact 5 and contact 39 with contact 4. Upon the occurrence of an overload through conductor A coil 29 is energized to actuate its movable core to actuate the latch 28 to permit the separation of the movable contacts 2 and 3 from their respective fixed contacts 4, 5, 6, and 7. An abnormal flow immediately occurs in coil 46 in like manner to cause the separation of contacts 42 and 43 from their respective fixed contacts.

The fixed and movable contacts are all suitably insulated from their respective supporting and actuating parts.

I do not wish to be confined in my invention to the specific form of main and supplemental circuit-breakers above described. They may be modified in many ways without departing from the spirit of the invention. For instance, in the supplemental circuit-breaker I may dispense with the solenoid and movable core and provide some suitable means by which the movable contacts may be actuated by the arm 26 after a certain free preliminary movement of the same to cause their separation from the fixed contacts—as, for instance, in Fig. 4 the link or rod 51 is pivoted to the arm 26 at 52 and freely movable through an aperture in lug 54, which is secured to the yoke 44 of the movable contacts. The head 55 of the rod 51 is larger than the aperture in lug 54, through which the rod passes. It is obvious that the arm 26 will have a free preliminary movement necessary to cause the head 55 to engage with the lug 54 before causing the actuation of the movable contacts. It is also obvious that the means by which the movable contacts may be actuated by the arm 26 after its said free preliminary movement may be variously modified, or said switch or movable bridges may be spring-actuated and adapted to open upon the withdrawal of the obstruction of the handle-arm and after the opening of the main circuit-breaker.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an automatic magnetic circuit-breaker the combination of a main breaker and a supplemental automatic magnetic breaker in shunt therewith adapted to break the circuit after the separation of the contacts of the main breaker, substantially as described.

2. In an automatic magnetic circuit-breaker the combination of a main breaker and separable coöperative contacts of a supplemental independently-actuated breaker in shunt therewith adapted to break the circuit after the separation of the contacts of the main breaker, substantially as described.

3. In an automatic magnetic circuit-breaker the combination of a main switch, spring means for actuating same, a latch for normally restraining said actuation, automatic magnetic means for operating said latch and a supplemental independently-operative switch in shunt with the main switch and so located as to be actuated as the result of the operation of the main switch after the opening of the same, substantially as described.

4. In an automatic magnetic circuit-breaker the combination of a main switch, spring means for actuating the same, a latch for normally restraining said actuation, automatic magnetic means for operating the latch, a supplemental independently-operative switch in shunt therewith, spring means for actuating same, a latch for normally restraining said actuation and means for actuating the latch of the supplemental switch after the opening of the main switch, substantially as described.

5. In an automatic magnetic circuit-breaker the combination of fixed and movable contacts, a movable cross-head intermediate the movable contacts, spring means for actuating

the cross-head in one direction and manually-operative means for actuating it in the other direction, means for normally restraining said spring actuation, automatic magnetic means for actuating the restraining means and means for changing the direction and communicating the force of movement of the cross-head to the said movable contacts, substantially as described.

6. In an automatic magnetic circuit-breaker the combination of fixed contacts and contacts movable with respect to each other in divergent and convergent planes to and away from their respective fixed contacts, spring-actuated means for imparting motion to the movable contacts, means for normally restraining the said spring actuation, automatic magnetic means for actuating the restraining means, substantially as described.

7. In an automatic magnetic circuit-breaker the combination of fixed contacts and movable contacts, a movable cross-head, the movable contacts movable in planes inclined to the plane of movement of the cross-head, spring means for actuating the movable cross-head in one direction and manually-operative means for actuating it in the opposite direction and means for communicating the movement of the cross-head to the movable contacts, substantially as described.

8. In an automatic magnetic circuit-breaker the combination of fixed and movable contacts, a cross-head, means for guiding and supporting the same, spring means for actuating said cross-head in one direction and manually-operative means for actuating it in the opposite direction, means for supporting and guiding the movable contacts in planes transverse to the plane of movement of the cross-head and rods operating intermediate the cross-head and movable contacts as means for communicating the force of the movement of the cross-head to the movable contacts to cause their operation to and away from their respective fixed contacts, means for normally restraining the movement of the cross-head against spring actuation and means for actuating said restraining means, substantially as described.

9. In an automatic magnetic circuit-breaker the combination of fixed and movable contacts, a cross-head movable intermediate the movable contacts, means for guiding the cross-head in a plane transverse to the movement of the movable contacts, spring means for actuating the cross-head in one direction, a pivoted handle-arm and link connecting the same with the cross-head so that the two connections of the link shall approach alinement upon the operation of the handle-arm as means for operating the cross-head against spring tension, means for normally restraining said spring actuation and means for actuating said restraining means, substantially as described.

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