No. 765,550. PATENTED JULY 19, 1904.

W. W. BROWN.

ELECTROMAGNET.

APPLICATION FILED APR. 23, 1904.

NO MODEL.

Fig. 1.

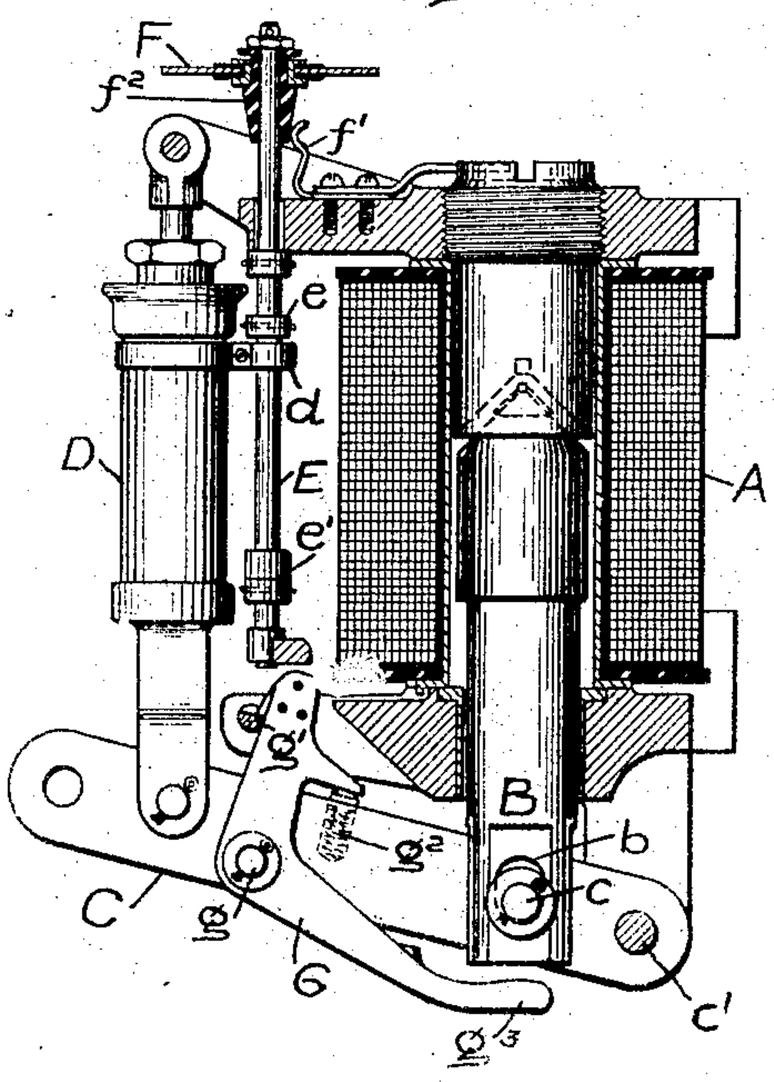


Fig. 2.

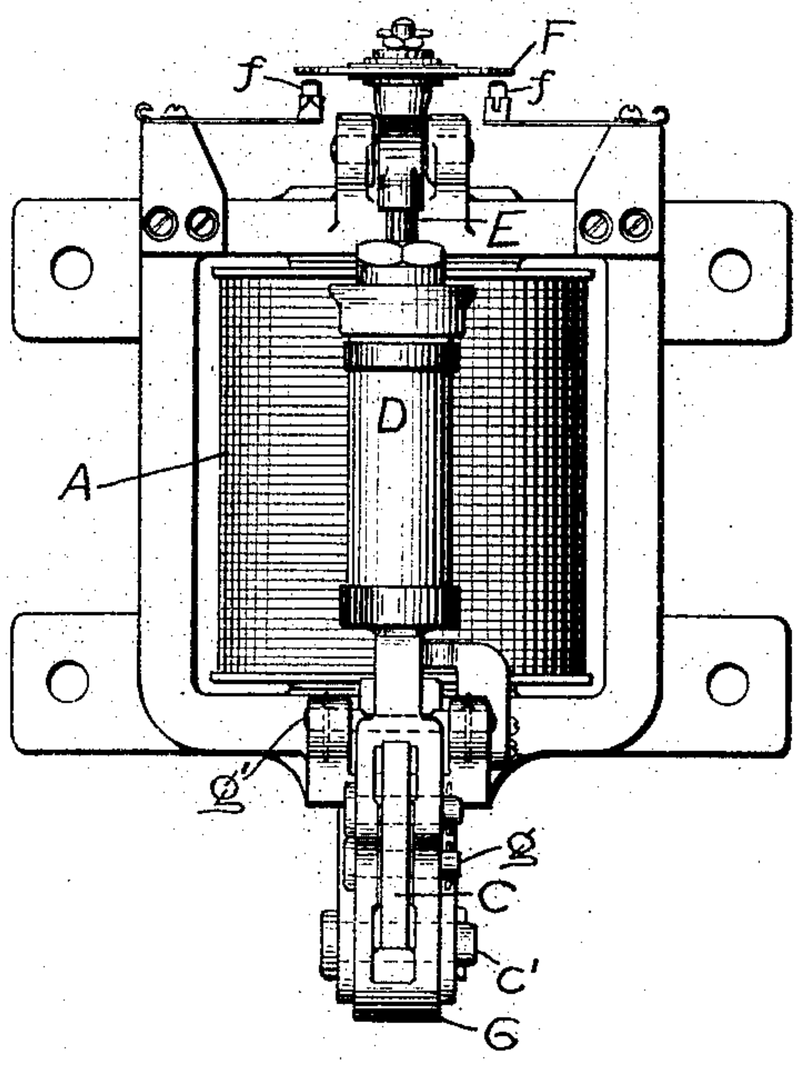
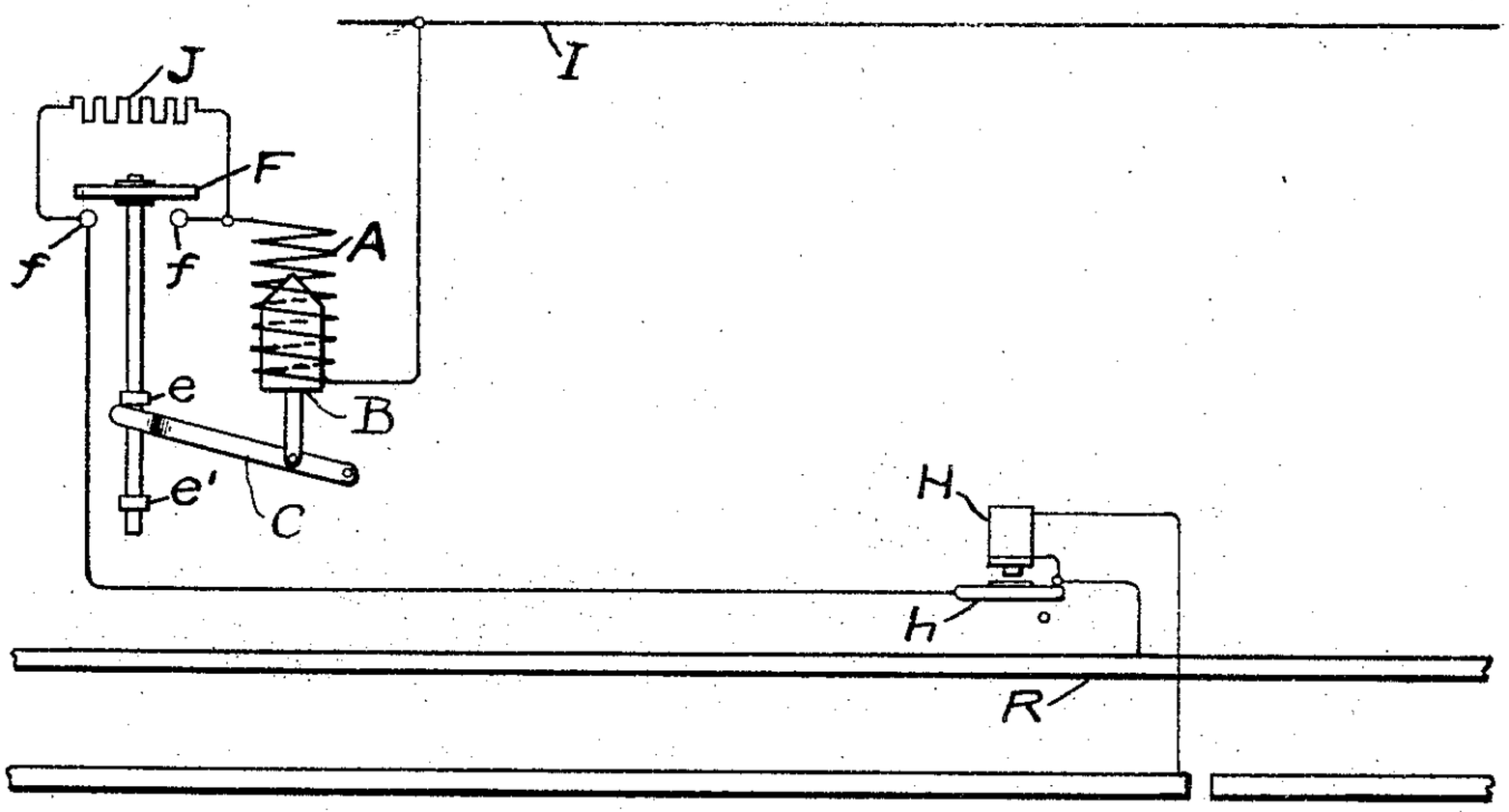


Fig. 3.



Witnesses
Thatcher E. Briggs.
Helen Alford

Inventor:
Walter W. Brown.
by Allen & Dann
Atty.

No. 765,550. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

WALTER W. BROWN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTROMAGNET.

SPECIFICATION forming part of Letters Patent No. 765,550, dated July 19, 1904.

Application filed April 23, 1904. Serial No. 204,557. (No model.)

To all whom it may concern:

Be it known that I, WALTER W. BROWN, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electromagnets, of which the following is a specification.

My invention relates to electromagnets, and it is particularly applicable to electromagnets or solenoids for controlling semaphore-signals in railway block-signal systems, although it is not limited to this specific application.

The object of my invention is to provide a novel arrangement of the electromagnet which shall enable it to operate with greater economy of current than is possible with magnets as heretofore arranged.

In block-signal systems it is customary to arrange the signals to be held at safety position by an electromagnet and to allow the signal to go to "danger" or "gravity" when the magnet is deënergized. This arrangement insures safety in operation, since a disabling of the electric circuits can produce no more serious effect than allowing the signals to go to "danger," and thereby delay traffic; but since the magnets must normally be energized in order to hold their signals at "safety" a large amount of current is constantly required.

By my invention I provide a novel arrangement for an electromagnet or solenoid, so that the maximum current is required only while the signal is being drawn to "safety," while a much smaller current suffices to hold the signal in safety position.

My invention will best be understood by the accompanying drawings, in which—

Figures 1 and 2 show side and front elevations of a solenoid arranged in accordance with my invention, and Fig. 3 is a diagrammatic representation of the magnet-circuits shown in connection with a block of a railway system.

In Figs. 1 and 2, A represents the actuating-coil of the solenoid, which when energized draws up the movable core B into the position shown in Fig. 1. Core B has at its lower end a slot *b*, which is loosely yet positively engaged by a pin *c*, carried by the lever C, which is pivoted at *c'*. The outer end of lever C is attached to the mechanism, such as a semaphore-signal (not shown) designed to be operated by the solenoid. D is a dash-pot adapted to retard the upward movement of lever C under the influence of core B. The movable member of dash-pot D, which is shown as the outer member, attached to lever C, carries a lug *d*, which encircles a vertical shaft E. The shaft E carries washers *e* and *e'*, adapted to be engaged, respectively, upon the upward and downward movements of the movable member of dash-pot D. F is a bridging member, of conducting material, such as a metal disk, and is carried at the upper end of vertical rod E. Bridging member F, when vertical shaft E is allowed to fall, engages the contacts *f f*. (Shown in Fig. 2.) *f'* is a spring which bears against a tapered insulating-block f^2, carried by shaft E and which holds shaft E in any given position. G is a dog or catch pivoted at *g* on lever C and adapted to engage the pin *g'* when lever C is in its raised position, as shown in Fig. 1. g^2 is a spring acting to hold dog G in engagement with the pin *g'*. As long as dog G is in engagement with pin *g'* it serves to support the weight of lever C and the signal mechanism connected thereto, as well as the movable member of dash-pot D, and thereby relieves core B of any downward strain thereon.

Referring now to Fig. 3, the circuit arrangement will be described. H represents a track-relay of the usual type, which when energized holds up its armature *h* in the position shown. A represents diagrammatically the actuating-coil of the solenoid. F represents the bridging member, (shown in Figs. 1 and 2,) which when in its lower position engages the contacts *f f* and, together with armature *h*, completes a circuit from the rail R, through the actuating-coil A, to the source of current I. J represents a resistance shunted across the contacts *f f*.

The operation is then as follows: Assume the actuating-coil A to be deënergized and the core B, lever C, and other parts of the mechanism at their lowest position, with bridging member F connecting the contacts *f f*. Now

if solenoid H is energized it will draw up its armature *h* and close a circuit through actuating-coil A. Actuating-coil A will draw up its core B, moving lever C and dash-pot D upward until the lug *d*, carried by the dash-pot D, engages the collar *e* (shown in Fig. 1) and raises bridging member F out of engagement with the contacts *f f*. When this occurs, the resistance J is thrown into series with the actuating-coil A and the current-flow through actuating-coil A is reduced to an amount insufficient to hold up the weight of lever C and attached mechanism. Lever C and dash-pot D accordingly drop back a small amount, sufficient to bring dog G into engagement with the pin *g'*, as shown in Fig. 1. Pin *g'* then takes the weight of lever C and the mechanism connected thereto, while the current flowing through coil A is still sufficient to hold up the weight of core B alone. Core B and lever C are consequently maintained in the position shown in Fig. 1, and spring *f'* holds bridging member F raised out of engagement with contacts *f f*. This condition of affairs continues as long as relay H remains energized. When relay H is short-circuited by a train entering a block, it releases its armature *h* and completely opens the circuit of actuating-coil A. Core B then falls freely until the upper end of slot *b* engages pin *c*, and in falling it strikes the toe g^3 of dog G, rotating it on its pivot against the pressure of spring g^2 and releasing it from engagement with pin *g'*. Lever C consequently falls, allowing the signal to go to "danger." Just before reaching its lowest position lug *d*, carried by dash-pot D, engages the washer or collar *e'* on shaft E and pulls down bridging member F into engagement with contacts *f f*. The resistance J is then short-circuited, and the actuating-coil A is ready to receive its maximum current upon the reënergizing of solenoid H.

It will be seen that with the arrangement described the maximum current is required by the solenoid only during the time that the signal is being raised instead of the entire time, as in magnets as usually constructed, and that an economy of current is thereby obtained.

Although I have shown the actuating-magnet as consisting of a simple solenoid, it will be understood that my invention is not limited to this particular form, but is applicable to other forms of electromagnets. Furthermore, the mechanical connections between the movable member of the magnet and the other portions of the device may be varied as desired to meet different conditions. Accordingly I do not desire to limit myself to the particular construction and arrangement of parts here shown, since changes which do not depart from the spirit of my invention will be obvious to those skilled in the art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with an electromagnet, a movable member adapted to be raised thereby, means for decreasing the current through said magnet when said member is raised, means for restraining said member when said current is decreased, and means for releasing said member when said magnet is deënergized.

2. In combination, a movable member tending to return to a given position, an electromagnet adapted to retract said member, means for decreasing the current through said magnet when said member is retracted, means for restraining said member when the current is decreased, and means for releasing said member when said magnet is deënergized.

3. In combination, a solenoid, a core therefor, a member adapted to be moved by said core, means for decreasing the current through said solenoid when said core is drawn into said solenoid, and a catch adapted to restrain said member when the current is decreased and arranged to be tripped by said core when said core is released by said solenoid.

4. In combination, a solenoid, a core therefor, a member adapted to be raised by said core, means operative when said member is raised for reducing the current through said solenoid to an amount sufficient to support only the weight of said core, means for restraining said member when the current is decreased, and means for releasing said member when said core is released.

5. In combination, a solenoid, a core therefor, a member loosely yet positively connected to said core and adapted to be raised thereby, a switch arranged to be operated by said member when raised so as to decrease the current through said solenoid, and a catch adapted to restrain said member when said switch is operated and to be tripped by said core when said core is released by said solenoid.

6. In combination, a solenoid, a core therefor, a member loosely yet positively connected to said core and adapted to be raised thereby, a catch adapted to restrain said member when raised, and a switch arranged to be operated when said member is raised so as to decrease the current through said solenoid, the said catch being arranged to be tripped by the movement of said core relative to said member when said core is released by said solenoid.

7. In combination, a solenoid, a core therefor, a member loosely yet positively connected to said core and adapted to be raised thereby, a switch arranged to be operated when said member is raised so as to decrease the current-flow through said solenoid, a pivoted spring-pressed dog raised by said member, and a support adapted to be engaged by said dog when said member is raised, said dog being arranged to be tripped by the movement of said core relative to said member when said core is released by said solenoid.

8. In combination, a solenoid, a core there-

for, a member loosely yet positively connected to said core and adapted to be raised thereby, a switch arranged to be raised when said member is raised so as to decrease the current through said solenoid, means for retaining said switch when raised, a catch adapted to restrain said member when the current is decreased and to be tripped when said core is released by said solenoid, and means for lowering said switch when said member falls.

In witness whereof I have hereunto set my hand this 21st day of April, 1904.

WALTER W. BROWN.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.