No. 762,621. PATENTED JUNE 14, 1904.

A. C. EASTWOOD.

MAGNETICALLY OPERATED SWITCH.

APPLICATION FILED JULY 27, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

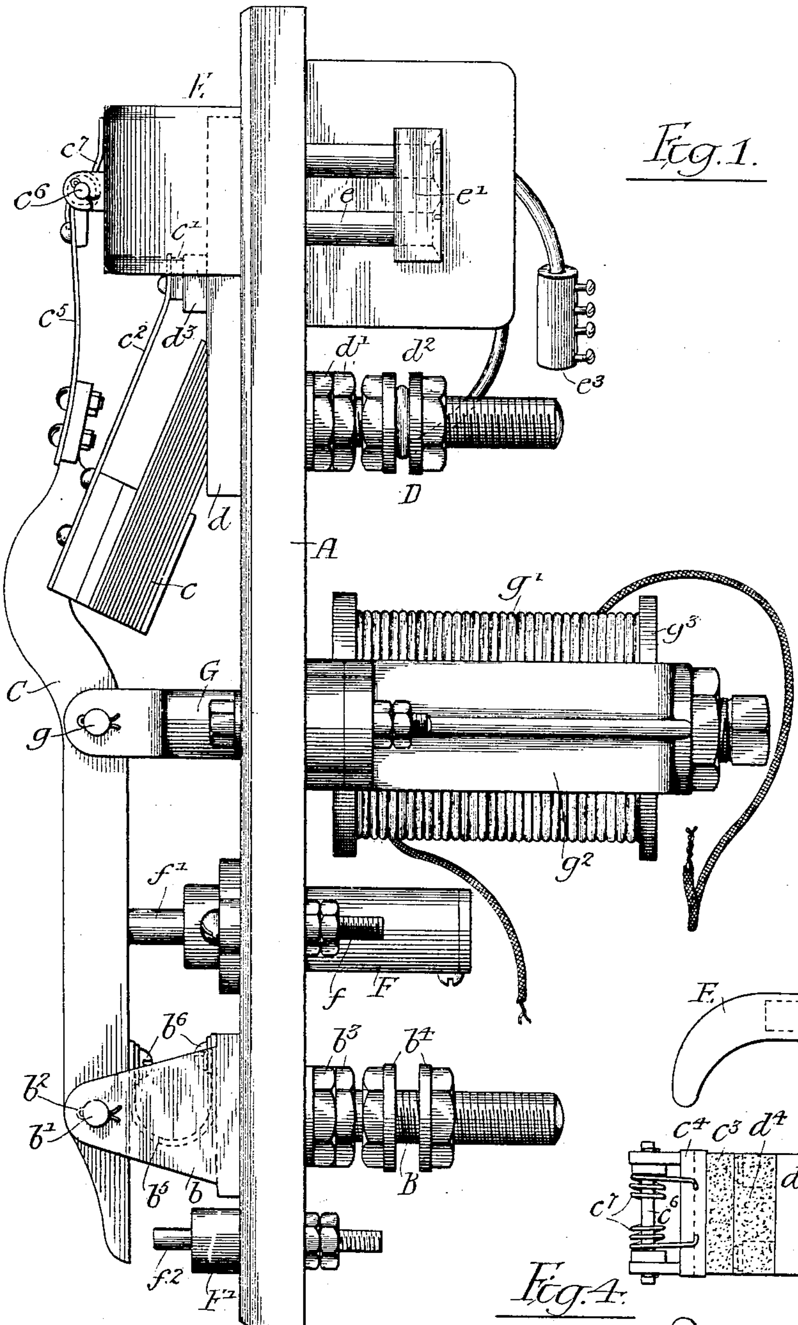


Fig. 1.

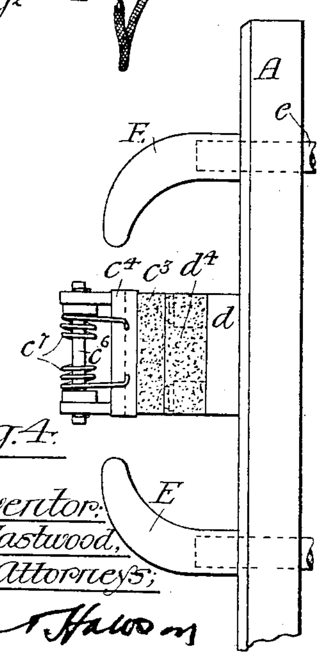


Fig. 4.

Witnesses:
James A. Kraayer.
Herman E. Metius

Inventor:
Arthur C. Eastwood,
by his Attorneys;
Howson & Howson

No. 762,621. PATENTED JUNE 14, 1904.

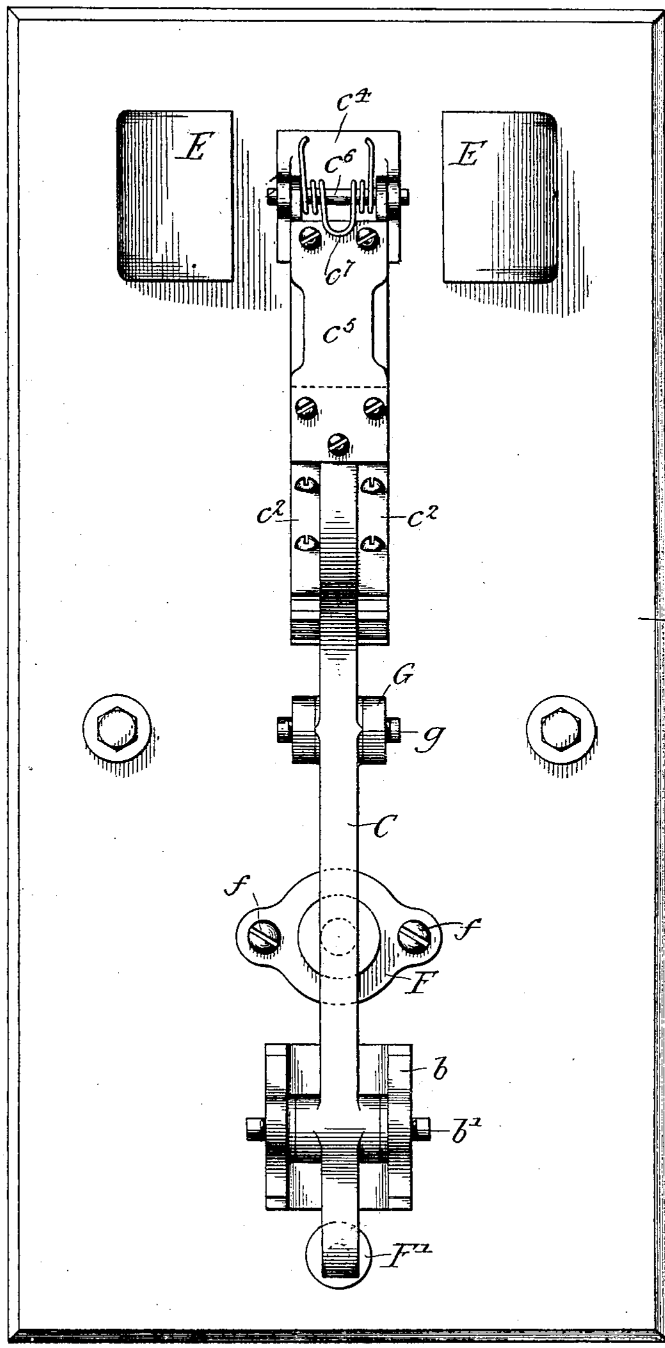
A. C. EASTWOOD.

MAGNETICALLY OPERATED SWITCH.

APPLICATION FILED JULY 27, 1903.

NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-

James C. Kraye

Herman E. Metius

Inventor:-

Arthur C. Eastwood,

by his Attorneys;

Howson & Howson

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

No. 762,621. PATENTED JUNE 14, 1904.

A. C. EASTWOOD.

MAGNETICALLY OPERATED SWITCH.

APPLICATION FILED JULY 27, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

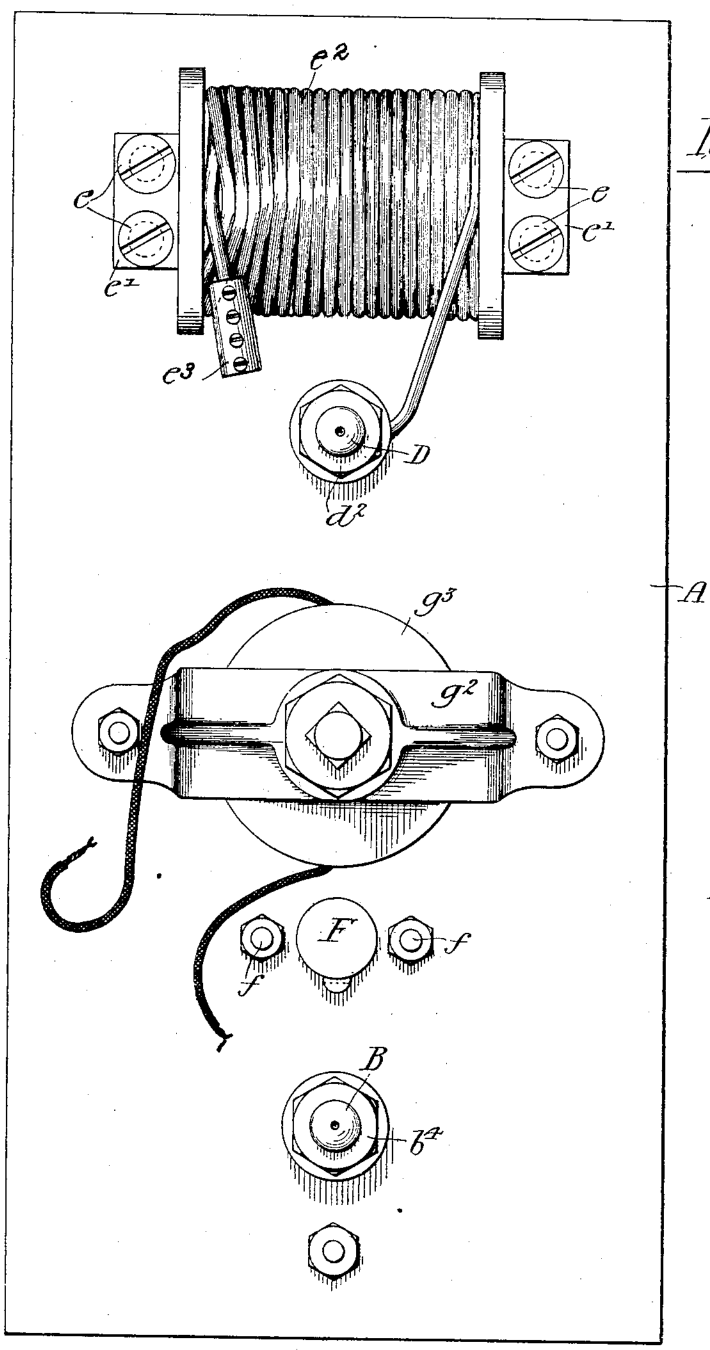


Fig. 3.

Witnesses:-
James Crayer
Herman E. Metius

Inventor:-
Arthur C. Eastwood,
by his Attorneys:
Howson & Howson.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 762,621. Patented June 14, 1904.

UNITED STATES PATENT OFFICE.

ARTHUR C. EASTWOOD, OF CLEVELAND, OHIO.

MAGNETICALLY-OPERATED SWITCH.

SPECIFICATION forming part of Letters Patent No. 762,621, dated June 14, 1904.

Application filed July 27, 1903. Serial No. 167,248. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR C. EASTWOOD, a citizen of the United States, residing at Cleveland, Cuyahoga county, Ohio, have invented certain Improvements in Magnetically-Operated Switches, of which the following is a specification.

My invention relates to certain improvements in that class of electric apparatus designed to make and break electric circuits commonly known as "switches;" and it consists more particularly in a switch of improved construction primarily designed to be opened and closed by means of a solenoid energized by breaking or making the circuit in which it is connected at a point distant from the switch.

The object of the invention is to provide a switch of the general character above noted which shall be durable and reliable in operation and which shall be of such a construction that liability of the contacts to injury from the arc formed on opening the switch shall be reduced to a minimum.

A further object of the invention is to provide auxiliary contacts of such arrangement and construction as shall certainly prevent the formation of an arc between the main contacts of the switch, thereby insuring the maintenance of these contacts in operative condition.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved switch, showing the relative arrangement of the various parts of the same when the switch is in its closed position. Fig. 2 is a front elevation of the switch. Fig. 3 is a rear elevation of the switch; and Fig. 4 is a plan view of a portion of the switch, showing the contacts in their closed position.

In the accompanying drawings, A is the supporting-body of the switch, consisting in the present instance of some insulating material, as slate or marble, which serves to rigidly hold the various parts of the switch proper in their relative positions.

Referring to the switch as being supported in the vertical position shown in Fig. 1, there is a stud B, passing through an opening in the lower portion of the slab A and carrying on its front end a bearing-piece b, provided with journals for the reception of the trunnion or pivot pin b', on which is carried the main switch-arm C, there being cotter-pins b^2 for the purpose of retaining said pin in position. The stud B is threaded for the reception of nuts b^3, by which it is rigidly held to the slab A, and there are also upon it a pair of nuts b^4 for the reception of a cable-terminal, it being understood that said stud forms one of the main terminals of the switch.

In order that there may be no undue resistance to the flow of current from the stud B to the main switch-arm C, I employ a flexible copper strip b^5 to electrically connect these two members, holding it to each of them by the screws b^6, as shown in Fig. 1.

A second terminal of the switch is shown at D, and this carries as its front face a heavy copper plate d, held in position by nuts d' and having other nuts d^2 for the attachment of a wire or cable, as hereinafter noted. A laminated switch-blade c is suitably held to the main switch-arm C, which is shaped in such form as to cause said blade to be inclined to the contact-plate d, its contact-face being thus necessarily formed so that it has a relatively large bearing-surface for engagement with said plate.

Either formed integral with the plate d or in good electrical connection therewith is an upwardly-projecting portion d^3, and this serves as the contact-piece for a pair of auxiliary contacts c', carried by spring-pieces c^2, held to the forward end of the switch-arm C.

As shown in the figures, the terminal contact-plate d is extended above or beyond the projecting contact d^3, so that it passes between a pair of relatively heavy pole-pieces E, there being held to this portion between the pole-pieces a carbon block d^4 for engagement by a second carbon block c^3, which forms a second auxiliary contact for the switch. This block c^3 is carried in a holder c^4, pivoted, by means of a pin c^6, to a piece carried by a spring-plate c^5, which is held,

by means of small bolts, to the forwardly-projecting end of the main switch-arm C.

The pole-pieces E are held in position by screw-bolts e, which pass through the ends of the fixed armature e' of a blow-magnet e^2, which is carried on the back of the slab A. One end of the winding of this magnet is electrically connected to the terminal stud D by means of the nuts d^2, and the other end is preferably provided with a connector e^3 for the reception of the end of one of the main cables leading to the switch.

A casing F passes through an opening in the slab A, being held in position by screw-bolts f and containing a spring, (not shown,) which continually tends to force upward a plunger f', this latter bearing upon the inner face of the main switch-arm C, so as to tend to turn it on the trunnion b' away from the slab A. A second spring-casing F' passes through the slab below the stud D and is also provided with a spring and a plunger f^2, which extends under a downwardly-projecting part of the main switch-arm C and tends to limit the motion of said arm when it turns upon its trunnion-pin b'.

At a point between the main contact c and the supporting-pin b' there is pivotally attached to the switch-arm C an iron bar G, such attachment being made by means of a pin g, passing through the forked end of the bar and the said main switch-arm. This iron bar G passes through the slab A and acts as the movable core or armature of a solenoid g', carried by a yoke-piece g^2, bolted to the rear face of the slab A. This magnet is wound upon a spool g^3, carried by the yoke, and in operation is energized by current whose flow is controlled from some point distant from the switch. As long as this current in sufficient amount passes through the windings of the solenoid g' the armature or core G will be held within it, thereby retaining the switch-bar C in such a position that the blade c makes good contact with the plate d. Such position is maintained in opposition to the outward action of the plunger f', and it is to be noted that with the arm C in the position shown the auxiliary contacts c' and c^3 also engage their respective fixed contact-plates d^3 and d^4. If now the current energizing the solenoid g' be broken, the spring within the casing F immediately forces out the plunger f', turning the main switch-arm C upon its pivot b' and first breaking contact between the blade c and the plate d. Immediately following this contact is broken between the piece c' and the projecting part d^3, while the final breaking of the current takes place between the carbon blocks c^3 and d^4. The arc formed between these latter is, however, instantly blown out by the magnetic field between the pole-pieces E, caused by the blow-magnet e^2, through which the main current is compelled to pass.

From the above it will be seen that it is practically impossible to break the main current of the switch between the blade c and the plate d, and for this reason these parts of the switch cannot become burned so as to cause bad contact and heating customarily found in switches of the type to which my invention belongs. Even should the second set of contacts c' d^3 fail to properly protect the main contacts of the switch the carbon blocks will effectually prevent the formation of the arc between said main contacts.

The spring c^7 by continually keeping the holder c^4 with its carbon block c^3 in a slightly-inclined position insures the engagement of this with the carbon block d^4 before the main contacts c d or even the auxiliary contacts c' d^3 could possibly engage each other, thereby preventing the possible burning and consequent poor contact frequently caused by the flash made on closing the switch.

I claim as my invention—

1. In a switch, the combination of a supporting structure having contact-plates of which one has a bearing-piece, an arm pivoted to said bearing-piece, having a main contact for engagement with the second contact-plate, an auxiliary contact-piece also carried by the arm and placed to be in electrical connection with the second contact-plate when the switch is closed, a blow-magnet having means for directing a magnetic field through the space adjacent to the auxiliary contact, with a flexible strip electrically connecting the arm and its supporting contact-plate at points adjacent to the pivotal support of said arm, substantially as described.

2. The combination with a supporting structure of a bearing-piece, a switch-arm pivotally attached to said piece and extending on both sides thereof, a contact-plate on the supporting structure, a contact-piece on the switch-arm for engagement with said plate, a spring-actuated plunger constructed to open the switch and means for holding the switch closed, both the plunger and said means being placed to act between the point of support for the switch-arm and the contact-piece, with a spring-supported plunger placed to act on the portion of the arm on that side of the supporting-pivot opposite to that having the first plunger, substantially as described.

3. In a magnetically-operated switch, the combination of a supporting-base having a terminal stud provided with a bearing, an arm pivotally carried by the bearing, a main contact-plate upon the same side of the supporting-base as said arm and a laminated contact-piece carried by the arm so as to engage said plate, an auxiliary contact also carried by the arm and engaging the plate, pole-pieces on each side of the contact-plate, a bolt or bolts extending through the plate from said pole-pieces and a blow-magnet carried by said bolts

on the rear face of the supporting-base, an operating-solenoid also carried upon the rear face of the supporting-base, a movable armature therefor extending through the base and connected to the switch-arm and a spring-actuated plunger constructed to act on the switch-arm to open the switch, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR C. EASTWOOD.

Witnesses:
C. W. COMSTOCK,
W. A. JONES.