

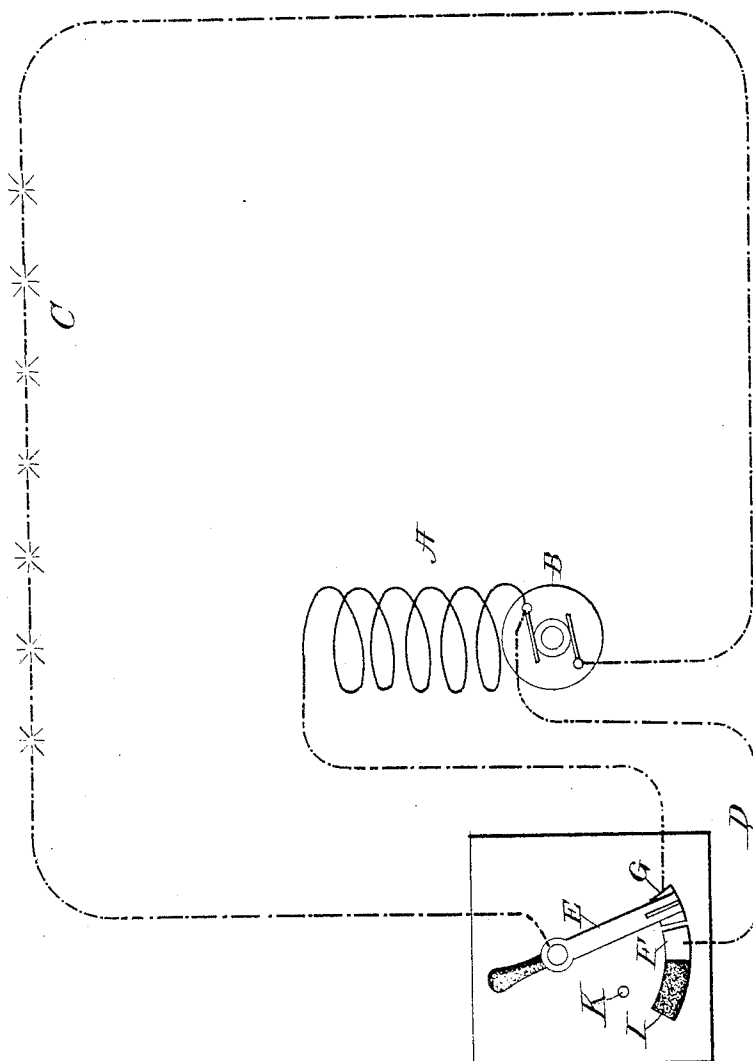
(No Model.)

C. R. ARNOLD.

SWITCH FOR SERIES DYNAMO ELECTRIC MACHINES.

No. 460,245.

Patented Sept. 29, 1891.



ATTEST:

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CRAIG RITCHIE ARNOLD, OF SHARON HILL, PENNSYLVANIA.

SWITCH FOR SERIES DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 460,245, dated September 29, 1891.

Application filed November 10, 1890. Serial No. 370,937. (No model.)

To all whom it may concern:

Be it known that I, CRAIG RITCHIE ARNOLD, a citizen of the United States, and a resident of Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Switches for Series Dynamo-Electric Machines, of which the following is a specification.

My invention relates to means for throwing out of operation that class of dynamo-electric machines in which the field-coil and the armature are in series with one another and with the work.

The object of my invention is to provide a switch whereby the machine may be connected to and disconnected from its working circuit without injury to the switch-contacts and without danger of damaging the armature or field-magnet coils of the machine.

It has heretofore been proposed to throw a series dynamo-machine out of action by forming a shunt for the armature-current around the field-magnet coils and the series circuit, the effect being to substantially put the armature on short circuit while the field-magnet was losing its power. This is in practice objectionable, because the whole armature-current can flow on short circuit, and as it takes time for the field to discharge the machine is practically for a time running on short circuit. In this method of throwing the machine out of operation the switch-contacts of the switch, which finally open the circuit of the armature, are also liable to great damage.

My invention consists, essentially, in the combination, with a series-wound dynamo-electric machine, of a circuit opening and breaking switch therefor having a supplemental contact placed in the path of the switch between the circuit-closing and circuit-breaking position and connected directly to one terminal of the field-magnet coil of the machine and adapted to be engaged by the switch as it passes to circuit-breaking position and before it leaves its normal position of closure of circuit, all as hereinafter described, whereby in operating the switch a shunt around the field-magnet coils is completed for the current which flows from the armature over the line.

In the accompanying drawings I have illustrated my invention diagrammatically, A being the series field-coil of a dynamo-electric machine, which is traversed by the current from the armature B. The working circuit containing the translating devices, such as electric-arc lamps, (indicated at C,) is fed by the current which flows in series through the armature and field.

E indicates a suitable switch-lever, and G the normal contact therefor, whereby the circuit of the armature B is completed through the field-magnet A, a series of lights or other translating devices C, and back to the armature. When the switch-lever is in position upon its normal contact G, the machine operates as a series dynamo-machine in obvious manner.

I is a non-conducting plate or rest upon which the lever E may bear when it is thrown over to open the circuit of the machine, or, in other words, to disconnect the same from the line, and K is a suitable stop-pin for arresting the movement of the circuit-opening lever when it is thrown to disconnect the machine from line and throw it out of action.

F indicates a supplemental contact with which the switch engages and makes contact as it passes from position in contact with G to the circuit-opening position. The distance between the plates G F is made so small or the width of the contact portion of the switch-lever so large that an electrical connection will be formed and maintained for an instant between G and F as the lever is thrown to open the circuit. The contact F is connected by a wire, as D, directly with one terminal of the field-magnet coil A, the other contact G being connected to the opposite terminal. When the switch is closed upon contact G, the circuit of the dynamo is complete through the working circuit in the ordinary way, the current generated by the armature acting to generate and maintain the magnetic field in which the armature revolves.

As the switch is moved to open the circuit or throw the machine out of action and disconnect it from line after the manner of the usual line-switches, contact will first be made with F, connection being maintained with G for the time being, so that the current of the

armature instead of flowing through the field A may flow through the branch around the same and over the working circuit through the working resistance C. Current being now
 5 shunted from the field A, the latter gradually loses its power and the electro-motive force developed by the armature falls; but during the fall of the field-magnetism no damage can
 10 ensue, because the current of the armature forms circuit only through the resistance interposed between the terminals by the working circuit. The machine therefore dies
 15 down without damage to a point where it develops an inappreciable or practically ineffective current due only to such final residual magnetism as may be left in the field-magnet core. The operation may now be completed
 20 by throwing the switch full to circuit-opening position, so as to not only throw the machine out of action, but to disconnect it from the circuit. In this action the lever first breaks
 25 contact with G; but as the machine is now practically dead no injurious flashing will occur at such contact and the final breakage of the circuit of the machine at F, which completes the throwing of the circuit of the machine out of operative condition, and the disconnection of the apparatus from line in the
 30 ordinary way will be accomplished without any damage.

While I have described the operation as if there was a pause of considerable duration after the closure of the contact or connection from F to G, it will be understood that in
 35 practice the switch will be moved directly from one to the other, but that the interval during which the circuit is completed between F and G will be sufficient to cover the time during which the magnetism of the field will
 40 fall to such an extent that no large or injurious flash or spark will occur when the switch-

lever finally leaves the contact G to rest fully or only upon the contact F''.

What I claim as my invention is—

1. The combination, with a series-wound
 45 dynamo-electric machine, of a circuit making and breaking switch for throwing the machine out of action and disconnecting it from the line, as described, having a contact, as G,
 50 through which the series circuit of the armature-field and translating devices is completed in series, said contact G being connected directly to one terminal of the field-magnet coil of the machine, and a supplemental contact,
 55 as F, connected directly to the opposite terminal of the field-magnet coil and placed in position to be engaged by the switch in passing from position of circuit closed to circuit broken and before it leaves the contact G.

2. The combination, with a series-wound
 60 dynamo-electric machine, of a starting and stopping circuit-breaking switch placed in the series circuit of the armature and field and connected directly to line, and two contacts for said switch, one connected directly to a
 65 terminal of the field-magnet coil and forming the normal contact of the switch and the other connected directly to an opposite terminal of said coil at a point between said field-coil and the armature of the machine and arranged to
 70 be engaged by the switch as it passes from circuit-closing position to circuit-opening position, or position to disconnect the apparatus from the line.

Signed at Chester, in the county of Delaware and State of Pennsylvania, this 25th day of October, A. D. 1890.

CRAIG RITCHIE ARNOLD.

Witnesses:

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