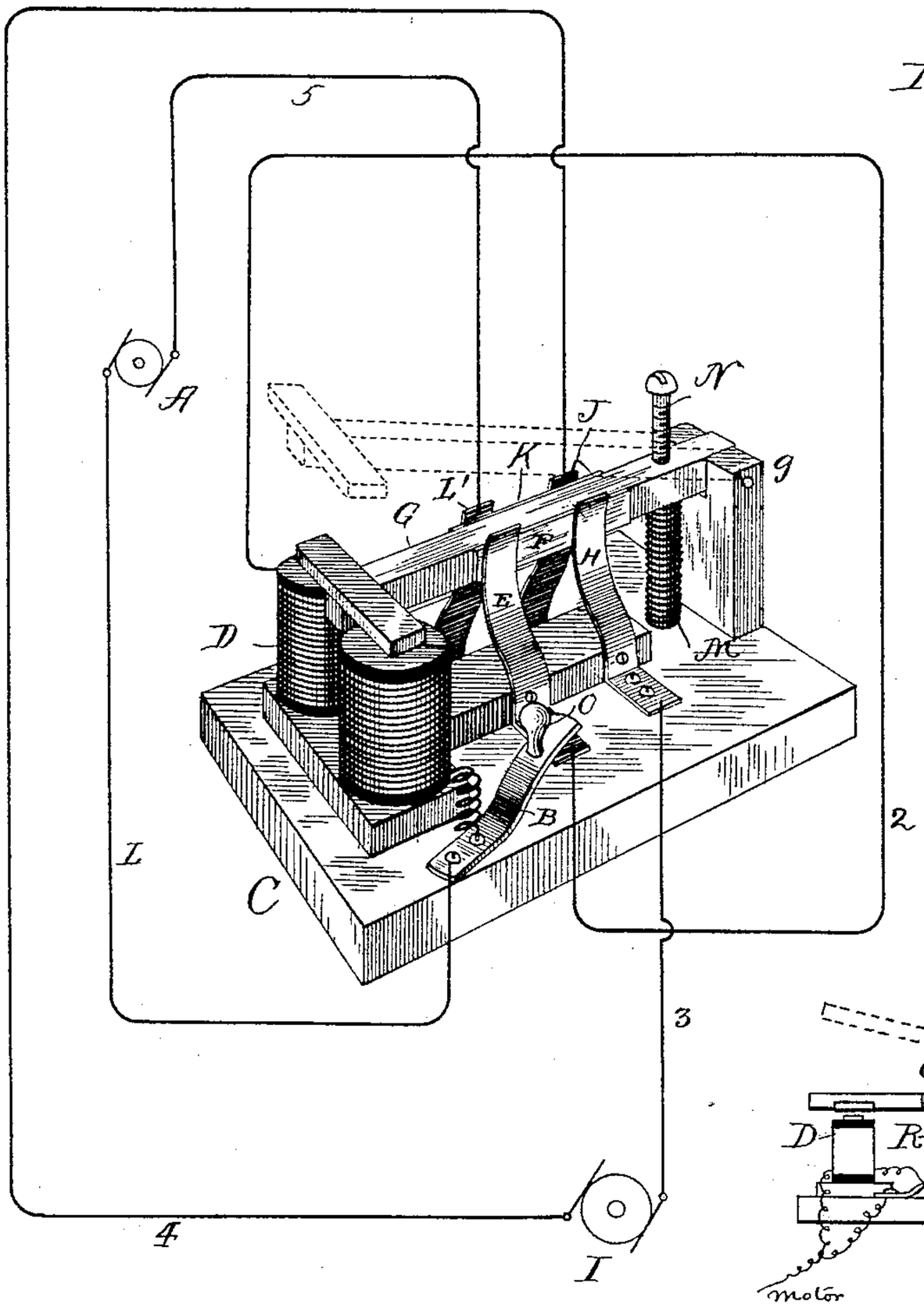
(No Model.)

G. D. SHEPARDSON.

SWITCH FOR ELECTRIC MOTORS.

No. 389,254. Patented Sept. 11, 1888.

Fig. 1.



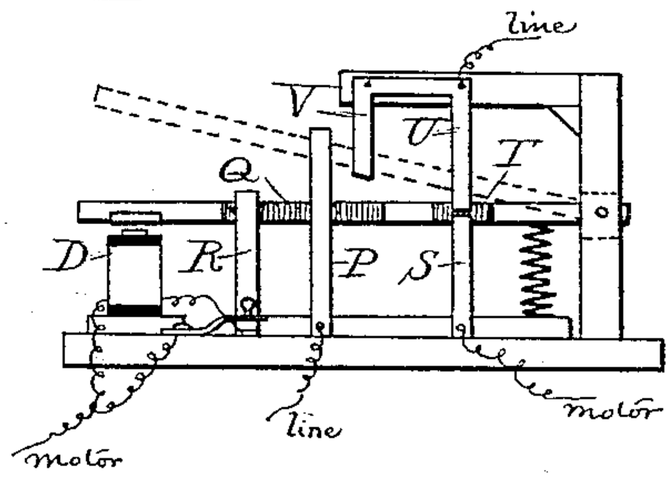


Fig. 2.

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SWITCH FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 389,254, dated September 11, 1888.

Application filed April 30, 1888. Serial No. 272,250. (No model.)

To all whom it may concern:

Be it known that I, GEORGE DEFREES SHEPARDSON, a citizen of the United States, residing at Granville, in the county of Licking and State of Ohio, have invented certain new and useful Improvements in Switches for Electric-Motor Circuits; and I do hereby declare that the following is a full, clear, and exact description of my invention, such as will enable others skilled in the art to which it appertains to make and use the same.

It is well known that in the practical operation of electric-motor systems heavy short circuits are liable to occur, which cause a great diminution or a practical cessation of the current on the main lines. Other causes may bring about the same result, thereby effecting a stopping of one or more of the motors in the system. Now, the disturbing cause may be suddenly removed either from accidental causes or by workmen sent for the purpose, in which case the motor will receive the full current while at rest. This is a fruitful source of danger to motors, armatures being burned out or other damage following frequently from this cause.

Of course it has been common to have switches in motor-circuits; but it often happens that the attendant is careless or ignorant of what should be done, or that he is unable to open the switch before the current is on again.

My improved switch acts automatically, so that the moment the current in the mains ceases the motor-circuit is interrupted and cannot again be permanently closed until the current is again restored.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 shows my switch in perspective and gives a diagram of the circuits, and Fig. 2 illustrates a switch to be used with motors connected up in series.

The switch illustrated in Fig. 1 acts as a circuit breaker or opener, and is designed for use on circuits of constant potential, the form illustrated in Fig. 2 being intended to be used with motors in series, as stated above.

Referring to Fig. 1, A is a generator of electricity, from which a wire, L, runs to a spring, B, on the base of my switch C. From B the circuit passes through an electro-magnet, D, and by wire 2 to a contact-spring, E, which presses against a plate, F, on the armature-lever G of the magnet D. The same plate, F, is likewise pressed upon by a second spring, H, from which a wire, 3, passes to the electric motor I The circuit continues by wire 4 to spring J, plate K, spring L′, and wire 5 back to the generator. This is the normal circuit when the motor is running without interference—that is to say, the magnet D is in series with the motor and normally holds its armature down to the poles, thus maintaining the circuit complete. It will be observed that the armature-lever G is pivoted at *g*, and that an adjustable spring, M, is provided for throwing the lever back when the armature is not attracted. The spring M can be adjusted by means of the screw N. Now, in case a heavy short circuit occurs, cutting out all or nearly all of the current from magnet D and motor I, this spring will overcome the power of the magnet and throw the lever into the position shown in dotted lines, thus breaking the original circuit by removing the plates F and K out of contact with springs E and H and J and L. The switch C is thus an automatic double-pole circuit-breaker, whose action is determined by the condition of the main circuit of the motor. If the lever G is pushed down before the current is restored, it will not remain down unless held positively in place. Thus there is no danger of the current being thrown upon the motor until proper precautions have been taken to prevent it being damaged by the full current being put upon it at once.

The spring B is provided with an insulating-button, O, by means of which it can be pressed into contact with E, thus short-circuiting the magnet. This short-circuiting switch may be employed when it is desired to open the main motor-switch.

I prefer to put the pivot of the lever G as far as possible from the electro-magnet in order to economize magnetizing power.

Referring to Fig. 2, it will be seen that I provide means for maintaining the main circuit closed even after the operation of my switch, thereby maintaining the line complete, and providing that each motor shall be protected by a switch of its own. This construc-

tion also prevents the danger of getting a shock in operating the switch or handling the motor when the current is on and the motor is off. In this form of switch the current enters at spring P, and passes by plate Q on the armature-lever G to the spring R, and thence through the magnet D to the motor. Returning, it passes to spring S, plate T, and spring U, and thence to line. Normally the plate T is pressed upon by the springs S and U at the same time. Electrically connected with the latter spring is a spring, V, which is normally out of contact with the plate Q, but in range of it, so that when the armature-lever is released contact will be made between the two. The spring P is extended so as to be in contact with the plate Q in every position of the armature-lever. The dotted lines show the relations of the parts after the armature has been released. The line-circuit is still complete through spring P, plate Q, and springs V and U. The circuit of the magnet D, however, is broken, and also that of the motor.

In the claims which follow I speak of the armature as being "spring-actuated." I do not wish to be understood as limiting myself to a spring for throwing back the armature-lever, as the same result may be accomplished by a weight or by the gravity of the lever itself. The switch which I have shown breaks both poles of the circuit; but it is evident that I may dispense with one of the contact-plates on the armature-lever and with one set of the co-operating springs. I prefer, however, the double-pole arrangement.

It will be seen that with my switch the motor-circuit is opened automatically, and necessarily when the motor-current ceases or becomes very low. This constitutes a distinct improvement over the most of the systems now in operation, it being customary in such systems to throw in dynamos when short circuits occur, if the dynamos already running cannot keep up pressure enough to melt the fusible safety-catch or melt out the short circuit.

Having now described my invention, what I claim is—

1. An electro-magnet and its armature, an armature-lever carrying contacts, one or more springs co-operating with the said contacts, and a manual switch for cutting out the magnet, all in combination with an electric motor, the circuit of the motor passing through the electro-magnet and the spring contact-pieces.

2. An electro-magnet and its armature, a spring-actuated armature-lever carrying contact-pieces, springs co-operating with the said contact-pieces, an electric motor whose circuit includes the magnet, springs, and contact-pieces, and a manual short-circuiting switch for cutting out the electro-magnet, as and for purpose set forth.

In witness whereof I have hereunto affixed my seal and signed my name in the presence of two subscribing witnesses.

GEORGE DEFREES SHEPARDSON. [L. S.]

Witnesses:
FRANK C. PERKINS,
GEORGE LERGA.