(No Model.)

C. J. VAN DEPOELE.

SAFETY SWITCH FOR DYNAMO ELECTRIC MACHINES.

No. 287,345. Patented Oct. 23, 1883.

Fig. 1.

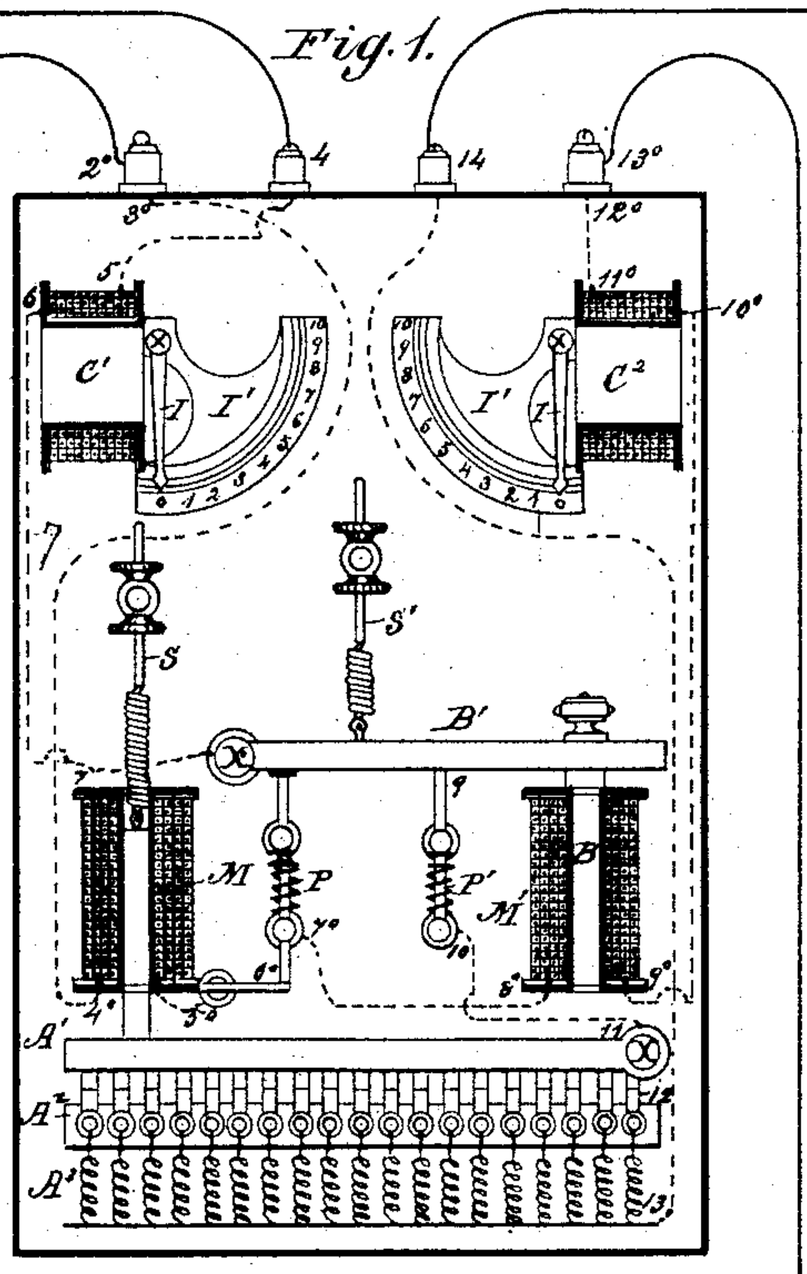


Fig. 3.

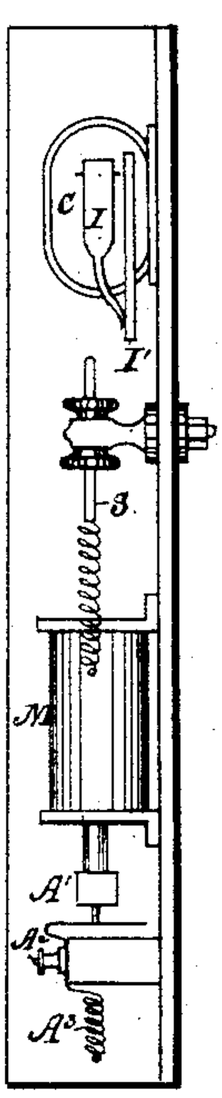


Fig. 2.

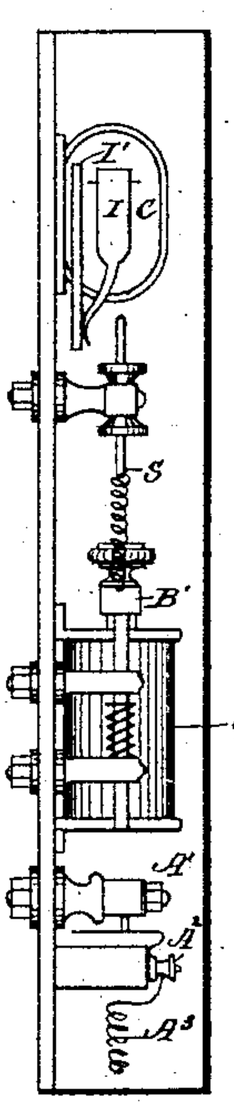


Fig. 5.

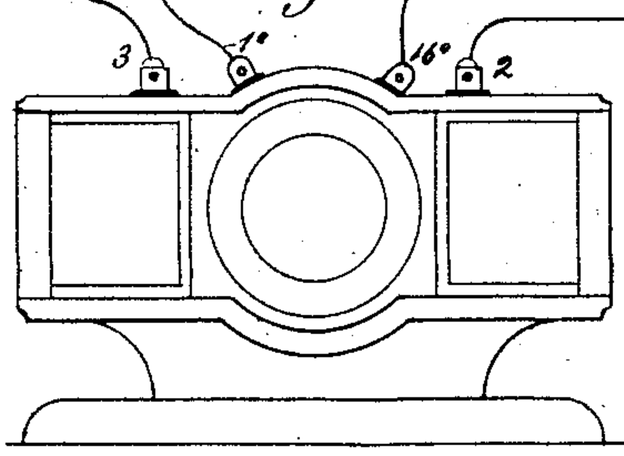
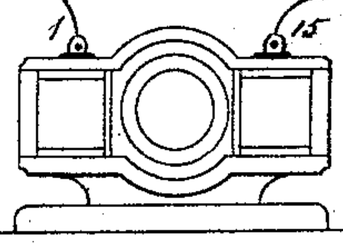


Fig. 4.



Attest.
A. D. Sprague
E. Scully

Inventor
Chas. J. Van Depoele
By Thos. S. Sprague Atty.

UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF CHICAGO, ILLINOIS.

SAFETY-SWITCH FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 287,345, dated October 23, 1883.

Application filed April 21, 1883 (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Safety-Switches for Dynamo-Electric Machines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to a new and useful safety-switch for dynamo-electric machines, to be used in connection with electric lighting; and the invention consists in the combination of four devices, each filling an important duty in the successful operation of electric lighting.

The following is a description of the combination, reference being had to the annexed drawings, forming part of this specification.

In the system as represented in the drawings the current used for the outside circuit or work is generated in a large dynamo, the field-magnets of which are excited by a separate small dynamo.

The first device is an automatic current-regulator similar to the one for which Letters Patent were granted me January 9, 1883, the form of construction, however, having been somewhat modified here, so as to be more compact. M is a solenoid provided with two separate coils or helices, which, being wound in opposite directions and included in different circuits, operate to neutralize the other, their combined action being thus very similar. The outer coil is included in the working-circuit, and operates the contact-bar A′ by the action of the core in M. A′ is a contact-bar hinged at one extremity at X, and suspended at the other extremity from the iron core of solenoid M. A^2 is a wooden bar, into which are fastened binding-posts and contact-points, so as to make connection between the resistance-coils A^3 and bar A′. A^3 are the resistance-coils, arranged in multiple arc. S is an adjustable spring to regulate the power of the core in M.

The second device consists of an automatic circuit-breaker. Whenever the main or working circuit is broken, this device breaks contact between the exciter and the field-magnets of the large dynamo, thus lessening the danger of the large dynamo burning up its commutator and brushes. S′ is an adjustable spring raising the bar B′ from the core B when the lamp or working circuit is not closed or is inoperative. B′ is a bar hinged at X′. B is the electro-magnet core. M′ is the electro-magnet coil. P′ is a contact-point. P is a contact-piece attached to the bar B′, but insulated therefrom and making contact at 6°.

The third and fourth devices are two indicators, one indicating the current in the working-circuit, the other indicating the power in the field-circuit, the cores C′ and C^2 repelling the pointers I and I.

Figure 1 is a front elevation of the apparatus containing the four devices above mentioned. Figs. 2 and 3 are side views of different parts.

There are two distinct circuits in the apparatus—one the working-circuit and the other the field-circuit. Said circuits run as follows: The large dynamo has its main binding-posts in the center marked 1° and 16°. The circuit starts at 1°, enters apparatus at 2°, passes from 3° to 4°, into electro-magnet or solenoid M, out at 5° to 6°, by contact-spring to 7°, to 8° in electro-magnet M′, out at 9° to indicator C^2, in at 10°, out at 11° to binding-post at 12°, from 13° to lamps at 14°, out of lamps at 15°, and closes at binding-post of dynamo at 16°. This completes the outside or working circuit. The second circuit runs as follows: from small dynamo, Fig. 4, starts out at 1 to binding-post 2, through field-coils of large machine, out at 3 to 4, enters apparatus, passes to indicator C′ at 5, out at 6, and by wire 7 to bar B′ at X, to contact-point P′ at 9, out at 10 to contact-bar A′ at 11, to all the contacts A^2 at 12 in multiple arc, through all the resistances A^3, out at 13, up to binding-post at 14, and back to small machine at 15, thus completing the field-circuit.

Having described the different parts of the combination, I will now explain the same as in operation.

The dynamo having been started and properly connected, as shown in the drawings, the bar B′ is pressed down upon the core B, and at the same time presses down the contact-points P and P′, thus closing the lamp-circuit in P at 6°, and the exciter and field-circuit in P′. The exciter will soon magnetize the field-magnets of the large dynamo,

and a current from its armature will circulate through the lamps and coils of M′ and the other devices, as above described, said current magnetizing at once the core B of electro-magnet M′, thus keeping down the bar B′ and closing the lamps or working-circuit, and also the field-circuit, and this will continue as long as the current is flowing in the working-circuit; but if, from any cause, the working-circuit is broken or interrupted, the core of M′ loses its power, and the bar B′, responding to spring S′, flies up, thus breaking the circuit between the exciter and field-magnet coils of the large machine, for if the field-magnets remain excited the current, not being absorbed by the working-circuit, would start around the commutator, forming an arc from one brush to the other, and soon destroy both. So by this device, on the interruption of the main circuit, the exciting-circuit is also broken and the machine saved harmless. As long as the working-circuit is not complete, the bar B′ will not be held down by core B, thus indicating that the line is open. The two indicators work as follows: Indicator C′ is in circuit with the field-magnets of the large machine and exciter, and as soon as the current is passing through the same the core C′ becomes magnetized proportionately to the strength of the current circulating in the coils of C′, thus showing the exact degree of energy in the field-magnets, and by proper graduation it is easy to see the power it takes to drive the generators, or to ascertain the required condition of the machines to do a certain amount of work. The needle I is pivoted at *x*, and is made of iron, which, being in magnetic contact with C′, becomes magnetized, and at its free end is of the same name as the pole it is in contact with. Thus a repulsion will be produced by the core C′ upon I with a strength corresponding to the degree of saturation in C′, so that the pointer will indicate upon a graduated dial, I′, the exact condition of energy in the field-magnets of large dynamo. Indicator C^2 is in circuit with the working or lamp circuit, and operates the pointer I the same as indicator C′. However, since, in order to work successfully the lamps or other devices in the main circuit, it is necessary that the electro-motive force should remain constant in said circuit, it is desirable, besides the current-regulator which is in the field-circuit operated by a solenoid in the main circuit, to have a means of detecting at once whether the electro-motive force is constant or not, whether it is either too high or too low. This we can accomplish by means of indicator C^2. When the maximum work is on and in circuit, the pointer we refer to should point to, for instance, the figure 5 on the dial. Having practically determined that this indicates the electro-motive force needed, if some lamps or other working devices are cut out of circuit, the resistance, being lessened, will raise the electro-motive force, and the pointer will correspondingly be raised, so that all there is to do to adjust the production of electro-motive force is to turn the brushes on small machine down until the pointer I shall again stand at 5, as before. In case work previously out of circuit is again put in, then by simply turning the brushes of the exciter up higher, until the pointer stands again at 5, we can in this way regulate the machine so as to produce a constant electro-motive force in the main or working circuit. As above stated, the current-regulator, being interposed between the exciter and field-magnets of large machine, will take care of the current needed in large machine; but if this should not work exact enough, it will be indicated in C^2 with perfect accuracy.

The combination of the four devices above described makes an apparatus by means of which, first, the exciting-circuit is completed as long as the main circuit is operative, and on the breaking of the main circuit interrupts the exciting-circuit; second, the current needed in the main or working circuit is made constant by the action of the current-regulator interposed between the exciting-machine and the field-magnets of the large machine, and actuated by a solenoid in the main circuit; third, the amount of work being done can be accurately determined by the indicator C′, which is in the field-circuit, and shows exactly the condition of energy in said field-circuit reacting upon the armature of the large machine; fourth, the indicator C^2 will show the exact intensity of current in the main or working circuit, enabling any correction to be made, if needed. It is not absolutely necessary to employ a separate exciter to magnetize the fields of the large dynamo, as a derivation can be taken from its main current, and the circuit of the derivation automatically broken when the main circuit is broken.

The construction of the indicators, circuit-breakers, and circuit-regulator (shown and described for the purpose of illustration) is not in any manner claimed herein, the particulars of said devices forming the subject-matter of separate applications for Letters Patent.

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

In a system of electric lighting where the field-magnets of the main dynamo are excited by a current independent of its armature, an automatic circuit-breaker operated by an electro-magnet in the main circuit, and breaking circuit between the field-coils and the exciter when the main current is interrupted or broken, substantially as described.

CHARLES J. VAN DEPOELE.

Witnesses:

NORMAN J. GASSETH,

THEO. P. BAILEY.