(No Model.) 2 Sheets—Sheet 1.

L. DAFT.

ELECTRIC SWITCH.

No. 322,916. Patented July 28, 1885.

Fig 1.

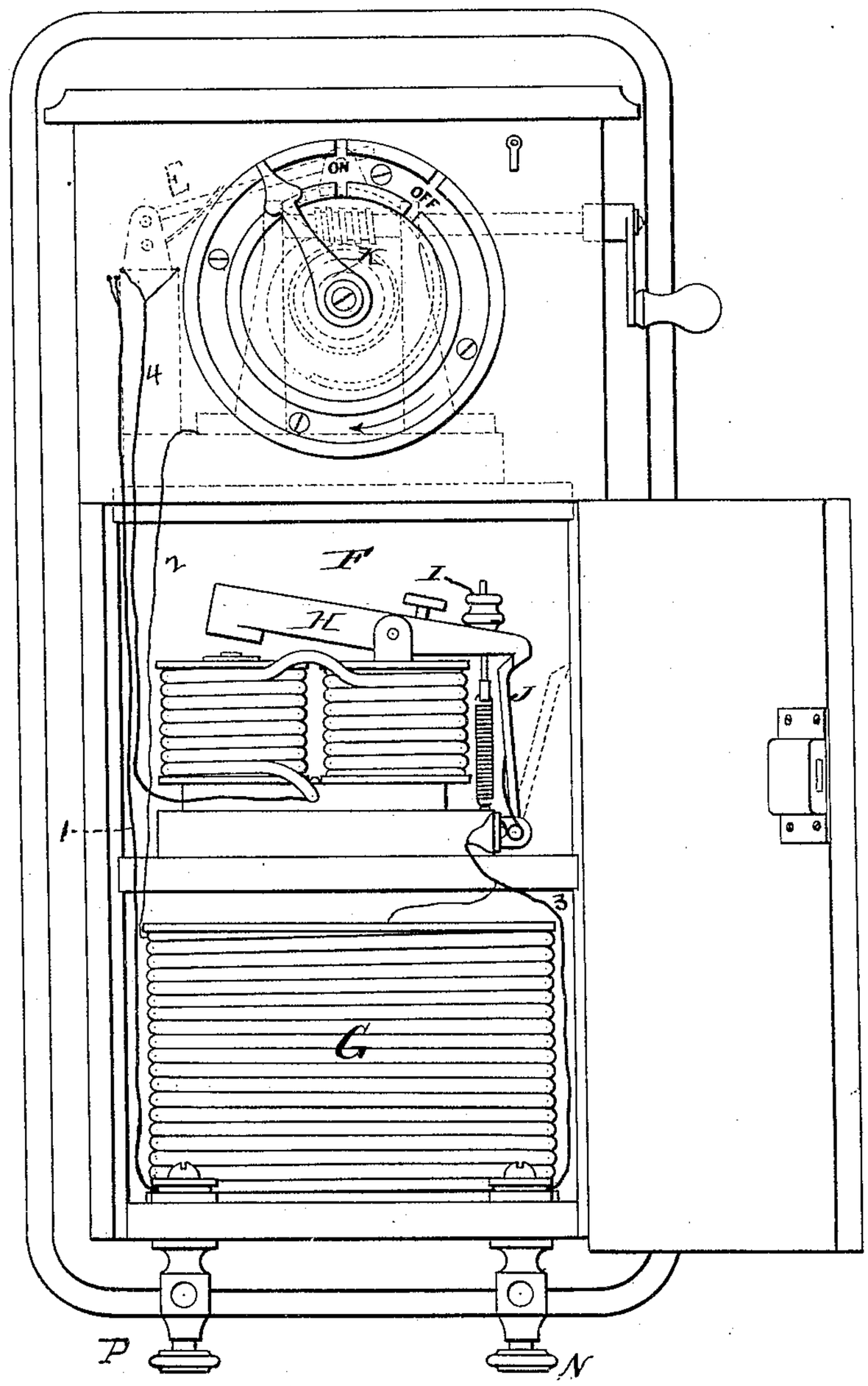
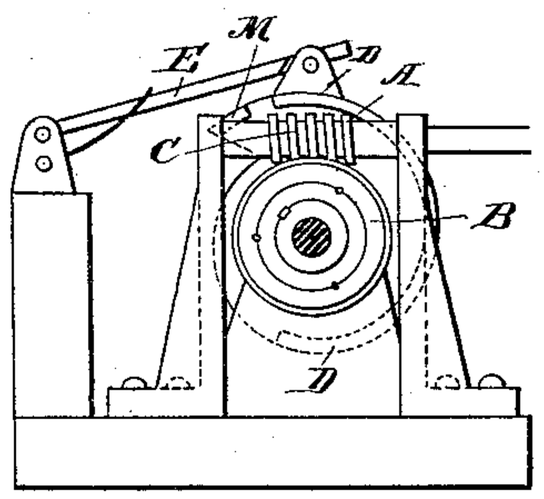


Fig 2.



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Leo. Daft.
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

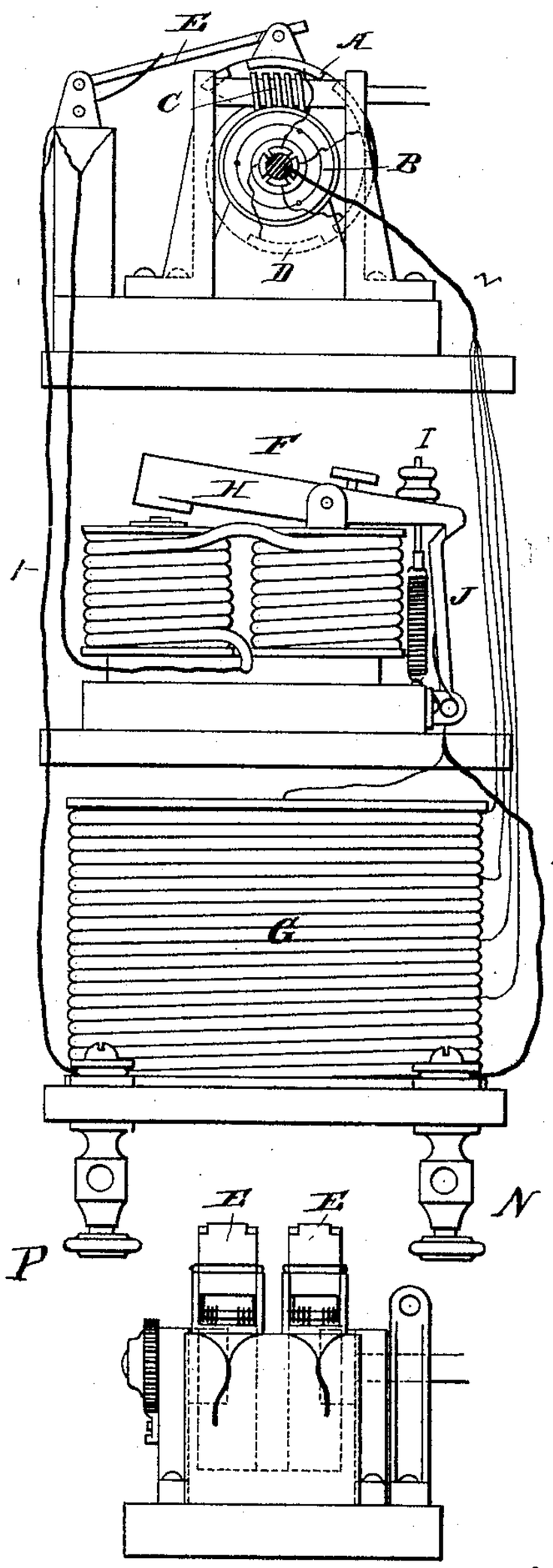

Fig. 3.

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UNITED STATES PATENT OFFICE.

LEO DAFT, OF GREENVILLE, NEW JERSEY.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 322,916, dated July 28, 1885.

Application filed March 9, 1885. (No model.)

To all whom it may concern:

Be it known that I, LEO DAFT, a subject of the Queen of Great Britain, residing at Greenville, in the county of Hudson and State of New Jeresey, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

In a system of electric distribution where power is furnished and sold to various consumers, it is necessary to provide some means of controlling the maximum amount of power each customer may use, as well as prevent injury to the machine by unskilled persons starting it with the full force of the current before the inertia of the armature is overcome and it has attained speed enough to develop a suitable working-resistance. I attain both of these results by the use of the device I am about to describe, which I have found to be simple, cheap, and effective.

Referring to the accompanying drawings, Figure 1 is a front view of a case containing my device. Fig. 2 is a side view of the switch. Fig. 3 is an end view of the same. Fig. 4 is a side view of the switch arranged to cut out the resistance gradually.

Mounted on a shaft supported in journals upon a suitable base is a gradually-increasing cam, A, of some insulating substance, as vulcanized fiber, hard rubber, glass, &c., and this cam is adapted to be rotated by some mechanical means, as a toothed wheel, B, on the same shaft, and a worm, C, meshing with said wheel and operated by a suitable handle. Upon the periphery of the cam are arranged strips or sections D D, of some conducting substance, as copper, and supported in suitable standards and insulated from each other, are two or more spring contact-pieces, E E, which are arranged to bear upon the strips on the cam. At the highest part of the cam is placed a transverse conducting-strip, M, insulated from the other strips and adapted to complete the circuit direct between the spring-contacts. In some convenient position, as in the bottom of the box containing the cam, is a resistance-coil, G, of any desired construction, and a cut-out switch, F, is also similarly arranged, the armature H of which is adjusted by a suitable regulating-screw, I, to withstand the desired degree of attraction before moving, and to retain the snap-switch J in position.

An indicator, K, may be applied to the cam-shaft, which shall show the relative position of the cam, so that the unskilled operator may properly manipulate the switch.

Suitable electric connections are made, so that the circuits may be completed, as hereinafter stated.

The circuits may be traced as follows: Entering at the post P it passes, by wire 1, to one of the spring contact-pieces E, which, in its normal or "off" condition, rests upon the insulating material of the cam, and no current can pass. As the cam is slowly rotated the contact-brushes bear upon the conducting-strips, one of which is electrically connected to the frame, and thus by the wire 2 through the resistance-coil to wire 3 and out by post N. When both contact-pieces bear upon the cross-strip M the current passes through the same and the contact-piece, by wire 4, through the cut-out and to post N, short-circuiting the resistance.

The operation may be described as follows: Supposing the indicator to point to the word "off," the spring-contacts will rest upon the smallest part of the cam, and if the strips on the periphery do not extend to this part the contacts will rest upon the insulating material of the same and no current will pass. If, now, the handle is turned, the cam will be slowly rotated, bringing the conducting-strips under the spring-contacts, and as these strips are connected to the resistance-coil the current will first flow through said coil, and the armature of the motor or other device will not be endangered; and as it requires a number of turns of the worm to complete the rotation of the varying-cam some little time will elapse after the first contact of the strips with the spring-contacts before they will reach the transverse conducting-strip, when the resistance will be cut out and the direct circuit be completed through the said strip and spring-contacts, permitting the motor to have the full force of the current, and the indicator will point at "on." It will be seen that, during this operation, the armature of the motor will have attained some considerable velocity,

thus developing a suitable working-resistance to prevent injury to the armature-brushes or other parts.

In Fig. 4 the resistance-coil is shown as being divided into sections, and the peripheral conducting-strips are similarly divided, and the connections are such that the resistance will be gradually cut out as the speed of the armature increases. The coil of the cut-out is placed in the main circuit, and the armature may be adjusted so as to allow a current of a certain specified strength to pass without operating it; but any abnormal increase due to overloading the motor or otherwise would cause it to be attracted toward the magnet-core, thereby releasing the snap-switch and breaking the circuit. The adjusting-screws permit of regulation for a wide range of current, and can be adjusted for any desired consumption of power. It is intended to keep the cut-out locked and under the control of the parties renting power, and the consumer will be limited, therefore, to the use of the amount of power contracted for. In the event of an attempt to take more power than contracted for, the speed of the armature will be reduced, the internal resistance of the machine being thereby decreased, the flow of the current will quickly reach the point at which the adjustable cut-out has been set, when the circuit will be severed and the consumer will be obliged to notify the company before the machinery can be placed in working order again. The use of the gradually-increasing cam is also especially valuable in preventing the operation of the cut-out when the machine is started, as otherwise an abnormal flow of current is likely to occur which would operate the cut-out. It also furnishes a safe and effective stop-switch, inasmuch as, just as soon as the increasing-cam in its rotation causes its highest part to pass the spring-contacts, they will instantly fall upon the smallest insulated part of the cam, thus severing the circuit without the possibility of forming an arc for any appreciable time. If at any time there should be a sudden abnormal increase in the current in the line from any cause, the cut-out would be operated and prevent injury to the machine.

What I claim is—

1. An electric switch consisting of an increasing-cam with a sudden drop, having peripheral conducting-strips arranged partially around its surface and a transverse conducting-strip arranged across its highest point, substantially as described.

2. In an electric switch, the combination, with a gradually-increasing cam having peripheral conducting-strips, of spring-contacts bearing upon said cam and an actuating worm-gear for said cam, substantially as described.

3. The combination, in an electric switch, of a gradually-increasing cam of insulating material, having peripheral conducting-strips arranged circumferentially and transversely, spring-contacts bearing upon said cam, and connections, substantially as described, whereby the circuit may be opened, closed through a resistance, and then closed direct through the working-circuit, as set forth.

4. The combination, in an electric switch, of a gradually-increasing cam having a sudden drop, circumferential and transverse conducting-strips on the periphery thereof, spring-contacts bearing on the cam, a worm and gear for operating the cam, and an indicator for showing its position, substantially as described.

5. The combination, in an electric circuit, of a resistance, a switch for varying the resistance, and a worm-gear for operating the switch, whereby a slow movement of the resistance-varying apparatus is insured, substantially as described.

6. The combination, in an electric circuit, of a resistance, a switch for varying the resistance, a worm-gear for operating the switch, and an automatic cut-out, substantially as described.

7. The combination, with the increasing cam-switch and contacts, of an automatic cut-out and connections, substantially as described.

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

LEO DAFT.

Witnesses:
JNO. N. BRUNS,
GEO. W. MANSFIELD.