(No Model.)

J. H. LEHMAN.

RHEOSTATIC SWITCH.

No. 444,707. Patented Jan. 13, 1891

Fig. 1.

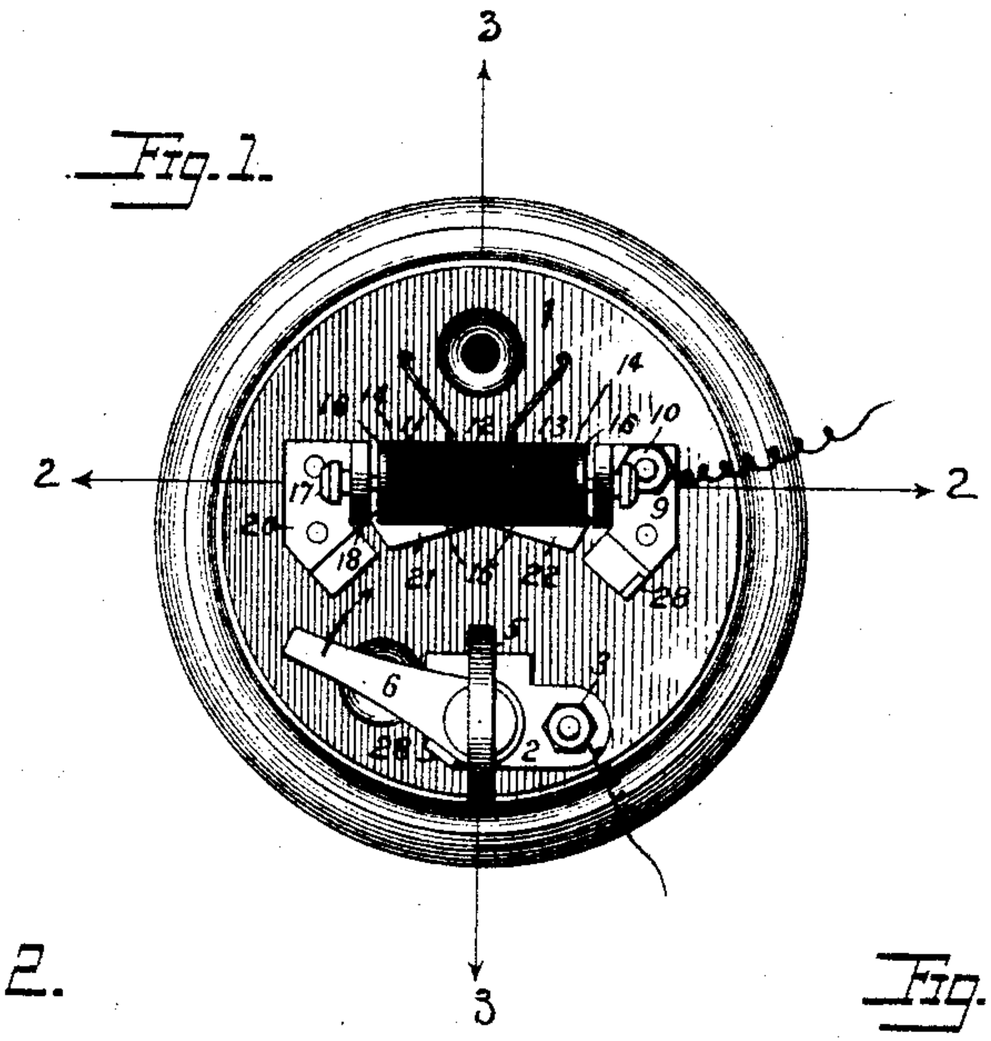


Fig. 2.

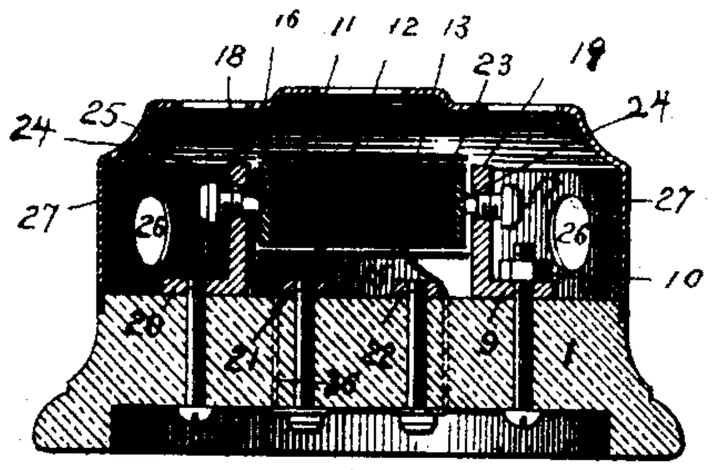


Fig. 3.

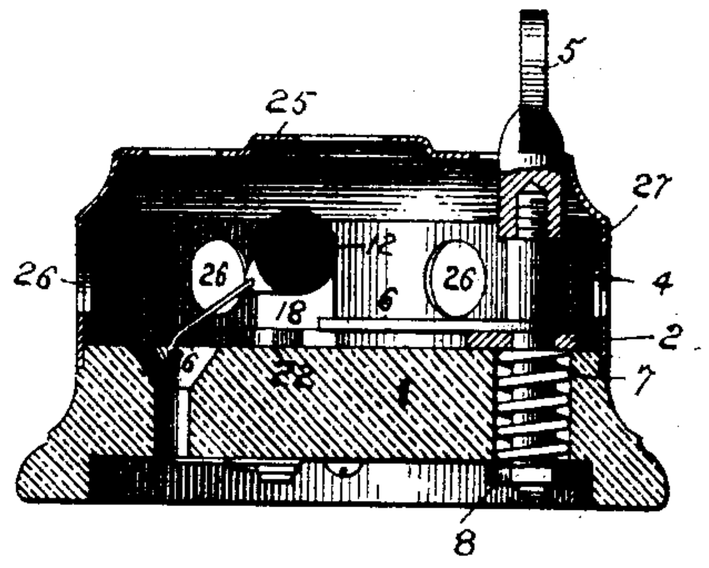
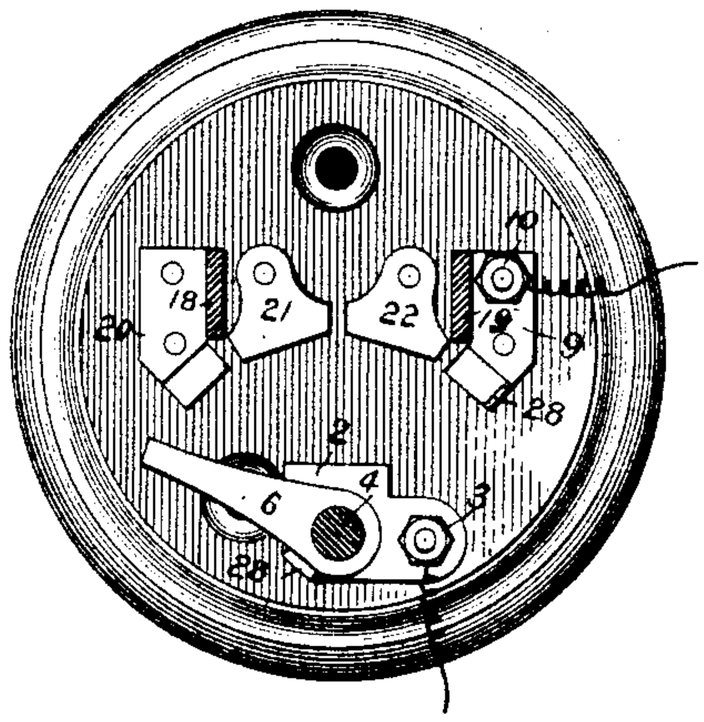


Fig. 4.



Witnesses
Jno. G. Hinkel.
H. L. McArthur.

Inventor
J. H. Lehman
By his Attorneys
Foster Freeman

UNITED STATES PATENT OFFICE.

JOSEPH HUFTY LEHMAN, OF PHILADELPHIA, PENNSYLVANIA.

RHEOSTATIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 444,707, dated January 13, 1891.

Application filed March 8, 1890. Serial No. 343,124. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH HUFTY LEHMAN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches or cut-outs, and has for its object to provide such a switch or cut-out which shall be cheap, simple, and effective, and which shall be not only capable of opening and closing the circuit, but of regulating the amount of current passing through the circuit to suit the wishes of the party or necessities of the case.

To these ends my invention consists in a switch constructed and arranged substantially as set forth hereinafter.

In the accompanying drawings I have illustrated the preferred embodiment of my invention, although it is evident that it can be constructed and arranged in different ways without departing from the spirit of the invention.

In said drawings, Figure 1 is a plan view of the switch with the case removed. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a section on the line 3 3, Fig. 1, the key being turned a quarter round from the position shown in Fig. 1. Fig. 4 is a plan view with some of the parts removed.

Upon a suitable base 1, which may be of any desired shape and material, although I preferably use porcelain or similar material, I arrange the operative parts of the switch. Mounted on the base is the plate 2, which is preferably provided with a binding-screw 3 for connection with one of the wires of the main circuit. Passing through this plate is a standard 4, having a screw-threaded upper end for the attachment of the thumb-nut 5, and carrying a switch-arm 6, resting upon the plate 2. The lever end of this standard extends through the body of the base and is surrounded by a spring 7, secured by a nut 8, by means of which the pressure of the arm may be adjusted upon the plate, so as to insure good contact and still allow a slight movement of the standard. Also connected to the base is a plate 9, provided with a binding-screw 10, to which one terminal of the circuit to be controlled is connected. It will be seen that when the arm 6 is turned so as to rest upon the plate 9 the circuit through the switch is complete and direct.

It is often desirable to regulate the amount of current passing through the switch—as, for instance, when it is used in connection with incandescent lamps—in order that the illuminating power of the incandescent filament can be regulated to any desired degree. It is also advantageous in many instances in closing a circuit to include more or less resistance in the circuit at first and to gradually cut it out before the full amount of current is allowed to flow through the translating device connected with the switch. One instance of this is in the operation of motors where the current may be too strong to be safely passed through the armature of the motor until it has commenced to rotate and to produce a counter electro-motive force. Other instances will occur to those skilled in the art and need not be recited. To provide for this contingency is one of the essential features of my invention, and this I do by the use of certain resistance-pieces arranged to be cut in and out of the circuit in succession, and preferably so arranged that when the circuit is first closed the whole current passes through all of the resistance devices, and they are gradually cut out until the desired number or all are removed from the circuit. These resistance blocks or devices 11, 12, and 13 are shown in the form of cylinders or blocks made up of a suitable composition which will offer the desired amount of resistance to the passage of the current. While these blocks may be of various material, I find that plumbago and potters' clay mixed together and pressed into the desired shape are the most effective. Of course it will be understood that the exact proportions of these materials combined together will depend upon the purposes for which the switch is to be used, and I have found about one part plumbago to three of potters' clay mixed together with water or other suitable binding agent and pressed into shape furnishes a good general mixture. I have also used plaster-of-paris and other equivalents; but I found the plumbago and

potter's clay the best adapted for the purposes, as it is most free from foreign substances and makes the mass more homogeneous and can be readily manipulated in forming the blocks. These resistance-blocks may be of various shapes and mounted in various ways, and I have illustrated in the present instance three blocks arranged axially in line with each other. In order that the electric current may readily pass into and out of these blocks without danger of burning or destroying the surfaces thereof, and in order to make good contact therewith, I preferably place on the sides of the blocks or between the adjacent sides of two of the blocks strips or plates of refractory material, and in the present instance I have formed such plates 14 15 of platinum. The blocks are supported in plates 16, of some conducting material, and these are held under pressure by screws 17, passing through standards 18 19. The standard 19 is shown as being a part of the plate 9 and the standard 18 as a part of the plate 20. The platinum disks 15 are each connected by wires 36 with the plates 21 22, respectively, which are mounted upon the base 1 and arranged within the sweep of the contact-arm 6. By thus arranging the resistance-blocks I am enabled to get good electric contact between them and the platinum plates or disks and prevent disruptive action. The passage of the current through these blocks causes more or less heat, and in order to prevent any possibility of accidents from the blocks becoming overheated I cover them with a layer of refractory material 23, preferably of asbestus, which may be wound around the blocks and their supporting-plates. In order to prevent the heat which may be generated in the blocks being transmitted as readily to the supporting-standards, I form the screws 17 with a reduced portion 24 near their ends, where they bear upon the plates 16, and in this way I have found that they convey less heat from the resistance-blocks to the standards than when they are of uniform size.

To further prevent overheating, I make the case or covering 25 of the switch, which preferably is of metal, with openings or holes 26 to allow free circulation of air, and in some instances I line a portion or the whole of the case with a layer of asbestus 27. In this way I am enabled to avoid all possibility of danger from overheating and to prevent any heat that may be generated in the resistance-blocks being transmitted to or beyond the switch. The base and all the surrounding parts being of fire-proof material, there is absolutely no danger from fire under the most severe conditions. In order to limit the movement of the thumb nut or key and the switch-arm 6, I form on the plates 2 and 9 projections or stops 28.

Such being the preferred construction of the device, its operation will be understood.

In Fig. 1 the device is shown with the switch open, and when it is turned so that the arm 6 moves in the direction of the arrow it first bears upon the plate 20 and completes the circuit through the plate and through all the resistance-blocks in the circuit to the plate 9 and thence to the translating device. It will thus be seen that in this position all of the resistance-blocks are included in the circuit. A further movement of the arm onto the plate 21 cuts out of circuit the block 11 and leaves the blocks 12 and 13 in the circuit, the current passing from the block 21 through the conductor 36 to one of the plates 15, and thence as before. A further movement of the arm onto the plate 22 cuts out of circuit blocks 11 and 12, leaving the block 13 in the circuit, and a still further movement of the arm onto the plate 9 cuts out all of the resistance-blocks and makes a direct circuit with the translating devices.

Of course it will be understood that the number and arrangement of the resistance-blocks will vary according to the purposes for which they are used, and as the circuit is closed it first includes the greatest amount of resistance, and the blocks are cut out successively until the direct current flows to the translating device.

My electric switch is of special advantage in use in connection with incandescent electric lights, by means of which the degree of incandescence, and consequently the amount of light, can be easily regulated. The arrangement of the parts when used in such sockets will vary somewhat from that shown in the drawings, owing to the necessities of the case, but the same general principles will apply.

What I claim is—

1. In an electric switch, a resistance device consisting of blocks of plumbago and potters' clay separated by disks of platinum, the disks being connected with separate contact-plates, and standards supporting the resistance device, substantially as described.

2. In an electric switch, a resistance device consisting of molded blocks, refractory material bearing against said blocks, and screws mounted in standards supporting said device, the said screws being reduced at their points, substantially as described.

3. In an electric switch, a base of refractory material, a series of contact-plates mounted thereon, a pivoted spring pressed by the contact-arm, also mounted thereon, a resistance device consisting of a series of blocks separated by disks of platinum and supported in standards on the plate, the disks being connected to the contact-pieces on the base, a sheath of refractory material surrounding the resistance devices, a perforated cover fitting the base, and refractory material placed between the cover and the resistance and contact devices on the base, substantially as described.

4. In an electric switch, a series of resistance-blocks supported between standards separated by intervening disks of refractory conducting material, the blocks consisting, essentially, of one part of plumbago and three parts of potters' clay mixed together, substantially as described.

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

JOSEPH HUFTY LEHMAN.

Witnesses:

P. H. LYNCH,

ABRAHAM M. BEITLER.