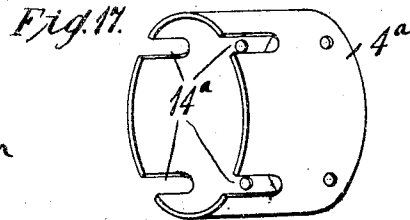
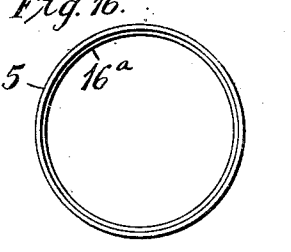
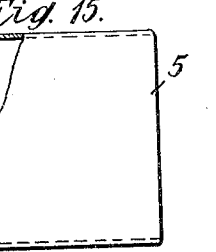
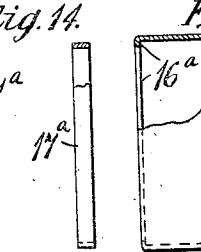
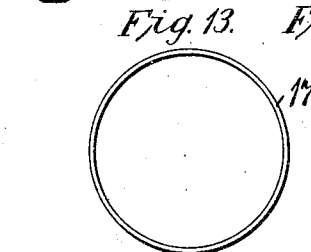
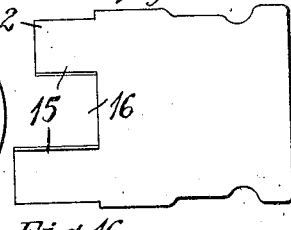
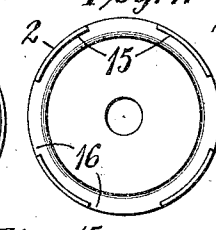
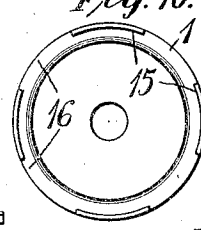
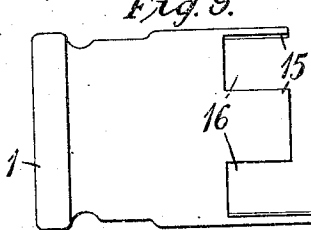
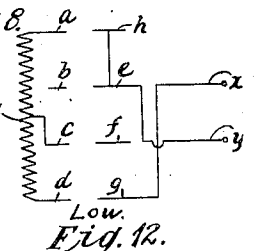
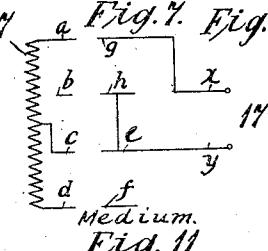
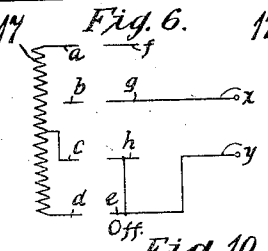
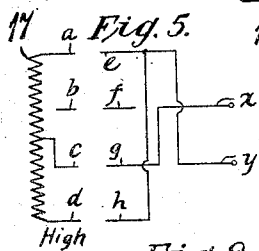
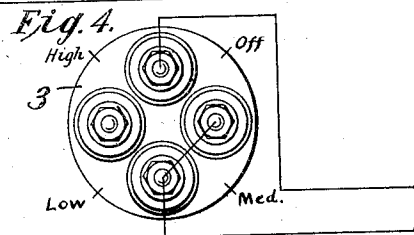
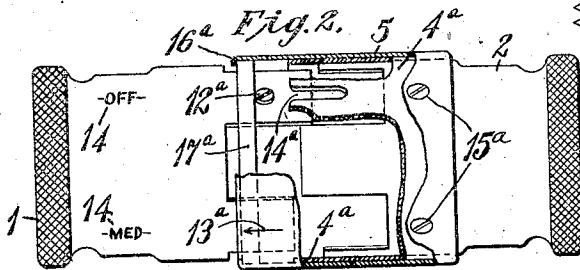
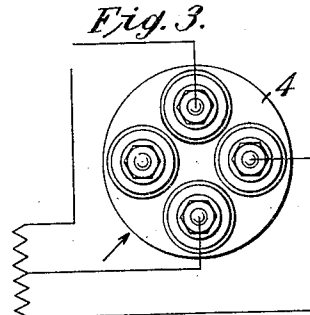
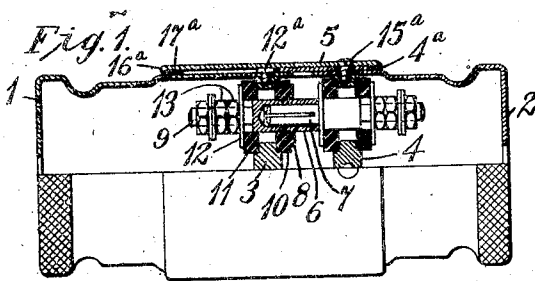


W. S. HADAWAY, JR. & E. E. ROSE.
PLUG SWITCH.
APPLICATION FILED FEB. 11, 1910.

Patented Aug. 17, 1915.

1,150,112.



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PLUG-SWITCH.

1,150,112.

Specification of Letters Patent.

Patented Aug. 17, 1915.

Application filed February 11, 1910. Serial No. 543,400.

To all whom it may concern:

Be it known that we, WILLIAM S. HADAWAY, Jr., and EDWARD E. ROSE, citizens of the United States, and residents, respectively, of East Orange, in the county of Essex and State of New Jersey, and of Swissvale, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Plug-Switches, of which the following is a specification.

Our invention relates to electric circuit controllers and switching devices and particularly to switches of the plug type.

One object of our invention is to provide a simple and durable device of the class above indicated that shall be compact and inexpensive in construction and adapted for use with relatively high-voltage circuits.

Another object of our invention is to provide a plug switch having a minimum number of cooperating socket and plug contact members that shall be so arranged as to effect a considerable number of circuit changes.

In addition to the foregoing, we prevent the two switch members from being completely separated and accentuate the various switch positions and also limit the relative rotary adjustment of the members in order to avoid injury to the circuit leads.

Electric heating devices and various other commercial apparatus which translate small quantities of energy are much more useful if the amount of energy supplied to them can readily be governed. However, ordinary switching devices and regulators are inadaptable to this service in various particulars, for example; a small electric stove or sad iron is usually equipped with a flexible cord containing the circuit leads, in order that it may be readily connected to lamp sockets and transported from place to place, as desired. In order not to interfere with the inherent advantages pertaining to light portable devices of this character, the circuit regulator for use in connection therewith must be light, entirely inclosed to avoid injury or annoyance to users, attractive in appearance and compact in design.

According to our present invention, we provide a plug switch having a comparatively small number of socket and plug connectors which are inclosed in a substan-

tially cylindrical casing of small diameter and are adapted to be interposed in an interrupted supply circuit and to form a part of the flexible cord which is attached to the translating device.

Our invention is illustrated in the accompanying drawings in which—

Figure 1 is a partially sectional elevation of a regulating device constructed in accordance therewith. Fig. 2 is a side elevation of the structure shown in Fig. 1, certain portions being broken away and the two members being separated ready for relative rotary adjustments. Figs. 3 and 4 are end views showing the arrangement of contact members and the circuit connections thereof. Figs. 5, 6, 7 and 8 are diagrammatic views showing the circuit connections which are effected in the various positions of the device when it is used in connection with a resistance for heating or for other purposes. Figs. 9 to 17 inclusive are detail views of the device shown in the other figures.

Referring to the drawings, the structure here shown comprises a pair of cooperating cylindrical shells 1 and 2 (see Figs. 9 and 12) within which metal disks 3 and 4 are supported, an intermediate sleeve 4*, an outer sleeve 5, a plurality of socket contact members 6 and plug contact members 7. The socket contact members 6 are secured to and insulated from the disk 3 which is provided with a plurality of holes to receive them. Each of the contact members 6 comprises a body member having a flange 8 and a screw-threaded projection 9 and is secured to the disk 3 as follows: An insulating washer 10 is fitted upon the body member and rests against the flange 8, the projection 9 is then thrust through one of the holes in the disk, which is materially larger in diameter than the body member, another insulating washer 11 is then fitted upon the body member on the other side of the disk 3 and the two insulating washers are clamped against the disk by means of the flange 8, a metal washer 12 and nuts 13, the latter being screwed upon the outer end of the projection 9. The washers 10 and 11 are adapted to fit into rabbets or grooves in the opposite sides of the disk 3, as clearly shown in Fig. 1 of the drawings.

The plug contact members 7 are adapted

to cooperate with the socket members 6 in the usual manner and are secured to and insulated from the disk 4 in the same way that the socket members are arranged relative to the disk 3. The disk 3 is held in position within the shell 1 by means of screws 12^a, the heads of which are relatively prominent and constitute short outwardly extending projections on the surface of the shell.

The intermediate sleeve 4^a is fitted upon the shell 2, to which it is secured, and is provided with notches 14^a (see Fig. 17) which are adapted to engage the heads of the screws 12^a. The notches thus accentuate the various positions of the switch, relieve the cooperating contact members from strains and guide the two parts of the device together.

The outer sleeve 5 is fitted over the sleeve 4^a and both of these parts, together with the disk 4, are secured to the shell 2 by means of screws 15^a. The outer edge of the sleeve 5 has a flange 16^a which holds a steel, or other hard metal ring 17^a in position. The ring 17^a is loosely fitted over the shell 1 and engages the screw heads 12^a when the parts are partially separated, as shown in Fig. 2. The parts are thus prevented from becoming entirely separated and, since the ring is hard and is allowed to rotatively adjust itself, there is no tendency for the screw heads to wear it unevenly and interfere with the normal adjustments of the disks. In this position, the parts may be rotatively adjusted from one position to another since the screw heads 12^a are separated from the notches 14^a and the plug and socket contact members are disengaged.

The sleeves 4^a and 5 extend over the adjacent end of the shell 1 and serve to guide the two parts as the plugs and sockets are moved into and out of engagement with each other. The plugs and sockets are symmetrically arranged on the disk in order that the two groups may readily be brought into engagement with each other in various positions, as hereinafter pointed out. The operative positions are indicated by means of a mark or arrow 13^a on the sleeve 5 and a series of marks or notations 14 on the shell 1. When the regulator is to be used with electric heating apparatus, the notations High, Low, Med. and Off, shown in Figs. 2 and 4 of the drawings, may be employed and, when the arrow 13^a is opposite notation "High", the circuit connections are such as to produce a relatively high heat, the other positions being similarly indicative of the results to be obtained.

The inner ends of the shells 1 and 2 are provided, respectively, with cooperating projections 15 and notches 16 which supplement the notches and screw heads and the sockets and plugs in insuring a proper cooperative relation of the parts. One of the projections

15 on each of the shells is slightly longer than the others, and they are so placed that they come into engagement with each other in the "off" position and prevent the continuous rotary adjustment of one part relative to the other. This feature is particularly important as a means for preventing rupture of the circuit leads due to twisting.

Reference will now be had to the diagrams of Figs. 5 to 8, in which the circuit connections for the various switch positions are disclosed. Assuming that *xy* is a supply circuit and that 17 is the resistance element of an electric heater, if *a*, *b*, *c* and *d* represent the plug contact members 7 and that *e*, *f*, *g* and *h* represent the socket contact members 6, when the members *e*, *f*, *g* and *h* are respectively brought into engagement with the members *a*, *b*, *c* and *d*, the circuit connections are established from line conductor *x* through members *g* and *e* to the middle point in the resistance 17, the circuit being completed through the two halves of the resistance in parallel, through members *c* and *e*, and members *d* and *h* to the line conductor *y*, members *e* and *h* being joined together as shown in Fig. 4 of the drawings. Obviously, under these conditions the effective resistance in the circuit is minimum and the amount of current taken from a constant potential source of energy and the amount of heat produced will be maximum.

Referring to Fig. 6 if members *f*, *g*, *h* and *e* respectively engage members *a*, *b*, *c* and *d* no circuit connections are established, since member *b* is dead. This represents the "off" position of the switch.

Referring to Fig. 7, if members *g*, *h*, *e*, and *f* are respectively connected to members *a*, *b*, *c* and *d*, circuit is established from conductor *x* through members *g* and *a* and one-half of the resistance 17 to member *c*, from which point circuit is completed through member *e* to the conductor *y*. As shown in Fig. 8, when members *h*, *e*, *f* and *g* are respectively connected to members *a*, *b*, *c* and *d*, circuit is established from conductor *x* through member *g* and member *d*, the entire resistance 17, members *a* and *h* to the conductor *y*. It is evident that the resistance is maximum in Fig. 8, is medium in Fig. 7 and is minimum in Fig. 5, consequently, these diagrams are respectively marked Low, Med. and High, with reference to the heat produced.

The structural details of the switch as regards the circuit connections, the number and arrangement of the plugs and sockets, etc., may be modified to suit varying service conditions within the scope of our invention as set forth in the appended claims.

We claim as our invention:

1. A circuit regulating device comprising telescoping cylindrical shells adapted for relative longitudinal and rotative move-

ments, transverse plates secured within the shells, and cooperating socket and plug contact members respectively secured to and insulated from the transverse plates, said shells having cooperating stops for limiting the relative longitudinal movement and for limiting rotative movements to one rotation.

2. A circuit regulating device comprising a pair of telescoping shells adapted for relative longitudinal and rotative movements, transverse plates secured within the shells and two corresponding groups of socket and plug contact members respectively secured to and insulated from the transverse plates, said shells having cooperating stops for limiting the relative longitudinal movement and for limiting the rotative movements to one rotation.

3. A circuit regulating device comprising a pair of telescoping shells adapted for relative longitudinal and rotative movements, transverse plates secured within the shells and two corresponding groups of socket and plug contact members respectively secured to and insulated from the transverse plates, said contact members being arranged at the corners of an equilateral polygon, whereby the two sets may be brought into engagement with each other in various positions, and said shells being provided with cooperating stops for limiting the relative longitudinal movement and for limiting rotative movements to one rotation.

4. In a plug switch, the combination with two telescoping members having cooperating plug and socket contact members, of outwardly extending projections on one of the members, an inwardly extending flange at one end of the other member and a ring located between the flange and the projections for preventing the separation of the members.

5. In a plug switch, the combination with two telescoping members having cooperating plug and socket contact members adapted to engage each other in various relations, of cooperating projections and an interposed steel ring for engaging said projections to prevent the complete separation of the members without interfering with their rotative adjustment.

6. In a plug switch, the combination with two telescoping shell members adapted for relative longitudinal and rotative movement and having inclosed cooperating plug and socket contact members, of means for preventing the complete separation of the shell members and means for limiting the rotative adjustment thereof relative to each other.

7. In a plug switch, the combination of two telescoping shell members adapted for relative longitudinal and rotative movement and having inclosed cooperating plug and socket contact members, of means for preventing the complete separation of the shell

members and stops for limiting the relative rotative adjustment thereof to one revolution.

8. In a plug switch, the combination with two telescoping shells and cooperating contact members, of projections extending outwardly from the inner shell, a ring surrounding said shell adjacent to the projections, and means for limiting the rotative adjustment of the members, said outer shell being flanged to prevent the shells from being completely separated.

9. A circuit regulating device comprising telescoping cylindrical shells adapted for relative longitudinal and rotative movements and having cooperating stops for limiting said movements, transverse plates secured within the shells, and cooperating socket and plug contact members respectively secured to and insulated from the transverse plates, each of said shells being partially closed at its outer end and provided with a small opening therein through which electric line conductors may extend to the terminal members within.

10. A circuit regulating device comprising a pair of cylindrical shells having a plurality of complementary projections and notches in their adjacent ends, one projection of each shell being materially longer than the others, transverse plates secured within the shells, cooperating socket and plug contact terminals respectively secured to and insulated from the transverse plates, means for holding the shells in axial alignment, and means for limiting the relative longitudinal movement of the shells, the relative rotative movement of the shells being limited by the engagement of said relatively long shell projections.

11. A circuit regulating device comprising a pair of cylindrical shells having a plurality of complementary projections and notches in their adjacent ends and one of them being provided with a plurality of lateral projections, transverse plates secured within the shells, cooperating socket and plug contact terminals respectively secured to and insulated from the transverse plates, an intermediate sleeve secured to one of said shells to project beyond its notched end and provided with end notches to engage the lateral projections of the other shell, the cooperating shell projections and notches being arranged to guide the contact terminals into engagement with each other in any one of a plurality of different relations.

12. A circuit regulating device comprising a pair of cylindrical shells having a plurality of complementary projections and notches in their adjacent ends and one of them being provided with a plurality of lateral projections, transverse plates secured within the shells, cooperating socket and plug contact terminals respectively secured

to and insulated from the transverse plates, an intermediate sleeve secured to one of the shells to project beyond its notched end and provided with end notches to engage the lateral projections of the other shell, and means for preventing the separation of the shells.

13. A circuit regulating device comprising a pair of cylindrical shells having a plurality of complementary projections and notches in their adjacent ends and one of them having a plurality of lateral projections, transverse plates secured within the shells, cooperating socket and plug contact terminals respectively secured to and insulated from the transverse plates, an intermediate sleeve secured to one of the shells to project beyond its notched end and having end notches to engage the lateral projections of the other shell, an outer sleeve so secured to the intermediate sleeve and the shell to which it pertains as to extend beyond the lateral projections on the other shell and having an inwardly projecting flange at its outer end to prevent the separation of the shells.

14. A circuit regulating device comprising a pair of cylindrical shells having a plu-

rality of complementary projections and notches in their adjacent ends and one of them having a plurality of lateral projections, transverse plates secured within the shells, cooperating socket and plug contact terminals respectively secured to and insulated from the transverse plates, an intermediate sleeve secured to one of the shells to project beyond its notched end and having end notches to engage the lateral projections of the other shell, an outer sleeve so secured to the intermediate sleeve and the shell to which it pertains as to extend beyond the lateral projections on the other shell and having an inwardly projecting flange at its outer end, and a ring located between the flange and the lateral projections for preventing the separation of the shells.

In testimony whereof, we have hereunto subscribed our names this 5th day of Feb., 1910.

WILLIAM S. HADAWAY, JR.
EDWARD E. ROSE.

Witnesses:

FRANK THORNTON, Jr.,
B. B. HINES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."