Jan. 25, 1927. 1,615,726

W. ROW

ELECTRICAL PLUG SWITCH

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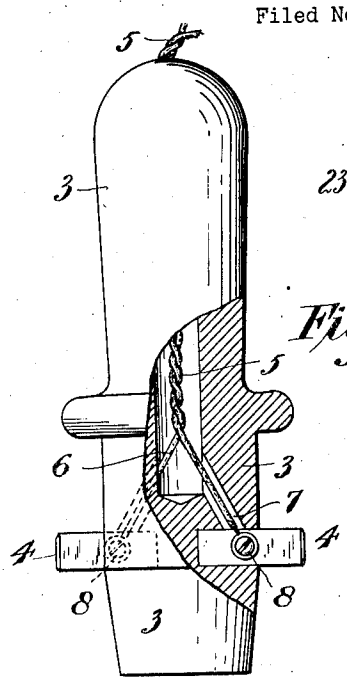


Fig. 2.

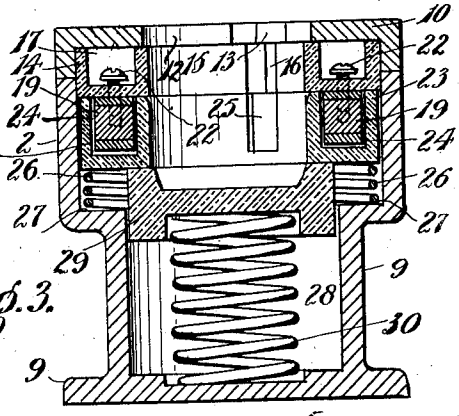


Fig. 3.

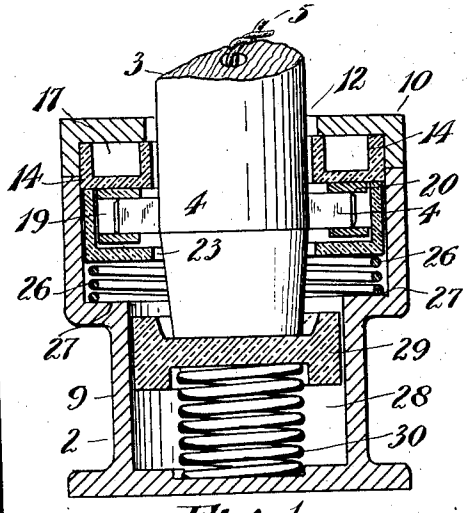


Fig. 1.

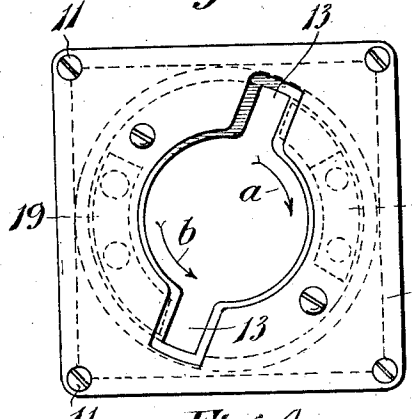


Fig. 4.

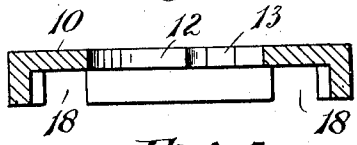


Fig. 5.

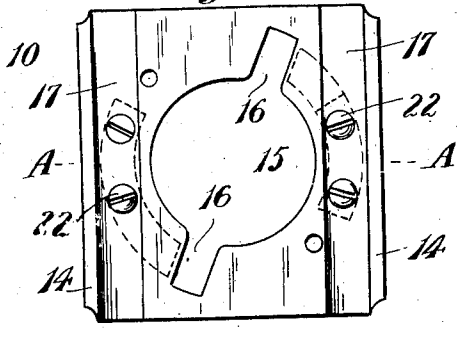


Fig. 6.

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ELECTRICAL PLUG SWITCH

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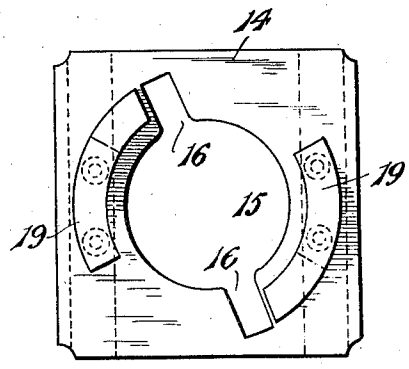


Fig. 7.

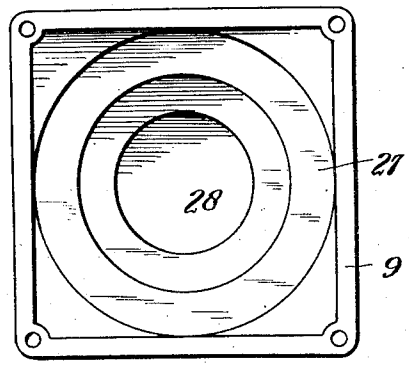


Fig. 11.

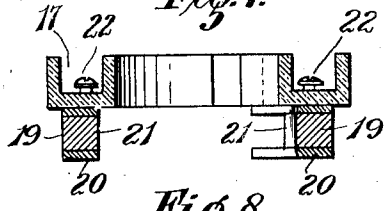


Fig. 8.

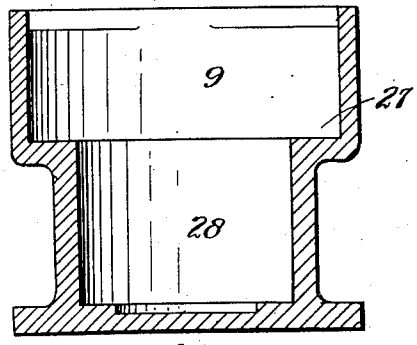


Fig. 12.

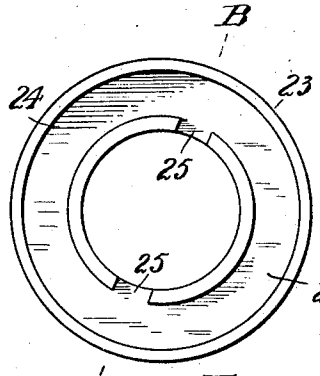


Fig. 9.

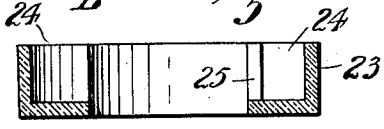


Fig. 10.

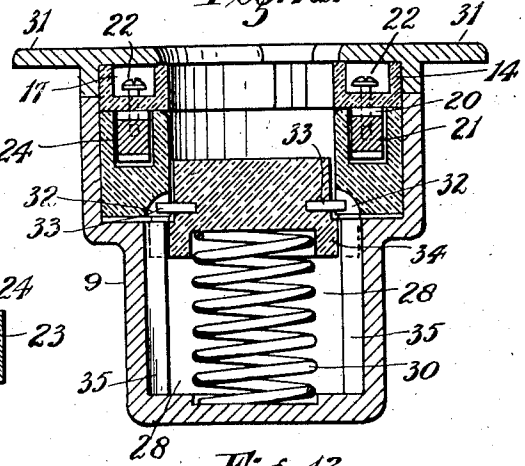


Fig. 13.

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Patented Jan. 25, 1927. 1,615,726

UNITED STATES PATENT OFFICE.

WILLIAM ROW, OF MELBOURNE, VICTORIA, AUSTRALIA.

ELECTRICAL PLUG SWITCH.

Application filed November 2, 1925, Serial No. 66,372, and in Australia November 13, 1924.

This invention relates to improvements in electrical plug-switches and particularly to plug switches of the type used in theatres and concert halls for rapidly switching various stage lighting circuits into use or for quickly changing over to different lighting circuits to obtain varying stage lighting effects.

One object of the invention is to provide a plug switch in which the plug when inserted into the socket is firmly retained or locked against accidental dislodgment and wherein the live contacts are completely enclosed and protected, thus preventing any possibility of fire or of damage being caused to the costumes of the performers and to stage properties.

A plug switch according to the invention comprises a socket and a plug, the plug being adapted for insertion into the socket and for rotatable movement therein. The plug has two contact studs which are connected to the stage lighting circuit or other circuit to be controlled, while the socket is formed with gaps through which said contact studs are passed when the plug is being inserted.

Fitted interiorly of the socket are contacts preferably of the spring type which are normally covered by a protective ring of insulating material to prevent arcing. This ring it rotatable and it has gaps to receive the contact studs on the plug so that when said plug is rotated within the socket to bring its contact studs into engagement with the socket contacts, said ring is simultaneously rotated to uncover said socket contacts, and when said plug is rotated to disengage its contact studs from the socket contacts said ring is also rotated to cover said socket contacts.

Suitable springs may be provided for pressing the protective ring over the socket contacts and also for quickly ejecting the plug from the socket when switching off.

The invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a sectional view of the improved plug switch showing the plug inserted into the socket.

Figure 2 is an elevational view partly in section of the plug removed from the switch.

Figure 3 is a sectional view of the socket.

Figure 4 is a plan view of Figure 3.

Figure 5 is a sectional view of the socket cover.

Figure 6 is a plan view of an insulating block forming part of the socket to which the spring contacts are secured.

Figure 7 is an underside plan view of Figure 6.

Figure 8 is a sectional view on line A—A of Figure 6.

Figure 9 is a plan view of the protective ring for covering the socket contacts.

Figure 10 is a sectional view on line B—B of Figure 9.

Figure 11 is a plan view of the socket casing.

Figure 12 is a sectional view of Figure 11.

Figure 13 is a sectional view of a modified construction of plug switch included in the invention.

The improved plug switch illustrated in these views comprises a socket 2 and a plug 3, said plug being adapted for insertion into the socket and for rotatable movement therein. The plug 3 is preferably formed of wood and it has two laterally projecting contact studs 4, which are oppositely arranged and are connected by wires 5 to the stage lighting circuit or other circuit to be controlled. The wires 5 pass through an axial passage 6 formed in the plug and then through inclined passages 7, being connected to the contact studs 4 by terminal screws 8, see Figure 2.

The socket member 2 of the plug switch comprises a casing 9 formed preferably of metal having a cover 10 which is detachably secured in position by screws 11. Formed in the cover 10 is a hole 12 through which the plug 3 is inserted. This hole has oppositely arranged gaps 13 through which the contact studs 4 are passed during the insertion of the plug.

Secured to the undersurface of the cover 10 is an insulating block 14 of square shape having a central hole 15 to receive the plug 3 and gaps 16 for the lateral contact studs 4. Formed on the upper surface of said insulating block are channels 17 through which power cables (not shown) are passed. Apertures 18 are formed in the ends of the cover 10 in register with the ends of the channels 17, so that the power cables connected to one plug switch can be extended and connected to adjacent plug switches.

Secured to the undersurface of the insulating block 14 are two arcuately shaped contacts 19, each of which comprises two spring plates 20 and a spacing block 21 secured be-

tween said plates. The contacts 19 are arranged directly beneath the channels 17 and the ends of their spring plates 20 lie adjacent to the gaps 16, see Figure 7.

The contacts 19 are secured in position by screws 22 which pass through the block 14 and are connected to the power cables in the channels 17. Arranged beneath the insulating block 14 is a protective ring 23 formed of insulating material which is formed having a deep annular groove 24 to accommodate the contacts 19. The ring 23 is rotatable within the casing 9 and it has gaps 25 formed in the interior wall of its groove 24 to receive the contact studs 4 when the plug is inserted into the socket.

A coil spring 26 is fitted in the casing 9 and it has one end bearing against a shoulder 27 formed on said casing and its opposite end bearing against the lower surface of the protective ring 23. This spring causes said protective ring 23 to be firmly pressed against the insulating block 14 thus covering the live contacts 19.

The lower end of the socket casing 9 is shaped to form a cylindrical chamber 28 wherein a block 29 is slidably mounted. A coiled spring 30 is fitted in said chamber and it bears against the lower end of the block 29 serving to normally maintain said block firmly pressed against the undersurface of the protective ring 23—see Figure 3.

In use, the power leads are passed through the channels 17 in the insulating block 14 and are electrically connected to the spring contacts 19 of the socket by the screws 22 while the wires 5 from the stage lighting circuit or other circuit to be controlled are connected to the contact studs 4 of the plug 3 by the terminal screws 8.

When switching-on, the plug 3 is inserted into the socket 2 through the hole 12 so that the contact studs 4 pass through the gaps 13, and the plug is then pressed inwardly against the block 29 to depress said block against the action of its coiled spring 30. As the plug 3 is inwardly pressed the contact studs 4 pass through the gaps 16 in the insulating block 14 and engage the gaps 25 in the wall of the protective ring 23. The plug is then rotated in the direction indicated by the arrow *a* in Figure 4 causing the lateral contact studs 4 to rotate the protective ring 23 and also causing said studs to pass between and engage the spring plates 20 of the contacts 19.

Electrical contact is thus made between the contact studs 4 on the plug and the contacts 19 on the socket, so that the wires 5 from the stage lighting circuit are connected to the power cables. The degree to which the plug 3 can be rotated within the socket 2 is limited by the engagement of the studs 4 with the spacing blocks 21 of the contacts 19.

Where switching-off, the plug 3 is rotated in the direction of the arrow *b* in Figure 4, thus rotating the protective ring 23 and disengaging the contact studs 4 from the contacts 19 to interrupt the circuit. The ring 23 while being rotated covers the contacts 19 so that any arcing which may take place is damped and cannot escape from the switch. By this means any possibility of fire or of damage being caused to the costumes of the performers and to stage properties is prevented.

Immediately the contact studs 4 on the plug come into alignment with the gaps 16 in the insulating block 14, the spring pressed block 29 causes the plug to be quickly ejected thus reducing to a minimum any arcing between the contacts 19 and the contact studs 4.

As the live contacts 19 are completely enclosed and protected, the possibility of a performer receiving a shock by contacting with the switch is prevented. Furthermore, as the plug 3 requires to be rotated before it can be withdrawn from the socket 2, accidental dislodgment of the plug by a performer is obviated.

When plug switches of the construction shown in Figures 1 to 12 are used for stage lighting they are preferably mounted on a suitable switchboard positioned beneath the stage floor, so that the wires 5 from the plugs will not interfere with the performers on the stage.

According to the modified construction illustrated in Figure 13, the socket casing 9 is designed to enable the plug switch to be recessed or fitted directly into the stage floor. In this form of the invention, an outward flange 31 is formed horizontally on the socket cover 10 to permit the attachment of the plug switch to the stage floor, and small slots 32 are provided on the lower surface of the protective ring 23 to receive pins 33 fitted to the spring pressed block 29. These slots and pins prevent the protective ring 23 from being rotated until the block 29 has been depressed against its spring 30. Thus the contacts cannot be uncovered, nor can the plug 3 be rotated until said plug has been inserted into the socket 2 to a required distance. Guide ribs 34 are formed on the wall of the chamber 28 and grooves 35 are formed in the block 29 to accommodate said ribs and prevent said block being displaced in such manner that the pins 33 will not engage the slots 32.

The invention is not limited solely to plug switches intended for controlling stage lighting circuits, as it can be applied with equal facility to plug switches intended for use with electric irons, and other electrical appliances or apparatus.

What I do claim is:—

1. A socket, an aperture in said socket to receive a plug, gaps in said socket providing

clearance for the contact studs of such plug, contacts fitted interiorly of said socket and arranged to be engaged by the contact studs of the plug, and a protective insulating member within said socket and rotatable by turning movement of the plug to cover or uncover the socket contacts.

2. A socket, an insulating block in said socket, an aperture in said block to accommodate a plug, gaps in said block providing clearance for the contact studs of the plug, contacts fitted to said block and arranged for engagement by the plug contact studs, and a protective insulating member in abutment with said insulating block and adapted to be rotated by turning movement of the plug to cover or uncover the socket contacts.

3. A socket according to claim 1, wherein a spring-pressed block is provided in the socket to bear against the end of the plug and eject same when switching off.

4. A socket according to claim 1, wherein each of the contacts in the socket consists of two spring plates spaced apart by a spacing block.

5. A socket according to claim 2, wherein the protective insulating member has an annular groove to accommodate the socket contacts, and gaps to receive the contact studs of the plug.

6. A socket according to claim 2, wherein a spring is provided to maintain the protective insulating member in clamping abutment with the insulating block.

7. A socket, an aperture in said socket to receive the plug, gaps in said socket providing clearance for the contact studs, contacts fitted interiorly of said socket and arranged for engagement by the contact studs of the plug, a protective insulating member normally covering the socket contacts and rotatable to uncover the same, a spring-pressed block in the socket bearing against the plug, and means for restraining said protective member against rotation until depression of said spring-pressed block.

8. A socket according to claim 7, wherein pins are provided on the spring-pressed block to engage slots in the protective insulating member and prevent rotation of said protective member until the said block is depressed.

In testimony whereof I affix my signature.

WILLIAM ROW.