

Feb. 11, 1947.

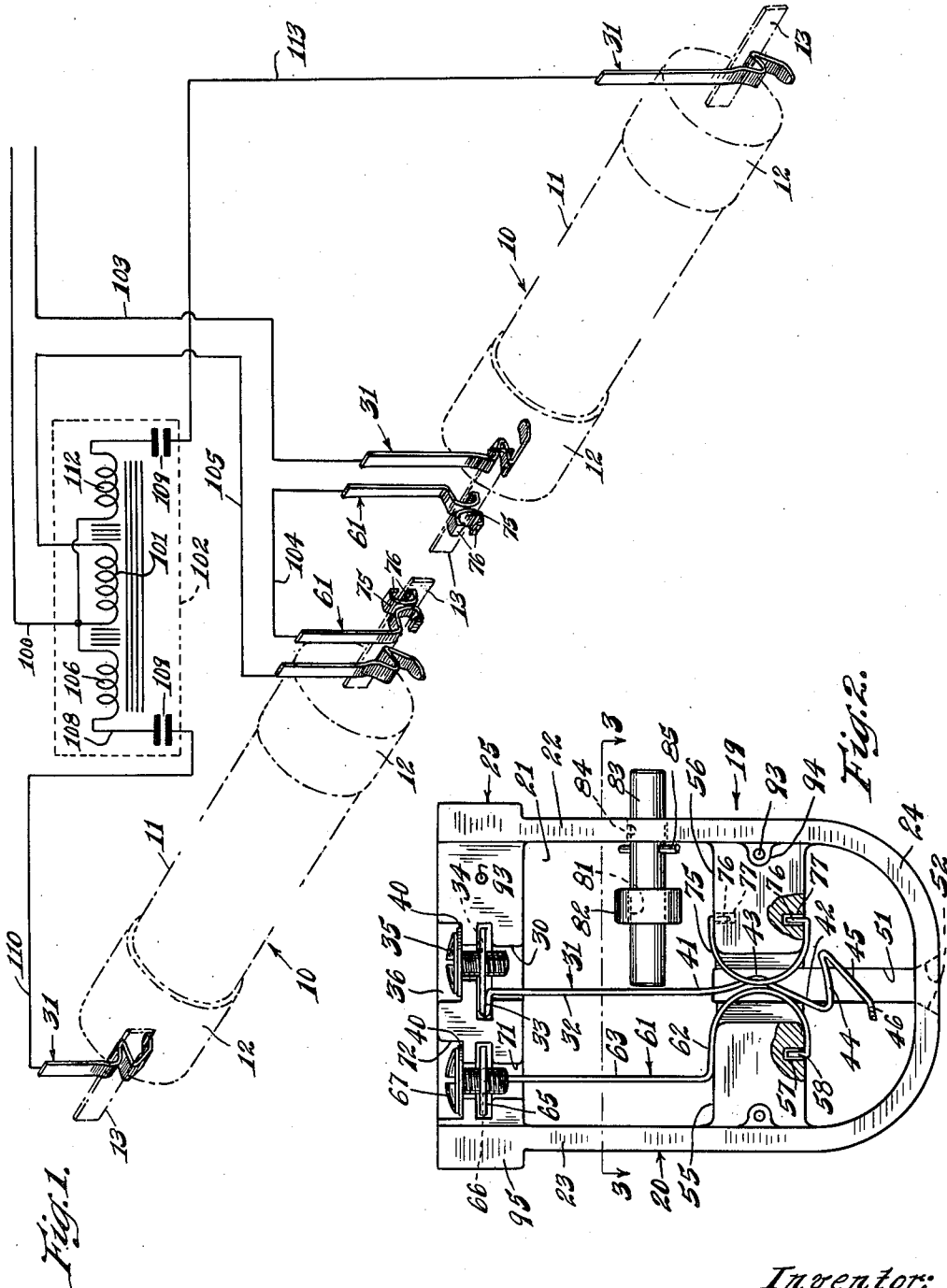
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2,415,496

ELECTRICAL RECEPTACLE

Filed Nov. 22, 1944

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

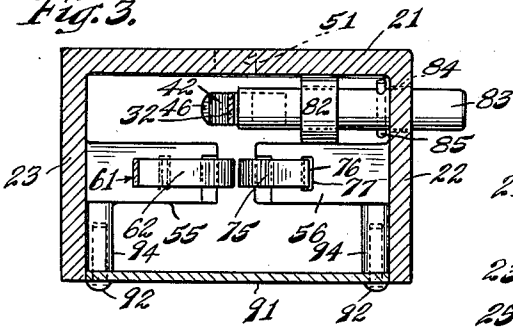


Fig. 6.

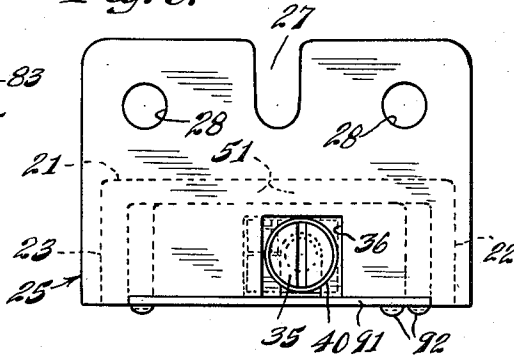


Fig. 4.

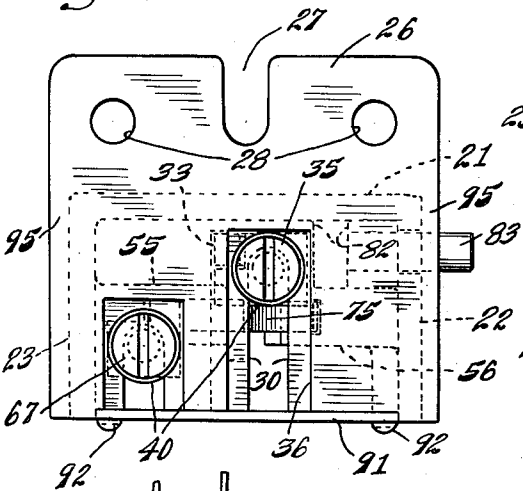


Fig. 5.

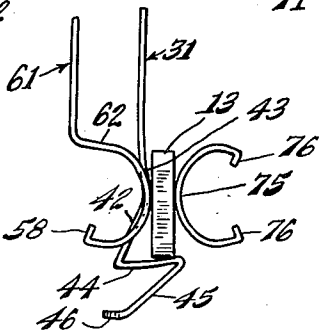
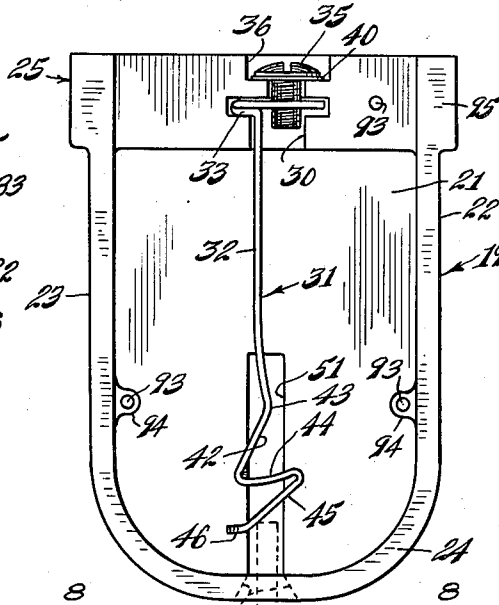


Fig. 7.

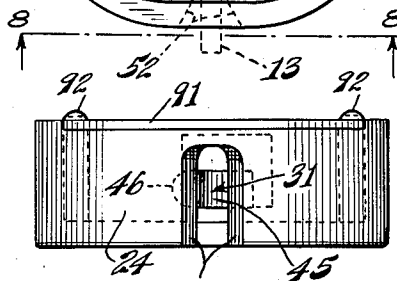


Fig. 8.

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UNITED STATES PATENT OFFICE

2,415,496

ELECTRICAL RECEPTACLE

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5 Claims. (Cl. 200—51)

1

This invention relates to an electrical receptacle and more particularly to a receptacle intended for use with lamps of the tubular type operable at relatively high voltages.

The invention is particularly applicable to the so-called cold cathode lamp which is a development combining certain features of the luminous type of lamp with the more recent fluorescent lamp. Such lamps may be connected for energization in various types of circuits but it will be apprehended from what follows that the invention is equally applicable to receptacles for single lamps or to two or more lamps connected in series, in parallel, in series-parallel, or in separate circuits.

Certain types of luminous tubes of the type just described usually are operated at voltages within a range of from approximately 600 volts to approximately 1000 volts and for that reason such units are classed as high voltage equipment. Accordingly, when used for lighting purposes it is essential that some means be provided to prevent a person handling the lamps from being accidentally subjected to a severe electric shock. Suitably high voltage, as referred to, is generally derived by inserting a step-up transformer in the usual mains, e. g., 110 volts A. C. or 220 volts A. C., and feeding the lamp from the secondary side at the required voltage, for example, 600 to 1000 volts, depending upon the size of the lamp and its characteristics. The transformer may be of the type having separate primary and secondary windings or it may be of the auto-transformer type, for example, as shown and described in United States Letters Patent No. 2,346,621, granted on April 11, 1944, to Joseph G. Sola.

When a lamp is withdrawn from its receptacles for cleaning or replacement, safety measures dictate that some means must be provided for interrupting the circuit feeding the primary of the transformer, and preferably such means should be automatic in operation, that is to say, the interruption should be without the necessity of conscious thought in that direction by the worker and should occur prior to or simultaneously with the withdrawal of a lamp from its receptacles. In that manner the receptacles and their appurtenant parts are rendered electrically "dead" and the operator may do whatever is necessary on and about the lamps with perfect safety.

Tubular lamps of the type for which the invention is particularly adapted are usually provided with a prong at each end for making contact with the receptacle, and the description to follow will

2

include as preferred embodiments two types of receptacle for a lamp having a single prong of thin, flat form. However it will be understood that the invention is equally applicable to other forms of prong and even to lamps having a plurality of prongs at each end thereof.

With the foregoing in view, the principal object of my invention is to provide a receptacle in which one end of a tubular lamp may be received and supported during its normal operation, and so adapted that upon the withdrawal of a lamp the circuit supplying current thereto is automatically interrupted, i. e., without the need of any separate operation by the attendant, for example, the opening of a line switch.

Because of the fact that in practice it is common to connect a unit of lamps, for example, two thereof in parallel to an auto-transformer individual to such pair, I attain the desired object of breaking the circuit in the receptacle by connecting the latter in such manner that current flows from one side of the main line through contacts within the receptacle and then returned to that side of the line, and further by arranging said contacts in such manner that the prong on the lamp serves to complete the circuit within the receptacle.

Accordingly, an additional object is to provide a receptacle having means to receive a prong on the end of the lamp and so arranged that when the lamp is inserted in the two receptacles provided therefor it is secured against accidental dislodgement, as by vibration, while securing an effective contact between the prong on the end of the lamp and the contact or contacts within the receptacle.

Still another object is to provide a receptacle of the type described having a member to engage the prong on the end of the lamp so formed and arranged that the prong may be engaged thereby by a simple manual movement not requiring the use of tools.

A further object is to provide circuit-breaking means within the receptacle which may be operated by manual pressure on a button, the said operation breaking the circuit established within the receptacle and simultaneously releasing the lamp for withdrawal.

Inasmuch as a lamp of the tubular type requires a receptacle at each end for proper support and admission of current thereto and, furthermore, since the circuit-breaking function need be performed by only one of the two receptacles, it is desirable to simplify manufacturing

problems by making the two different receptacles as nearly alike as possible.

For that reason another object is to provide two different constructions of receptacle, similar in function in some respects, so adapted and arranged as to employ certain parts in common. Thus the manufacture of an unnecessary multiplicity of different parts is successfully avoided and the cost of the article correspondingly reduced.

With the above and other objects which will appear hereinafter in view, I have described and shown in the appended drawings one preferred embodiment of each of the two types of receptacles comprising the invention.

In the drawings:

Fig. 1 is an isometric diagrammatic view of a typical circuit and assembly pertinent to a pair of lamps connected in parallel;

Fig. 2 is a rear elevational view of one form of receptacle with the cover removed to reveal the parts therein;

Fig. 3 is a cross sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of the receptacle shown in Fig. 2;

Fig. 5 shows a rear elevational view of the other form of receptacle with the cover removed;

Fig. 6 is a plan view of the receptacle shown in Fig. 5;

Fig. 7 is a fragmentary view of the prong-contacting and retaining members of the embodiment of Fig. 2 with certain parts omitted for clarity; and

Fig. 8 is a view looking in the direction of the line 8—8 of Fig. 5.

Adverting first to Fig. 1, there are shown at 10 two tubular lamps of the type to which the invention is adapted. These comprise the usual cylindrical glass envelope 11 including the necessary cathode and gases for the glow discharge and coated on its inner surface with a suitable phosphor to yield the desired fluorescence. Affixed to each end of the lamp 10 by a suitable basing compound are the caps 12 of cupped formation each provided with an axially extending prong 13 centrally disposed with respect thereto. Although the prongs 13 are shown as of relatively thin, flat form, it will be comprehended that these may be of circular or other transverse cross section. As will appear, the essence of the invention to be disclosed herein will be equally adaptable to lamps having prongs of types other than that depicted, only certain changes in the dimensions or proportions of the receptacle being necessary to accommodate the same.

Two similar types of receptacles will be described, one for one end of the lamp for simple reception thereof and current supply thereto, and the other associated with the opposite end of the lamp not only for those purposes but to break the circuit feeding the transformer as aforesaid. The first-mentioned type will sometimes for convenience be referred to herein as the "single-contact" receptacle and the other as the "double-contact" receptacle.

In Fig. 2 I have shown a view of the double-contact receptacle with the back cover removed. This comprises a box-like casing 19 of electrical insulating material, e. g., molded plastic composition and having a body 20 comprising a thin front wall 21, thin edge walls 22 and 23 and a thin substantially semi-circular bottom wall 24. Surmounting the body is the mounting portion 25 which is of relatively thicker cross section than

the walls and extends beyond the body 20 proper, as more clearly shown in Fig. 4, to form a mounting projection 26. The projection 26 is provided with a central U-shaped slot 27, by means of which the receptacle is properly aligned on the lamp mounting in the usual manner, and with a pair of holes 28 for receiving the bolts by which the receptacle is supported. If desired, the mounting portion 25 may overhang the body 20, as shown at 29, whereby the receptacle may be inserted through a rectangular hole in the lamp support, as is well known in connection with sockets for fluorescent lamps generally.

Carried in a suitably shaped aperture 30 in the mounting portion 25 is the combined contact and retaining member or tongue 31 of relatively thin, narrow cross-section and of resilient material, for example, phosphor bronze or beryllium copper, comprising a straight shank portion 32 widened near its upper extremity and bent upon itself, as at 33, to form a lug having a threaded aperture 34 for the reception of the terminal screw 35. It will be noted that the terminal screw is received in an undercut portion 36 of the base 25 in order that the terminal screw and wire connected thereunder may not project beyond the upper surface of the base, thereby permitting the necessary flush condition for mounting of the receptacle. Toward its lower end, the tongue 31 is curved slightly outwardly, as at 41, and then returned, as at 42, to form a knee 43. It is bent further beyond the knee into an upward inclination 44 to form an acute angle and then back also at an angle to the axis of the tongue to form a cam surface 45 terminating in a tail 46.

It will be noted that the axis of the tongue 32 is substantially coincident with the vertical center line of the body 20 and that beginning substantially opposite the bend 41 there is provided a slot 51 cut into both the front wall 21 and the bottom wall 24. The entering portion of the slot 51, i. e., where cut into the bottom wall 24, is tapered outwardly, as indicated at 52, to facilitate the entry of the prong 13 into the receptacle.

Outstanding from the edge walls 22 and 23 and extending into the interior of the receptacle are the two integrally formed projections 55 and 56 (Figs. 2 and 3). The projection 55 is provided on its under-surface with a recess 57 adapted to receive the upwardly bent terminus 58 of the resilient contact member 61 of thin, relatively narrow cross section and comprises a substantially semi-circular lower portion 62, a straight shank 63 and a suitably formed upper end 65, provided with a threaded aperture 66 for the reception of the other terminal screw 67. Apertures 71 and 72 serve the tongue 61 in the same manner as the corresponding elements 30 and 36 described in connection with the tongue 31. The usual washers 40 are provided underneath the terminal screws 35 and 67.

Opposite to, and in alignment with, the tongue 61 is the resilient member 75, also substantially semi-circular in form and provided with two ears 76 adapted to be received in apertures 77 in the projection 56.

At this point it will be understood from the foregoing and particularly from Figs. 2 and 3 that the tongues 32 and 61 as well as the member 75 are preferably of the same material and of relatively thin, narrow cross section not only for economy in manufacture but to support the lamp and yield the required resiliency consist-

ent with the pressure necessary for appropriate electrical contact.

Slidably supported in an aperture 81 passing through an integral lug 82 in the wall 21 and also in an aperture 84 in the wall 22 is the button 83 of electrical insulating material. The button 83 may be cylindrical, or of other suitable form, and extends a short distance externally of the casing 19. At its inner end the button 83 is adapted to abut the shank 32 of the tongue 31. After assembly of the button 83 with the receptacle a pin 85 may be driven therethrough to retain the same against accidental dislodgment.

To conceal and protect the working parts of the receptacle there is provided a cover 91 (Fig. 4) received within the walls 22, 23 and 24 and retained in position by escutcheon pins 92. The latter may be driven into holes 93 formed in lugs 94 integrally formed with the walls 22 and 23 and in a like hole formed in the mounting portion 25.

The other form of the invention, namely, the single-contact type is depicted in Figs. 5, 6 and 8 and parts similar to those described in connection with the first embodiment are given like reference numerals. It will be noted that the essential difference between the two embodiments is the omission in the single-contact type of the tongue 61, member 75, button 83 and their associated supports.

As employed in connection with a lamp of the type illustrated in Fig. 1, the invention would function as follows:

Assuming that the receptacles are mounted on the lamp housing by means of bolts passed through the openings 28 so that a single-contact receptacle is disposed at one end of a lamp and a double-contact receptacle at the opposite end and positioned with the slots 51 facing each other for proper reception of the prongs 13, a lamp would be installed by raising it vertically so that the prongs 13 enter the slots 52 and 51 individual to each receptacle. These prongs will first engage the camming portion 45 of the tongue 32 individual to each receptacle and displace it to one side (Fig. 5). Further movement upwardly will cause the prongs 13 to pass beyond the corner where portion 44 meets portion 45, whereupon the tongues 31 are, due to their inherent resiliency, permitted to spring back to substantially their normal position to carry the portion 44 underneath the lower edge of the prong 13 (Fig. 7). When such engagement has been made it will be noted that the portions 44 effectively maintain the lamp in the desired vertical position and the knee 43 makes effective additional contact with one side face of the prong 13.

At the same time a further engagement takes place, but only in connection with the double-contact receptacle, namely, the prong 13 is wedged between the curved portion 62 of tongue 61 and the correspondingly curved member 75 (Fig. 7). As a result of this last-described engagement the prong 13 will form an electrical circuit between the tongues 31 and 61, most clearly seen in Fig. 1.

Referring to that figure, it will be noted that one side of the main line is connected through conductor 100 to the primary winding 101 of the auto-transformer 102, for example of the type shown and described in U. S. Patent No. 2,346,621 hereinbefore referred to. The other side of the mains is connected through a conductor 103 to a tongue 31 of one double-contact receptacle, thence through the associated prong 13 to the

tongue 61 of that receptacle. The circuit is continued through a conductor 104 to the tongue 61 of the adjacent double-receptacle, through the prong 13 engaged therewith and the tongue 31, through a conductor 105 leading to the other side of the primary 101 of the transformer. One secondary winding 106 of the transformer is connected through a conductor 108 to a condenser 109 and thence through a conductor 110 to the tongue 31 of the single-contact receptacle at the other end of the left-hand lamp. The other secondary winding 112 is similarly connected through a condenser 109 and conductor 113 to the tongue 32 of the remaining single-contact receptacle.

Assuming that the lamps are in position, a circuit may be traced from conductor 100 through the primary 101 through the conductor 105, tongue 31, prong 13, tongue 61, conductor 104, tongue 61, prong 13, tongue 31, and conductor 103 to the mains. Thus the primary of the transformer will receive current and since the secondary windings 106 and 112 are connected in auto-transformer relation with the primary winding with their respective end terminals connected to the two single-contact receptacles through the conductors 110 and 113, and the double-contact receptacles are connected to the primary 101, each of the lamps is energized from one of the secondary windings as disclosed particularly in Fig. 4 of said Patent No. 2,346,621.

To remove a lamp, the button 83 is pushed inwardly of the casing and against the tongue 31. This actuates the hooked portion 44 from beneath the prong 13 (Fig. 7) and the lamp may be removed by lowering that end thereof individual to the double-contact receptacle. Then, when the prong 13 is cleared outside of the slot 52 the lamp may be moved in the direction of its axis to withdraw the other prong 13 endwise through the slot 51 associated with the single-contact receptacle.

It will be noted that upon operation of the button 83 the knee 43 and hook 44 are separated from their contact with the prong 13 so that the circuit feeding the lamp is effectively interrupted before removal of the lamp is possible. Alternately, removal of the other lamp 10 will interrupt the circuit in the same manner. Thus, upon removal of either or both lamps the circuit to the transformer is completely interrupted and the lamp system is rendered completely safe.

Although the body of the two types of receptacles comprising my invention may be formed of various materials, I prefer, in accordance with modern practice, to mold them of plastic material having high electrical insulating properties.

Under such method of manufacture it is possible to insert the tongues 31 and 61 in the mold and to cause the plastic material to be molded therearound, or these may, as shown, be inserted in suitable apertures forming during the molding operation. A similar expedient may be employed in connection with the tongue 61 and member 75 where they engage the projections 55 and 56, respectively. In that event the recesses 57 and 77 need not be molded separately.

It will be comprehended that the members 61 and 75 may be combined into a single member appropriately formed to include two arcuate oppositely disposed resilient surfaces between which the prong 13 may be engaged.

While I have shown particular embodiments of my invention, it will be understood, of course, that I do not wish to be limited thereto since

many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A receptacle for an electrical device of the type having a prong to engage the receptacle, said prong being adapted to interrupt the circuit supplying current thereto when disengaged from said receptacle comprising in combination a body portion; a first contact member including a yieldable shank supported at one end on the said body portion, a hooked portion, and a cam portion angularly disposed with respect to said shank; a second contact member offset from said first contact member longitudinally of said prongs and including a yieldable prong engaging protuberance, said cam portion being adapted for camming action with respect to the prong upon insertion of the device in the receptacle, said hooked portion being adapted to receive and retain the prong and to make electrical contact therewith, and said protuberance being adapted to form an electrical contact with the prong, whereby the prong forms an electrical path between said members separate from the electrical path through said device.

2. A receptacle for an electrical device of the type having a prong to engage the receptacle, said prong being adapted to interrupt the circuit supplying current thereto when the device is withdrawn from the receptacle comprising in combination a body portion, a first contact member including a yieldable shank supported at one end on said body portion, a cam portion angularly disposed with respect to said shank, and a prong engaging portion intermediate said end and said cam portion, said prong engaging portion being constituted by deforming said member into an acutely angled offset, a second contact member offset from said first contact member longitudinally of said prongs and including a shank portion and a resilient prong engaging portion, said prong engaging portions of both members being adapted to form an electrical path with said prong in addition to the electric path through said device upon insertion of the device in the receptacle, and said members being electrically insulated one from another.

3. A receptacle for an electrical device of the type having a prong to engage the receptacle, said prong being adapted to interrupt the circuit supplying current thereto when the device is withdrawn from the receptacle comprising in combination a hollow, enclosed body portion; a first contact member including a yieldable shank supported at one end by and within said body portion, a cam portion angularly disposed with respect to said shank, and a prong engaging portion intermediate said end and said cam portion, said prong engaging portion being constituted by deforming said member into an acutely angled offset; a second contact member including a

shank portion and a resilient prong engaging portion, said prong engaging portions on said members being offset longitudinally of said prong to form an electrical path with said prong independent of the circuit through said device upon insertion of the device in the receptacle, said members being electrically insulated one from another, and a slot in at least one wall of the body portion to guide the prong into engagement with the said members.

4. A receptacle for an electrical device of the type having a prong to engage the receptacle comprising in combination an enclosed hollow body, a resilient contact tongue insulatedly associated with said body, said tongue including a shank portion for supporting said tongue with respect to said body portion, a knee-like portion, a hooked portion and a cam-surface portion, said body having a slot in one side, said slot being substantially in lateral alignment with said tongue, a second contact member insulatedly associated with said body and offset longitudinally of said prong from said tongue, said member including a shank portion for supporting said member and an arcuate prong-engaging portion, whereby upon insertion of the prong in the receptacle the prong will strike said cam-surface portion to actuate said tongue to one side and then be engaged by said hooked portion; the said knee-portion, the said hooked portion and the said arcuate portion forming electrical contact with said prong to provide a circuit through said prong separate from the circuit through said device.

5. A receptacle for an electrical device of the type having a prong to engage the receptacle comprising in combination a body portion of electrically non-conductive material, a contact tongue resiliently mounted on said casing, said tongue including a hooked portion to engage and retain the prong, a pair of resilient, arcuately formed contact members electrically insulated from said tongue and supported on said casing, said members being adapted to receive the prong therebetween, and an electrically insulated element movable with respect to said casing and adapted to abut said tongue, said element being adapted upon movement thereof to actuate said tongue and release the prong from said tongue.

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The following references are of record in the file of this patent:

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