Nov. 4, 1958 R. J. BRANDT 2,859,291

CLAMP AND SWITCH FOR HIGH POWER INCANDESCENT LAMPS

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Fig. 1

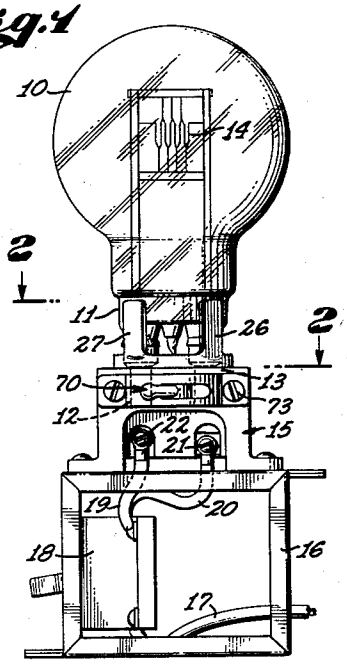


Fig. 2

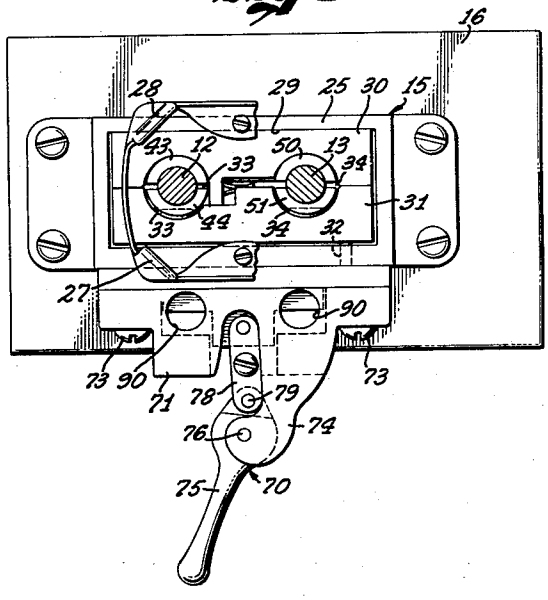
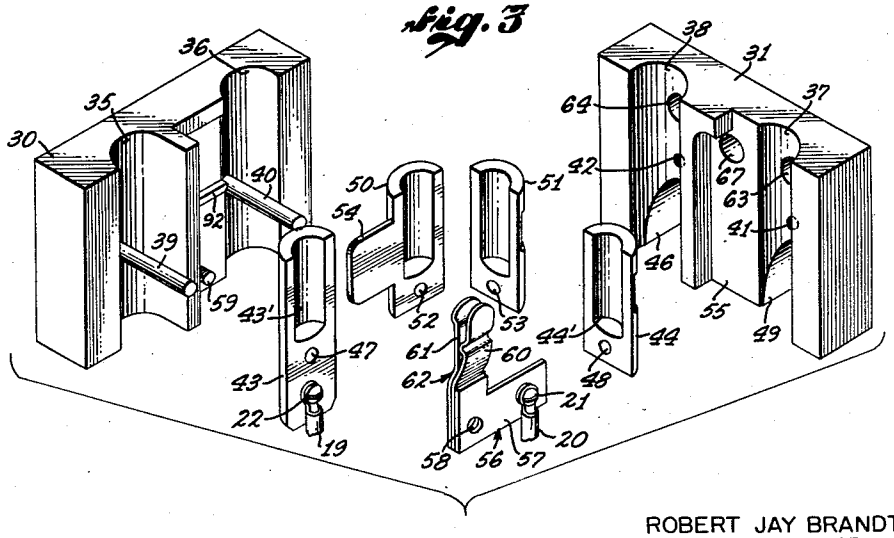


Fig. 3



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Fig. 4

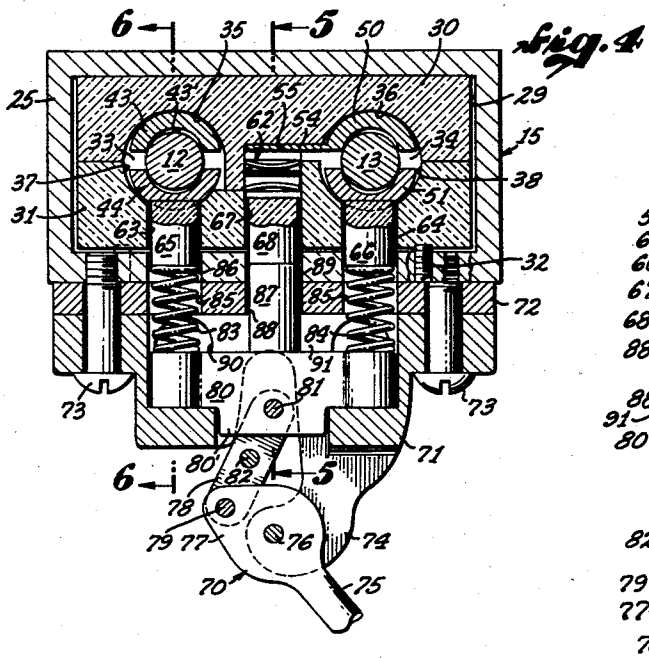


Fig. 7

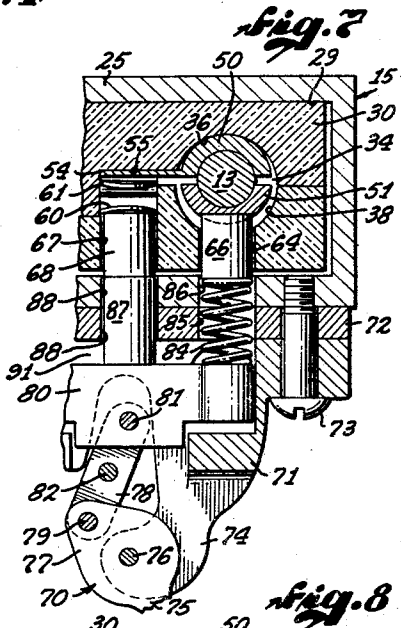


Fig. 5

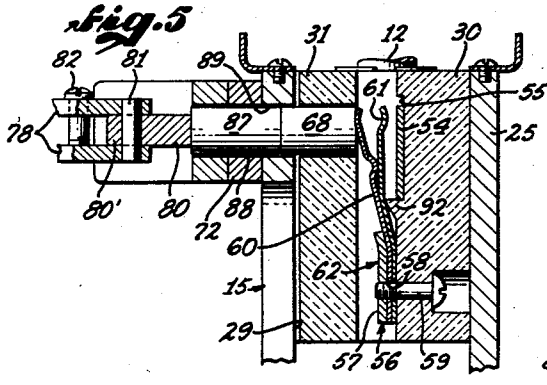


Fig. 8

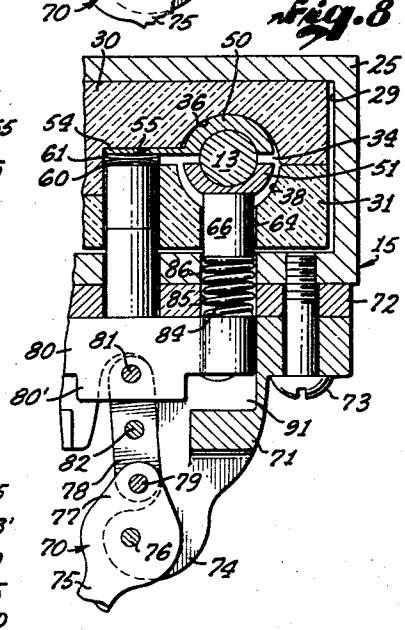
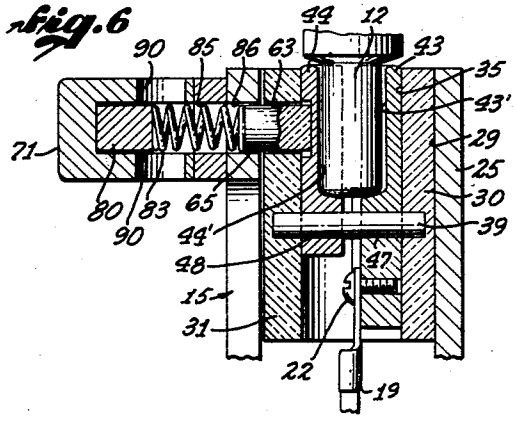


Fig. 6



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CLAMP AND SWITCH FOR HIGH POWER INCANDESCENT LAMPS

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9 Claims. (Cl. 200—51)

The invention relates to lamp sockets especially adapted for high power incandescent lamps and has particular reference to an automatic sequence clamp and switch device by means of which the contact prongs which convey the electric current from a lamp socket to a lamp are simultaneously clamped and then interconnected with the electric circuit.

Very large incandescent lamps used primarily for high power illumination are ordinarily constructed with contact elements comprising prongs which protrude downwardly from the base of the lamp into suitable recesses formed in a pair of blocks in a lamp receptacle or socket. Contact clamps are provided in the blocks and serve to fasten about the prongs prior to passing a heavy current to the lamp. It frequently happens that technicians handling such equipment often insert the prongs into the recesses and neglect to tighten the clamping means upon the prongs prior to switching on the current. As a result, because of the very heavy electric charge involved, there results a considerable arcing between the clamps and the prongs. Repeated arcing of this kind pits the surfaces of the prongs, which pitting interferes with the making of a good electric contact causing increasing trouble with the equipment and an attendant loss of time and expense.

It is therefore among the objects of the invention to provide a new and improved lamp socket for high power incandescent lamps of the prong contact type which is effective in insuring against arcing at the prongs.

Another object of the invention is to provide a new and improved lamp socket for high power plug contact lamps so arranged that a circuit to the prongs remains open against flow of electricity to the lamp until the prongs have been properly clamped.

Another object is to provide a socket for prong contact electric lamps of high power which is proof against the passing of electric current to the lamp before the prongs are properly clamped and which also is of such construction that the clamping device is readily released and the circuit readily broken whenever the clamp is removed from the socket.

Still another object of the invention is to provide a rugged and inexpensive socket for prong contact electric lamps which incorporates in a socket otherwise of standard size and construction a switch means coupled to the clamping device in such sequence that the switch cannot be closed until proper clamping has been completed.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of a lamp and socket mounted for operation.

Figure 2 is a cross-sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an exploded view of the clamping and switching elements.

Figure 4 is a cross-sectional view through the socket showing the clamping and switching means in off or open position.

Figure 5 is a fragmentary vertical sectional view taken on the line 5—5 of Figure 4.

Figure 6 is a fragmentary vertical sectional view taken on the line 6—6 of Figure 4.

Figure 7 is a fragmentary cross-sectional view similar to the right portion of the view of Figure 4 showing the position of parts immediately after movement has begun toward a closed or on position.

Figure 8 is a fragmentary cross-sectional view similar to Figure 7 showing the parts in on and clamped position.

In an embodiment of the invention chosen for the purpose of illustration there is shown an incandescent lamp 10 having a base 11 from the lower end of which protrudes contact prongs 12 and 13. It will be noted from the character of filaments 14 indicated that the lamp here under consideration is one of exceedingly high power and of a type frequently used in outdoor lighting and in motion picture and TV sets where a great deal of luminescence is required. In Figure 1 the lamp 10 is shown mounted in a socket 15 which in turn is carried upon a chassis 16. An electric lead 17 from a suitable source of supply communicates with a control switch 18 from which wires 19 and 20 extend to binding posts 21 and 22 respectively of the socket 15.

More particularly the socket includes a housing 25 here shown with a rectangular shape at the upper end of which are four resilient brackets, three of which are shown indicated by the reference characters 26, 27 and 28, which are adapted to grasp and steady the base of the lamp, thereby to assist in holding it in place.

The housing 25 has an interior chamber 29 within which are positioned blocks 30 and 31 of dielectric material, the blocks being slightly smaller in size than the chamber 29 and tightened in place by means of set screws 32. These blocks when tightened in place provide a pair of prong-receiving recesses 33 and 34.

The blocks 30 and 31 are matching blocks so constructed that the block 30 contains matching halves 35 and 36, respectively, of recesses 33 and 34. Similarly block 31 carries matching halves 37 and 38, respectively, of recesses 33 and 34. To maintain the blocks in proper relationship one with respect to the other, projections 39 and 40 are provided in the block 30 adapted to be received in corresponding holes 41 and 42 in the block 31.

In the prong-receiving recess 33 are metallic liners or liner halves 43 and 44. It will be noted that the outside radius of the liners is something less than the inside radius of the corresponding recess 33 and that the liners are something less than a semi-circle. The liners have hollows 43' and 44', respectively, adapted to surround the prong 12. Both of the liners 43 and 44 have solid bottoms, as shown to good advantage in Figure 3, the liner 43 extending downwardly to a location lower than the bottom of the liner 44, thereby to provide a base for the binding post 22. In the solid bottom portions are holes 47 and 48 adapted to slide over the projection 39, thereby to hold the liners in position within the prong-receiving recess 33. A cut-out portion 46 in the block 31 gives access to the binding post 21 and a cut-out portion 49 gives access to the binding post 22.

Similarly liners 50 and 51 are provided for matching halves 36 and 38, respectively, of the prong-receiving recess 34. The outside and inside radius of curvature on the liners 50 and 51 are relatively the same as corresponding outside and inside radii of curvature of the liners 43 and 44. These liners 50 and 51 also have solid bottom portions in which are holes 52 and 53, respectively, adapted to receive the projection 40, thereby to hold the liners in position. Of special interest is a laterally extending switch contact plate or armature 54 on the liner 50 which is adapted to lie within a plate recess 55 in the block 31.

Also lying within the plate recess 55 is a second switch

armature 56 of somewhat composite construction, the lower portion 57 of which provides a mounting for the binding post 21. A threaded hole 58 in the lower portion provides means for attachment of a screw 59 to hold the armature in proper position. Comprising part of the armature 56 is a pair of resilient arms 60 and 61 which act together to form one of the contact points of the switch indicated generally by the reference character 62.

In the block 31 there is provided a plug aperture 63 communicating with the prong-receiving recess 33 and a plug-receiving aperture 64 communicating with the prong-receiving recess 34. A plug 65 of dielectric material lies within the recess 63 and a similar plug 66 lies within the recess 64. The plugs in each instance have a bearing upon the respective liners 44 and 51. Still another plug aperture 67 in the block 31 communicates with the plate recess 55. Within the last identified plug aperture 67 is a plug 68 also of dielectric material.

To manipulate the plugs, thereby to tighten a grip upon the prongs 12 and 13 and to manipulate the switch 62, there is provided a toggle switch indicated generally by the reference character 70. The switch comprises a switch casing 71 mounted on a gasket 72 and attached to the housing 25 by means of screws 73. A bracket 74 mounts a toggle switch arm 75 which is pivoted by means of a pin 76 to the bracket. A projection 77 of the toggle switch arm is attached to a link 78 by means of a pin 79. At the other end the link 78 is pivotally attached to a flange 80' of the yoke 80 by means of a pin 81. A bolt 82 serves to interconnect opposite sides of the link 78.

Coiled springs 83 and 84 engage at one end with the actuator 80 and at the other ends respectively with plugs 65 and 66, the springs extending through holes 85 in the gasket and holes 86 in the housing 25. Still another plug 87 engages at one end with the yoke and at the other end with the plug 68 and extends through a hole 88 in the gasket and a similar hole 89 in the housing 25. Cooling holes 90 may be provided in the toggle switch communicating with a chamber 91 therein to assist in dissipating heat generated in the socket.

In the operation of the device herein shown and described it is customary to first mount the incandescent lamp 10 in the socket by pressing the base 11 of the lamp downwardly within the area defined by the brackets 26, 27 and 28 and so that the prongs 12 and 13 extend downwardly into the prong-receiving recesses 33 and 34 within the liners in those recesses. At this point there will be but a loose conection because the toggle switch arm 75 will need to be in open or released position. If it were in closed position, the liners would be pressed so close together that the aperture formed between them would not be large enough to admit the prongs. Once in place the prongs are clamped. This is accomplished by rotating the toggle switch arm 75 from open or unclamped position to closed or clamped position. This necessitates a movement clockwise as viewed in Figures 2, 4, 7 and 8. As the switch arm is swung in the direction described, pressure is exerted upon the link 78 which moves the actuator 80 upwardly as viewed in the figures made reference to. Movement of the actuator as described causes pressure upon the springs 83 and 84 which in turn press the plugs 65 and 66 into engagement with the respective liners 44 and 51. This causes the liners to exert a tight physical and electrical engagement with the respective plugs.

At initial stages of the engagement, as illustrated in Figure 7, the actuator 80 will have moved plugs 87 and 68 inwardly into engagement with the resilient arm 60 and will tend to tilt both the arm 60 and the resilient arm 61 about a fulcrum 92 but the movement will not be far enough as yet to close contact between the resilient arm 61 and the switch contact plate 54. As the toggle switch arm, however, is swung from the prong-engaging position shown in Figure 7 to the over-center position shown in Figure 8, the yoke or actuator 80 will be moved the additional distance necessary to shift plugs 87 and 68 far enough so that the resilient arm 61 is moved into contact with the switch contact plate 54. Since it will not be possible for electric current to flow through the binding posts, prongs, and lamp filament before the over-center position is reached, manipulation of the control switch 18 will have no effect. After, however, the over-center position has been reached and the contact made between the switch arm 61 and the switch contact plate 54, the circuit will be complete from the binding post 21 to the prong 13 and thereafter when the control switch 18 is turned to on position current will flow. It is important to note, however, that current cannot be made to flow until after a tight physical and electrical contact has been made between the liners and the corresponding prongs. Hence there will be no possibility of arcing and hence undesired pitting of the prongs by any inadvertent act of the mechanic or operator.

Similarly when the prongs of the lamp 10 are to be released, rotation of the switch arm 75 in a reverse or counterclockwise direction, as viewed in Figures 2, 4, 7 and 8, first effects a disconnection of the resilient switch arm 61 from the switch contact plate 54, thereby opening the circuit before pressure is released upon the liners and their engagement with the prongs. Should, through some inadvertence, the current be left on through the control switch 18, again arcing will be avoided at the prongs and if any arcing takes place it will be confined to the switch elements.

There has accordingly been shown and described herein a safety switch device which is compact in its construction and so designed that it can be built into a socket of substantially the same design and configuration as sockets currently in use for incandescent lamps of the kind herein described. The parts are few in number and simply designed as shown so that operation is positive and proof against arcing at the prongs either when the current is turned on or when the current is turned off.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

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

1. A clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing having prong recesses therein, matching split prong contacting elements of electrically conducting material in said recesses, a pair of armatures forming a switch in said housing in circuit with one of said prong contacting elements, one of said armatures comprising a resilient switch arm in the general path of movement of portions of said split prong contacting elements movable to closed position upon movement of said portions to positions wherein said elements are in prong engaging position, a pressure member having resilient engagement with said prong contacting elements first and thereafter with one of said switch armatures, and an actuator on the housing having on and off positions and operably engageable with said pressure member whereby to move said prong engaging elements and said switch jointly between on and off positions.

2. A clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing and having a plurality of prong recesses therein, a split prong contacting element of electrically conducting material in each prong, a pair of armatures forming a switch in said housing in circuit with one of said prong contacting elements, one of said armatures comprising a switch arm in the general path of movement of said prong con

tacting elements, said prong contacting elements having positions closed upon the prongs while said armatures remain in open position, said prong contacting elements being movable to closed position upon movement of portions of said elements to positions wherein said elements are in prong engaging position first followed by movement of said armatures to closed position, and a lever member mounted in the housing in resilient engagement with said prong contacting elements and one of said switch armatures, said lever member having on and off positions whereby to move said prong engaging elements and said switch between on and off positions.

3. A clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing and having a plurality of prong recesses therein, a split prong contacting element of electrically conducting material in each prong, a pair of armatures forming a switch in said housing in circuit with one of said prong contacting elements, one of said armatures comprising a switch arm in the general path of movement of said prong contacting elements movable to closed position upon movement of portions of said elements to positions wherein said elements are in prong engaging position, and a lever member mounted in the housing in resilient engagement with said prong contacting elements and one of said switch armatures, said lever member having on and off positions whereby to move said prong engaging elements and said switch between on and off positions.

4. A clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing having prong recesses therein, matching split prong contacting elements of electrically conducting material in said recesses, a pair of armatures forming a switch in said housing in circuit with one of said prong contacting elements, one of said armatures comprising a resilient switch arm in the general path of movement of portions of said split prong contacting elements movable to closed position upon movement of said portions to positions wherein said elements are in prong engaging position, a pressure member having resilient engagement with said prong contacting elements and one of said switch armatures, and an actuator on the housing having on and off positions and operably engageable with said pressure member whereby to move said prong engaging elements and said switch jointly between on and off positions.

5. A sequence clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, a pair of matching blocks of dielectric material mounted in the housing for limited lateral movement and having a plurality of prong recesses therebetween, means in each block forming matching half recesses of said plurality of prong recesses, a matching prong contacting element of electrically conducting material in each matching half recess in the blocks, a pair of armatures forming a switch in said housing in circuit with one of said prong contacting elements, one of said armatures comprising a resilient switch arm in the general path of movement of said prong contacting elements movable to closed position upon movement of said elements to positions wherein said elements are in prong engaging position, a resilient pressure member having resilient engagement with said matching prong contacting elements and with one of said switch armatures, and an actuating member on the housing having on and off positions and operably engageable with said pressure member whereby to move said prong engaging elements and said switch simultaneously between on and off positions.

6. A clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, a support of dielectric material mounted in the housing having prong receiving recesses therein, a pair of metallic liner halves mounted for lateral movement in each recess and of radius less than the radius of the said recess, binding posts for the respective liners, one of said liners having a laterally extending switch contact, a resilient switch arm mounted in said housing for engagement with said switch plate, one of said blocks having transverse paths communicating respectively with each of the liners therein and having an intermediate transverse path therebetween, a plug in each said aperture engageable respectively with the liners and said resilient switch arm, an actuator for said plugs, resilient means between the actuator and the plugs having engagement with the liners, a toggle switch on the housing comprising an arm having off and on positions, and a link between said arm and the actuator having an over-center adjustment in on position whereby to move and hold said liners and said resilient switch arm in on position.

7. A sequence clamp and switch device for a high power prong contact incandescent lamp comprising a socket housing, a pair of matching blocks of dielectric material mounted in the housing for limited lateral movement, clamping means for said blocks, said blocks having prong receiving recesses therebetween, comprising means in each block forming a matching half recess of each said recess, a metallic half liner mounted for lateral movement in each matching half recess and of radius less than the radius of the said half recess, binding posts for the liners in the respective prong receiving recesses, one of said liners having a laterally extending switch contact plate, a resilient switch arm mounted in said housing for engagement with said switch plate, one of said blocks having transverse apertures communicating respectively with each of the liners therein and having an intermediate transverse aperture therebetween, plugs of dielectric material in said first identified transverse apertures engageable respectively with the liners and a plug in the next identified aperture engageable with said resilient switch arm after engagement of said first plugs with said liners, an actuator for said plugs, resilient means between the actuator and the plugs having engagement with the liners, a toggle switch on the housing comprising an arm having off and on positions, and a link between said arm and the actuator having an overcenter adjustment in on position whereby to move and hold said liners and said resilient switch arm in on position.

8. A clamp and switch device for a switch operated high power prong contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing having prong receiving recesses therein, conforming split prong contacting elements of electrically conducting material in said recesses, a switch in said housing in circuit with one of said split prong contacting elements, and manually actuated socket locking means for substantially immediately clamping said prong contacting elements about said prongs and thereafter closing said switch, but upon release operating to immediately open said switch and thereafter release said clamping elements.

9. A clamp and switch device for a switch operated high power contact incandescent lamp comprising a socket housing, mounting means of dielectric material secured in the housing having prong receiving recesses therein, conforming split prong contacting elements of electrically conducting material in said recesses, a switch in said housing in circuit with one of said split prong contacting elements, and manually actuated socket locking and release means including lever actuated mechanism for resiliently first clamping said conforming split contacting elements on said prongs and thereafter closing said switch but upon release operating to immediately open said switch and thereafter release said clamping elements.

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