

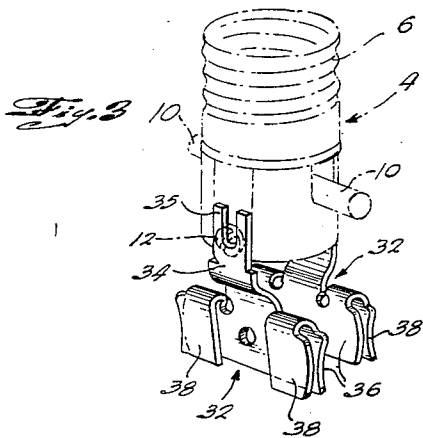
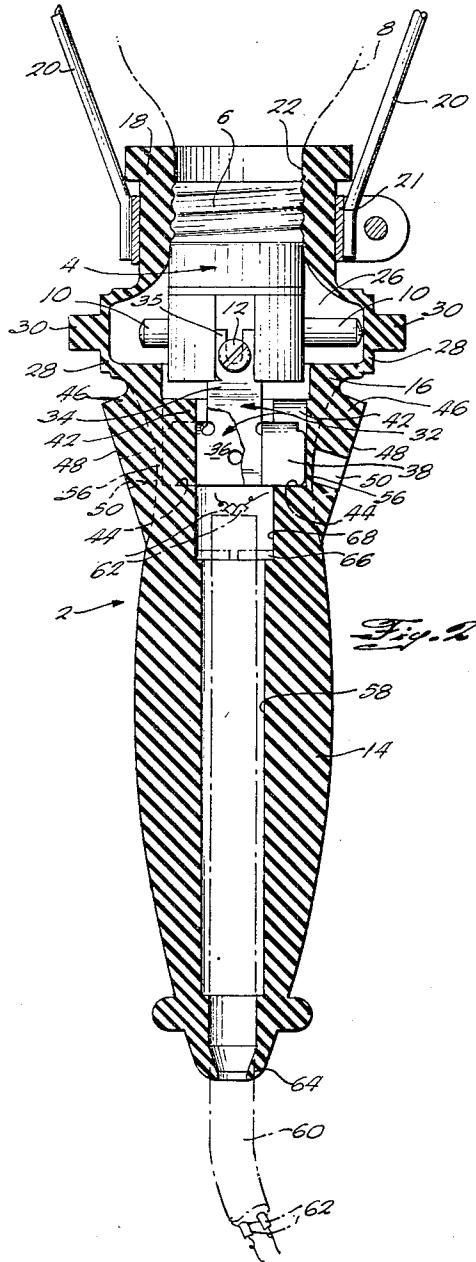
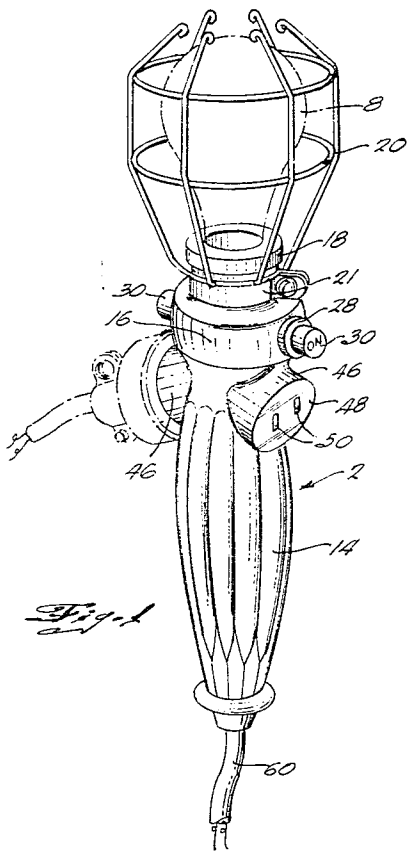
Dec. 11, 1956

L. N. BAENZIGER
PORTABLE ELECTRIC HAND LAMP HAVING RECEPTACLES
TO RECEIVE ATTACHMENT PLUGS

2,774,048

Filed Aug. 6, 1954

2 Sheets-Sheet 1



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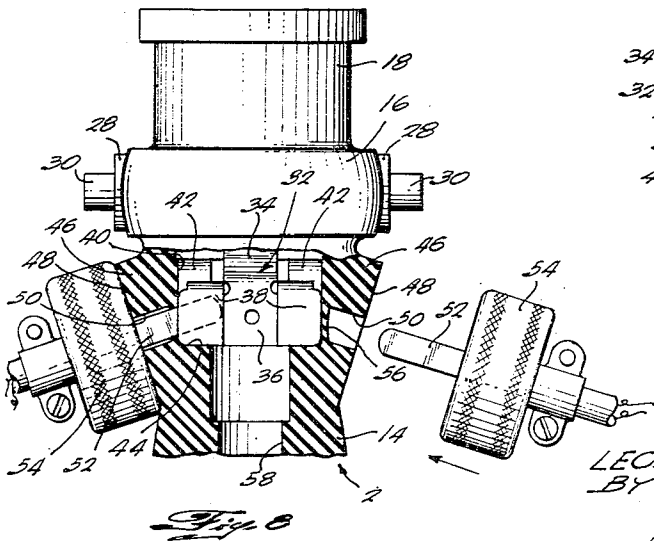
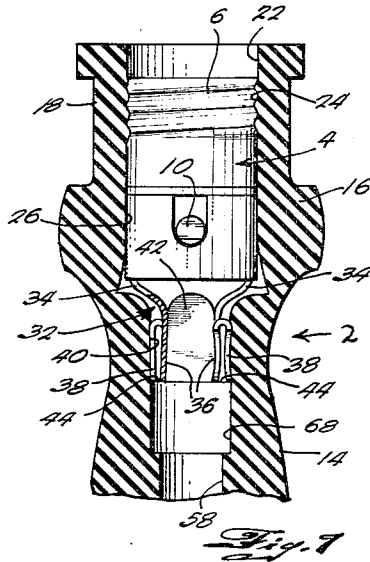
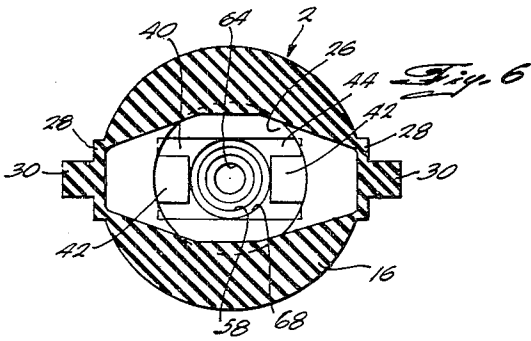
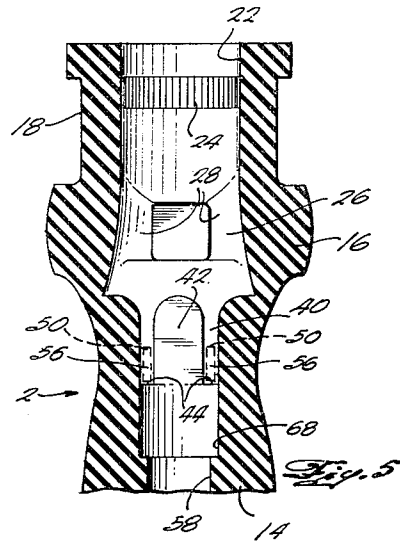
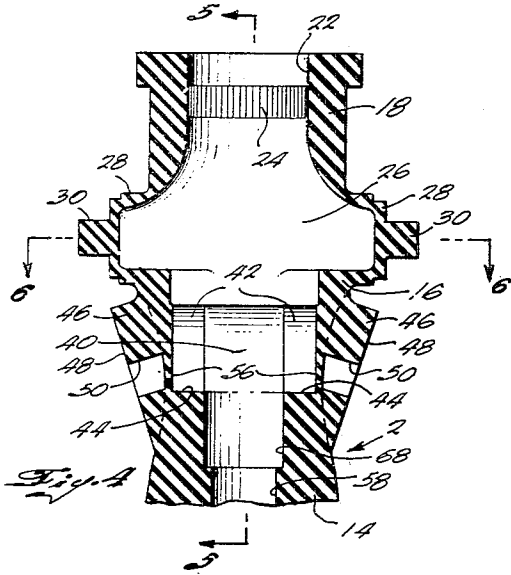
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PORTABLE ELECTRIC HAND LAMP HAVING RECEPTACLES TO RECEIVE ATTACHMENT PLUGS

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Application August 6, 1954, Serial No. 448,170

10 Claims. (Cl. 339—59)

The present invention relates to a portable lamp and in particular to one which is adapted to have male electrical connectors plugged thereinto.

Portable lamp structures in which the combined socket and switch for a bulb is mounted on a handle and is covered with a sheath or housing which permits manipulation of the switch to turn the bulb on and off but which seals the socket against foreign matter are generally known as trouble lamps. They are frequently employed in manufacturing and repair shops in order to illuminate the work being done. Because additional sources of electrical power are often required at such places and times, it is desirable that the portable lamp structures themselves be modified to permit a male electrical connector to be plugged thereinto.

Attempts to thus modify the lamp constructions have in the past been unsatisfactory. One of the prime drawbacks was that in the absence of complex and expensive structures such a modification could not be accomplished without excessively compromising, and sometimes entirely destroying, the seal around the socket which is so important in devices of the type under discussion. Not only did the apertures through which the male connectors were to pass define openings through the sheath or housing through which foreign material could gain access to the socket and switch, but the structure of the housing or sheath itself had to be appreciably modified in an essentially unsatisfactory way in order to permit the appropriate internal electrical connections to be made between the bulb socket and the electrical structure adapted to receive the male connectors. Moreover, the very electrical connections in question were difficult and time consuming to make, and were most unreliable. To produce a one-piece sheath or housing which would effectively seal the bulb socket and switch, which would at the same time carry female connector elements adapted to cooperate with male connectors, and which would provide for effective internal electrical connections, has in the past eluded the art.

The structure of the present invention, however, achieves all of those objectives. The female terminal elements adapted to cooperate with the male connectors are rigidly physically secured to the socket-switch unit, and the thus defined combination is housed within the one-piece sheath in a manner quite comparable to that employed previously solely for the bulb socket and switch unit. In a preferred embodiment the female terminal elements, because of their shape and because of their essential rigidity, are relied upon to fix the position of the socket within the sheath, thus making for greater shock resistance without applying any strain to the essentially fragile portions of the socket or switch. Because of the location of the female terminal elements within the sheath spaced from the socket and switch, the provision of apertures through the sheath for accommodating the male connectors does not appreciably affect the sealing function of the sheath. In the embodiment here disclosed these apertures through the sheath are oriented at an angle with re-

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spect to the female terminal elements, so that the prongs of the male connector engage the female terminal elements at a corresponding angle, thus making for a better and more reliable electrical connection therebetween. In addition, because the sheath is customarily made of some resiliently flexible material such as rubber or the like, the apertures leading to the female terminal elements are preferably interrupted by frangible walls which, when the prongs of the male connectors are forced therethrough, define flaps which engage those prongs and seal the apertures while the prongs are in place and which, when the prongs are withdrawn, spring back into engagement with one another so as to substantially close the apertures and thus prevent the entry of foreign matter into the sheath. The sheath may be molded in one piece without sacrificing its effective cooperation with the socket, switch and female terminal elements, thus greatly reducing manufacturing and assembly costs. The female connectors are positioned close to the socket, and hence are in a most convenient location, since even when male connectors are engaged therewith there will be a minimum of interference with ready manual manipulation of the lamp by means of its handle.

To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to the construction of a portable lamp as defined in the appended claims and as described in this specification, taken together with the accompanying drawings, in which:

Fig. 1 is a three-quarter perspective view of a preferred embodiment of the present invention;

Fig. 2 is a vertical cross sectional view thereof;

Fig. 3 is a three-quarter perspective view of the female terminal elements, the socket-switch combination to which they are secured being shown in phantom;

Fig. 4 is a fragmentary vertical cross-sectional view of the upper portion of the sheath;

Fig. 5 is a cross sectional view taken along the line 5—5 of Fig. 4;

Fig. 6 is a cross sectional view taken along the line 6—6 of Fig. 4;

Fig. 7 is a view similar to Fig. 5 but showing the socket-switch-female terminal element combination in place; and

Fig. 8 is a fragmentary view similar to Fig. 2 but showing one male connector in engagement with the female terminal elements and another male connector in position to be engaged with another set of female terminal elements.

The lamp of the present invention comprises a sheath generally designated 2 within which a socket-switch unit generally designated 4 is adapted to be received, that unit conventionally including an upper internally threaded portion 6 into which a bulb 8 is adapted to be screwed, a laterally slidable pushbutton 10 for turning the switch on and off, and a pair of terminals 12 to which electrical connection is to be made.

The sheath 2 is preferably formed in one piece of some suitable insulating material, preferably resilient, such as rubber. It comprises an elongated handle portion 14, a body portion 16, and an upper neck 18, a cage-type lamp guard 20 being secured to the neck 18 by means of the clamp ring 21 and surrounding the bulb 8 in order to protect the latter against breakage.

The neck 18 is provided with a comparatively wide vertical passage 22 within which the externally threaded portion 6 of the socket 4 is adapted to be snugly received, a portion of the inner surface of the passage 22 being roughened or knurled at 24 in order that the socket portion 6 might be firmly gripped thereby. The passage 22 communicates with a first recess 26 inside the body

portion 16 of the sheath 2, the body of the socket-switch unit 4 being received therein. Thin-walled, and consequently readily flexible, portions 28 extend outwardly on opposite sides of the body portion 16 of the sheath 2 in order to accommodate the switch pushbutton 10, those portions 28 terminating in button-like protrusions 30 adapted to register with the ends of the pushbutton 10. By pressing in that button-like protrusion 30 which is opposite the outwardly projecting end of the pushbutton 10, the pushbutton 10 can be forced to its opposite operative position, thus turning the switch off or on.

The female auxiliary terminal elements, generally designated 32, are formed of some self-supporting and preferably stiffly resilient conductive material such as spring brass. They comprise an arm 34 having an upper end 35, that end being adapted to fit over the terminal screw 12 on the switch unit 4 and be retained on and physically fixed to the switch unit 4 by screwing the terminal screw 12 down thereover. It is preferred to reinforce this securing action through the use of solder or the like. These arms 34 extend downwardly with respect to the switch-socket unit 4 and carry at their lower ends a laterally extending leaf 36, that leaf being positioned appreciably below the switch-socket unit 4 and extending to either side well beyond the arm 34. Cooperating leaves 38 are bent over from the top of the projecting ends of the leaves 36 so as to overlie those projecting ends, the leaves 36 and 38 being resiliently biased toward one another through the inherent resiliency of the material of which the terminal elements 32 are formed and a space being defined between each leaf 38 and the portion of the leaf 36 which that leaf 38 overlies, into which space a prong of a male connector is adapted to be received. As may best be seen from Fig. 3, the leaves 36 and 38 may be longitudinally bowed in order to intensify the resilient firmness with which the leaves 36 and 38 will grasp and make electrical connection with a male connector prong inserted therebetween.

The body portion 16 of the sheath 2 is provided with a second recess 40 beneath and communicating with the first recess 26. The sides of the recess 40 are provided with bosses 42 adapted to fit snugly between those portions of the leaves 36 on the female terminal element 32 which extend theretoward, the leaves 38 being snugly received against the outer walls of the recess 40. The recess 40 has a bottom wall 44 on which the bottom edges of the female terminal elements 32 are adapted to rest. Thus it will be seen that, because of their rigidity and because they rest upon the bottom wall 44 of the second recess 40, the female terminal elements 32 limit the degree to which the switch-socket unit 4 can be inserted into the sheath 2. Moreover, because of the snug grasping of the laterally outer portions of the female terminal elements 32 between the bosses 42 and the outer walls of the recess 40, and because of the substantially rigid connection between the switch-socket 4 and the female terminal element 32, the switch-socket 4 is also held in position laterally by the terminal elements 32 to an appreciable degree, thus reinforcing the inherent strength of the sheath 2. The body portion 16 of the sheath 2, because of the extent of the first recess 26 and the consequent thinness of its walls, is considerably less rigid than the handle 2, so such reinforcements as the female terminal elements 32 are able to provide is quite valuable.

The sheath 2, between the handle portion 14 and the body portion 16, is provided on each side with a boss 46 having a flat outer face 48, that boss being provided with a pair of apertures 50 which communicate between the outside of the sheath 2 and the spaces between the bosses 42 and the outer walls of the second recess 40. It is through these apertures that the prongs 52 of male electrical connectors 54 are adapted to pass, those apertures 50 being in line with the spaces between the leaves 36 and 38 of the female terminal elements 32. Conse-

quently, whenever a male connector 54 is plugged into the bosses 46 on the sheath 2 its prongs 52 will enter the space between an appropriate pair of leaves 36 and 38, will be firmly resiliently grasped between those leaves, and consequently will make effective electrical connection therewith. When the male connectors 54 are withdrawn, the apertures 50 will define a path into the inside of the sheath 2 through which foreign material might pass, but those paths are remote from the switch-socket unit 4, foreign material can reach the member 4 only after passing through a tortuous path, and consequently the security of the sheath 2 is not appreciably affected except insofar as water is involved.

In order to provide an even greater degree of protection the apertures 50, when the sheath 2 is first molded, are interrupted by a thin wall 56 (see Figs. 2 and 8). The first time that a male connector 54 is plugged into a given boss 46 its prongs 52 will be forcibly pushed through the walls 56 interrupting the apertures 50, the thinness of the walls 56 rendering them frangible. Because the material of which the walls 56 are formed is resilient, they will, after being thus broken, define flaps which resiliently wipe against the sides of the prongs 52 and thus seal the apertures 50, at the same time serving to clean the prongs 52 and thus ensure effective electrical connection with the female elements 32. When the male connector 54 is withdrawn the thus formed flaps will, because of their inherent resiliency, tend to spring back to their initial position, thus again closing the apertures 50 and sealing the inside of the sheath 2. Of course, if desired, the wall 56 may be pre-penetrated so as to form flaps before the lamp is assembled and before male connectors are plugged thereto.

It has been found that more effective engagement between the male connector prongs 52 and the female connector element leaves 36 and 38 is achieved if the prongs 52, when they enter the space between the leaves 36 and 38, do so at an angle with respect to the leaves. Consequently, as may best be seen from Figs. 2 and 8, the apertures 50 are not perpendicular to the length of the sheath 2, but instead make an acute angle therewith, while the width of the leaves 36 and 38 is perpendicular to the length of the sheath 2. The inner ends of the apertures 50 terminate, of course, in registration with the spaces between corresponding pairs of leaves 36 and 38. It will be noted that, because each pair of leaves 36, 38 is substantially snugly received between a boss 42 and an outer wall of the second recess 40, the resiliency of the material of which the sheath 2 is formed will serve to ensure that the leaves 36, 38 make firm engagement with the male connector prong 52, thus providing for a more reliable electrical connection when the male element 54 is plugged into the sheath 2.

The handle 14 is provided with an axial passageway 58 which communicates between the bottom of the handle 14 and the recesses 40 and 26. A cable 60 is adapted to pass up through the passage 48, the wires 62 thereof being adapted to be connected respectively to the terminals 12 of the switch-socket 4 in conventional manner. The lower end of the passageway 58 is defined by a thin wall section 64 adapted to resiliently grasp the cable 60 and thus seal the passageway 58 at its lower end. If desired, a suitable cable strain relief element, such as the washer 66, may be employed, that washer firmly gripping the upper end of the cable 60 and being received within enlarged portion 68 at the upper end of the passageway 58.

The sheath 2 is preferably molded in one piece. The cable 60 is forced through the passageway 58, the recesses 40 and 26, and the passageway 22 until it extends above the top of the sheath. The switch-socket unit 4 has the female terminal elements 32 secured thereto and the ends of the wire 62 are also secured to the appropriate terminals 12, solder preferably being employed to ensure permanency of connection. The strain relief washer 66

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is put into place and the cable 60 is then pulled downwardly while the neck 18 of the sheath 2 is expanded, the switch-socket unit 4 and the female terminal elements 32 then moving downwardly into their proper positions within the recesses 26 and 40 respectively, the lower edges of the female terminal elements 32 resting on the bottom wall 44 of the recess 40 so as to fix the position of the electrical parts within the sheath, support the switch-socket 4, and rigidify the upper portion of the socket, all as set forth above. The sheath neck 18 then being released, it contracts and firmly grips the internally threaded portion 6 of the switch-socket unit 4, thus sealing the top of the sheath. In its preferred form the apertures 50 are at this point positively sealed by the frangible walls 56. The bulb 8 is screwed into the socket portion 6, the cage 20 is mounted on the neck 18, and the unit is ready for use, depression of one or the other of the button-like protrusions 30 shifting the position of the pushbutton 10 so as to alternately turn the switch on and off and thus illuminate or extinguish the bulb 8. Whenever it is desired to use auxiliary equipment, the male connectors 54 associated with that equipment may be plugged into the bosses 46 and, in the preferred embodiment, in which the frangible wall portions 56 are provided, removal of the male connectors 54 will not appreciably adversely affect the protective sealing action of the sheath 2.

The construction here disclosed is simple and inexpensive, all of its parts are susceptible of manufacture on a mass production basis or else are standard components purchasable on the open market, the unit is very readily assembled, it is substantially indestructible, and is very effective for the purposes for which it is used.

While but a single embodiment of the present invention has been here disclosed, it will be apparent that many variations may be made therein without departing from the spirit of the invention as defined in the following claims.

I claim:

1. In combination, a socket for an electric light, a handle for said socket, said handle being formed of insulating material and having a first recess open at the top thereof in which said socket is substantially snugly received, said socket having first terminals forming a part thereof and located in said first recess, a passage through said handle from a point adjacent the bottom thereof through which a wire is adapted to pass up to and be electrically connected to said first terminals, female auxiliary terminals of self-sustaining material comprising an arm physically affixed to a corresponding first terminal and depending therefrom and a pair of overlying leaves secured to said arm, extending below said socket, and resiliently urged toward one another so as to define between themselves a space adapted to snugly receive a male connector, said handle having a second recess below and communicating with said first recess in which said auxiliary terminals are at least partially snugly received, said second recess including a bottom wall on which said auxiliary terminals rest, thereby fixing the position of said socket and said auxiliary terminals within said handle, said handle having apertures therethrough through which male connectors are adapted to pass so as to engage and make electrical connection with said auxiliary terminals.

2. The combination of claim 1, in which said leaves are oriented substantially perpendicular to the length of said handle and the outer ends of said apertures in said handle are positioned out of line with said leaves, said apertures being oriented at an acute angle with respect to the length of said handle, whereby said male connectors enter between said leaves at an acute angle relative thereto so as to make a better electrical connection therewith.

3. In the combination of claim 2, screws on said first terminals, to which screws wires are adapted to be secured, said screws engaging said auxiliary terminals and

securing said auxiliary terminals to said first terminals respectively.

4. In the combination of claim 1, screws on said first terminals, to which screws wires are adapted to be secured, said screws engaging said auxiliary terminals and securing said auxiliary terminals to said first terminals respectively.

5. In combination, a socket for an electric light, a handle for said socket, said handle being formed of insulating material, having a passage therethrough for receiving a wire, and having a first recess in which said socket is received and a second recess communicating with said first recess, said socket having first terminals forming a part thereof and located in said first recess to which said wire is adapted to be connected, female auxiliary terminals of self-sustaining material physically secured to said first terminals, depending therefrom and received within said second recess, said handle having apertures therethrough communicating with said second recess in registration with said auxiliary terminals through which male connectors are adapted to pass so as to engage and make electrical connection with said female auxiliary terminals, said second recess having a ledge, said auxiliary terminals resting on said ledge and thus fixing the position of said socket and said auxiliary terminals within said handle.

6. The combination of claim 5, in which said female auxiliary terminals are oriented substantially perpendicular to the length of said handle and the outer ends of said apertures in said handle are positioned out of line with said leaves, said apertures being oriented at an acute angle with respect to the length of said handle, whereby said male connectors enter between said leaves at an acute angle relative thereto so as to make a better electrical connection therewith.

7. The combination of claim 5, in which said female auxiliary terminals are oriented substantially perpendicular to the length of said handle and the outer ends of said apertures in said handle are positioned out of line with said leaves, said apertures being oriented at an acute angle with respect to the length of said handle, whereby said male connectors enter between said leaves at an acute angle relative thereto so as to make a better electrical connection therewith, and in which said primary terminals comprise elements adapted to connect said wire thereto, said elements engaging said auxiliary terminals and securing said auxiliary terminals to said primary terminals.

8. In the combination of claim 5, screws on said first terminals, to which screws wires are adapted to be secured, said screws engaging said auxiliary terminals and securing said auxiliary terminals to said first terminals respectively.

9. In combination, a socket for an electric light, a handle for said socket, said handle being formed of insulating material, having a passage therethrough for receiving a wire, and having a first recess in which said socket is received and a second recess communicating with said first recess, said socket having first terminals forming a part thereof and located in said first recess to which said wire is adapted to be connected, female auxiliary terminals of self-sustaining material physically secured to said first terminals, depending therefrom and received within said second recess, said handle having apertures therethrough communicating with said second recess in registration with said auxiliary terminals through which male connectors are adapted to pass so as to engage and make electrical connection with said female auxiliary terminals, said auxiliary terminals comprising an arm directly secured to the corresponding first terminal and depending therefrom, and a pair of overlying leaves secured to said arm, extending below said socket, and resiliently urged toward one another so as to define between themselves a space adapted to snugly receive a male connector, said leaves being ori-

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ented substantially perpendicular to the length of said handle, the outer ends of said apertures in said handle being positioned out of line with said leaves, said apertures being oriented at an acute angle with respect to the length of said handle, whereby said male connectors enter between said leaves at an acute angle relative thereto so as to make a better electrical connection therewith.

10. In combination, a socket for an electric light, a handle for said socket, said handle being formed of insulating material, having a passage therethrough for receiving a wire, and having a first recess in which said socket is received and a second recess communicating with said first recess, said socket having first terminals forming a part thereof and located in said first recess to which said wire is adapted to be connected, female auxiliary terminals of self-sustaining material physically secured to said first terminals, depending therefrom and received within said second recess, said handle having apertures therethrough communicating with said second recess in registration with said auxiliary terminals through which male connectors are adapted to pass so as to engage and make electrical connection with said female auxiliary terminals, said auxiliary terminals comprising an arm directly secured to the corresponding first terminal and depending therefrom, and a pair of overlying

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leaves secured to said arm, extending below said socket, and resiliently urged toward one another so as to define between themselves a space adapted to snugly receive a male connector, said leaves being oriented substantially perpendicular to the length of said handle, the outer ends of said apertures in said handle being positioned out of line with said leaves, said apertures being oriented at an acute angle with respect to the length of said handle, whereby said male connectors enter between said leaves at an acute angle relative thereto so as to make a better electrical connection therewith, and screws on said first terminals, to which screws wires are adapted to be secured, said screws engaging said auxiliary terminals and securing said auxiliary terminals to said first terminals respectively.

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