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ELECTRICAL TERMINAL BOX

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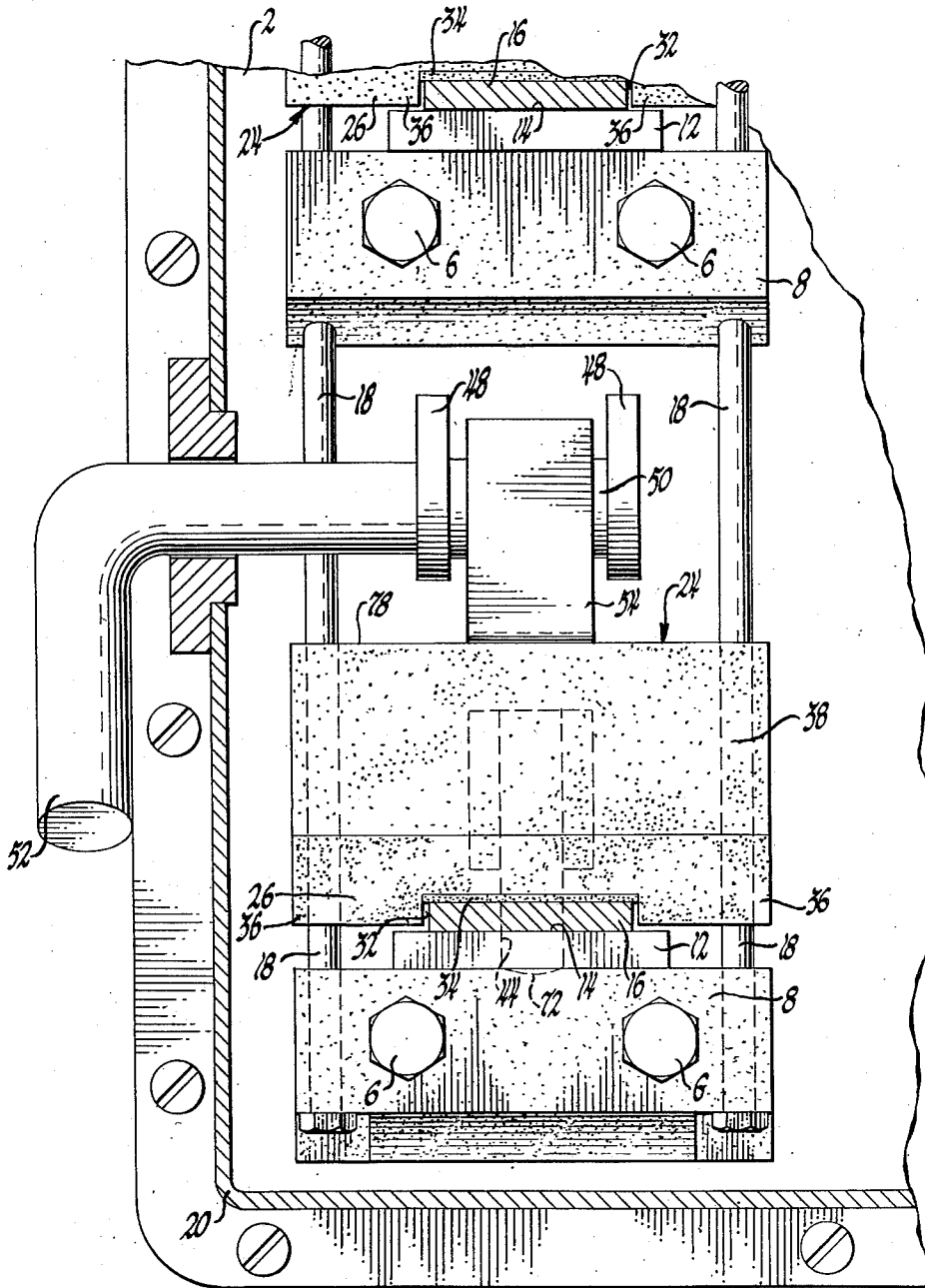


Fig. 2

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ELECTRICAL TERMINAL BOX

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This invention relates generally to devices in the nature of electrical binding posts and more particularly to quick connect and disconnect devices for the terminals of electrical conductors such as electrical power cables.

Quick connect and disconnect devices of the type to which this invention relates are deficient in one or more of the following respects: They do not provide high contact pressure; they cannot be operated to connect or disconnect the terminals of the conductors without the use of wrenches or other tools; they do not positively lock the terminal of the cable or conductor to the contact or binding post; when inserted blind, as is sometimes necessary, they do not positively assure that the terminal of the conductor is in proper position; they do not provide watertight construction; and, furthermore, they do not provide the option of making the connection permanent.

It is, therefore, an object of the present invention to overcome all these defects by providing a quick connect and disconnect device for the terminals of electrical conductors such as power cables which provides extremely high contact pressure between the terminal and the binding post or contact and in a way which enables this contact pressure to be acquired in a minimum of space.

It is a further object of the invention to provide a device which enables the terminals to be very quickly connected or disconnected without the use of any tools or wrenches whatsoever.

It is another object of the invention to provide a novel quick connect and disconnect device for the terminals of electrical conductors which provides immediate contact of pressure as soon as the spade terminal is inserted.

It is a still further object of this invention to provide a novel spring-loaded locking pin which allows the terminal to be "snapped" into place and properly located when the terminal is inserted "blind" into the device.

It is an even further object of this invention to provide a device of the character indicated which is watertight in construction and which includes the option of making the connection permanent.

For a fuller understanding of the above and other objects of this invention reference may be had to the accompanying detailed description and drawings, in which:

Fig. 1 is a side view in elevation with certain parts in section and others broken away to illustrate the various inventive features of the device.

Fig. 2 is a view taken on the line 2—2 of Fig. 1 which further illustrates the device.

Referring to the drawings, a vertical mounting plate support is shown which is indicated by a numeral 2. Mounted on the support by means of short studs 4 and long studs 6 are two vertically spaced saddle-like sup-

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ports 8 of some suitable insulating material. Extending through the mounting plate or support 2 and insulated therefrom by the insulation 10 are a pair of vertically disposed contacts or buss bars 12 formed from some good conducting material. The contacts 12 are each provided with an upper flat contact surface 14 on which the spade portions 16 of the cable terminal lugs 17 are adapted to be placed in a manner to be described more particularly shortly. Extending through suitable holes provided in the insulating saddle supports 8 are a pair of laterally spaced vertical guide rods 18 which have their upper ends anchored in the outer covering 20 of the device by means of nuts 22 threaded on the ends thereof. Movably mounted and guided on the rods 18 are two vertically disposed follower assemblies indicated generally by the numerals 24. As best seen by reference to the lower of these follower assemblies 24, each one comprises a lower insulated member 26 having a spring seat 28 formed therein and a hole 30 extending therethrough. Member 26 is provided adjacent its lower portion with a slot or recess 32 with a slight convexly curved surface 34 which enables the spade 16 to be easily slid therebelow into slot 32. Downwardly extending portions 36 which define the slot 32 are adapted to abut the upper surface 14 of the contact 12 when the spade is not on surface 14 and in the slot 32. These portions 36 also serve to tend to limit the amount of compression of the spade 16 between the upper surface 14 of contact 12 and the member 26 by the novel cam means in a manner which will appear shortly.

Located above the member 26 and also comprising a part of the assembly 24 is a second insulated member 38 which, as indicated in Fig. 1, has an annular clearance 40 whose base portion forms an upper spring seat 42. Downwardly depending from the base 42 is a locking pin 44 which, although not essential, is in this instance integrally formed with the member 38. The pin 44 extends through the opening 30 provided in the lower member 26 and is movable therein. Having its opposite ends seated on seats 28 and 42 and normally tending to bias the members 26 and 38 apart is a helical coil spring 46 through which the pin 44 also extends. Also mounted on the support or mounting plate 2 above their respective contacts 12 and assemblies 24 are a pair of vertically disposed sets of arms or brackets 48. Each of the sets of brackets 48 has extending there-through a shaft 50 on which is provided an operating handle or lever 52. Also secured to each of the shafts for rotation therewith is a cam member 54 having cam surface 56 in continuous engagement with the surface 78 on top of the member 38 with which it is associated. Secured to the front of the outer covering 20 of the device by screws 58 is an insulated face plate 60 having holes 62 extending therethrough about which are provided suitable bosses 64. As shown in Fig. 1, the terminal cable lugs including the spade portions extend through bosses 64 and holes 62 of the face plate 60 so that the spades extend between the busses 14 and the members 26. Surrounding the cable 66 to which the terminal lugs 17 are attached are rubber boots 68 which tightly engage the cable 66 at one end and tightly fit around the bosses 64 at the opposite end so as to provide in combination with covering 20 and face plate 60 a waterproof construction.

The operation of the device is as follows: As will be noted, the upper quick disconnect is shown in the release operating position and the lower quick connect and disconnect device is shown in its positive connecting position. Referring first then to the upper mechanism, it will be observed that the handle 52 is turned upwardly

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so that a flat portion 70 of surface 56 of the cam 54 engages the top of the member 38. This allows the members 38 and 26 to separate under the influence of the spring 46. When the members 38 and 26 are separated, however, as shown by the upper portion of the device, the locking pin 44 moves upwardly so that only a curved end portion 72 protrudes through the opening 30 and slightly below the member 26. When the members are in the position shown the terminal cable lug 17 may be inserted through the boss 64 and hole 62 so that the spade portion, by reason of the curved surface 34, is easily slid under the member 26 and between the member and the upper contact surface 14. Since, as the spade 16 slides into the slot 32, however, it is provided with a hole 74, the spade snaps into place when the small curved projecting portion 72 of the pin 44 engages in the hole 74. Thus, it is immediately apparent to the person making the connection that the spade and the terminal lock are properly located and will be yieldingly maintained in place. Immediately upon inserting the spade below the member 26 due to the biasing effect of the spring 46 immediate pressure will be exerted on the spade which yieldingly clamps the spade to the contact surface 14 of the buss 12 so that a yielding connection is immediately made. After the spade has been inserted in place, as shown by the upper device, the handle 52 may be rotated through an angle of approximately 90° so that the surface 56 cams the upper member 38 downwardly thereby increasing the compression of the spring 46 and the contact pressure between the spade 16 and the upper surface 14. When the cam 54 has moved through an angle of 90° a flat portion 76 engages the upper portion of member 38 and tends to maintain the cam in the position shown by the lower device because of the cooperation between the engaged flat surfaces 76 and 78. As indicated by the lower device, after the spring 46 has been sufficiently compressed the upper member 38 abuts the lower member 26 so that the cam 54 may now cause tremendous contact pressures to be exerted by the spade 16 and the contact surface 14. These pressures, of course, improve the contact between the spade and the buss 12 so that the optimum electrical joint is obtained. To avoid distorting of the spade 16 or destruction of certain of the parts, the portions 36 may be so proportioned as to properly limit movement of the members 38 and 26 toward the surface 14 of contact 12. It should also be observed that as the members 38 move downwardly the locking pin 44 was caused to move completely through the hole 74 in the spade 16 and into hole 80 provided in the buss 12. In this manner the spade 16 is positively locked to the buss 12 under exceedingly high contact pressure.

From the foregoing description it may now be appreciated that a quick connect and disconnect device has been provided which, first of all, is completely waterproof in construction. It permits extremely high contact pressure which with slight changes in the cam means can be increased or decreased. Furthermore, it will be observed that this contact pressure is acquired in a minimum of space. The invention permits quick connection and disconnection without the use of wrenches. It provides a positive lock between the buss and the spade so that the spade cannot be removed without first rotating the cam through 90 degrees. There is immediate contact pressure regardless of whether the cam is operated or not and, also, the spade is yieldably retained in place. When the spade is inserted blind, it will be observed, the person making the connection will know whether the spade is properly inserted by feeling whether the spade "snaps" into place or not and, also, whether he can rotate the cam lever arm or not,

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since this would not be possible unless the spade were fully inserted.

The device provides the option of making the connection permanent by merely removing the assembly 24 along with the guide rods and camming means and in place thereof inserting bolts in the holes 74 and 80.

What we claim is:

1. In combination, an electrical conductor terminal and a binding post therefor comprising an insulated support, an electrical contact mounted on said support, a guide on said support, a follower assembly movable on said guide and including a pair of insulated members tending to be biased apart by a spring interposed therebetween, one of said members being interposed between said contact and the other of said members, said terminal being interposed between the one of said members and said contact and resting on said contact and cam means mounted on said support engageable with the other of said members and operable to move the other of said members toward the one of said members until said spring is compressed and said members engage each other and then both of said members are cammed toward said contact to thereby clamp the terminal between the one of said members and said contact.

2. In combination, an electrical conductor terminal having a hole therein and binding post therefor comprising a support, an electrical contact having a hole therein mounted on said support, a guide on said support, a follower assembly movably mounted on said guide and including a pair of insulated members normally biased apart by a spring interposed therebetween, a pin on one of said members extending through said spring and through a hole in the other of said members, said contact having the hole therein in alignment with the hole in the other of said members into which said pin is adapted to be moved, said terminal being interposed between the other of said members and said contact with the hole therein in alignment with the hole in said contact and the other of said members, cam means mounted on said support and engageable with the one of said members operable to move said member toward said contact and said pin through the hole in the terminal of the electrical conductor and into the hole in said contact and the other of said members toward said contact to thereby clamp the terminal between the other of said members and the contact and also to anchor the terminal to said contact.

3. In a quick connect and disconnect device including the terminal of an electrical cable wherein the terminal comprises a flat spade having a hole therein, a support, an electrical contact mounted on said support and having a hole therein over which the hole in said spade is placed with said spade in electrical contacting engagement with said contact, guide means mounted on said support, a follower assembly movable on said guide means and including a pair of members tending to be biased apart by a spring interposed therebetween, one of said members having a pin thereon extending through an opening in the other of said members and in alignment with the holes of said spade and contact, an arm on said support spaced from an end of the one of said members, a lever attached to a shaft rotatably mounted in an end of said arm, a cam secured to said shaft and rotatable therewith and having a cam surface in engagement with said end of one of said members to cam the one of said members on its guide means toward said spade and said pin into the holes of said spade and contact.

References Cited in the file of this patent

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