QUICK DETACHABLE ELECTRICAL CONNECTOR

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

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QUICK DETACHABLE ELECTRICAL CONNECTOR

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This invention relates to a device for securing and electrically connecting a wire or similar current carrying member to another conductor or current carrying member.

The device of the present invention has particular utility, for example, in a contact or terminal post of a switch or the like and the objects of the invention is to provide an arrangement whereby a wire may be securely connected to the post merely by insertion therein, wherein the connection is completely adequate both from an electrical and mechanical standpoint, and yet which permits the wire to be released and withdrawn freely and at will when desired, the connection and disconnection of the wire being accomplished without the need for any tools or disassembly of the post or associated structure.

Another object of the invention is to provide an electrical connector which in addition to the foregoing is characterized by a simple construction and compact arrangement and which comprises elements which may be economically manufactured and readily assembled as a unit.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a vertical cross-sectional view of a terminal binding post which mounts the connecting elements comprising the present invention;

Fig. 2 is a top plan view of the electrical connecting elements shown in Fig. 1;

Fig. 3 is a front left hand end view of the assemblage shown in Fig. 1; and

Fig. 4 is a longitudinal cross-sectional view of the connecting elements shown in the engaging or connecting relation between two conductors.

The electrical connector or wire grip of the present invention is shown in the drawings as applied to a terminal binding post 10 such as the terminal post of an electric switch or the like. In this embodiment, the connector includes a conductor element 12 which is fabricated in the form of a contact element of the switch and which, therefore, is a permanent part of the binding post. However, it should be understood that the conductor element 12 may take various other forms to particularly adapt the connector and binding post for various applications. For example, the connector and binding post may be used in connection with an electric kitchen range wherein the element 12 may be a conductive strip or a wire which may permanently connect the binding post to a heating element, etc.

Referring to the drawings, the binding post 10 includes a generally cup-shaped housing 11 formed of insulating material and having a rectilinear well 14 in which is received a frame or supporting member 24. The frame or supporting member 24 is formed of current conducting sheet material, such as copper, into a generally U-shaped member having a bottom plate 28 and side walls 30 and 32. The bottom and side walls of the frame 24 engage the bottom and side walls defining the well 14 within the binding post 10 and the top wall of the well 14 is provided with a depending section 34 which runs longitudinally of the well 14 and is disposed between the top edges of the frame side walls 30 and 32. The front end wall 16 of the housing is provided with an aperture 18 having a diverging outer taper 20 to receive the end of a wire conductor 22. The arrangement of the aperture 18 in the housing end wall 16 is such that when the wire conductor 22 is inserted within the aperture 18 the extending end portion of the wire will overlie and engage the top surface of the bottom wall 28 of the frame. The bottom wall 28 may be integrally formed with the conductor 12 as in the illustrative disclosure or it may be electrically connected thereto in some other conventional manner so as to complete electrical connection between the conductors 12 and 22 upon engagement of conductor 22 with the frame bottom 28.

Supported by the frame 24 is a spring element 26 for gripping the wire 22 and pressing it into engagement with the plate 28. The spring element 26 is formed of spring steel or the like into a generally U-shaped member having spring legs 36 and 38 which are disposed transversely in the channel of the frame 24 and which are joined at their upper ends by a web or wall 40. The spring legs 36 and 38 have free ends 37 and 39, respectively, which normally press against the top surface of the frame bottom 28 and the legs 36 and 38 each engage the bottom 25 at an acute angle.

The web 40 has opposed laterally outwardly extending lugs 42 which are inserted within notches 44 cut into the upper edges of the frame side walls 30 and 32. The side walls 30 and 32 provide a tapering edge 46 on one side of each of the notches 44 of the frame to prevent inadvertent removal of the lugs 42 theretfrom. In addition, each of the side walls 30 and 32 are provided with an inwardly directed boss 48 forwardly of the foremost spring leg 36 to provide opposed abutments against which the spring leg thursts and which limits forward movement of the spring leg 36. An ear 50 is struck from the wall 40 adjacent the leg 36 and presses against the overhanging shoulder 34 on the post 10, thereby tending to pivot the wall 40 and the spring leg 38 about the lugs 42 secured within the notches in the frame side walls. This pivoting tendency is in the counterclockwise direction shown in Fig. 1 so that the bottom edge of the spring legs 36 and 38 are pressed with some force against the bottom wall 28 of the frame 24.

The spring leg 38 is transversely disposed in the frame 24 closely adjacent the aperture 18 so that the free end of the wire conductor 22 after it is inserted through the aperture 18 strikes against the free end 39 of the spring leg 38. The end of the wire conductor will force the spring leg 38 to pivot clockwise, as viewed in Fig. 1, about the lugs 42 so that the end of the conductor 22 may be inserted beyond the spring leg 38 until it strikes the other spring leg 36. The spring leg 38 forces the wire conductor against the frame bottom wall 28 which, as previously mentioned, is electrically connected to the other conductor 12. Of course the free end of the wire conductor 22 is stripped of insulation so that an efficient electrical contact will occur between the wire end and the bottom wall of the frame. The wire conductor cannot be disengaged by pulling it from the binding post 10 since such movement of the wire 22 against the spring leg 38 merely forces the end 39 of the spring leg counter-
clockwise to effect even tighter clamping engagement or gripping of the wire conductor 22 between the frame bottom 26 and the spring leg 35.

While the arrangement so far described is convenient and effective for forming the quick connection or gripping of the wire 22, it frequently is desired in many installations to be able to subsequently disconnect or release the wire 22 with a minimum of effort and time. Therefore, there has been provided, in accordance with the present invention, an arrangement for effecting disconnection or release of the wire 22 which makes the operation substantially as simple and convenient as the connecting operation, which does not require any special tools or technique and which makes it unnecessary for the operator to remove the terminal post or disassemble the associated mechanism in order to obtain access to the open end of the housing 11. This has been accomplished in accordance with the present invention by providing an arm 52 preferably made integral with the spring member 26 and may be stamped from the same material. The arm 52 is bent at right angles to the plane of the spring leg 38 and because of its width presents a considerable resistance to bending stress. At the same time the arm 52 is sufficiently thin so that only a very narrow slot 54 is required, this being true even though the arm 52 has a small bent-over portion 56 at its outer end to operate as a thumbscrew.

Since the arm 52 is made integral with the spring leg 38 and extends outwardly along the side of the wire 22, it forms a very convenient and efficient means for flexing the spring leg 38 to facilitate detaching of the wire 22. All that the operator needs to do in order to release the wire 22 is to push downwardly on the thumbscrew 56 with a moderate force, causing the spring leg 38 to flex about the upper pivot thereof, thereby permitting the wire 22 to be withdrawn. This eliminates any need for the use of special tools or the need for obtaining an access to the spring through the opposite end of the post, the latter being especially advantageous when the post is incorporated in a switch or the like. This arrangement also permits the use of the rear spring leg 38 of which course would prevent the insertion of a tool. The size of the slot 54 required for the relatively lever or pivot 52 is so small that the clearance of the outer end of the post is not materially or adversely affected from a practical standpoint.

Since the pivot point is internally of the housing, only a very short extension of the arm 52 from the front wall 16 is required, there being ample leverage provided for releasing the spring leg 38. Furthermore, the operation is so simple and convenient that even operators unfamiliar with devices of this type will readily perceive the proper operation, thus avoiding inadvertent damage to or destruction of the post.

The use of the arm 52 is advantageous not only for releasing the wire 22 but also facilitates the insertion of wires of the stranded type which normally would not have sufficient rigidity to be inserted against the force of the spring leg 38. When stranded wires are inserted, it is simple for the operator to depress the arm 52 during insertion of the wire, thus ensuring a minimum of resistance to insertion of the wire.

Also, inasmuch as the arm 52 may be made integral with the spring leg 38, the fabrication and assembly of the unit is greatly facilitated. As will be apparent, the switch contact element 12 may be formed as an integral part of the frame 24 to which the spring leg 38 and its lever arm 52 is fixed and the assembly thus completed may be inserted into the post housing 10 as a unit from the open end 14 without the need for any difficult assembly operation within the housing; there being no need to provide a pivot for the arm 52 either on the frame 24 or the front wall 16 of the housing.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

1. An electrical terminal post comprising a generally cup-shaped insulated housing having a rectilinear well therein, a generally U-shaped frame disposed within said well, said frame having a bottom wall arranged to receive against its upper surface a longitudinally disposed wire and the closed end of said housing defining an aperture for insertion of a conducting wire adjacent the upper surface of said bottom wall, an electrical connector connected to the frame and extending from the open end of said well, a generally U-shaped spring element having depending legs and a connecting web secured to the side walls of the frame adjacent the upper edges thereof, said legs being disposed at different distances from the closed end of the housing, said legs being biased toward said bottom wall of the frame, each of said legs transversely engaging the upper surface of said bottom wall and extending in approximately the same direction at an acute angle thereto, means on the side walls of said frame engaging the leg farthest from the closed end of the housing to prevent pivoting movement thereof in one direction relative to said frame, the other of said legs having a free end arranged to engage the conducting wire and hold the same against the upper surface of said bottom wall, and lever means integrally formed on said other leg along one side edge thereof and extending outwardly from said frame adjacent the conducting wire, the closed end wall of said housing having a slot receiving the free end of said lever therethrough, the free end of said lever being operable externally of said housing by said other leg out of engagement with the conducting wire and whereby said conducting wire may be removed longitudinally from said housing.

2. A quick detachable electrical connector comprising a casing having laterally spaced side walls and a longitudinally bottom wall, an inverted U-shaped spring having a longitudinal web pivotally supported at laterally spaced points in said side walls and having two spaced legs engaging said bottom wall in the same direction at an acute angle at longitudinally spaced points, laterally opposed bosses in said side walls engaging one of said spring legs to retain said legs in resilient contact with said bottom wall, an aperture in said casing for inserting the end of a first conductor beneath the end of the other of said spring legs, means for connecting another conductor to said casing, and a lever arm integral with said other spring leg extending outside said casing for manually pivoting said other spring leg away from said bottom wall to release said first conductor.

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