Jan. 25, 1949. B. P. McKINLEY 2,459,832

ELECTRICAL OUTLET TERMINAL

Filed Jan. 29, 1945

Fig. 1

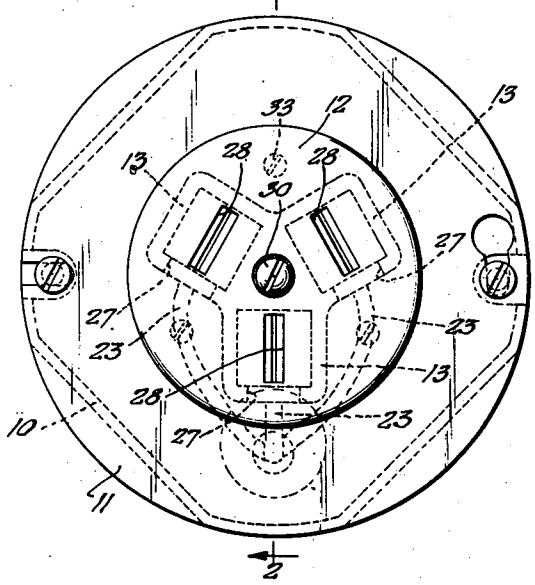


Fig. 2

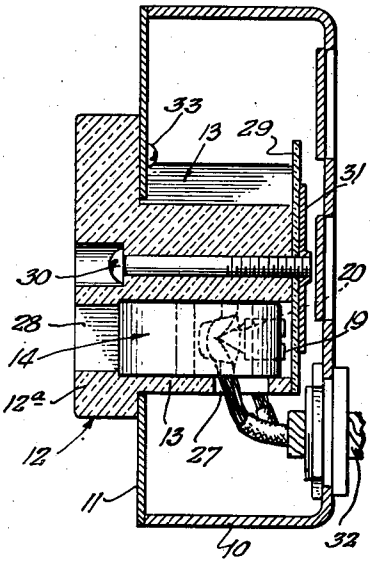


Fig. 3

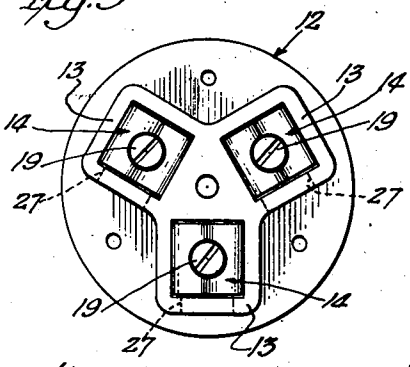


Fig. 4

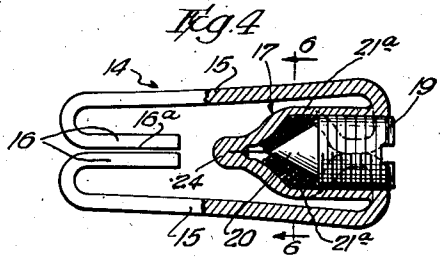


Fig. 6

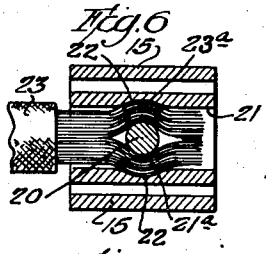


Fig. 5

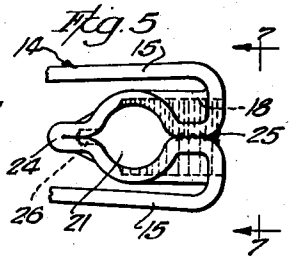


Fig. 8

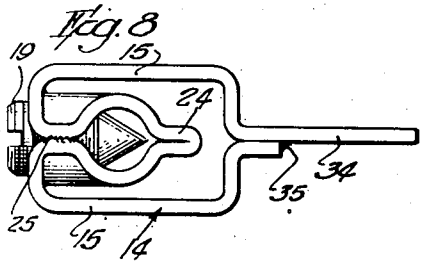
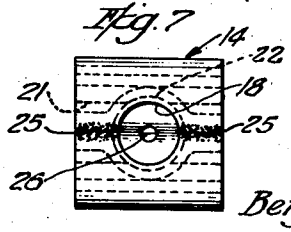


Fig. 7



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ELECTRICAL OUTLET TERMINAL

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Application January 29, 1945, Serial No. 575,115

5 Claims. (Cl. 173—340)

1

This invention relates to improvements in electrical apparatus.

One object of the invention is to provide an improved electrical terminal for use in outlet receptacles or in attachment plugs.

Another object of the invention is to provide a terminal formed of a single length of strip conductor material shaped to provide one of a pair of contact members as well as conductor receiving and anchoring means.

An additional object of the invention is to provide an electrical terminal that can be manufactured economically from strip material by die-forming operations and which includes means providing a relatively large contact-area, solderless connection for a conductor, and is provided with means for anchoring the conductor within the terminal firmly against accidental dislodgement.

Another object of the invention is to provide electrical terminals and an insulating receptacle therefor into which the terminals may be inserted and retained in positions of use by a common closure and without employing individual securing means for the terminals.

Other objects of the invention relate to various features of construction and arrangement of parts which will be apparent from a consideration of the following specification and accompanying drawings wherein:

Figure 1 is an elevation of a conventional outlet box, and a cover therefor, and a receptacle provided with electrical terminals which are illustrative of the present improvements;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a rear end view of a receptacle, detached from the box of Fig. 1 showing three terminals in position therein;

Fig. 4 is an enlarged broken side elevation of a detached terminal illustrating a conductor and conductor anchoring means in position therein;

Fig. 5 is a partial side elevation of a terminal with the conductor anchoring means removed;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4;

Fig. 7 is an end elevation looking in the direction of arrows 7—7 of Fig. 5;

Fig. 8 is a side elevation of a terminal embodying the invention for use with one or more others in a plug cap.

In the drawings, the improved apparatus shown for illustrative purposes comprises a conventional outlet box 10 that may be installed in a wall or in any position where the outlet is to be

2

used. A box cover 11 is shown that may be conventional except that it is provided with an opening corresponding to the cross-sectional shape of the rear portion of an insulating receptacle 12, the rear portion being formed of the shape required in providing terminal cells 13. In the present disclosure three such cells are shown, the receptacle being designed for a three-wire circuit such as generally is employed for electric ranges for example. Where other than a three wire system is employed, the receptacle is provided with the number of cells for the required terminals.

An improved terminal, indicated generally by the numeral 14 is shown in Figs. 4 and 5 detached from the receptacle and as therein shown is formed of a strip of suitable conductive metal or alloy. The terminal is of such shape as to provide novel advantages in use and such that it can be die-formed for economy in production and requires no mounting as distinguished from mere placement and confinement within a cell 13. The assembly of the improved apparatus, including the terminals and receptacle, is thereby simplified over the assembly of present terminals that generally are attached to a base, as by screws or rivets or are formed integral with a base that requires mounting on an insulating support.

The strip of which the improved terminal is formed is shaped, as by die-forming operations, to provide a pair of arms 15 which at one end of the terminal are turned inwardly, to provide a pair of contact members 16. The cooperating pair of contacts 16 are slightly spaced apart as indicated at 16a, and provide electrical contact with an inserted male member of a terminal plug, such as is shown in Fig. 8, and later described. The member 14 is thus the female of a pair of cooperating circuit connectors, the arms 15 being sufficiently resilient to enable them to spring apart in receiving therebetween a blade such as that above mentioned.

At the other end of the terminal the strip is provided with a reentrant portion that is disposed between the arms and is indicated generally by numeral 17. Portion 17 is formed to provide a longitudinal passage 18 that is threaded to receive a screw 19 having a tapered or conical inner end 20 as shown in Fig. 4. The portion 17 is provided also with a transverse passage 21 that intersects the axial passage 18 and preferably is of somewhat smaller diameter than passage 18 whereby there are formed two opposed concavities 22 in the wall of the transverse pas-

sage. An end of a conductor 23 forming part of a current carrying cable is adapted to be inserted in the transverse passage 21, the diameter of the passage preferably being but slightly greater than the diameter of the conductor.

Conductors employed in connecting outlet receptacles to a source of current supply generally are of the stranded type and where the stranded end of such a conductor is inserted in a passage 21 and the screw 19 is thereafter tightened upon the conductor, the strands 23a of the conductor within the passage 21 are divided or separated at the intersection of the passages and are pressed firmly in contact with the walls of the passage 21 to provide a relatively large area, solderless electrical connection. The separation or division of the strands by the screw 19 deforms a part of the strands into the concavities 22 and thereby further firmly anchors the conductors within the passage against displacement.

For the purpose of preventing the springing apart of the halves of the reentrant portion 17 along the plane of their contacting faces, they preferably are made integral at the inner ends as indicated at 24, while the contacting edges of the halves at the other end of the terminal are secured together as by welding, as indicated at 25. Such arrangement provides rigid screw holding and conductor holding passages that do not expand or deform under the action of the screw as the latter is turned inwardly in providing firm and close electrical contact between the bared end of a conductor 23 and the wall of the recess 21.

The inner end 24 of the reentrant portion is shown provided with a drilled or otherwise formed recess 26 for receiving the point or apex of the screw 19 should the latter be screwed inwardly sufficiently to require accommodation beyond the wall of the transverse passage 21.

As indicated in Figs. 1, 2 and 3, terminals of the type described above are adapted to be positioned within the cells 13 of the receptacle 11. Each cell is provided with a conductor opening 27 that is in alignment with the conductor passage 21 of the respective terminal whereby after a terminal 14 has been positioned properly within a cell, a bared end of a conductor can be inserted through the opening 27 into the passage 21 of the terminal and secured firmly in place by tightening down the screw 19, as above described.

The positioning of the terminals in the cells as to cause the transverse passages 21 of the terminals to register with the openings 27 of the cells, effects proper alignment of the space 16a between the contact portions 16 of each terminal with a slot or opening 28 provided in the forward external portion 12a of the insulating receptacle 12. Hence insertion of blades of an outlet plug into the openings 28 insures electrical connection as between the terminals and the blades.

For the purpose of securing the terminals within the cells, an insulating closure member is provided which, in the form illustrated, comprises an insulating disc 29 which is secured over the rear ends of the cells by means of a bolt 30 provided with a nut 31 at the rear thereof. The terminals are thus merely confined within the cells, as distinguished from being mounted upon bases by screws or rivets as has been common heretofore. An economical structure as well as one that can be assembled readily is provided by the improvements disclosed.

In Fig. 2 the outlet box 10 is shown with a knock-out opening through which a cable 32 comprising, in the instance illustrated, the three conductors 23, is led into the box in conventional manner. The present receptacle therefore can be installed in a conventional metal or other box, the lid only of which requires modification to make provision for receiving the rear cell-portion of the receptacle as well as holes for screws 33 that secure the receptacle to the cover.

The improved terminal above described is of the female type but a male type, such as is shown in Fig. 8 may be made in accordance with the principle of the invention. In Fig. 8 parts common to those shown in Fig. 4 and indicated by similar reference characters, the difference between the two forms residing in shaping the arms 15 to provide a single terminal blade 34. The required number of such male terminals may be mounted in a plug cap or equivalent insulating support, not shown, the blades 34 of which are so spaced and disposed in planes as to enable them to be pressed through the slots 28 into electrical contact between the contact arms 16 of the female terminals 14. The arms 15 of the member shown in Fig. 8 are attached together adjacent their forward ends, as by welding, as indicated at 35.

In the forms of the improvements illustrated, the anchoring screw 19 is shown disposed within the axial passage of the terminal and the conductor within the transverse passage, although use of the reverse arrangement is contemplated where advantageous.

While I have shown and described a structure illustrative of the invention it will be seen that changes in detail thereof may be made within the scope of the invention defined by the following claims.

I claim:

1. An electrical terminal comprising a strip of conductive metal shaped to provide a contact means at one end and providing a pair of spaced apart arms having a reentrant portion extending inwardly between the arms at the other end of the terminal defining an axial passage and a transverse passage intersecting said axial passage, and conductor anchoring means in one of said passages adapted to engage a conductor end inserted in the other of said passages.

2. An electrical terminal comprising a strip of conductive metal shaped to provide contact means at one end and providing a pair of spaced apart arms having a reentrant portion at the other end disposed between said arms and providing an axial passage and a transverse passage intersecting said axial passage, one of said passages being of greater diameter than the other to provide opposed concavities in the walls of the smaller passage, and conductor anchoring means in said larger passage adapted to separate the stranded end portion of a conductor inserted into the smaller passage and to deform some of the strands into said concavities for anchoring the conductor within said smaller passage in firm electrical contact with the wall thereof.

3. An electrical terminal comprising a strip of conductive metal shaped to provide contact means at one end and providing a pair of spaced apart arms having a common reentrant portion at the other end disposed between said arms and providing an axial passage and a transverse passage intersecting said axial passage, said axial passage being of greater diameter than said transverse passage to provide opposed concavities in the walls of said transverse passage and being threaded for receiving a set screw, and a set screw for

said threaded passage having a conical lower end adapted to effect separation of the end portion of a stranded conductor inserted in said transverse passage and to press the portions of the strands into firm electrical contact with the walls of the transverse passage and to deform some of said strands into said concavities for anchoring the conductor firmly within said last mentioned passage.

4. An electrical terminal comprising a strip of conductive material shaped to provide contact means at one end of the terminal and a pair of spaced apart arms having inwardly directed portions at the other end of the terminal, said portions being connected at the inner ends thereof and being complementarily shaped to provide an axial passage and a transverse passage intersecting said axial passage between said arms, means connecting said complementary portions together at the edges adjacent said last mentioned end of the terminal to prevent separation of said portions, and a member for said axial passage for engaging a conductor end inserted into said transverse passage and pressing the same into firm electrical contact with the wall of said transverse passage.

5. An electrical terminal comprising a strip of conductive material shaped to provide contact means at one end of the terminal and a pair of spaced apart arms having inwardly directed portions at the other end of the terminal, said portions being integrally united at the inner ends

thereof and being complementarily shaped to provide an axial passage and a transverse passage intersecting said axial passage between said arms, an operable member within said axial passage for engaging a conductor and inserted into said transverse passage and pressing the same into firm electrical contact with the wall of said transverse passage, and means at the outer ends of said portions for preventing separation thereof by said operable member within said axial passage.

BENJAMIN P. McKINLEY.

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Certificate of Correction

Patent No. 2,459,832. January 25, 1949.

BENJAMIN P. McKINLEY

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 6, line 5, for the words "conductor and" read *conductor end*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of September, A. D. 1949.

[SEAL]

JOE E. DANIELS,
Assistant Commissioner of Patents.