March 17, 1964 P. H. WINTER 3,125,392

SPRING-WIRE, DUAL-GRIPPER FOR CONDUCTORS

Filed April 2, 1962

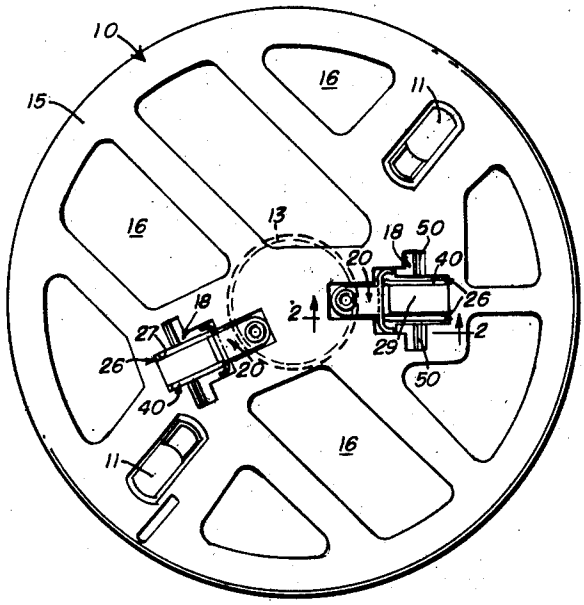


FIG. 1

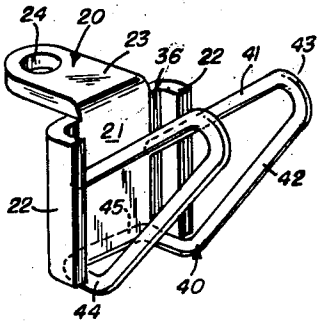
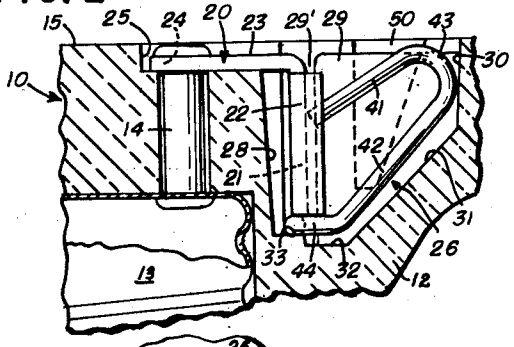


FIG. 3

FIG. 2



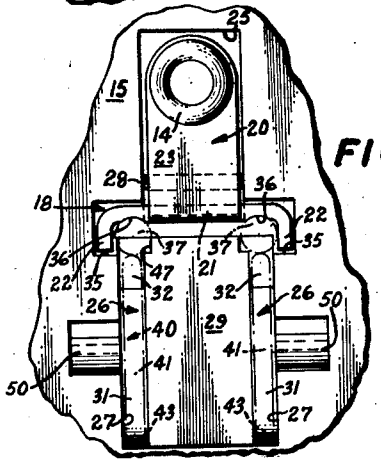


FIG. 6

FIG. 4

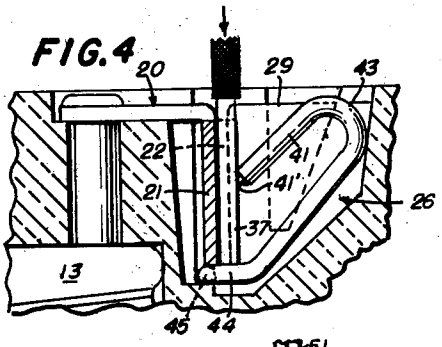
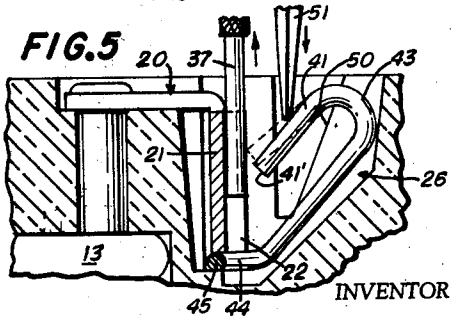


FIG. 5



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SPRING-WIRE, DUAL-GRIPPER FOR CONDUCTORS

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This invention relates to electric wiring devices and more particularly to a spring-wire, dual-gripper for conductors.

It is a general object of the present invention to provide a novel and improved gripper for two conductors formed from a single length of spring-wire arranged for cooperation with a stationary terminal plate.

An important object of the invention resides in the arrangement and cooperation of a dual-gripper of spring wire with a terminal plate which holds the former in position in a formed recess in a moulded insulation part without the need for any additional fastening or cover means.

Another important object of the invention consists in the provision of access directly to the gripper springs individually by a common tool to alone release either conductor gripped thereby.

An important feature of the invention consists in holding the dual spring in position by having the bottom of the terminal plate engage and hold its transverse central portion against outward movement.

Other and further objects and features of the invention will be more apparent to those skilled in the art after a consideration of the following specification and the accompanying drawing, wherein is disclosed a single examplary embodiment of the invention, with the understanding that such changes and modifications may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

FIGURE 1 is a bottom plan view of a porcelain lighting fixture equipped iwth two spring-wire, dual-grippers constructed in accordance with the present invention;

FIGURE 2 is a fragmentary longitudinal section, on a larger scale taken therethrough on line 2—2 of FIGURE 1;

FIGURE 3 is a perspective view, on the larger scale, of the spring-wire, dual-gripper and its cooperating terminal plate removed from the insulating fixture base;

FIGURE 4 is a view similar to FIGURE 2, but illustrating a conductor in position held by one part of the gripper, and with the terminal plate shown in longitudinal section between the wings thereon;

FIGURE 5 is a view similar to FIGURE 4, but showing the gripper flexed by a tool to release the conductor for withdrawal; and

FIGURE 6 is a fragmentary view, like FIGURE 1, on an enlarged scale, showing in dot and dash lines one complete gripper assembly in position in a recess in a mouded insulation base.

The invention is illustrated for convenience in connection with a moulded, box-mounting type of lamp holder, commonly referred to as a "boxcover socket" or "porcelain light fixture" for bathroom, kitchen and similar uses, but obviously this is merely by way of illustration for the terminal device is capable of use in many other positions where sufficient housing depth, in moulded insulated material, is available to accommodate it.

Referring now to the drawing and first to FIGURES 1 and 2, it will be seen that the wiring device comprises a moulded base or housing **10**, suitably perforated at **11**—**11** for the reception of mounting or fastening screws which secure it to act as a cover for a junction or fixture box of the circular or octagonal type. The fragmentary

section of FIGURE 2 illustrates the socket sleeve **12** projecting integrally and centrally from the front face, of the circular base shown in FIGURE 1, and formed of suitable insulating material such as porcelain or synthetic resin. A conventional metal screw shell **13** is mounted in the central recess thereof, and secured in position by means of a rivet **14**, and is illustrative of one of two contacts each of which is accommodated by a dual-gripper for conductors, formed in accordance with the principal part of the present invention.

The back wall **15** of the wiring device is substantially flat, as shown to fit against a wall surface, and is provided with various lightening pockets **16** and with two recesses **18** spaced somewhat less than 180° apart to accommodate the wire grippers for conductors supplying current to the fixture. For the convenience of wirement it is now customary to provide means for attaching two wires to each terminal of such a device in order that current may be forwarded therefrom to other fixtures or wiring devices without the necessity of soldering connections, and, for this purpose, each of the recesses **18** is provided with a dual wire gripper.

The dual wire grippers and their essential equipment, arranged in the recesses **18**, are identical in construction and the description of one will suffice for both. As seen in FIGURE 1 a terminal plate **20** is provided against the inner wall of the recess **18**, and comprises, as seen in the other figures, a flat plate **21** having side wings **22** parallel to each other and bent up substantially at right angles to the flat surfaces of the plate **21**. A tang **23** is bent at right angles from the upper edge of the plate, is somewhat narrower than the rest of the plate and is perforated as at **24** to accommodate a rivet such as **14** shown headed over in FIGURE 2 whereby the terminal plate is placed in electrical communication with the socket contact **13**. The other wire gripping device has its tang connected to a central contact, not shown, for the socket. The tang **23** is accommodated in a shallow recess **25** in the back wall of the wiring device, thus keeping all parts below the flat surface thereof.

The recess **18** is of a complex shape as best seen in FIGURE 6 considered along with FIGURE 2. The recess **18** includes a pair of parallel grooves **26** normal to the face of the plate **21** and having their outer walls **27** substantially continuations of the inner faces of the wings **22**. The plate **21** is accommodated in a transverse channel **28** which connects together the notches or grooves **26**. The minimum dimension of the channel **28**, i.e., measured in the direction of length of the notches **26** is only slightly greater than the thickness of the plate **21** to readily accommodate it but to leave between it and the face of the abutment **29** between the notches **26**, a space **29'** less than the thickness of the plate and certainly less than the diameter of the gripping wire which will be later described.

The notches **26**, as best seen in FIGURES 2 and 4, open out through the back wall of the wiring device, having substantially parallel side walls and an irregular bottom wall composed of the wall **30** almost normal to the flat surface of the back of the wiring device, the wall **31** extending at an angle of approximately 45° to the axis through the socket of the wiring device, and a bottom wall **32** normal to said axis. A portion **33** slightly elevated above this bottom wall **32** lies only beneath the lower edge of plate **21**, which it will be appreciated is held in position by the tang **23** and the rivet **14**. Behind the plate **21** the rear wall of the channel may be inclined to provide draft for the process of molding the device, and, this is true of the other walls which are more nearly normal to the surface of the back of the wiring device.

As seen in FIGURES 1 and 6 the transverse channel **28** extends laterally beyond each of the notches **26** and is

thickened at and beyond the notches, as seen at 35, to accommodate the wings 22 as best seen in FIGURE 6. At the junctions of these wings with the plate 21 are preferably formed shallow grooves 36 in alignment with the longitudinal centers of the notches 26 to assist in guiding the conductors, to be held by the grippers, and to give them a somewhat greater contact area with the terminal plates as well as to prevent them from rolling laterally. Such conductors are indicated in section at 37 in FIGURE 6 and for the purpose of permitting them to be inserted longitudinally, as indicated in FIGURE 4, the upper edge of plate 21 and its appurtenances are exposed through the back of the wiring device.

The dual gripper for the conductors is best seen in FIGURE 3 where it is generally referred to by the reference character 40. It is a complex formation of resilient steel wire, such as piano wire, bent from one piece thereof into the structure illustrated at 40 to provide a pair of grippers. Each gripper has a free end cooperating with the wall of terminal plate 20, just within one of the wings thereof, serving to grip a wire which is introduced through the open side of notch 26 so as to prevent it from being withdrawn in accordance with the illustration in FIGURE 4.

For purposes of convenience, the wire component 40 may be looked on as two, parallel-positioned, wire grippers each composed of two arms 41 and 42 connected together by an elbow 43 and divergent as best indicated in FIGURE 2. The arm 41, referred to as the gripper arm, is straight from its junction with the elbow, and the arm 42 is straight for most of its length beyond the elbow and then has a short section 44 bent through an angle of about 30° in order that its end may rest on the shelf 33, previously referred to, when it is parallel to the bottom wall 32 of the notch in which it is received. To integrate the two wire gripper springs just defined, the wire beyond the parts 44 is bent at right angles and integrated with a transverse connection portion 45.

This whole component 40 is shaped and sized to be received with each wire gripper in one of the two notches 26 and with the connecting portion 45 in channel 28, prior to the introduction and securing of the terminal plate 20. It is positioned as illustrated in FIGURES 2, 4 and 5 by having the elbows 43 resting against the walls 30 near the upper edges of the notches and by having the cross connecting portion 45 rest on the shelf 33 which places it beneath the lower edge of plate 21 as seen in FIGURE 4, when the latter is finally positioned, which serves to hold the wire complex 40 in the position illustrated in that figure with the ends 41' of the gripper arms 41 engaging against or substantially against the plate 21 at a distance below the level of the elbow, which reaches almost two the rear surface of the wiring device base.

This makes each wire 41 form an acute angle with the surface of the plate, which angle decreases in extent as the conductor wire 37 is forced between its end 41' and the groove in the conductor plate as seen in FIGURE 4. The action of forcing such wire in position is resisted by the engagement of the bend 43 in the gripper wire with the surface 30 causing the wire to flex in the bend and strongly forcing the sharp end thereof against the conductor wire, which is of soft copper, at such an angle that it cannot be withdrawn. Any tendency to withdraw it and the gripper wire along with it is resisted by the plate 21 resting on the stretch 45 connecting the two sets of gripper wires. This stretch cannot move out from beneath the lower edge of the plate 21 since the barrier 29 is too close against the outer face of plate 21 to permit movement of this portion upwardly. To assist in maintaining the gripper ends 41 of the gripper wires in alignment with the introduced conductors as seen at 37 in FIGURE 6, the walls of each of the notches 26 are spaced only sufficiently far apart to loosely receive the wire of the gripper but to prevent it from having any substantial lateral movement. FIGURE 6 shows that the conductor 37 is also limited in its lateral movement by first the inner wall of the adjacent wing 22 on the plate 21 and by the wall 47 which is offset slightly inwardly from the inner wall of the notch 26. Thus, the conductor 37 is hemmed in on three sides by stationary walls, one having groove 36 therein, and engaged on the fourth side by the end 41' of the gripper arm 41 in such a manner that no matter how hard the conductor may be pulled it is only gripped tighter.

In order that the wireman may withdraw a conductor should he introduce one improperly or place the wrong one in gripping engagement, a recess 50 seen in FIGURES 1 and 6, and perhaps best in FIGURE 5, extends into the material of the base and through the outer wall of notch 26 and permits the introduction of a tool, such as a screwdriver as seen at 51 in FIGURE 5, to engage the upper side of portion 41 of the gripper and depress it as indicated by the arrow in FIGURE 5 whereby its end 45 is withdrawn from its engagement with conductor 37 so that the latter can readily be withdrawn and the proper conductor substituted.

The arrangement just described makes a simple, low cost and very effective wire gripper requiring a minimum of parts and of assembly operation. The materials are cheap and simple to manufacture, and the amount of time saved by the wiremen is very considerable over that of using screw-type terminals.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An automatic dual conductor wire gripper comprising an insulating base, dual, parallel, laterally spaced substantially V-shaped notches in said base terminating substantially at a surface thereof and having one leg of each V-shaped notch substantially normal to said surface, a transverse channel connecting said legs for substantially their full depth and extending laterally beyond them, a terminal plate secured in and nearly filling said channel having a wing on each edge substantially at right angles to the plate and each directed generaly toward the other leg of each V, a conductor wire gripper comprising a pair of divergent arms of spring wire integrated by a bend of the order of 180° and arranged one pair in each said notch with the free end of each outermost arm substantially engaging said plate adjacent one of said wings at a position deeper in its notch than the bend between the arms of the pair, a straight transverse integral portion of said spring wire connecting the inner ends of the other arms together, and extending in said channel beneath the lower edge of said terminal plate, whereby the dual spring wire gripper unit is maintained in position in the V-shaped notches and connecting channel.

2. The wire gripper of claim 1 in which said terminal plate is grooved adjacent each wing to guide the free ends of said outermost arms and also the inserted conductor wire.

3. The wire gripper of claim 1 in which the wall of said transverse channel which faces said terminal plate is spaced therefrom less than the diameter of said spring wire and said terminal plate substantially holds the transverse integral portion of said gripper assembly against the bottom of said channel.

4. The wire gripper of claim 1 in which the said base laterally of and through one side wall of each V-notch is recessed close to the said transverse channel and to a depth below the position of the outermost arm of gripper wire therein whereby a tool may be inserted to depress said arm and release a wire gripped thereby.

5. The wire gripper of claim 4 in which the recessed side wall of each V-notch is the outermost one.

6. In a wiring device housing of insulating material containing at least one contact member and means for automatically gripping and connecting a pair of conductor wires to said contact comprising a terminal plate electrically connected to said contact and having parallel wings turned up from opposite edges thereof, one end of

said plate and of the wings being exposed through a wall of said housing to slidably receive an end section of one of said conductor wires adjacent each wing, a narrow groove in said housing extending normal to said plate adjacent the inner wall of each wing, a conductor wire gripping means in each groove comprising two arms of spring wire having an integral connecting elbow and diverging therefrom at a small included angle, a transverse channel connecting said grooves and receiving said terminal plate, one of the arms of each gripping means being the gripping arm and having a free end substantially engaging said terminal plate adjacent a wing thereof and more remote from the said surface end of the plate than said elbow, the ends of the other arms of each gripping means being integrated by a transverse portion of wire located in the bottom of said transverse channel and beneath the lower edge of said terminal plate for retention in the channel thereby, a wall in each groove being

located to engage and position the elbow of each gripping means as defined to fix the gripping means assembly in the housing.

7. The wiring device of claim 6 in which a notch is provided in the insulating material laterally of each groove extending through a side wall thereof to a depth below the position of the gripping arm therein whereby a tool may be inserted to depress said arm and release a wire gripped between the free end thereof and said terminal plate.

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