

[54] **ELECTRICAL CONNECTORS**  
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 292/113, 256.5

[57] **ABSTRACT**

An articulated plug-in connector suitable for attachment to a duct carrying electrical conductors has a base including a lever pivoted about a first axis located opposite hook fixing means integral with the base and engaging in anchoring apertures in the duct. A yoke carrying second hook fixing means is pivoted about a second axis carried by the lever, and the second hook fixing means engages in further anchoring apertures in the duct when the lever is depressed bringing the axes into line with the second hook fixing means on a line at right angles to the duct.

[56] **References Cited**  
**UNITED STATES PATENTS**  
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**10 Claims, 6 Drawing Figures**

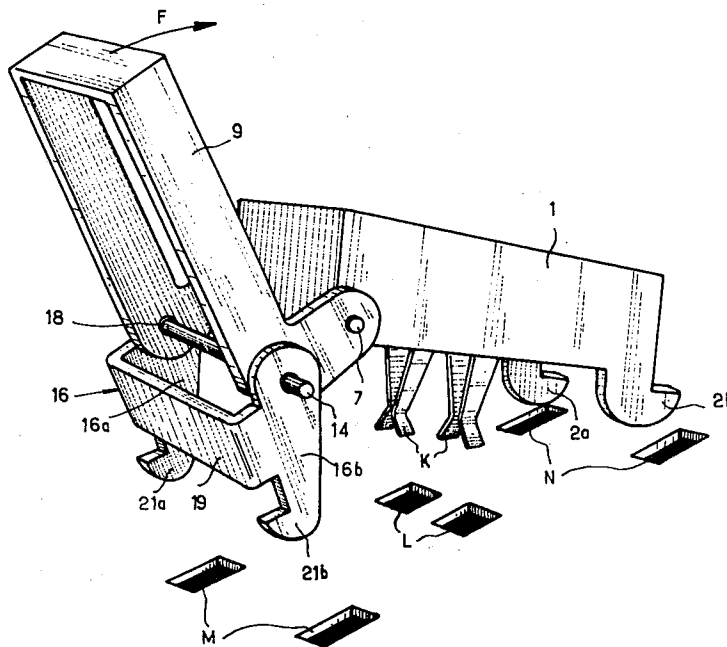


FIG. 1

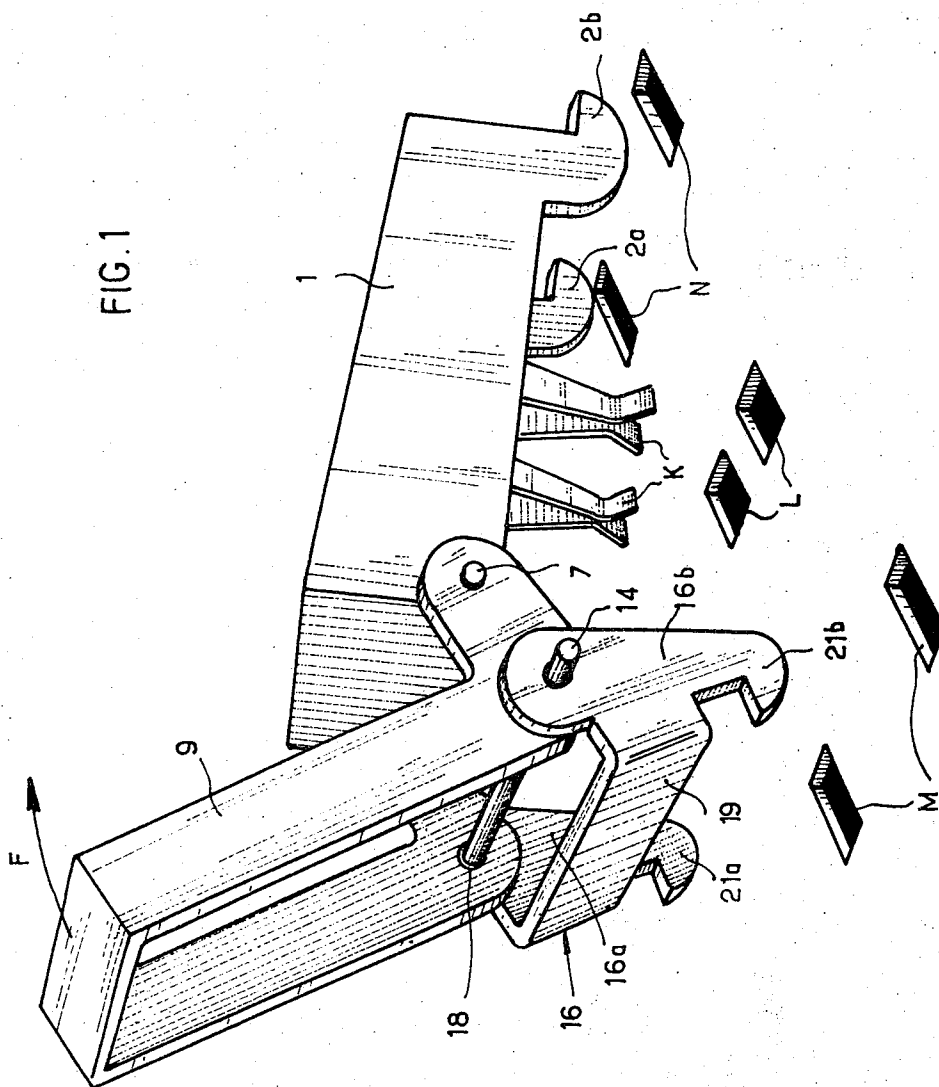


FIG. 2

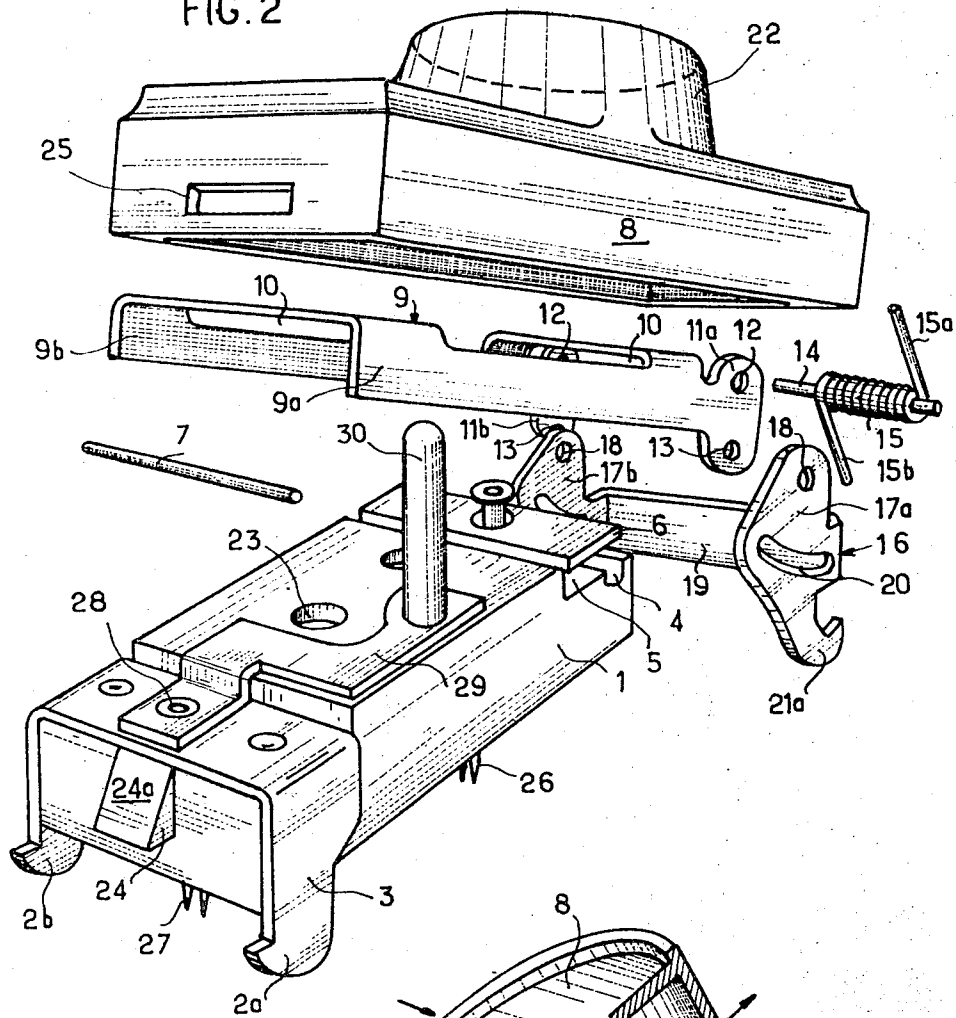
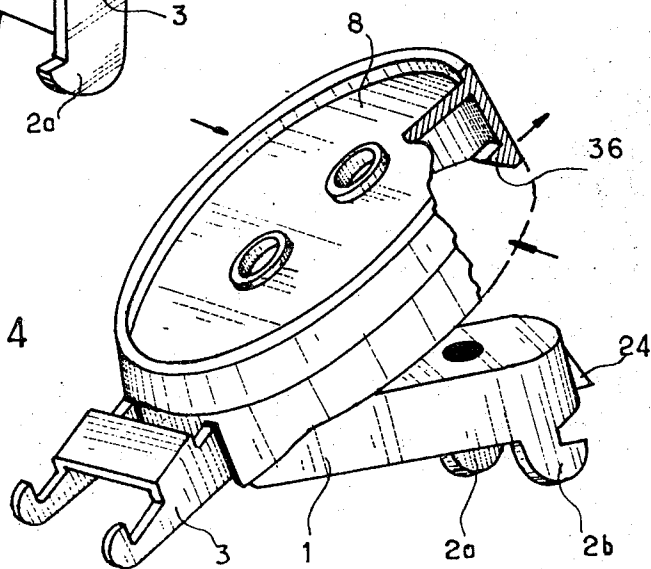
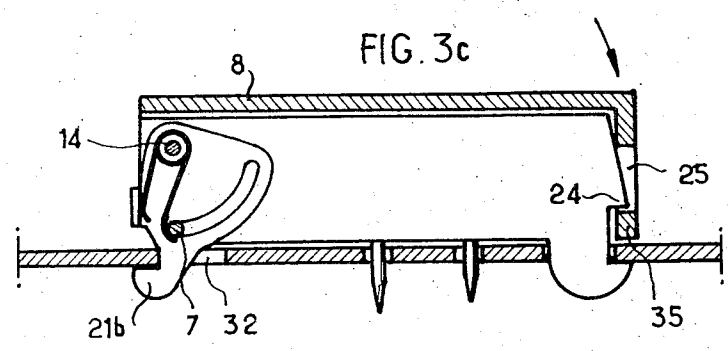
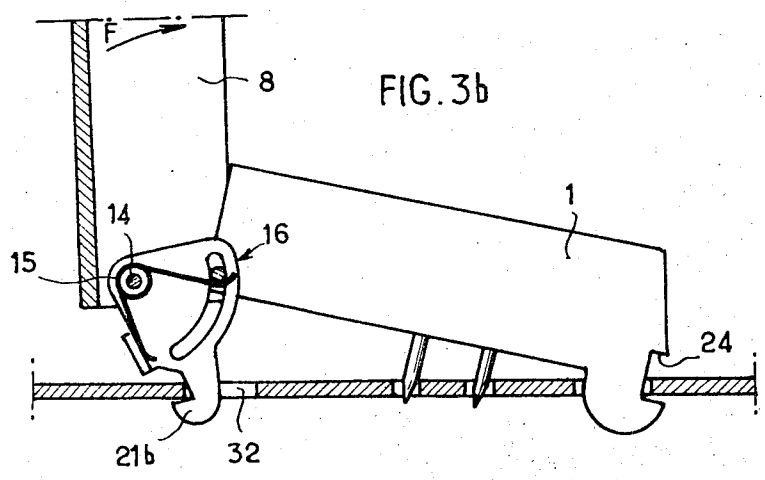
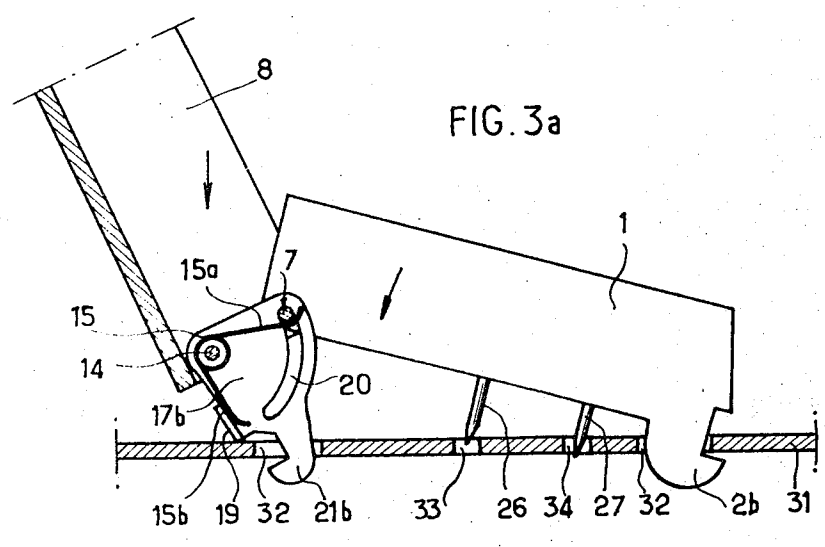


FIG. 4





## ELECTRICAL CONNECTORS

## BACKGROUND OF THE INVENTION

The invention relates to electrical connectors and more especially to an articulated device for a pin-type plug-in connector adapted to be fixed to a duct carrying electrical distribution conductors; the connector being of the kind having a base provided with hooks adapted to engage consecutively on each side of the base and by an angular movement into anchorage means of the duct. In this way, the insertion of connection pin into the conductors and the locking of the connector onto the service duct are achieved.

A connector of this kind is already known from French Pat. Specification No. 2,097,279, in which the insulating base of the connector is a parallelepiped block having on one side a pair of hooks integral with the block, and on the other side a pair of movable hooks comprising a rocking stirrup. The stirrup comprises a claw forming a nut on a screw, and the screw is engaged in a part of the base so as to cause the stirrup, which locks the base, to rise or fall. This device occupies too large a space in a connector required to carry various other elements; additionally it necessitates the use of a screwdriver, and above all the user cannot be certain of the total engagement of the connection pins unless he applies excessive force to the screw.

The invention seeks to overcome these disadvantages. An object of the invention is to provide an articulated mechanism for the connector which gives the pins an increased penetrating force, and at the same time provides an efficacious mode of locking the connector in engagement with the device. The invention can easily be adapted to all systems of connectors for plugging into omnibus service ducts, whether by piercing insulated wires by needle pins, or by engaging copper or aluminum bars by connector clips.

## SUMMARY

The invention provides an articulated device for a pin-type plug-in connector to be fixed to a duct carrying electrical distribution conductors. The connector has a base provided with hooks on each side adapted to engage, by an angular movement, into anchorage means of the duct, and the base has a lever articulated about a first spindle fixed relative to the base opposite first hook fixing means. A yoke carrying second hook fixing means is articulated on the lever about a second spindle carried by the lever, so that with the first hook fixing means already engaged in anchorages on the duct, when the second hook fixing means engages in corresponding anchorages of the duct, the lever can exert a depressing action upon the base by causing rotation of the first spindle about the second spindle so as to bring consecutively the second hook fixing means, the first spindle and the second spindle into the region of a line at right angles to the duct.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of an articulated connectors according to the invention,

FIG. 2 is an exploded perspective view of a second, more detailed embodiment,

FIGS. 3a, 3b and 3c show schematic profiles illustrating the stages of assembly of another articulated connector according to the invention, and

FIG. 4 is a perspective view of a connector in the form of a power outlet point.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a connector base 1 is provided with a pair of hooks 2a, 2b adapted to engage into anchoring perforations N in a duct. Opposite the hooks 2a, 2b, the base carries a spindle 7 near its lower face, and upon this spindle which defines a first axis there swivels a lever 9 formed as a double angle-piece, and constituting a stirrup capable of enclosing the base 1. The elbow of the angle-piece receives a spindle 14 which defines a second axis and carries a yoke 16 comprising a central web 19 and two cheeks 16a and 16b. The cheeks 16a and 16b terminate opposite the axis 14 in hooks 21a, 21b which engage to anchoring perforations M in the distribution duct.

The base 1 carries, on its lower face approximately in the center thereof, a pair of connecting pins K which engage in orifices L of the distribution duct. The duct is not described in detail, since it does not form part of the invention. The pins K are in the form of clips intended to clamp onto copper bars in the duct.

It will be seen clearly from FIG. 1 that if the hooks 2a, 2b are engaged in the perforations N, movement of the lever 9 permits the hooks 21a, 21b to be lowered into the perforations M, whereupon, by rocking the lever towards the right as indicated by arrow F, the arm extending between the spindles 14 and 7 exerts a depressing action upon the base 1. The mode of operation will be understood in greater detail from the description of a second, more highly perfected mechanism now given.

The mechanism of the second embodiment will be understood by referring to and comparing FIG. 3a and FIG. 2. The base, generally indicated at 1, is a rectangular parallelepiped carrying on one end a pair of hooks 2a, 2b formed on the arms of a stirrup 3 which is riveted to the base. At the opposite end of the base a groove 4 is formed in a shoulder 5, with a cover plate 6 closing the groove 4. The spindle 7 is placed in the groove 4 and is retained by the plate 6. The cover of the connector, generally designated by numeral 8, can, when closed, cover the base 1 in the manner of a hood. Inside the cover 8 a metallic fitting 9 is fixed by fixing means such as screws, not shown. The fitting 9 comprises two lateral strips 9a, 9b connected together by cross members 10. Each strip 9a and 9b terminates at the rear in a lug 11a, 11b provided with holes 12 and 13. The holes 13 are arranged at a suitable level to receive the spindle 7 of the base 1, whereas the holes 12 are at a higher level inside the cover 8. The holes 12 permit the rotation of spindle 14 on which a hairpin spring 15 is housed. The spindle 14 further permits the articulation of a stirrup-shaped yoke, generally designated by numeral 16, which comprises two parallel cheeks 17a, 17b which nest against the lugs 11a, 11b of the fitting 9 and which are fitted with holes 18 for receiving the spindle 14. The cheeks 17a and 17b are interconnected by a cross member 19, so as to embrace the end of the base 1 opposite the hooks 2a, 2b. Each cheek is formed with a semicircular slot 20, beneath the holes 18 the purpose of which slot will be described below. Each

cheek terminates downwardly in a respective hook **21a** and **21b** forming the second pair of fixing hooks. The spindle **7** of the connector is fitted after engaging the cheeks **17a**, **17b** upon the lateral faces of the base **1**, the ends of the spindle **7** being engaged in the slots **20** of the two cheeks.

The cover **8**, of moulded material, comprises on its top face a collar **22** which serves as housing for a power point plug, the pins of which will engage in sleeves **23** of the base when the cover **8** is pivoted downwardly. The base likewise comprises on its lateral face, in proximity to the hooks **2a**, **2b**, a nose **24** with an upwardly inclined bevel **24a**, for engagement in a hole **25** in the cover **8**.

This embodiment has been devised to receive pins of pointed conductors of the kind described in French Pat. Specification Nos. 2,097,278 and 2,097,279, to which reference should be made for further details.

In FIG. 2, the ends **26** and **27** of two groups of needle-shaped connection pins are illustrated. The group **26** is intended to engage distribution conductors carried in a moulded service duct. The group **27** are adapted to engage a ground conductor. It will be observed that the pins **27** are located in proximity to the pair of hooks **2a**, **2b**. Inside the base **1**, the group of needle-shaped pins **27** corresponds to a connection **28** attached to a plate **29** on the top of the base. On the said plate **29** there is arranged a pin **30** which is the prescribed grounding pin of the power outlet points. The construction is made so that the pin **30** passes freely inside the cover **8** during the downward pivoting of the cover onto the base **1**.

The distribution duct is illustrated in FIGS. **3a**, **3b** and **3c** solely by its cover **31**, which is formed with anchoring perforations **32** and with power outlet holes **33** and **34**.

The use of the device will be explained with reference to the schematic illustrations of FIGS. **3a**, **3b** and **3c**. Firstly, the hooks **2a** and **2b** on the base **1** are engaged in the anchoring perforations **32**. As long as the hooks **21** **21b** are not engaged, the arm **15a** of the spring **15** engaging the spindle **7** and the arm **15b** engaging the cross member **19**, maintain the stirrup **16** in position as an extension of the cover **8**. The stirrup **16** turns with the cover if the cover is manipulated about the spindle **7**, because the spindle **7** is in abutment at the end of the slots **20**. It is thus easy to find the position of engagement of the hook **21b** in the corresponding perforation **32**. Then the cover **8** is turned in the closure direction F, as shown in FIG. **3b**, the hook **21b** being retained in its anchoring perforation, and the spindle **7** begins to turn about the axis of the spindle **14**, i.e., the cover forms a lever, the minor arm of which is equal to the distance between the axes of the spindles **7** and **14**, and this lowers the left-hand end of the base **1**, which in turn lowers the pins **26** and **27**. The pins **27** which are the grounding pins will be the first to come into contact with the ground conductor in the duct.

Continuing the movement as shown in FIGS. **3c**, the spindle **7** becomes located almost beneath the spindle **14**, having travelled along the entire length of the slots **20**. At this moment the hook **21b**, the spindle **7** and the spindle **14** are all located in the region of a line at right angles to the service duct, whereby any reaction towards opening will be cancelled. At the same time, the nose **24** has engaged in the hole **25**. To disengage the

connector, a tool is necessary to move the edge **35** of the cover slightly away from the end of the nose **24**.

In order to obviate the use of a disengaging tool, a device illustrated in FIG. 4 may be used. The base **1** is of slightly oval shape and has, on the same side as the hooks **2a** and **2b**, a nose **24** in its longitudinal plane. The cover **8** is of round or oval shape with a minor diameter greater than that of the base. The cover is made of a resilient plastic material and it comprises an interior nose **36** for engaging over the nose **24** of the base. In order to disengage the nose **36**, it is sufficient to apply pressure to the sides of the cover along the transverse diameter, which has the effect of causing an elongation along the major axis, such as to disengage the nose **36** from the nose **24**.

I claim:

1. An articulated device for detachable connection of an electrical connector to a duct carrying electrical distribution conductors, said device comprising a base including first hook means for releasably engaging corresponding anchoring means of the duct, a lever pivotably connected to said base for movement about a first axis, a yoke pivotably connected to said lever for movement about a second axis spaced from the first, second hook means on said yoke for releasably engaging corresponding second anchoring means of the duct, said base, lever and yoke forming an assembly by which with the first and second hook means engaged with the corresponding anchoring means of the duct, the device can be secured to the duct in an operative position by pivoting said lever to cause travel of the first and second axes into substantial alignment with said second hook means along a line extending at right angles to the duct, electrical connection means carried by said assembly for making connection in said operative position, with the electrical conductors in the duct, said lever and yoke including cooperating abutment means in contact with one another to provide a position for engagement of the second hook means with the corresponding anchoring means, and resilient means acting between the lever and yoke normally to maintain said abutment means in contact with one another while not subjecting the lever to a force tending to move the device to its operative position after engagement of the second hook means with the corresponding second anchoring means of the duct, the securing of the device in operative position being obtained by application of force to said lever in opposition to said resilient means.

2. A device according to claim 1 wherein said electrical connection means comprises connecting elements on said base.

3. A device according to claim 1 wherein said electrical connection means comprises at least two pairs of needle-shaped connection pins on said base, one of the pairs of connection pins being arranged on the base in proximity to the first hook means for connection to a ground conductor in said duct.

4. A device according to claim 1 wherein the yoke comprises two cheeks, said second hook means comprising extensions of said cheeks formed as a pair of hooks, each of the cheeks having a semicircular slot centered around the second axis, a spindle carried by said base along said first axis and rotatably supporting said lever, said spindle being slidable in said slots, said abutment means being constituted by one end of the semicircular slots and said spindle.

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5. A device according to claim 4 wherein said yoke is formed as a stirrup with a web connecting said two cheeks immediately above the hooks and positioned so that the lower part of the web contacts the top of the duct to limit entry of the hooks into the duct.

6. A device according to claim 5 wherein said resilient means comprises a hairpin spring engaged on said second axis and including arms respectively bearing against said web and said spindle.

7. A device according to claim 1 wherein said lever comprises a cover which pivots downwardly onto the base in said operative position.

8. A device according to claim 7 wherein said cover comprises an insulating housing, and a metallic fitting fixed in said cover and including bearings for rotation of the lever, yoke and base about said first and second axes.

9. A device according to claim 8 wherein said cover has a side adjacent the first hook means which is provided with a hole, and a nose on said base engageable in said hole in said operative position of the device to lock the cover in position when it is pivoted downwardly onto the base.

10. A device according to claim 8 wherein said cover has a side adjacent the first hook means with an internal nose, and a nose carried by the base and engageable with said internal nose on the cover in said operative position of the device to lock the cover on the base, said cover being sufficiently resilient to be deformed by axial elongation upon application of lateral pressure thereto, so as to separate said internal nose from said nose of the base.

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