Sept. 1, 1953 E. N. JACOBI 2,650,973

ELECTRICAL SWITCH

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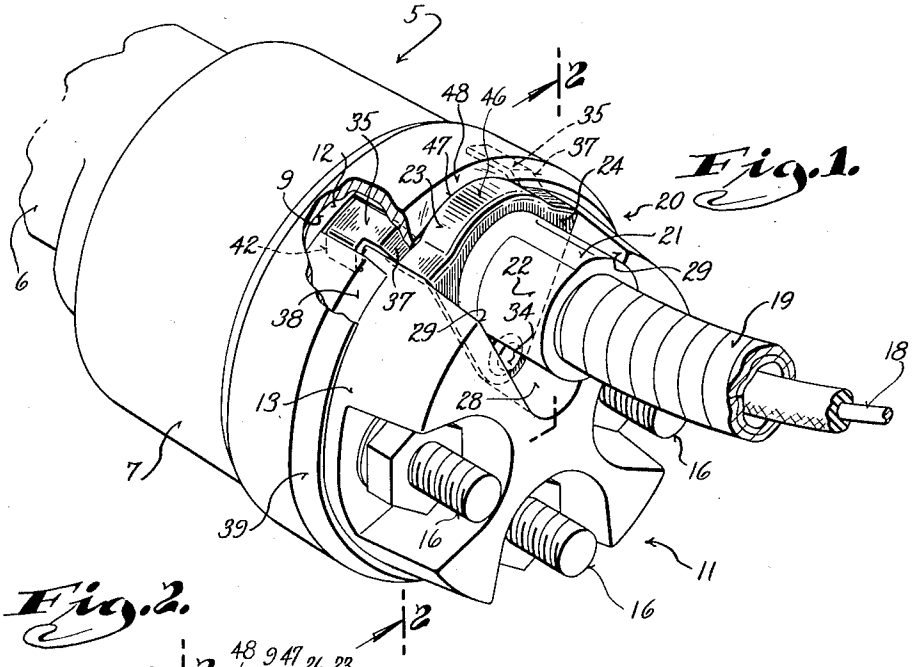

Fig. 1.

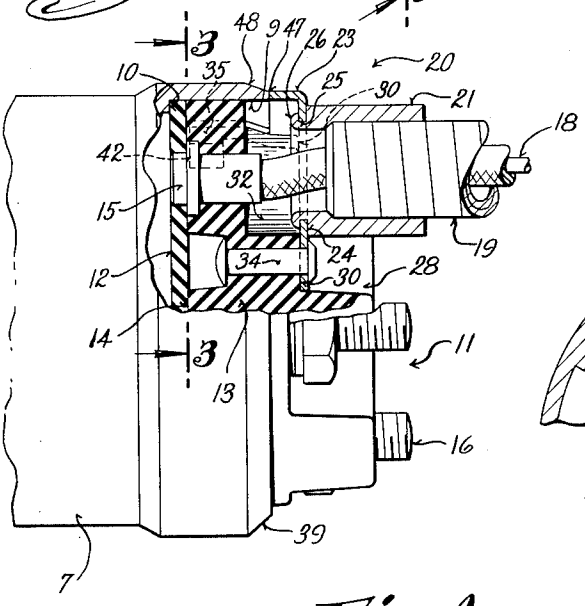

Fig. 2.

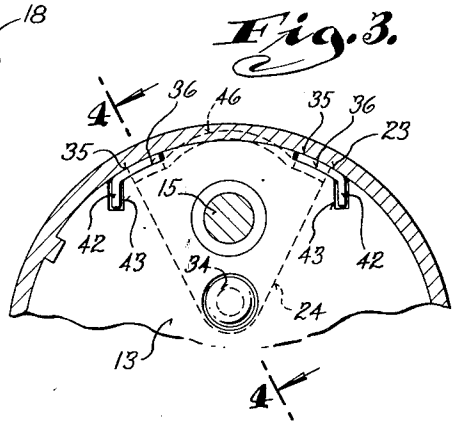

Fig. 3.

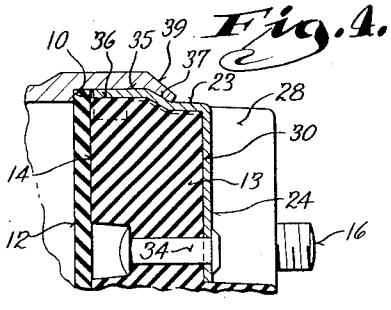

Fig. 4.

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Fig. 5.

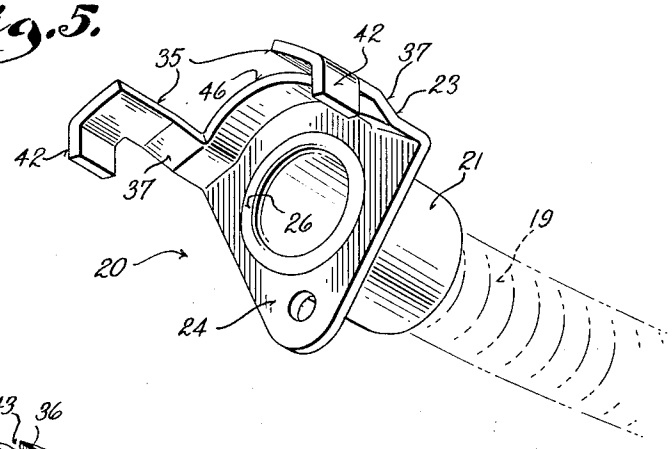


Fig. 6.

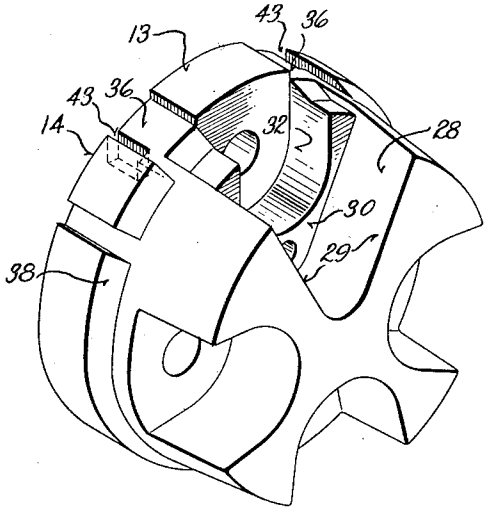
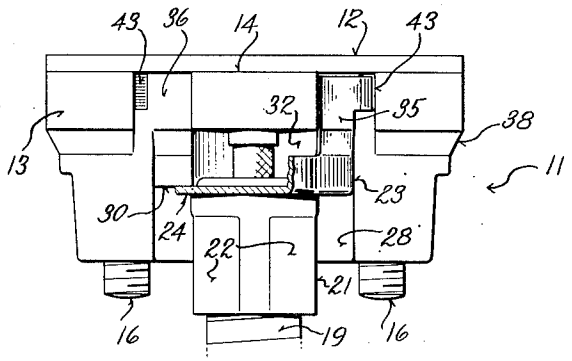


Fig. 7.



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UNITED STATES PATENT OFFICE

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ELECTRICAL SWITCH

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12 Claims. (Cl. 200—168)

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This invention relates to electrical switches and has more particular reference to switches of the type having an armored cable lead connected with one of the stationary switch contacts on the terminal head of the switch.

Switches of this nature are in wide-spread use for the control of the ignition circuit in automobiles and the like, wherein the ignition coil is connected with one of the stationary switch contacts through a conductor having an armored shell surrounding it. The purpose of the shell, of course, is to preclude unauthorized persons from gaining access to the coil lead; and complete protection against "jumpering" of the switch is had only when the cable conductor is protected at the point of connection between the armored cable and the terminal head at the back of the switch.

While such complete protection of the ignition lead has been achieved in many ways in the past, the connection or anchoring of the switch end of the armored cable to the terminal head of the switch has nevertheless presented an annoying problem, and frequently led to the provision of complicated and costly anchoring means for this purpose.

Accordingly, the present invention provides a terminal head for an electric switch of the character described which features a simple and inexpensive anchoring means for the armored cable, which anchoring means is unique in that it may be formed chiefly as a sheet metal stamping easily secured to the terminal head.

In addition this invention provides an anchoring device for the armored cable of an electric switch which is constructed to have means thereon cooperate with the terminal head and the switch case to positively locate the anchoring device on the terminal head and to secure the same in position upon the switch.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

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Figure 1 is a perspective view looking at the rear or terminal head end of an electric switch showing the cable anchoring device of this invention in place thereon, portions of the switch case being broken away and shown in section to illustrate parts therebeneath;

Figure 2 is a side view of the switch shown in Figure 1 with portions of the switch case and terminal head broken away and shown in longitudinal section;

Figure 3 is a cross sectional view taken through Figure 2 on the plane of the line 3—3;

Figure 4 is a detail sectional view taken through Figure 3 on the plane of the line 4—4;

Figure 5 is a perspective view of the anchoring device per se looking at the underside thereof;

Figure 6 is a perspective view of the terminal head per se looking at the back thereof; and

Figure 7 is a view of the terminal head-cable assembly looking at the top edge of the terminal head.

Referring now more particularly to the accompanying drawings in which like numerals indicate like parts the numeral 5 generally designates a locking ignition switch of the type used extensively on automobiles to control their ignition circuits. The housing for the switch includes a small diameter front end portion 6 in which the lock mechanism (not shown) is mounted, and a large diameter cup portion 7 at the rear providing a circular switch case. At the rear of the housing the side wall of the switch case is enlarged and counterbored as at 9 to provide an annular abutment 10 at the bottom of the counterbore. The abutment 10 faces the open rear of the switch case and is spaced a distance from the rear extremity of the case as seen best in Figure 2.

The terminal head, generally designated 11, comprises a relatively thin flat disc 12 of insulative sheet material inside the counterbore 9 and seated flatwise against the annular shoulder 10 at the bottom thereof, and a larger molded block 13 of insulative material having its front portion projecting into the counterbore 9 to lie adjacent to the back of the disc 12. Preferably the block 13 has a flat front face 14 engaging the rear of the disc 12.

The terminal head is adapted to have the stationary switch contacts, one of which is indicated at 15, embedded therein and exposed at the front thereof; and it has a number of terminal posts 16 electrically connected with the stationary contacts thereon and passing rearwardly through the block 13 to extend from the bottoms of wells

in the back of the block. This construction has the desirable effect of isolating the posts.

The stationary contact 15 represents the ignition contact of the switch, and for this purpose the ignition lead 18 which is electrically connected therewith is usually encircled by a metallic sheath or shell 19. This shell extends right up to the back of the terminal head and it is joined thereto by means of the anchoring device 20 of this invention.

The anchoring device includes a sleeve 21 having a bore of a size to snugly receive the switch end of the shell 19 on the armored cable and this shell is adapted to be securely fastened to the sleeve inside the same. While this may be accomplished in any suitable manner, the sleeve 21 in the present case has been shown as having its opposite sides clinched inwardly as at 22 about the switch end of the shell.

The sleeve is attached to the terminal head by a bracket 23 stamped from sheet metal and forming a part of the anchoring device. This bracket includes a substantially triangular plate 24 having a central aperture 25 through which a reduced neck on the inner end of the sleeve projects and this neck is peened over the forward or underside of the plate as at 26 to permanently join these parts together.

The plate 24, as stated, is substantially triangular and it is received in a well or cavity 28 in the block opening to its back and its top edge. The well is defined by relatively radial converging side walls 29 and a bottom wall 30, the bottom wall providing a relatively flat outwardly facing surface upon which the plate is seated with two side edges thereof contiguous to the radial walls of the well. The well or cavity 28 aligns with the stationary contact 15, and the conductor 18 passes through a notch-like hole 32 in the top edge of the block, in line with the cavity 28, for connection to the contact. With this construction, it will be noted that the surface 30 at the bottom of the well is in the nature of a ledge surrounding the notch-like hole 32.

The plate 24 is anchored to the back of the terminal head by means which includes a rivet 34 passing through the block 13 and the inner corner of the plate so that this inner corner is firmly held against the ledge-like surface 30 on the terminal head. The means for securing the plate to the terminal head also includes a pair of arms 35 joined to the outer edge of the plate and projecting forwardly therefrom to be received in relatively shallow recesses 36 in the periphery of the block 13. The arms, though substantially flat, nevertheless have a degree of transverse curvature corresponding to the curvature of the periphery of the block, and the recesses are of complementary shape so that the exterior surfaces of the arms lie flush with the periphery of the block. The shallow recesses in which the arms are received extend rearwardly from the front face of the block and are of a size to fit the width of the arms so that the sides of the recesses act as abutments with which the side edges of the arms engage to preclude rotation of the plate about the axis of its rivet 34.

As seen best in Figures 1, 3, and 5, the arms 35 extend forwardly from the two corners of the triangular plate 24 which are remote from the apertured inner corner having the rivet 34 passing therethrough. These arms also have offset intermediate portions 37 which circumferentially align with and substantially form continuations of a rearwardly facing annular shoulder 38 on

the insulating block 13, and the offsets likewise provide shoulders against which the rim portion 39 at the rear of the switch case engages when the same is clinched thereover, as seen in Figure 4, to securely lock the terminal head in place closing the rear of the switch case.

Hence, the clinched down rim portion 39, by its engagement with the offset intermediate portions 37 of the arms 35, precludes the possibility of the plate 24 being tilted rearwardly off of the surface 30 from a point adjacent to the periphery of the block 13.

Further assurance that the anchoring device or bracket will be securely fixed to the terminal head is afforded by fingers 42, one on each of the arms 35 bent downwardly from the outer side edges of said arms and extending into relatively deep slits 43 in the periphery of the block 13. These fingers lie in substantially parallel planes perpendicular to the body or plate 24 of the anchoring bracket. Since the rear ends of the slits 43 provide abutments over which the fingers hook, the fingers also prevent rearward motion of the body or plate 24 off of its seat 30.

As seen best in Figures 1 and 5 the arms 35 of the bracket are reinforced by an outwardly bowed arcuate flange 46 joined to the upper edge of the plate 24. This flange joins the inner ends of the arms and projects forwardly across the space between the plane of the plate and the rim of the switch case into abutting relationship, as at 47, with an unclinched portion 48 on the rim of the switch case. Hence, the flange closes the side of the hole 32 and cooperates with the sleeve 21 in precluding access to the conductor 18.

It will be apparent, therefore, that securement of the anchoring device to the back and top edge of the terminal head in the manner described along with clinching of the opposite sides of the sleeve 21 over the switch end of the shell 19 of the armored cable firmly anchors the cable to the back of the terminal head and affords excellent protection against unauthorized access to the conductor 18 at its point of connection with the stationary switch contact 15.

In assembly, the anchoring device is preferably slipped over the switch end of the armored cable and the cable clinched in the sleeve 21 thereof as described. The conductor 18 may then be drawn forwardly through the bracket and electrically joined in any suitable manner to the ignition contact 15 of the switch. With the construction shown, the contact 15 may be secured to one end of the conductor and the other end of the conductor passed through the block and the sleeve 21 while the anchoring device is in place on the block. This, of course, is accomplished prior to insertion and securement of the terminal head into the rear of the switch case.

In either event, the anchoring device is attached to the block 13 by engaging its fingers 42 in the slits 43 in the periphery of the block during edgewise insertion of the plate 24 into the open side of the well 28. This automatically brings the arms 35 into the shallow recesses 36 in the periphery of the block 13 to locate the anchoring device in its proper position on the terminal head.

The rivet 34 is then passed through the terminal head and the inner apertured end of the plate and the riveted connection between the plate and terminal head is effected. Thereafter the terminal head with anchoring device attached thereto is inserted into the open rear of the switch case against the abutment 10 therein,

and the rim of the case is curled or clinched inwardly onto the shoulders 37 and 38 on the arms and the block to securely anchor the entire terminal head and anchoring device in place on the switch.

From the foregoing description taken in connection with the accompanying drawings it will be readily apparent to those skilled in the art that this invention provides for attaching an armored cable to the terminal head of an electric switch by an anchoring device which features simplicity and low cost without sacrificing adequate protection for the cable conductor.

What I claim as my invention is:

1. As an article of manufacture, a cable anchoring device comprising: a flat substantially triangular plate having a substantially central hole therein, and having an aperture in one corner portion thereof; arms joined to said plate along the edge thereof opposite said apertured corner, adjacent to the remaining corner portions of the plate, said arms extending a substantial distance to one side of the plate substantially at right angles thereto; a hook-like finger on the outer end of each arm projecting therefrom substantially in the direction of said apertured corner; and a cable receiving sleeve fixed to the plate in register with said hole therein and projecting a distance from the opposite side of the plate.

2. As an article of manufacture, a cable anchoring device comprising: a bracket stamped from sheet metal and including a relatively flat body having a central hole therein and an aperture in a lower portion thereof spaced from said hole, a pair of elongated relatively flat spaced apart arms joined to said body along the upper edge thereof and projecting to one side of the body substantially at right angles thereto, each of said arms having an offset intermediate portion disposing the outer ends of the arms at levels above the junctions between the inner ends of the arms and the body, and fingers on the end portions of the arms remote from the body, each bent downwardly from one side edge of its arm, said fingers lying in substantially parallel planes perpendicular to the body; and a sleeve fixed to the body in register with said central hole therein and projecting from the opposite side of the body.

3. As an article of manufacture, a cable anchoring device comprising: a flat substantially triangular plate having a central hole therein, and having an aperture in one corner portion thereof; elongated relatively flat arms joined to said plate along the edge thereof opposite said apertured corner, adjacent to the remaining corners of the plate, said arms extending to one side of the plate substantially at right angles thereto and having their portions remote from the plate offset outwardly a slight distance from said edge of the plate; a hook-like finger on the outer end portion of each arm projecting from one side edge thereof substantially in the direction of the apertured corner of the plate, said fingers lying in parallel planes substantially perpendicular to the plate; an outwardly bowed arcuate flange joined to said edge of the plate and extending between the inner end portions of said arms to connect the same; and a cable receiving sleeve fixed to the plate in register with said central hole therein and projecting from the opposite side of the plate.

4. As an article of manufacture, a cable anchoring device comprising: a bracket stamped from sheet metal and including a relatively flat

body having a central hole therein, an elongated relatively flat arm joined to the body along the upper edge thereof and projecting to one side of the body substantially at right angles thereto, and a hook-like finger on the end portion of the arm remote from the body bent from one side edge of the arm and projecting from its underside, said finger being disposed substantially edgewise to said side of the body; and a cable receiving sleeve fixed to the body in register with said hole therein and projecting from the opposite side of the body, said sleeve having an unbroken substantially cylindrical side wall.

5. A terminal head assembly for an electric switch, comprising: a block of insulative material having a substantially flat front face on which the stationary switch contacts are located, said block having a relatively shallow rearwardly extending recess in its periphery and having a deeper relatively narrow slit extending into its periphery from one side of said recess; a plate overlying a rearwardly facing surface on said block adjacent to the periphery thereof, said plate having a hole therein; means for attaching said plate to the terminal head including an arm extending forwardly from the outer edge of the plate and received substantially flatwise in said shallow recess to preclude edgewise motion of the plate laterally of the block, a finger on the side of the forward end of said arm extending from the underside of the arm into said slit in the periphery of the block to preclude flatwise separation of the plate from said surface on the block, and a connection between the plate and the block remote from the periphery of the block for precluding edgewise motion of the plate relative to the block in a direction to carry said arm out of its recess; a sleeve fixed on said plate in register with the hole therein and extending rearwardly from the plate; and an armored cable having its outer shell secured inside said sleeve and having its conductor passing through the hole in the plate for connection to one of the contacts on the terminal head.

6. A terminal head assembly for an electric switch comprising: a block of insulative material having a substantially flat front face on which the stationary switch contacts are located, said block having a pair of relatively shallow rearwardly extending recesses in its periphery at spaced apart locations thereon and having deeper relatively narrow slits extending into its periphery from the sides of said recesses; a plate overlying a rearwardly facing surface on said block and extending to the periphery thereof, said plate having a hole therein substantially at its center; means for attaching said plate to the terminal head including a pair of arms on the plate extending forwardly from the outer edge thereof and received substantially flatwise in said shallow recesses in the block with their outer surfaces substantially flush with the periphery of the block, a finger on the outer end of each of said arms extending therefrom into the adjacent slit in the periphery of the block so that said arms and fingers preclude all but edgewise motion of the plate relative to the block in a direction to carry the arms out of their recesses, and a connection between the plate and the block remote from the periphery of the block for precluding such edgewise motion of the plate relative to the block; a sleeve fixed on said plate in register with the hole therein and extending rearwardly from the plate; and an armored cable having its outer shell secured inside said sleeve

and having its conductor passing through the hole in the plate for connection to one of the contacts on the terminal head.

7. A terminal head assembly, comprising: a terminal head including a block of insulative material having a contact on its front face, said block having a relatively shallow rearwardly extending recess in its periphery and having a deeper relatively narrow slit extending into its periphery and opening to said recess; a plate overlying a rearwardly facing surface on said block and extending out to the periphery of the block, said plate having a hole therein; an arm on said plate extending forwardly from the outer edge thereof and received substantially flatwise in said shallow recess to have its outer surface substantially flush with the periphery of the block; a finger on the forward end of said arm projecting into said slit in the periphery of the block, so that said arm and the finger thereon preclude all but edgewise motion of the plate relative to the block in a direction to disengage the arm and finger from the periphery of the block; means remote from said arm connecting the plate with the terminal head and cooperating with said arm and finger to preclude edgewise motion of the plate relative to the block; and a sleeve fixed on said plate in register with the hole therein and extending rearwardly from the plate, said sleeve providing for anchoring the shell of an armored cable to the terminal head and enabling the conductor of the cable to pass through the hole in the plate for connection to the contact on the terminal head.

8. In a device of the character described: a terminal head including a block of insulative material having a front face provided with a contact, said block having a relatively shallow rearwardly extending recess in its periphery and having a deeper relatively narrow slit extending into its periphery from one side of said recess; means on the back of said block defining a well and a relatively flat rearwardly facing surface at the bottom of said well, said well opening to the periphery of the block and having side walls which converge inwardly away from the periphery of the block toward the central portion of the block; a substantially triangular plate seated on said rearwardly facing surface at the bottom of said well and of a shape corresponding to the shape of the well, said plate having a hole therein aligning with a hole in the bottom of the well; an arm extending forwardly from the outer edge of the plate and received substantially flatwise in said shallow recess; a finger on the outer end of said arm projecting into said slit in the periphery of the block, said finger and the converging side walls of the well cooperating to preclude all but edgewise motion of the plate in a direction to disengage the arm thereon from its recess in the periphery of the block; means connecting the plate to the terminal head at a location remote form the periphery of the plate for precluding such edgewise motion of the plate relative to the block; and a sleeve fixed on the plate in register with the hole therein and extending rearwardly from the plate to receive the shell of an armored cable, the hole in the plate enabling the conductor of the cable to pass through the holes in the plate and the terminal head for connection to the stationary contact thereon.

9. In a device of the character described: a

case having a cylindrical side wall open at its back; an abutment inside the case a distance from and facing the open rear of the case; an insulative terminal head seated against said abutment and having its periphery contiguous to the inner surface of said side wall of the case so that the terminal head closes the rear of the case, said terminal head having a contact thereon exposed at the inside of the case; a shoulder on said terminal head facing the rear of the case; a rim portion on the rear of said side wall clinched over the shoulder on the terminal head to hold the same in position closing the rear of the case; an armored cable adapted to have its conductor electrically connected with said contact on the terminal head; a sleeve at the back of the terminal head in which one end of the shell on the cable is fixed; and means for mounting said sleeve on the outer side of the terminal head including a plate fixed to said sleeve and seated against an outwardly facing surface on the terminal head, said plate having a hole therein registering with the bore of the sleeve to enable the cable conductor to pass therethrough for connection to said contact on the terminal head, a pair of relatively flat spaced apart arms on said plate projecting forwardly therefrom into the rear of the case directly adjacent to the inner surface of the side wall of the case so as to be confined substantially flatwise between said side wall and the terminal head, said terminal head having relatively shallow notches in its periphery in which said arms are received and having deeper slits leading thereinto from said notches, hook-like fingers on the forward end portions of the arms extending into said slits in the periphery of the terminal head, and a rivet connecting the plate with the terminal head at a point remote from said arms on the plate.

10. The device set forth in claim 9 further characterized by the fact that the arms on the plate are offset intermediate their ends to provide rearwardly facing shoulder portions thereon over which said rim portion on the rear of the side wall of the case is clinched.

11. The device set forth in claim 10 further characterized by the provision of a forwardly extending flange on the outer edge portion of the plate spanning the space between said arms and having its front edge in abutting relationship with an unclinched rim portion on the case.

12. The device set forth in claim 9 further characterized by the provision of a casing closely encircling the periphery of the block to be closed thereby, said casing overlying said arm and thereby confining the finger on the arm in its recess so as to provide further assurance against motion of the plate relative to the block.

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