United States Patent

[11] 3,594,709

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[21] Appl. No. 783,020
[22] Filed Dec. 11, 1968
[45] Patented July 20, 1971
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[32] Priority Feb. 13, 1968
[33] Switzerland
[31] 2,135/68

[54] **ELECTRIC SERIES TERMINAL**
8 Claims, 5 Drawing Figs.

[52] U.S. Cl. 339/198, 339/19, 339/196
[51] Int. Cl. H01r 9/00
[50] Field of Search 339/19, 198, 195, 196, 206, 209, 210, 216, 153

[56] **References Cited**

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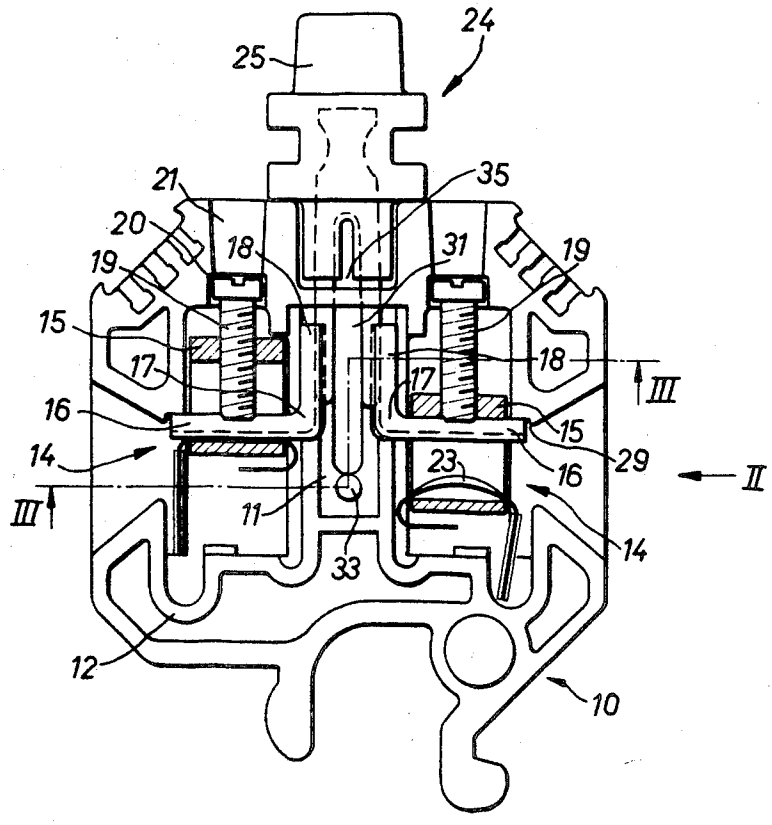
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ABSTRACT: An electric series terminal having a releasable and insertable isolating plug with an insulated grip portion and a metallic contact portion. The plug has two connecting devices for electric conductors and the terminal itself comprises an insulating body with various contacting parts therein.



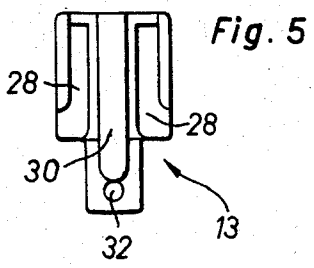


Fig. 5

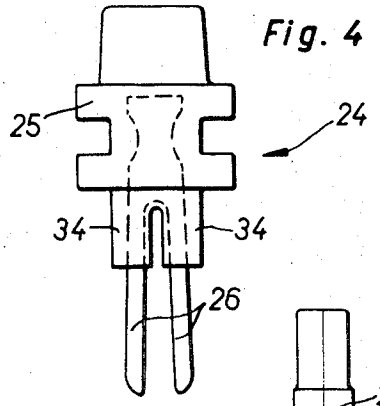


Fig. 4

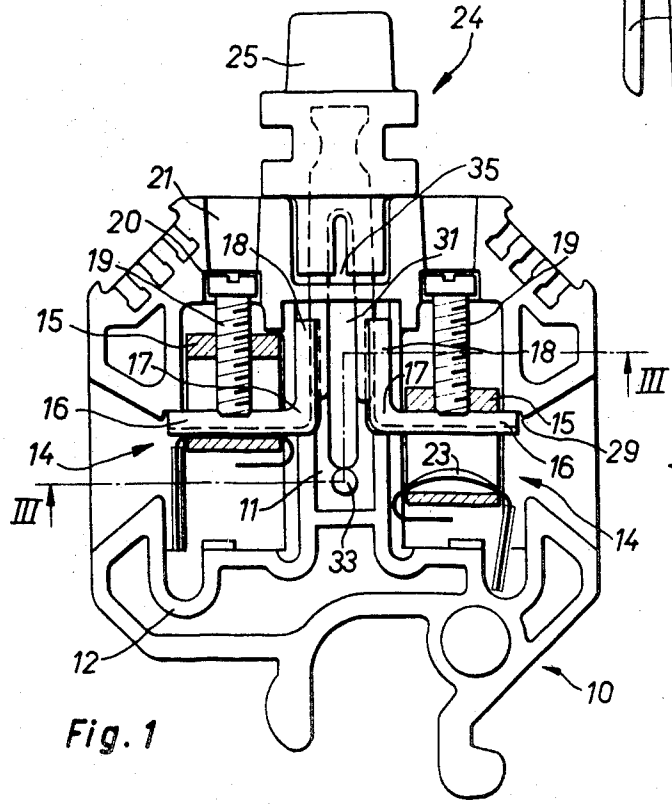


Fig. 1

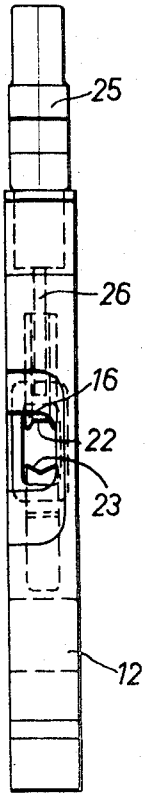


Fig. 2

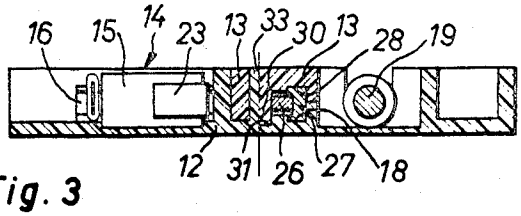


Fig. 3

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ELECTRIC SERIES TERMINAL

This invention relates to an electric series terminal with a releasably insertable isolating plug.

It is an object of the present invention to provide an electric series terminal with a releasably insertable isolating plug having an insulated grip portion and a metallic contact portion, which latter portion interconnects two connecting devices for electric conductors and these devices are arranged in an insulating body.

In a known series terminal of the stated type, the contact portion of the isolating plug comprises two pairs of fingers, disposed parallel with each other and each of which, for the purpose of connecting the two connecting devices, resiliently embraces a projecting contact part of said devices, the areas of contact between the plug fingers and the contact part being relatively small. Thus, in the case of heavy currents, rather severe heating can occur.

A further object of the present invention basically consists in avoiding the above-mentioned disadvantages. For this purpose, the series terminal of the invention is essentially characterized in that each of the connecting devices comprises an angular contact part with one limb of one contact part being disposed at a distance from and parallel to the corresponding limb of the other contact part. The faces of the two parallel limbs of the contact parts facing away from each other lying against the insulating body, and such faces of the two stated limbs facing each other being in contact with corresponding opposed faces on the contact portion of the inserted isolating plug.

Further objects and details of the invention will be apparent from the following description of one embodiment when considered in connection with the accompanying drawing in which:

FIG. 1 is a side elevation, partly in section, of a series terminal, the cap of the insulating body being removed;

FIG. 2 is a side view taken in the arrow direction II of FIG. 1;

FIG. 3 is a cross section taken on the line III–III of FIG. 1 in the direction of the arrows;

FIG. 4 is a side view of the isolating plug; and

FIG. 5 is a side view of the inside of the cap of the insulating body.

As shown in the drawing, the series terminal comprises a two-part insulating body **10**, a relatively small cap **13** being completely sunk or depressed into a complementary recess **11** in the larger part **12** of the insulating body, which part **12** will be referred to hereinafter as the base. Inserted in the base **12** are two connecting devices **14**, in which the ends of electric conductors can be firmly clamped. Each connecting device **14** incorporates a clamping element **15**, which consists of a piece or section of rectangular tube displaceably mounted in the base **12**. Positioned in the tub is one limb **16** of a contact part **17** bent at right angles and this limb acts as a pressure element. The other limb **18** of the contact part **17** runs parallel with the direction in which the clamping element **15** is displaced. As can be seen from FIG. **1**, the two limbs **18** of the contact parts **17** are disposed parallel with each other, and portions of the limbs **16**, acting as pressure elements, are coaxial in the longitudinal direction. Each contact device **14** also incorporates a socket-hand screw **19**, which is screwed into a tapped hole in the clamping element **15** and bears with its end on the middle portion of the limb **16** of the contact part. Since the head of the screw **19** bears against a shoulder **20** in a recess **21** in the base **12**, provided for turning the screw **19**, and the contact part **17** is held against displacement in the base **12** in a manner to be described, the effect of turning the screw **19** is to displace the clamping element **15** relatively to the limb **16**. To increase the clamping action on the conductors to be held in the connecting devices **14**, that side of the limb **16** remote from the end of the screw **19** has a longitudinal groove **22**. Furthermore, for the same purpose, a saddle shaped spring element **23** with angled end portions is fitted in the conductor-receiving compartment of each clamping element **15**.

For electrically connecting the limbs **18**, there is provided a isolating plug **24**, FIGS. **1** and **4**, which comprises an insulated grip portion **25** and a one-piece bifurcated contact portion having two plug pins **26**, which are in spaced-apart parallel relationship and are of rectangular cross section. The contact portion of the isolating plug **24** is pressed into its grip portion **25** and the plug pins **26** are spread slightly, FIG. **4**, when the isolating plug **24** is withdrawn from the insulating body **10**.

The longitudinal grooves **22** in the shanks **16** of the contact parts **17**, acting as pressure elements or surfaces are continued into the mutually facing sides of the parallel limbs **18** and over the entire length thereof, and such lateral faces of the plug pins **26** of the inserted isolating plug **24** that face away from each other, extend partially into the continued grooves and are in contact with the bottoms thereof. As can be seen from FIG. **3**, except for the grooved longitudinal face portions of the parallel limbs **18** with which the plug pins **26** are in contact, all the other longitudinal face portions bear against walls of complimentary recesses in the insulating body **10**. Grooves **27** and **28**, matched to the cross section and length of the shanks **18**, are provided both in the base **12** and in the cap **13**, so that both the base **12** and the cap **13** each embrace about one-half of those faces of the parallel limbs **18** of the contact parts **17** that face away from each other. Since the lengths of the above-mentioned grooves **27** and **28** correspond to the lengths of the limbs **18** and, in addition, the ends of the limbs **16** each abut against a nose **29** on the base **12**, displacement or twisting of the contact parts **17**, relatively to the base **12** or the cap **13**, is precluded.

The cap **13** also incorporates between the parallel limbs **18** of the contact part, a longitudinal rib **30** against which those faces of the plug pins **26** that face each other, bear. The longitudinal rib **30** on the cap **13** engages in a complimentary groove **31** in the base **12**.

In the present embodiment, the base **12** and the cap **13** are made of a thermoplastic synthetic material. The two parts of the insulating body can therefore be interconnected by molding. For this purpose, the tongue like lower end portion of the cap **13** is provided with an orifice **32** through which is pushed a cylindrical stud **33** on the base **12**. The end of the stub **33** is welded to the cap **13** by the application of heat and pressure.

To prevent the plug pins **26** from being inadvertently contacted when the isolating plug **24** is being inserted or withdrawn, the grip portion **25** incorporates sleeves **34** each of which surrounds the upper end of pins plug pin **26**. When the isolating plug **24** is inserted, the two sleeves **34** are fully engaged in a complimentary recess **35** in the base **12**.

The important advantage of the above-described series terminal and releasably insertable isolating plug resides in the fact that the contact surfaces of the plug pins are of large area and are in contact with the corresponding opposed faces of the contact parts under relatively high pressure. The contact resistance at the points of contact is thereby kept small, so that even under heavy current loading, no impermissibly great heating occurs. The high contact pressure is achieved by the longitudinal faces of the parallel limbs of the contact parts lying against the walls of the insulating body and by the spreading action of the plug pins being reinforced by the longitudinal rib **30** on the cap **13**.

When the isolating plug is withdrawn, the longitudinal rib **30**, disposed between the parallel limbs of the contact parts, considerably increases the creepage path distance between the contact parts. Furthermore, the cap **13** which embraces the parallel limbs of the contact parts on those of their longitudinal faces turned away from each other, counteracts deflection of the base **12** resulting from the contact pressure of the isolating plug, and in addition, due to the cap **13** being connected to the base **12**, the metal parts of the connection devices **14** are held firmly in the insulating body in a manner that prevents their being lost.

In a modified form of the series terminal, not illustrated in the drawing, the shanks **16** and **18** of the contact parts do not contain longitudinal grooves for centering the electric conductors or for guiding the plug pins **26**. Despite this simplification, the good contact properties are retained, since the plug pins cannot deflect laterally. Furthermore, the cap **13** can be connected to the base **12** by gluing instead of welding.

I claim:

1. Electric series terminal with a releasably insertable isolating plug, comprising an insulated grip portion and a metallic contact portion, said metallic contact portion interconnecting two connecting devices for electric conductors, and insulating body in which the devices are arranged, each of the connecting devices comprising an angular contact part having two limbs, one limb thereof being disposed at a distance from and colinear with a corresponding limb of the other contact parts, the other two corresponding limbs being parallel and being against the insulating body, and an inserted isolated plug with those faces of the two parallel limbs facing each other being in contact with corresponding opposed faces on a contact portion of the inserted isolating plug, and said corresponding limbs of the contact parts engaging in complimentary grooves in the insulating body.

2. Electric series terminal with a releasably insertable isolating plug, comprising an insulated grip portion and a metallic contact portion, said metallic contact portion interconnecting two connecting devices for electric conductors, an insulating body in which the devices are arranged, each of the connecting devices comprising an angular contact part having two limbs, one limb thereof being disposed at a distance from and colinear with a corresponding limb of the other contact parts, the other two corresponding limbs being parallel and being against the insulating body, and an inserted isolating plug with those faces of the two parallel limbs facing each other being in contact with corresponding opposed faces on a contact portion of the inserted isolating plug and except for the longitudinal face portions with which the contact portion of the isolating plug is in contact, all the other longitudinal face portions of the parallel limbs of the other contact parts bear against walls of complimentary recesses in the insulating body.

3. Electric series terminal according to claim **2**, in which the insulating body is composed of two parts of which one part being a cap which is completely depressed in a complimentary recess in the other part of the insulating body, and the complimentary recesses against the walls of which the parallel limbs be being present in both parts of the insulating body so that the cap partially embraces those faces of the parallel limbs of he other contact part that face away from each other.

4. Electric series terminal according to claim **2**, in which the insulating body is composed of two parts of which one part being a cap which is completely depressed in a complimentary recess in the other part of the insulating body, and the complimentary recesses against the walls of which the parallel limbs

of the other contact parts lies, being present in both parts of the insulating body so that the cap partially embraces those faces of the parallel limbs of the other contact part that face away from each other, and the cap being welded to the other part of the insulating body.

5. Electric series terminal with a releasably insertable isolating plug, comprising an insulating grip portion and a metallic contact portion, said metallic contact portion interconnecting two connecting devices for electric conductors, an insulating body in which the devices are arranged, each of the connecting devices comprising an angular contact part having two limbs, one limb thereof being disposed at a distance from and colinear with a corresponding limb of the other contact parts, the other two corresponding limbs being parallel and being against the insulting body, and an inserted isolating plug with those faces of the two parallel limbs facing each other being in contact with the corresponding opposed faces on a contact portion of the inserted isolating plug, a contact part of the isolating plug comprises two plug pins in spaced-apart parallel relationship with each other, said plug pins being interconnected in the insulated grip portion of the isolating plug, and the insulating body comprises a rib against which the mutually facing faces of the plug pins bear between the parallel limbs of the contact part.

6. Electric series terminal according to claim **5**, in which the rib forms part of the cap disposed between the plug pins and the rib engaging in a complimentary groove in the other part of the insulating body.

7. Electric series terminal with a releasably insertable isolating plug, comprising an insulated grip portion and a metallic contact portion, said metallic contact portion interconnecting two connecting devices for electric conductors, an insulating body in which the devices are arranged, each of the connecting devices comprising an angular contact part having two limbs, one limb thereof being disposed at a distance from and colinear with a corresponding limb of the other contact parts, the other two corresponding limbs being parallel and being against the insulating body, and an inserted isolating plug with those faces of the two parallel limbs facing each other being in contact with corresponding opposed faces on a contact portion of the inserted isolating plug, a contact part of the isolating plug comprises two plug pins in spaced-apart parallel relationship with each other, said plug pins being interconnected in the insulated grip portion of the isolating plug, the plug pins being of rectangular cross section, and the mutually facing sides of the parallel limbs of the contact parts containing longitudinal grooves into which the plug pins at least partially extend.

8. Electric series terminal according to claim **7**, in which the longitudinal grooves in the parallel limbs of the other contact parts being continued in the other limbs thereof, which latter limbs are arranged as pressure elements, in a tubular clamping element of each connecting device.