United States Patent

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[54] **TURRET TERMINAL BOARD**
10 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **339/198,** 339/61, 339/220
[51] **Int. Cl.** **H01r 9/00**
[50] **Field of Search** 339/198, 176, 59, 61, 220, 221

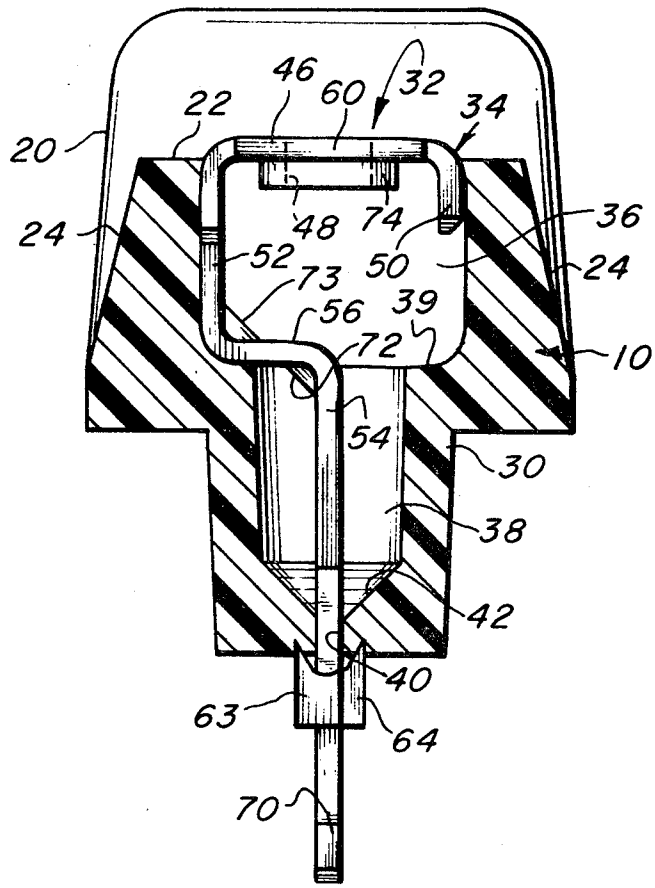
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ABSTRACT: A terminal board has a plurality of stations each having a passage in which a terminal element is mounted. Each passage opens up at the bottom thereof in the form of a slot and the terminal element has a lug which passes through the slot. Opposed tabs on the terminal element are adapted to be deformed by twisting out of the general plane of the slot so that pointed projections on the tabs will engage the sidewalls of the slot to rigidly secure the terminal element to the terminal board. An end plate having similar barbs may be mounted in the passages of the end stations to facilitate mounting the terminal board on a chassis.



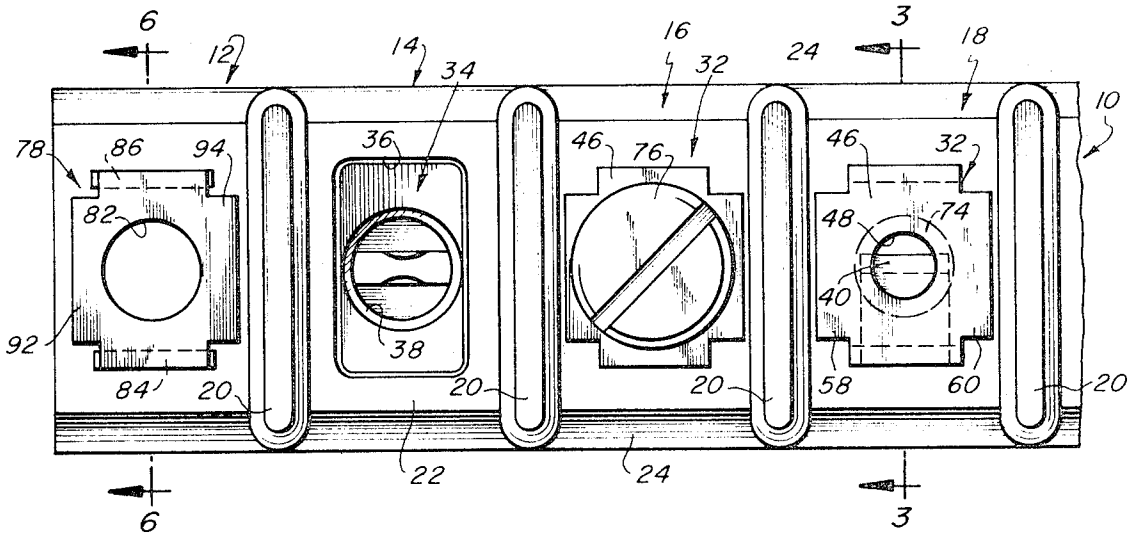


FIG. 1

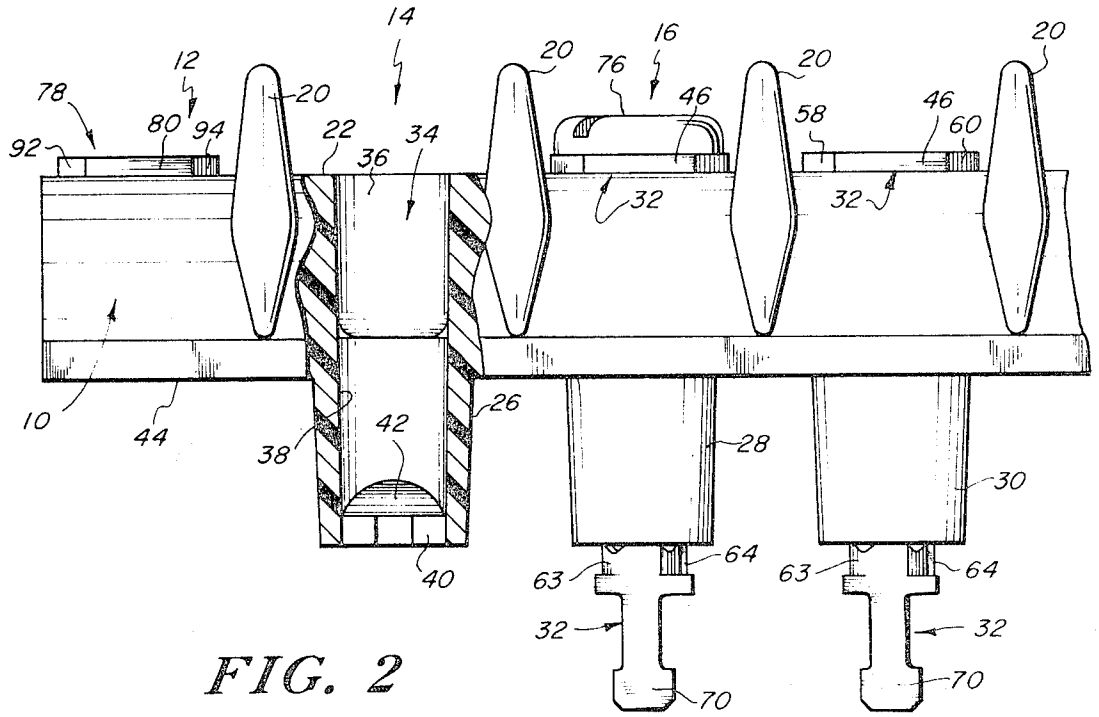


FIG. 2

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FIG. 3

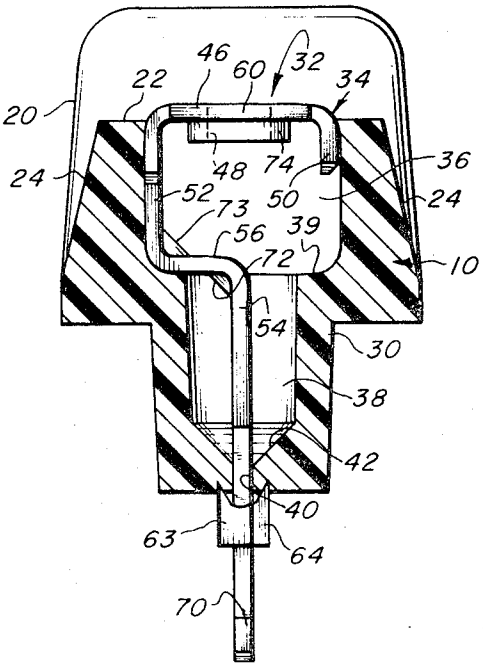


FIG. 4

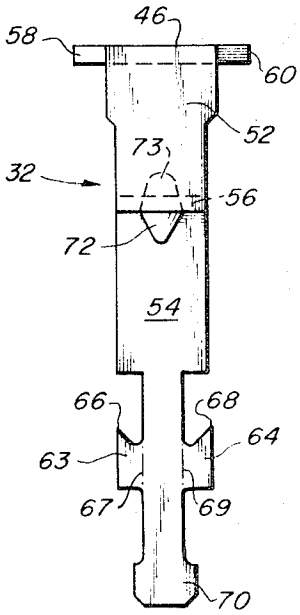
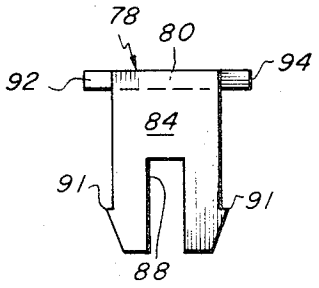


FIG. 5



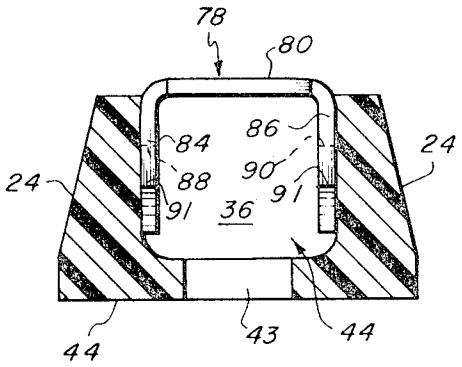


FIG. 6

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TURRET TERMINAL BOARD

BACKGROUND OF THE INVENTION

Terminal boards are often made of plastic, and problems arise in attempting to mount metal terminal elements rigidly thereon. The terminal elements may, of course, be mounted by conventional fasteners, e.g. machine screws of the like, but this is not always practical or economical. For example, in certain instances, the metal terminal element may be so small that there is insufficient space available to accommodate a threaded fastener. Because of the physical properties of the plastic material (e.g. phenolic) care must be taken to avoid breaking, cracking, or chipping of the plastic material when the metal terminal element is affixed thereto. If a metal fastening element is put on too tightly, the plastic may be damaged and a rigid connection between the metal terminal element and the plastic board may not be obtained.

According to the present invention, a metal terminal element is provided with means adapting the element to be secured rigidly to a plastic terminal board. The metal terminal element, which may be economically made from a metal stamping, is provided with tabs which are adapted to be upset or bent into a position wherein the tabs engage the plastic to secure the terminal element rigidly to the terminal board. The arrangement is such that the tabs may be readily bent by a suitable tool thereby to secure the terminal element is place. No separate or external fastening means are required. The terminal board is also adapted to receive an end plate in any one of the stations to facilitate mounting the terminal board on a mounting block or chassis. The end plate is mounted in any station, usually the stations at the end of the terminal board and is adapted to accommodate a fastener such as a screw which secures the plastic terminal board to a chassis.

SUMMARY OF THE INVENTION

In accordance with the invention herein, there is provided a terminal board comprising an elongated strip of plastic material having a plurality of terminal stations. A cylindrical turret projects from the bottom of the strip at each of the terminal stations, and a passage, opening through the top of the strip, extends into the cylindrical turret where it opens up at the bottom thereof in the form of a slot. A metal terminal element is mounted in the passage and has a lug which passes through the slot to protrude beyond the end of the turret. The terminal element has opposed tabs residing below the turret slot and has pointed projections at least parts of which extend upwardly into the slot, whereby the tabs are adapted to be deformed by twisting out of the plane of the slot so that the pointed projections engage the sidewalls of the slot to rigidly secure the terminal element to the terminal board. An end plate may be mounted in the end passages of the terminal board to facilitate mounting the terminal board on a chassis.

Additional objects and advantages of the invention will become apparent during the course of the following specification when taken in connection with the accompanying drawings, in which:

FIG. 1 is a top plan view of a section of a turret terminal board constructed according to the invention, showing the terminals thereof in various stages of assembly;

FIG. 2 is a side elevation of the terminal board shown in FIG. 1 with a portion thereof broken away and shown in section;

FIG. 3 is a sectional view taken along the line 3–3 of FIG. 1;

FIG. 4 is an end elevational view of the terminal used in the terminal board shown in FIGS. 1 and 2;

FIG. 5 is an end elevational view of the end plate used in the terminal board shown in FIGS. 1 and 2; and

FIG. 6 is a section taken along line 6–6 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, FIG. 1 shows a turret-type terminal board or strip having an electrically insulating body in the form of an elongated molded strip **10** of plastic material, for example, phenolic. The strip **10** may be cut to any length, and in the drawings is shown, by way of example, as having four stations **12, 14, 16** and **18**. The molded strip **10** has a plurality of integral partition walls **20** separating the stations. Each partition wall **20** consists of a narrow web extending above the top surface **22** of the molded strip **10**. The sidewalls **24** of the strip **10** are slightly tapered, as best shown in FIG. **3**, and the partition walls **20** extend part way down to the tapered sidewalls **24**.

In the terminal strip **10**, the end station **12** at the left-hand end of the strip, as well as the other end station (not shown) at the opposite right-hand end of the strip, are adapted to receive a mounting screw for securing the strip **10** to a support surface in a manner to be described hereafter. The intermediate stations between the two end stations, such as stations **14, 16** and **18** are adapted to mount an electrical terminal, and for this purpose are provided with cylindrical bottom extensions or turrets **26, 28** and **30**. Stations **16** and **18** are shown with respective terminals **32** installed therein, while station **14** is shown as it appears before its terminal is installed.

Each station **14, 16** and **18** of the strip **10** has a through passage **34** therein extending from the top surface **22** of strip **10** to the bottom of the respective turret **26, 28** and **30**. As shown in FIG. **3**, each passage **34** comprises an upper rectangular cavity **36** communicating with a cylindrical bore **38** of smaller cross-sectional dimension, and forming a shoulder **39** therebetween. The bore **38** terminates in an inwardly tapered portion **42** which communicates with a narrow rectangular slot **40** opening through the bottom wall of the turret.

In practice, the terminal strips are made in long lengths and are then cut to the desired size with the required number of terminal-supporting stations. To complete the strip, the turrets are cut off the two end stations to provide a continuous bottom surface of the end stations which is flush with the bottom surface **44** of the strip **10**. Thus, as indicated in FIG. **6**, the passage in end station **12** is similar to the passages **34** in stations **14, 16** and **18**, except that it terminates at the bottom surface **44** of strip **10**, and the upper portion of cylindrical bore **38** becomes a circular aperture **43** opening through said bottom surface **44**.

The terminal **32** which is to be mounted in each passage **34** in stations **14, 16, 18** comprises a metal stamping having at its top a flat, rectangular upper section **46** with a threaded central opening **48**, and terminating at one end in a depending flat lip **50** of lesser width. At its other end, the top section **46** has an integral depending leg **52** which is also of lesser width. The leg **52** is connected to a centrally disposed and elongated, generally flat lug **54** by a connecting web **56** extending perpendicularly therebetween and parallel to the upper section **46**.

As can best be seen in FIG. **3**, the depending leg **52** and lip **50** fit into the upper rectangular cavity **36** with the leg **52** in flush abutment with an end wall of cavity **36**, the lip **50** in flush abutment with the opposite end wall and connecting web resting upon shoulder **39**. The elongated lug **54** extends down into the turret **28** and passes through the bottom slot **40** as will be further described. The side portions of the upper section **46** are in the form of laterally projecting integral flanges **58, 60** (FIG. **4**) which project beyond the upper rectangular passage portion **36** and rest on the top surface **22** of the strip **10**, thereby limiting any further downward movement of the terminal **32** into the passage **34**.

The lug **54** of the terminal **32** has a pair of intermediate lateral tabs **63, 64** disposed in the general plane of the lug **54** and having upward facing barbs **66, 68** respectively. When the terminal **32** is inserted into the passage **34** to the maximum depth wherein the flanges **58, 60** engage the top surface **22** of the strip **10**, the upper portions of the barbs **66, 68** will be

located a slight distance within the confines of the rectangular slot 40.

To secure the terminal 32 to the strip 10, after the terminal 32 has been inserted into the passage 34 to its maximum depth, the two tabs 63, 64 are deformed by bending or twisting in opposite directions out of the general plane of the lug 54 and slot 40, that is, the tabs 63, 64 are bent along the lines indicated at 67, 69 respectively in FIG. 4. As the bending or twisting occurs, the barbs 66, 68 of the tabs 63, 64 respectively, will engage the plastic material of the strip 10 within the slot 40 and will interfere with the plastic adjacent the sidewalls of the slot 40. The lower portions of the tabs 63, 64 are bent or twisted to the side beyond the plane of the slot 40. Accordingly, as the upper portions of the tabs 63, 64 adjacent the barbs 66, 68 engage the sidewalls of the slot 40 and the lower portions of the tabs 63, 64 bend or twist beyond the plane of the slot 40, the tabs 63, 64 in addition to bending along the lines 67, 69 as previously indicated, will also bend along a transverse line across the upper portion of each of the barbs 66, 68 where the latter engage the bottom edge of the slot 40. The bending of the barbs 66, 68 across the aforesaid transverse lines will tend to pull the terminal 32 down into the passage 34 as the upper webs 58, 60 engage the upper surface 22 of the strip 10 to limit any further movement of the terminal 32 into passage 34. As a result of the above, the terminal 32 cannot be pulled in or out of the passage 34 because the bent or twisted tabs 63, 64 hold it rigidly in position as the upper webs 58, 60 abut the upper strip surface 22. It has been found that bending or twisting the tabs 63, 64 to the sides in this manner will provide a rigid connection between the terminal 32 and the plastic strip 10. The tabs 63, 64 may be pushed or bent to the sides by a suitable tool (not shown) which engages the portion of the tabs 63, 64 projecting out of the bottom of the slot 40. Preferably, the tabs 63, 64 are bent so that each tab resides on opposite sides of the general plane of the lug 54. However, alternatively, both tabs 63, 64 may be bent or twisted to the same side of the general plane of the lug 54.

The bottom end portion of the lug 54 is provided with a soldering spade 70 to facilitate soldering the end of a wire thereto. Alternatively, the end portion of the lug 54 may have other shapes and configurations to facilitate attachment of wires thereto. The terminal 32 may be stamped from a suitable metal (e.g. brass) and in the stamping operation, reinforcing gussets 72, 73 may be pressed outwardly between the web 56 and the lug 54 and leg 52 respectively. The opening 48 is punched in the flat upper section 46 in a manner to provide a depending cylindrical collar 74 which extends the opening 48 and provides a greater threaded area for a terminal screw 76 which is adapted to affix the end of a wire to the terminal 32.

Although, for purposes of illustration, the stations 14, 16, 18 are shown in different stages of assembly, each such station is adopted to receive a terminal 32 in the manner described, and each terminal is adapted to receive a screw 76 in the manner shown in connection with station 16. The end station 12, on the other hand, receives an end plate 78 to facilitate securing the strip 10 to a suitable mounting structure or chassis (not shown). The end plate 78, as shown in FIGS. 5 and 6, comprises a metal stamping having a flat, upper section 80 with a central circular opening 82, and two downwardly depending legs 84, 86 each having a slot 88, 90 respectively and each having barbs 91. The flat upper section 80 includes a pair of opposed lateral flanges 92, 94 which project beyond the upper rectangular passage portion 36 in the strip 10 and overlie and rest upon the top surface 22 of the strip 10, thereby limiting any further downward movement of the end plate 78 into the passage portion 36. The distance between the outer extremity of opposing barbs 91 on each leg 84 or 86 is slightly greater than the width of the rectangular passage portion 36 in the strip 10, considered in the longitudinal direction of the latter. Accordingly, when the end plate 78 is pushed into the rectangular passage portion 36, the barbs 91 will interfere with the plastic in the sidewalls of the rectangular passage portion 36 as the slots 88 and 90 allow the barbs 91 to flex inwardly. This construction prevents an excess of pressure on the plastic of the strip 10 which might cause the latter to chip or break while still providing sufficient pressure for the barbs 91 to bear against the plastic to bite therein, thereby retaining the end plate in position in the upper rectangular passage portion 36. The opening 82 in the end plate 78 is sized to permit passage therethrough of a screw or other fastening member to secure the strip 10 to a chassis or mounting frame. However, end plates may not always be required on the strip 10. For example, the strip 10 may be provided with turrets at all of the stations and such turrets may be inserted in suitable holes in the chassis or mounting frame. Suitable push or spring clips (not shown) may be utilized to engage and grasp the turrets to retain the strip in place on the chassis or mounting frame.

In cases where end plates 78 are utilized, any number may be used along the longitudinal extent of the strip 10. The molded strip 10 may be made any suitable length with any number of stations. At those stations where it is desired to use an end plate, the turret which projects below the bottom surface of the strip may be readily removed, for example by a milling operation.

From the above it will be seen that there has been described a terminal board which is adapted to receive a terminal element and, as may be desired, a plate element to facilitate securing the terminal board to a chassis. The terminal board may be made as long as desired with any number of stations, the partition walls serving to separate the stations and prevent the wires at adjacent terminal stations from touching one another. The terminal elements and plate elements may be made inexpensively by a stamping operation and both elements are readily secured to the plastic terminal strip without requiring any external fastening members.

While a preferred embodiment of the invention has been shown and described herein, it will be obvious that numerous omissions, changes, and additions may be made in such embodiment without departing from the spirit and scope of the invention.

What we claim is:

1. A terminal board comprising an elongated strip of plastic material having a plurality of terminal stations, a turret projecting from said strip at each of said terminal stations, each of said stations having a passage opening up at the top of the strip and extending into the turret to open up at the bottom end of the turret in the form of a slot, a terminal element mounted in said passage and having a lug passing through the slot to protrude beyond the end of said turret, said lug having opposed, laterally projecting tabs disposed below said terminal slot, each of said tabs terminating at their top ends in upwardly facing pointed barbs at least parts of which extend upwardly into said slot, whereby said tabs are adapted to be deformed by twisting out the plane of the slot so that the points of said barbs engage the sidewalls of the slot and interfere with the plastic material adjacent the bottom of said slot to rigidly secure the terminal element to the strip.

2. A terminal board according to claim 1 wherein said terminal element comprises an upper, generally flat section having a pair of flanges, said flanges extending laterally beyond the top passage opening thereby to engage the top of the strip and limit further insertion of the terminal element into the passage.

3. A terminal board according to claim 1 wherein said lug is generally flat and said opposed tabs project from the edges thereof in the same general plane as the lug, said slot having a rectangular configuration with a width approximately equal to the thickness of a said flat lug and a length approximately equal to the transverse distance between opposite outer edges of opposed tabs.

4. A terminal board according to claim 1 wherein said terminal element comprises an upper, generally flat section having a downwardly depending lip and an opposed downwardly depending leg, and a transverse web connecting said downwardly depending leg to said lug.

5. A terminal board according to claim 4 wherein said passage has an upper portion having a transverse rectangular configuration and a lower portion having a transverse circular configuration, said downwardly depending lip and leg being accommodated in said upper passage portion.

6. A terminal board according to claim 4 wherein said flat, upper section has an opening to receive a fastening device to secure a wire thereto.

7. A terminal board according to claim 4 further comprising an end station on said elongated strip, said end station having an aperture opening up at the top of the strip, a plate element mounted in said aperture, said plate element having two generally flat opposed legs extending into said aperture, and barb elements projecting from the edges of the legs in the same general plane of the legs, said barb elements being adapted to engage the walls of the aperture to prevent withdrawal of the plate element from the aperture.

8. A terminal board according to claim 7 wherein the distance between opposite outer edges of opposed barb elements on the same leg is greater than the corresponding dimension of the aperture in the section of the latter in which the plate element legs are accommodated.

9. A terminal board according to claim 7 wherein each of said legs is provided with a slot extending between opposed barb elements, thereby to facilitate flexure of the barb elements as the plate element is inserted into the aperture.

10. A terminal board according to claim 7 wherein said plate element comprises an upper, generally flat section having a pair of flanges, said flanges extending laterally beyond the top aperture opening, thereby to engage the top of the strip and limit further insertion of the plate element into the aperture.