United States Patent [19]

Scott

[11] **3,920,305**

[45] **Nov. 18, 1975**

[54] **NO-STRIP TAP CONNECTOR**

[75] Inventor: **William J. Scott,** Sycamore, Ill.

[73] Assignee: **Ideal Industries, Inc.,** Sycamore, Ill.

[22] Filed: **Jan. 21, 1974**

[21] Appl. No.: **435,108**

[52] **U.S. Cl.** **339/98**

[51] **Int. Cl.** **H01r 13/38**

[58] **Field of Search** ..... 339/97 R, 97 P, 98, 99 R

[56] **References Cited**

UNITED STATES PATENTS

2,738,479	3/1956	Gibson	339/98
3,388,370	6/1968	Elm	339/98
3,793,612	2/1974	Driscoll	339/98

Primary Examiner—Joseph H. McGlynn
Assistant Examiner—Mark S. Bicks
Attorney, Agent, or Firm—Kinzer, Plyer, Dorn & McEachran

[57] **ABSTRACT**

An electrical insulated wire connector in which a continuous wire and tap wire are held in side-by-side channels in an insulating body having an integral self-locking cover and a slot in its side into which a slotted conductive insert is forced so that it penetrates the insulation of the wires and makes an electrical connection between them.

7 Claims, 3 Drawing Figures

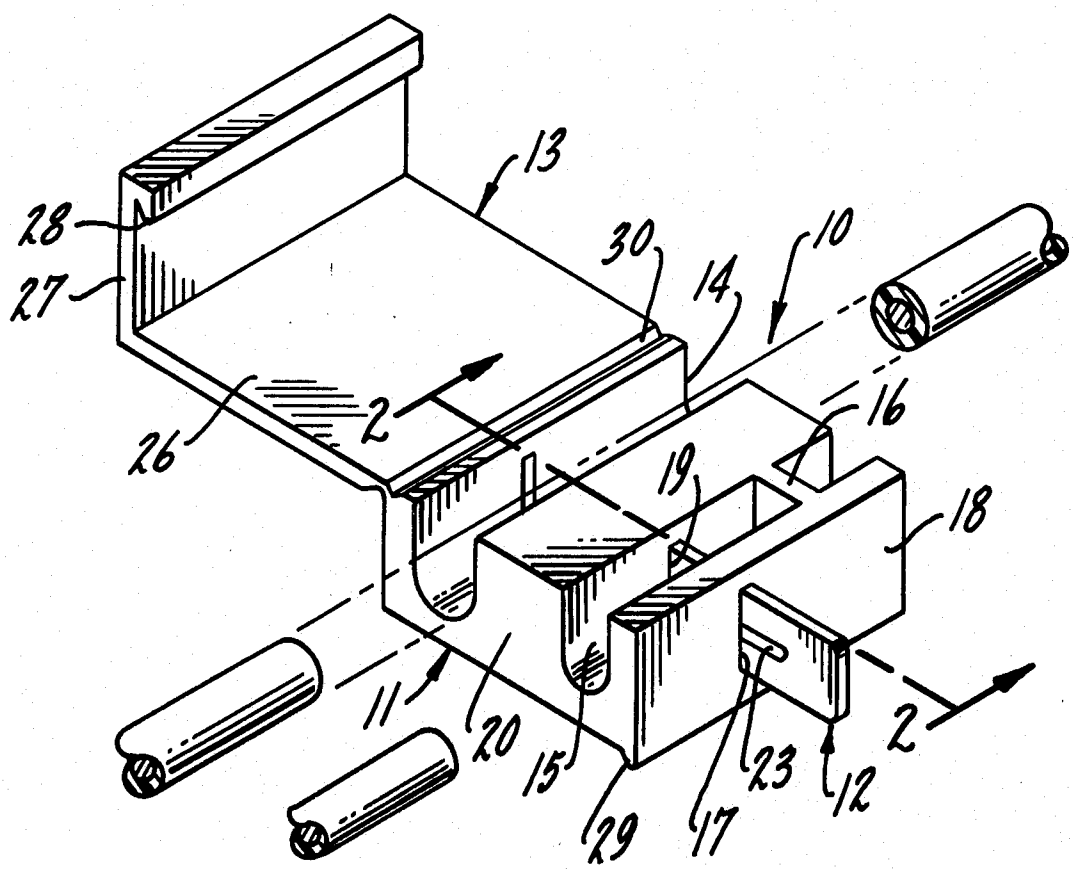
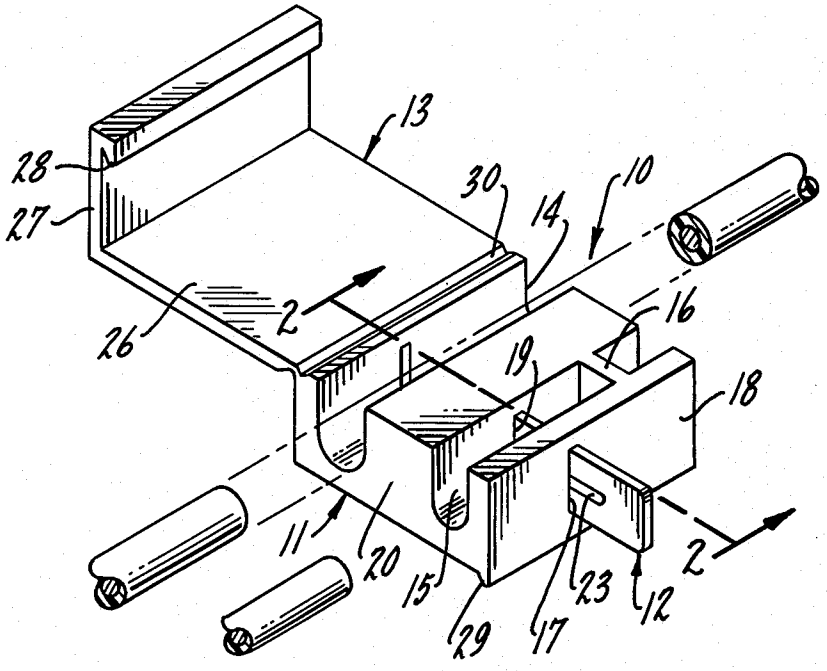


fig.1.



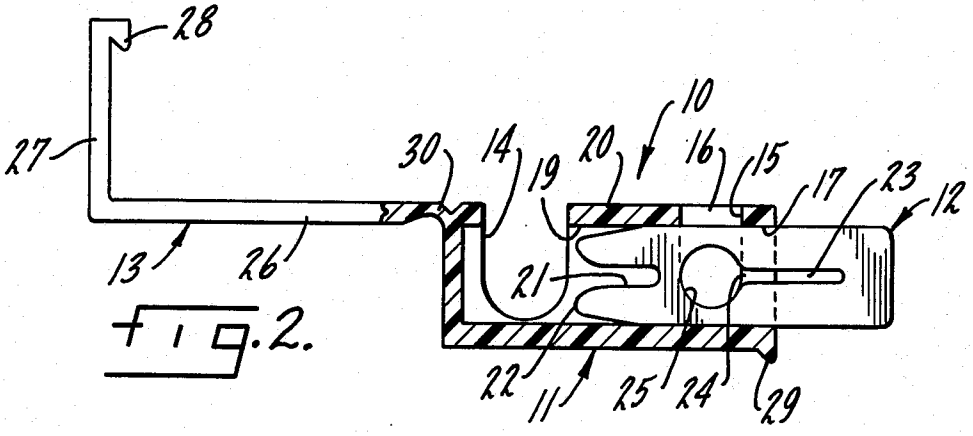


fig.2.

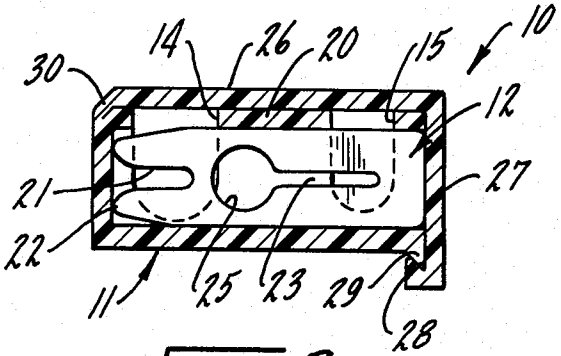


fig.3.

NO-STRIP TAP CONNECTOR

SUMMARY OF THE INVENTION

The invention is directed to the field of electrical wire connectors and more particularly to an electrical no-strip insulated wire connector.

A solid body of insulating material has two longitudinal wire-receiving channels at least one of which runs the length of the body and opens along the top to receive a continuous wire and the other channel being for a tap wire contains a stop surface across it. A slot in the outside wall of the tap wire channel disposed intermediate its length extends into and through both channels to allow the insertion of a conductive insert with two parallel slots disposed one behind the other so that each slot pierces the insulation of one of the wires lying in the channels of the body, thus making an electrical connection between them. The insulating body also has an integral self-locking cover flap to close over the open top and side of the body. Therefore an improved no-strip tap connector is a primary object of this invention.

Another object is an improved no-strip tap connector in which the position of the fully inserted tap wire in the body of the connector can be clearly viewed before the electrical connection is made.

Another object is an improved no-strip tap connector in which the joining action is clearly visible as the metal insert is forced into the slot in the side of the insulating body.

Another object is an improved no-strip tap connector in which the slots are disposed one behind the other so that distortion of the insert as a slot is forced over a conductor wire will not affect the adjacent slot.

Another object is an improved no-strip tap connector in which the metal insert can be pre-positioned generally half way into the transverse slot such that the tap wire can be inserted through a hole in the conductive insert without the necessity of removing the insert.

Another object is an improved no-strip tap connector with a cover flap which can be opened by an inspector to visibly expose the joint in the open slots.

Other objects will appear in the ensuing specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a perspective view of a no-strip tap connector constructed in accordance with the concepts of the invention and showing the positions of the insulated continuous and tap wires for insertion into the respective channels of the connector;

FIG. **2** is a transverse cross-section of a portion of the no-strip tap connector taken along line **2—2** of FIG. **1** showing the cover open and metal strip in position for receiving the wires to be connected; and,

FIG. **3** is the same view as FIG. **2** but shows the metal strip in the fully inserted contact position and the cover closed over the top and side and latched to the connector body below the slotted side.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A no-strip tap connector **10** is shown in FIG. **1** consisting of a solid body **11** of insulating material and a conductive insert **12.** Integral with and hinged to the connector body **11** is a cover flap **13.**

The connector body **11** contains two longitudinal channels **14** and **15** for receiving the insulated wires to be connected. The continuous wire channel **14** extends through the entire length of the body and is open along the top to accept a continuous wire. The tap wire channel **15** is open along the top and blocked by a stop surface **16** which the fully inserted tap wire abuts and which provides insulation for the exposed end of the tap wire. The connector body is slotted transversely intermediate its length by means of a side slot **17** through the outside wall **18** of the tap wire channel and a central slot **19** through the portion of the body **20** between the channels. Together they form a continuous linear slot open at its outer end **17** through the side and extending inward through the tap wire channel **15,** through the body portion **20** between the channels and into the continuous wire channel **14.**

A conductive insert **12** is adapted to be slidably retained and inserted into the transverse slot. A slot **21** is cut into the inner end **22** of the insert **12** as is shown in FIG. **2** for penetrating the insulation of a wire in the continuous wire channel **14.** Another similarly directed parallel slot **23** for penetrating the insulation of a wire in the tap wire channel **15** is disposed in the insert such that the longitudinal distance between the open ends of the slots is generally equal to the distance between the centerlines of the channels **14** and **15.** The slots **21** and **23** are generally somewhat smaller than the smallest conductor of the insulated wire they are to engage.

In the embodiment shown in FIGS. **1–3,** the tap wire slot **23** in the conductive insert **12** is part of a keyhole-shaped aperture **24** made up of a hole **25** and slot **23.** The hole **25** is generally equal in diameter to the width of the tap wire channel **15** and the slot **23** extends outward from the hole parallel to the inner slot **21.** The aperture **24** is positioned in the insert such that the center of the hole **25** is positioned generally in line with the centerline of the tap wire channel **15** when the inner end **22** of the insert is at the point of initial contact with the continuous wire channel **14.**

Furthermore, in the embodiment shown in FIGS. **1–3,** the edges of the insert at the slotted end **22** are tapered in toward the slot **21** to facilitate directing the insert into the side slot **17** of the connector and the wire-engaging open ends of the slots **21** and **23** in the conductive insert are flared away from the center line of the slots to aid in guiding the sides of the slots over the conductor wires as the insert is pressed through the insulation so as to prevent any part of the insert adjacent to the open end of a slot from abutting directly against a conductor wire.

The cover flap **13** which is an integral part of the connector body **10** consists of three portions: a first portion **26** for covering the open channels **14** and **15** on the top of the connector, a second portion **27** for covering the slotted side **18** of the connector and a means for locking the cover flap in a closed position over the top and side. The means shown in the embodiment of FIGS. **1–3** consists of a continuous hooked lip **28** along the inside edge of the free end of the cover flap and a matching continuous hooked lip **29** along the bottom edge of the slotted side **18** of the connector. The cover flap **13** is connected to the body **10** by a continuous hinge **30** which is shown disposed along the top edge of the side of the connector adjacent to the continuous wire channel. The cover flap is shown in the closed and locked position in FIG. **3.**

Examples of materials which may be used for the construction of this invention include a copper alloy such as brass for the conductive insert and polypropylene or polyallomer for the connector body.

The use, operation and function of the invention are as follows:

This connector is meant to make a no-strip tap connection of an insulated wire to a continuous insulated wire with pliers for the sole tool. To do this, the connector body is placed onto the continuous wire so that a portion of the wire loosing supported in the continuous wire channel. The tap wire is then inserted into the tap wire channel through either the open top or directly into the open end far enough so that its free end rests against the stop member in the channel. The insert may be prepositioned about half way into the connector body and the tap wire inserted through the large end of the keyhole so that the insert would not have to be moved in order to insert the wires. Thus one installation step could be eliminated which would save time and avoid the problem of loosoing separated parts. Now with the insert in its position of initial contact with the wires lying in the channels a pair of common pliers may be used to make the connection by pressing the free outer end of the insert on one side and the closed side of the connector body on the other side until the metal insert is fully within the connector body. The cover flap can then be manually closed and snapped into locked position for a fast efficient electrical connection.

An advantage of the present invention is the open view of the placement of the tap wire in its channel so the end of the wire is in visible proximity to the stop member and the connection will be made on the conductor at a point other than the end of the wire. The joining action is also clearly visible after the wires are placed into their respective open-top channels and the conductive insert has been pressed through the wires. Because of the hinged cover the connector can later be opened by an inspector and the joint will be visible in the open slot. The clear visibility of this connector therefore assists in making a clean connection initially and later facilitates any necessary trouble-shooting.

The present invention has several other significant advantages. Each wire-receiving channel has a separate opening to the outside either through the top or its open end so as to avoid any problem of stretching the outermost channel caused by inserting more than one wire through one open slot. Also, the conductive insert is pressed into the "inside" of the connector body relative to the electrical conductors so that the invention may be used in an application where the top and bottom of the connector are either inaccessible or inconveniently disposed. In addition, because of the end-to-end relationship of the slots in the conductive insert, any distortion of a slot in the conductive insert as it is forced over its conductor wire will not effect adjacent slots since there is no common side member between them.

Possible variations of the present invention include increasing the number of tap wire channels so as to connect three or more wires, or a pigtail connector could be connected with two or more blocked slots. The side slot for the conductive insert may be disposed at other than a right angle to the side of the connector body so as to help the insert penetrate the wire insulation. For easier molding of the side slot to hold the insert in a non-perpendicular attitude to the wire channels the bottom of the connector body could be hinged similar to the top. The hinge would be at the bottom of the closed side of the connector body and additional latches like the hooked lips along the free end of the cover flap and bottom edge of the open side of the connector body would be required. The forces acting transverse across the connector body permit this construction alternative.

The wires, channels, slots etc have been shown with different sizes, but they might be the same or reversed. Also, the slots **21** and **23** in the metal insert have been shown as generally coaxial and coextensive but it might be otherwise. For example, the slots might be offset slightly but generally parallel which could be used to reduce the size of the unit.

While a preferred form and several variations of the invention have been disclosed, it should be understood that suitable additional modifications, changes, substitutions and variations may be made without departing from the invention's fundamental theme.

What is claimed is as follows:

1. A no-strip tap connector comprising a solid body of insulating material with two longitudinal wire-receiving channels at least one of which extends through the entire length of the body and opens continuously along the top surface of the body to accept a continuous wire, the other channel being for a tap wire and also opening directly along the top surface of the body and containing a generally traverse stop surface, a transverse slot extending across the channels intermediate the length of the tap wire channel and opening through a longitudinal side of the body normal to the top surface, a conductive insert insertable into the transverse slot through said body side and having an end slot at one end to penetrate the insulation of a continuous wire in the continuous wire channel, an insulation piercing slot adjacent the other end of the insert and generally aligned with the end slot for penetrating the insulation of a tap wire in the tap wire channel, a cover flap integral with and hinged to the body and of a size to cover the top and side so as to close and cover the open channels and side slot, and means for locking the cover flap in a closed position over the top and side of the body.

2. The no-strip tap connector of claim **1** wherein the tap wire insulation piercing slot of the conductive insert is part of a keyhole-shaped aperture consisting of a tap wire-receiving hole and slot extending outward therefrom for piercing the insulation of the tap wire.

3. The no-strip tap connector of claim **2** wherein the hole of the keyhole-shaped aperture is generally equal in diameter to the width of the tap wire channel and the slot extends outward therefrom, said aperture being positioned in the insert such that with the inner end of the insert at the point of the initial contact with the continuous wire in the continuous wire channel the center of the hole of the keyhole-shaped aperture will be positioned generally in line with the center line of the tap wire channel.

4. The no-strip tap connector of claim **1** wherein the tap wire channel is of smaller diameter than the continuous wire channel and the tap wire insulation piercing slot of the conductive insert is narrower than and parallel to the slot at the inner end of the insert so that a tap wire of smaller diameter than the continuous wire may be connected.

5. The no-strip tap connector of claim 1 wherein the cover flap is hinged along the top edge of the side of the connector adjacent to the continuous wire channel and the means for locking the cover flap is disposed generally along and adjacent to the lower edge of the slotted side of the connector body.

6. The no-strip tap connector of claim 2 wherein the solid body of the connector contains one or more tap wire channels and the metal insert contains an equal number of keyhole apertures so that one or more tap wires may be connected to the continuous wire.

7. In a no-strip tap connector comprising a solid body of insulating material with two longitudinal wire-receiving channels, at least one of which extends through the entire length of the body, the improvement comprising:

said one channel having a continuous opening directly through the top surface of the body to accept a continuous wire,

the other channel also having an opening directly through the top surface of the body to accept a tap wire,

a generally transverse stop surface across said other channel,

a transverse slot having an opening through a longitudinal side of the body adjacent said other channel and extending through the other channel and body and into said one channel, the top surface of the body overlying and closing the transverse slot through the solid body,

a conductive insert slidingly receivable into the transverse slot and having an end slot in one end to penetrate the insulation of a continuous wire in said one channel, a tap wire receiving hole for receiving a tap wire disposed in the other channel and an insulation piercing slot opening into the tap wire hole and generally aligned with the end slot for penetrating the insulation of a tap wire, and

an integral cover flap hinged to the body for closing the openings of the channels and transverse slot when closed and exposing the relative position of the conductive insert and wires in the channels when opened.

* * * * *