United States Patent [19]

Ray

[11] **3,790,917**

[45] **Feb. 5, 1974**

[54] **STRIP METHOD**

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[22] Filed: **Oct. 28, 1968**

[21] Appl. No.: **770,958**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 702,375, Feb. 1, 1968, Pat. No. 3,551,803.

[52] **U.S. Cl.** ..... **339/95 R,** 339/273 R

[51] **Int. Cl.** **H01r 9/08**

[58] **Field of Search** 339/95, 97–99, 339/247–249, 270, 273, 174–176, 198

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[57] **ABSTRACT**

A wire from each of two communication cables to be spliced is inserted into a tang connector, which has a stiff plate above and below the connector. The tanged connector is one of many in a block. The connectors, each containing wire, are crimped by forcing each connector into a tapered hole, the plurality of tapered holes being located in a crimp block. After crimping the connectors, the excess wire is cut off by a cutter in a slot in the crimp block. The crimp block is left permanently attached to the connectors in the completed splice. The holes in the crimp block extend through the crimp block leaving the end of each connector exposed for future connections. A square pin extending from one of the stiff plates provides a pin for making a future connection.

19 Claims, 10 Drawing Figures

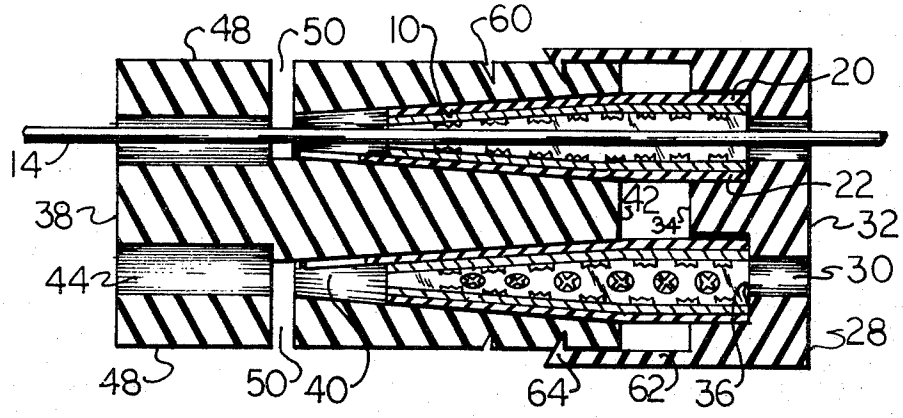
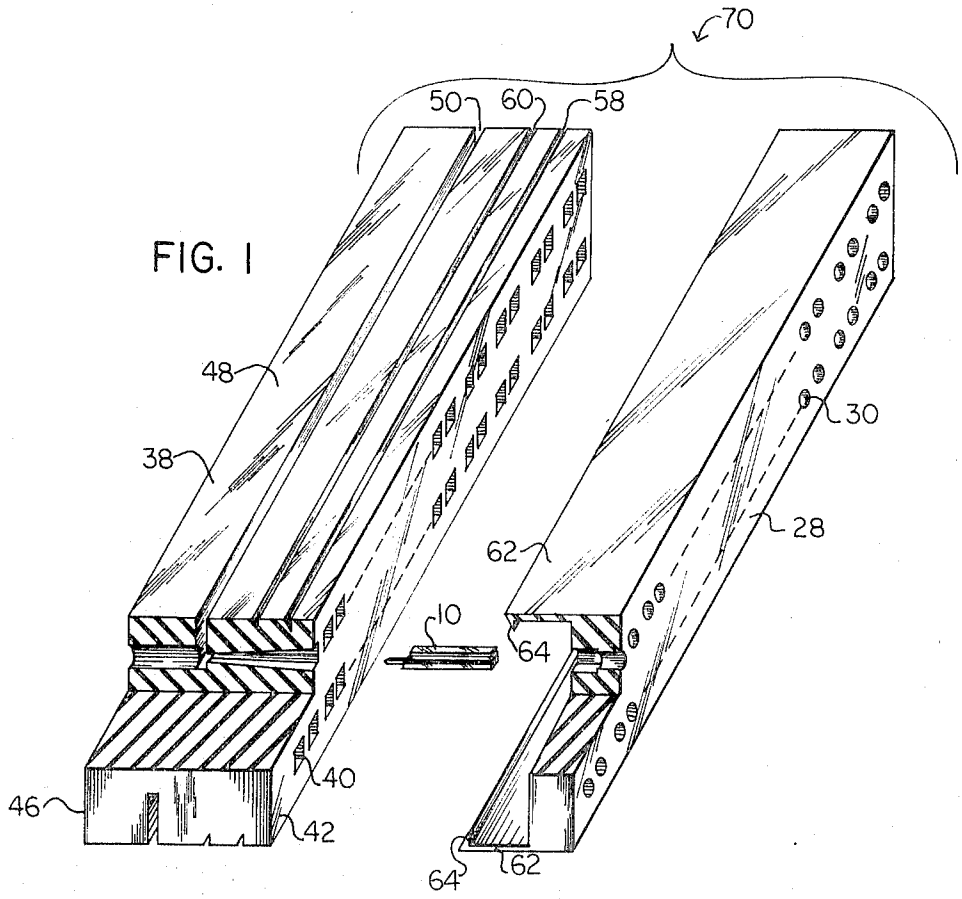


FIG. 1



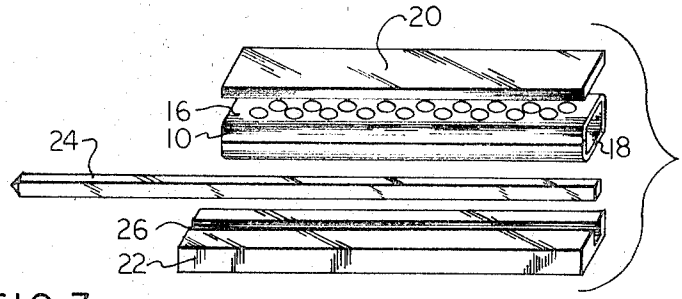
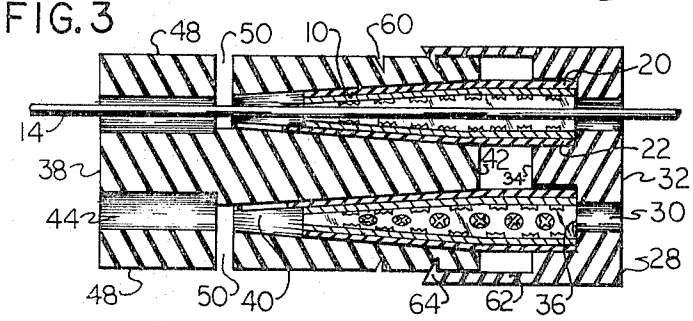


FIG. 2

FIG. 3



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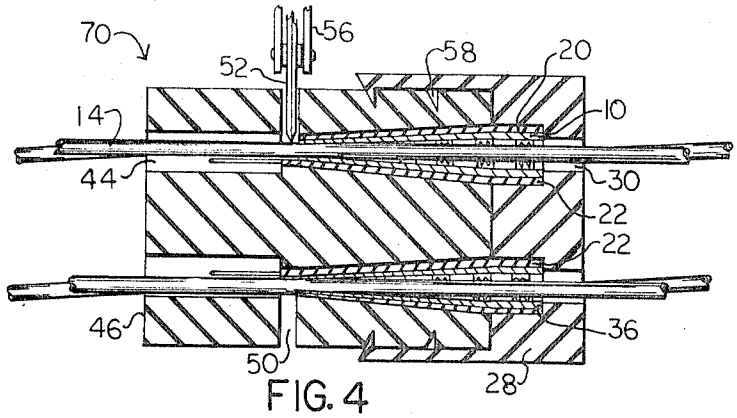

FIG. 4

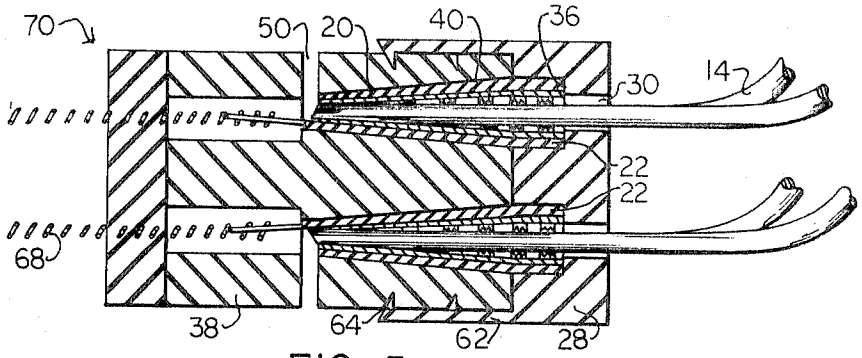

FIG. 5

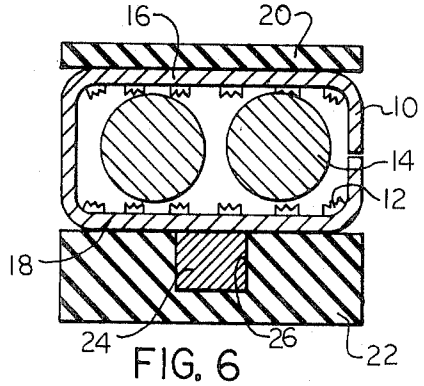

FIG. 6

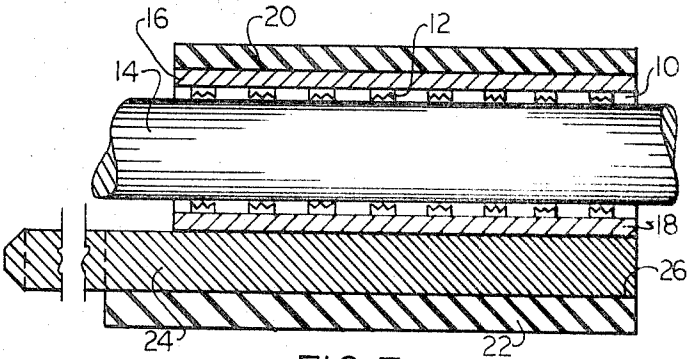

FIG. 7

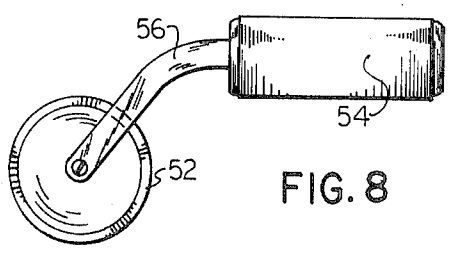

FIG. 8

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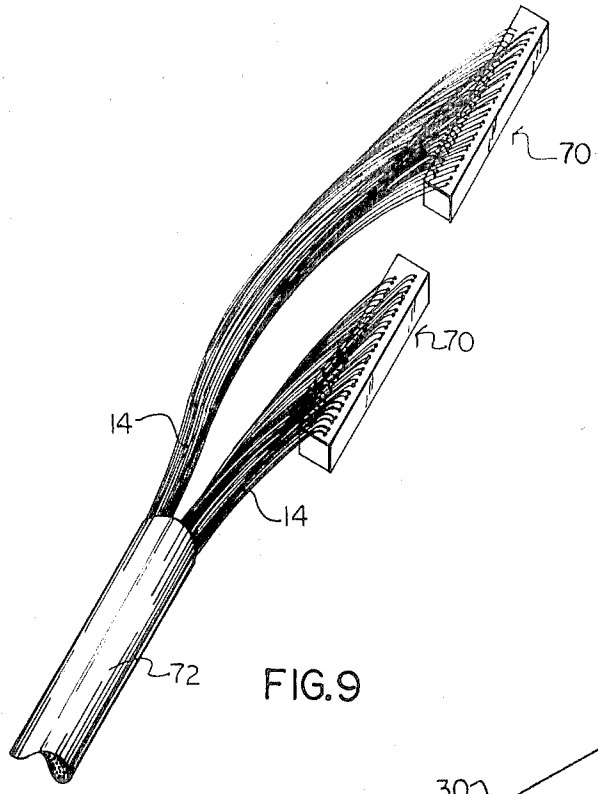

FIG. 9

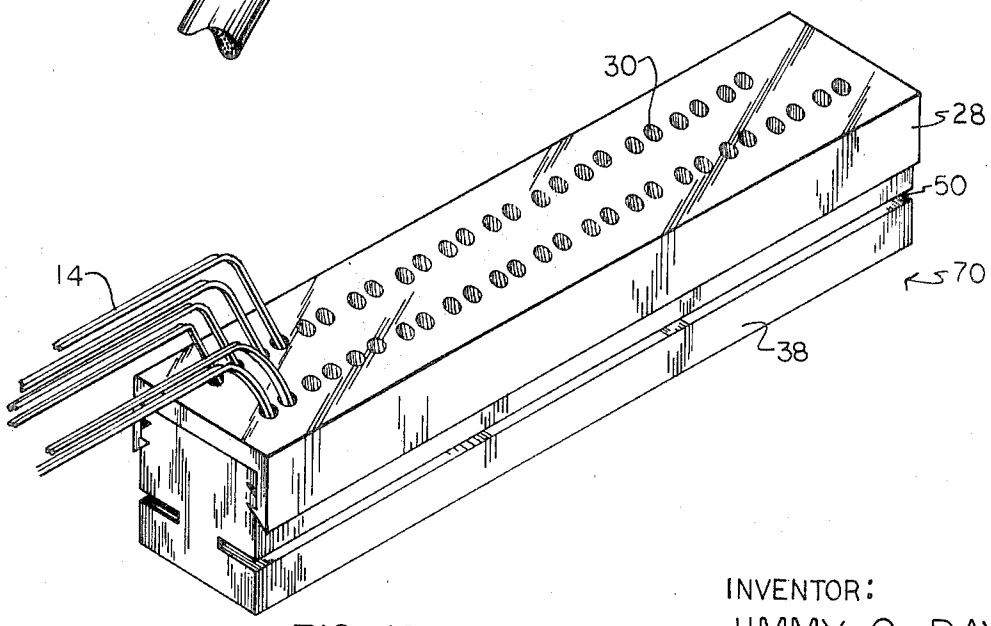

FIG. 10

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STRIP METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

My three patent applications listed below are related to the same subject matter. This application is a continuation-in-part of the application Ser. No. 702,375, filed Feb. 1, 1968 and now U.S. Pat. No. 3,551,803.

Title	Ser. No.	Filing Date	Group
SPLICER CONNECTORS FOR WIRES	525,506	Feb. 7, 1966	323
GROUP SPLICING	682,364	Nov. 13, 1967	353
	702,375	Feb. 1, 1968	353

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to electrical connections and more particularly to splicing cables carrying communication signals.

2. Description of the Prior Art

At the present time many communication cables—such as telephone cables—are installed underground in conduits. When putting the cable in conduit, a lead wire is put into the conduit and then the cable is attached to the lead wire and pulled through the conduit. After the cable is in the conduit, the ends of the cable are spliced together at connection points in manholes.

It is commercial practice today to splice two insulated wires by inserting the wires into a tanged cup shaped connector and crimping the connector onto the wire, the tangs piercing the insulation and making contact with the metal within the insulation. E.g., embodiments of U.S. Pat. No. 3,064,072 are commercially on the market. The crimping is done by side force upon the walls of the connector as by squeezing with plier-like mechanism.

Also, it is known that cables be connected by providing one with a plurality of male prongs and the other with a plurality of female sockets, plugging one into the other.

It is recognized as acceptable practice to make a connection by wrapping bare wire around a square plug.

SUMMARY OF THE INVENTION

By this invention, I provide a simple means and method of splicing cable, which is advantageous if the splice is never disturbed, however, it has many additional advantages in that at a later date the splice itself acts as a plug connection whereby a test set can be plugged into the splice, or another cable plugged into the splice.

This is accomplished by having a plurality of tanged connectors mounted into a block so the wires may be inserted into the connectors and the connectors crimped with the tangs piercing the insulation and making contact with the wire inside. The connectors are crimped by forcing the connectors of the connector block into a crimping block which has tapered holes for each of the connectors. The connectors are generally made of thin metal so that the tangs are sharp and, also, so that they are easily crimped. A stiffening plate has been put on the two flat sides of the connector so that they operate better in the tapered holes of the crimping block.

A square spike or pin of metal, extending from one of the stiffening plates of the connector, is normally enclosed in the crimping block. However, if it is necessary to make an electrical connection later, a bridge adapter having a helical coil for each of the spikes may be plugged into the end of the crimping block.

Also, this invention is adaptable for assembly at a factory or a centrally located place rather than in manholes. The crimp blocks and connector blocks are long and narrow so that their dimensions are no greater than the cable to which they connect. Therefore, one wire may be placed in each connector and the connectors crimped so that the connector block forms a plug. Then the assembled cable with the connectors already installed is still of proper dimensions to be pulled through the conduit and then the cables plugged together to complete the installation. Of course, general practice requires that the connection be taped so that it is air tight to prevent deterioration.

An object of this invention is to splice communication cables.

Another object is to provide a plug on the end of a cable so that another cable may be plugged thereto.

Further objects are to achieve the above with a device that is lightweight, sturdy, compact, durable, simple, safe, versatile, efficient, and reliable, yet inexpensive and easy to manufacture, install, operate and maintain.

Still further objects are to achieve the above with a method that is rapid, efficient, inexpensive and does not require skilled people to install, adjust, operate and maintain.

The specific nature of the invention as well as other objects, uses, and advantages thereof, may clearly appear from the following description and the accompanying drawing, the different views of which are not necessarily to the same scale.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an exploded perspective view of the connector block and the crimp block, partially broken away to show details of construction.

FIG. 2 is an exploded perspective view of a connector with its associated still plates and pin.

FIG. 3 is a sectional view of the assembled connector block and crimp block with the wires as would be inserted in the upper connector.

FIG. 4 is a sectional view of an assembled connector block and crimp block with the connectors crimped to the wires and showing the top wires in the process of being cut.

FIG. 5 shows a completed and assembled connector and crimp block with a showing of the subsequent attachment to it by helical springs.

FIG. 6 is a cross sectional view of a single connector with the wires therein before crimping.

FIG. 7 is a longitudinal sectional view of a connector with the wires therein before connecting.

FIG. 8 is an elevational view of a cutter adapted to be used to cut the wires.

FIG. 9 is a perspective view of a cable with two connector assemblies attached thereto.

FIG. 10 is a perspective view of a connector assembly only partially utilizing its connectors.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Connector **10**, according to this invention, is sleeve shaped with a cavity and is open at both ends. There are a plurality of tangs **12** struck from it, the tangs having sharp points on the interior of the connector for piercing the insulation and making good contact with the wire **4** when the connection is completed. The connector **10** itself is made of thin metal and is basically wider than it is high, i.e., it has a flat top **16** and bottom **18**.

Inasmuch as connector **10** is made of thin metal, top stiff plate **20** is placed on the top **16** of the connector to reinforce it and a bottom stiff plate **22** is placed on the bottom **18** of the connector to stiffen and reinforce it. The pin or spike **24** is rectangular and is electrically attached, as by soldering, to the bottom **18** of connector **10**. It has a portion which extends forward from the end of the connector beyond the open end thereof. The pin **24** is of conductive material and has sharp edges on the corners. The bottom stiff plate **22** has an elongated slot or notch **26** into which the pin **24** fits upon assembly.

The connector block **28** is an elongated rectangular member which has fifty holes **30** therethrough arranged in two rows thus forming connections for 25 pairs of wire. As may be seen, the holes from the outside or face side **32** are of smaller diameter than on the inside of contact side **34**. Thus the shoulder **36** is formed about midway of connector block **28**. A connector **10** with plates **20** and **22** is placed in each of the holes **30** with the end of the connector **10** and the ends of the stiffening plates **20** and **22** abutting against the shoulder **36**. The pin **24** extends forward and is on the center line side of each hole **30**.

Crimp block **38** has a tapered hole **40** for each connector **10**. The tapered hole, plus the portion of the hole **30** in the connector block, is equal to the length of the connector **10** (FIGS. **4** and **5**). The tapered holes are open on the contact side **42** or contact face of the crimp block **38**. Bore **44** opens into each of the tapered holes **40** and it opens from the plug side **46** of the crimp block **38**. The crimp block **38** and connector block **28** are made of insulated materials.

Between the tapered hole **40** and the bore **77** from the top **48** of the crimp block **38** is knife slot **50**. This knife slot is for the blade of knife **52** which is seen in FIG. **8**. The knife includes a handle **54** which has bifurcated arm **56** which connects to the center of the circular blade **52**.

The top and bottom of crimp block **38** also has a notch **58** running parallel and adjacent to contact side **42**. Also there is a parallel notch **60** on top and bottom between the notch **58** and the knife slot **50**, all being parallel.

The connector block **28** has an upper and lower flange **62** and lip **64** is on the extreme end of the flange **62**.

At the beginning of operation, the assembly **70** will have the lip **64** in the first notch **58** and therefore each of the connectors **10** will be partially inserted in the tapered holes **40**. This is the position as seen in FIG. **3**. Then the operator will place one or two wires into each connector **10** which will permit the wires to extend into the bore **44**. When the wires have all been inserted, the connector block and crimp block will be forced together so that the lip **64** fits into the crimp notch **60** as seen in FIG. **4**. At this time the connector **10** extends the full length and the end of connector **10** is flush with the end of the tapered hole **40** which is also flush with one edge of the knife slot **50**. When the connector **10** is forced into the tapered hole **40** of the crimp block, the stiff plates **20** and **22** transform the sliding, frictional movement into crimping pressure. Therefore, the stiff plates **20** and **22** may be made of "nylon" or other synthetic plastic.

At this time the knife blade **52** can be inserted in the knife slot **50** and the wires cut by the movement of the knife along the slot **50**. This operation is shown in FIG. **4**. The bottom stiff plate **22** extends beyond the end of the connector **10** and into the knife slot **50** thus forming a cutting board or "bread board." Thus the wires **14** are cut between the blade **52** and the cutting board of the plate **22** and pin **24**.

If two wires are inserted into each connector, these two wires will be connected and, therefore, if there are 25 pairs with two wires in each connector, the splice of the two 25 pair cables shall be completed except for protecting it from moisture and atmospheric conditions. Such a completed assembly **70** is substantially illustrated in FIG. **10**.

However, if only one wire is connected and it is desired to use the connector assembly **70** as a plug, or if it is desirable to test the cables, as more fully described in my patent application identified above, connection can be made by using a spring block **66** (FIG. **5**). The spring block would have fifty helical springs **68** extending through it with one spring oriented to insert into each of the bores **44** telescoped over the pin **24**. The inside diameter of the helical spring **68** is less than the dimensions of the pin **24** across corners and, therefore, the sharp edges of the square pin **24** will cut into the spring **68** forming a good connection. Also, each portion of the spring **68** will be strained so that it continues to exert pressure and tension regardless of thermol expansion or contraction, thereby always providing a good connection.

FIG. **9** illustrates a fifty pair cable **72** with 25 pair connected to the assembly **70** and the other **25** pair connected to a second assembly **70**. The width and thickness of the assemblies **70** are less than the thickness of the cable **72**; therefore the cable with the assemblies **70** attached as plugs may be pulled through a conduit.

It is noted that the pins **24** are completely recessed within the bores **44** of the crimp block **38**. Therefore, when the connector assemblies **70** are factory preplaced on the cable **72**, the pins **24** are protected from damage during shipping, storage and pulling through the conduit. Furthermore, if the assembly **70** is used as a two wore connector (FIG. **10**, the pins **24** are protected by being recessed and the assembly is readily wrapped.

The embodiments shown and described above are only exemplary. I do not claim to have invented all the parts elements or steps described. Various modifications can be made in the construction, material, arrangement and operation, and still be within the scope of my invention. The limits of the invention and the bounds of the patent protection are measured by and defined in the following claims. The restrictive description and drawing of the specific example above do not point out what an infringement of this patent would be,

but are to enable the reader to make and use the invention.

I claim as my invention:

1. A connector for splicing insulated communication wire comprising:
a. a sleeve-shaped tanged connector having a cavity,
b. said connector open at both ends,
c. a plurality of tangs extending from the connector into the cavity, and
d. stiff plates above and below the connector,
e. so that the connector may be forced into a tapered hole with the plates transforming the sliding frictional movement into crimping pressure,
f. said stiff plates including a pin of conducting material having
i. sharp longitudinal edges
ii. extending beyond the end of the connector,
whereby another connection may be made to the tanged connector by use of the pin.

2. The invention as defined in claim 1 with the additional limitation of
h. a connector block of insulated material,
j. a plurality of said tanged connectors on the connector block, and
k. means associated with said connector block for crimping all the tanged connectors.

3. The invention as defined in claim 2 wherein means for crimping includes
m. a crimp block having
i. a plurality of tapered holes from one side,
ii. a plurality of matching bores from the opposite side,
iii. each bore interconnecting with a correlative hole, and
iv. a knife slot from the top between all of the holes and bores,
n. one of said tanged connectors in each tapered hole with
i. said pin extending into a correlative bore, and with
ii. at least one wire extending into the bore on the knife slot side of the pin,
o. so that a cutter knife slot may cut the wire.

4. A connector for splicing insulated communication wire comprising:
a. a sleeve-shaped tanged connector having a cavity,
b. said connector open at both ends,
c. a plurality of tangs extending from the connector into the cavity, and
d. stiff plates above and below the connector,
e. so that the connector may be forced into a tapered hole with the plates transforming the sliding frictional movement into crimping pressure,
f. a connector block of insulated material,
g. a plurality of said tanged connectors on the connector block, and
h. means associated with said connector block for crimping all the tanged connectors, wherein the means for crimping includes
j. a crimp block having
i. a plurality of tapered holes from one side,
ii. a knife slot from the top,
k. one of said tanged connectors in each hole with
i. at least one wire extending beyond the end of the connector
ii. and beyond the knife slot,
m. so that a cutter in the knife slot may cut the wire.

5. A connector strip comprising in combination:
a. a crimp block having
i. a plurality of tapered holes from one side,
ii. a plurality of matching bores from the opposite side,
iii. each bore interconnecting with a correlative tapered hole, and
iv. a knife slot from the top between all of the holes and bores,
b. a tanged connector in each tapered hole having
i. at least one wire
ii. extending into the bore,
c. so that a cutter in the knife slot may cut the wire.

6. The invention as defined in claim 5 with the additional limitation of
d. a stiff plate on one side the connector for transferring sliding, frictional movement into crimping pressure, and
e. the stiff plate extending beyond the connector for forming a cutting board under the slot.

7. The invention as defined in claim 5 with the additional limitation of
d. a pin electrically connected to the connector and extending into said bore for future connections.

8. The invention as defined in claim 7 with the additional limitation of
e. a stiff plate on one side the connector for transferring sliding, frictional movement into crimping pressure, and
f. the stiff plate extending beyond the connector for forming a cutting board under the slot.

9. A connector for splicing insulated communication wire comprising:
a. a tanged connector having a cavity,
b. a plurality of tangs extending from the connector into the cavity,
c. a crimp block having a thickness equal to at least the length of said tanged connector,
d. a tapered hole in the crimp block,
e. said connector at least partially in the tapered hole,
f. said hole having a width less than the width of the tanged connector before use,
g. adapted for at least one wire to be inserted in the cavity of the connector and the connector pressed within the hole in the crimp block so that tangs of the tanged connector pierce the insulation and penetrate into the metal of the wire,
h. a connector block of insulating material,
j. a plurality of said tanged connectors on the connector block and
k. said crimp block having a correlative hole for every tanged connector,
m. said crimp block also made of insulating material.

10. The invention as defined in claim 9 with the additional limitation of
n. cutter means operable at the end of the tanged connector for severing the wire with the tanged connector pressed within the hole.

11. In a cable having
a. a plurality of wires
b. each wire individually insulated;

c. the improvement in combination with the above comprising:
d. at least one connector assembly,
e. the cable being thicker than the connector assembly is thick or wide so that the connector assembly will slide through any conduit the cable will slide through, and
f. a plurality of pins,
g. each pin recessed into the connector assembly so that it is protected from damage,
h. each pin connected to a wire of the cable, and
j. each pin forming a means for conductivity connecting its wire to a further conductor, and
k. a crimp block having a plurality of tapered holes,
m. a tanged connector in each hole,
n. one of said pins extending from each tanged connector.

12. The invention as defined in claim **11** with the additional limitations of
o. more than one connector assembly,
p. each connector assembly having fewer pins than the wires of the cable.

13. A connector assembly for connecting the wires of two cables together comprising:
a. at least two blocks,
b. a plurality of connectors attached to one of said blocks,
c. each of said connectors being means for electrically connecting itself to wires from the cables by piercing the insulation of the wires and by making good contact with the wires,
d. said blocks being means for connecting the connectors to the wires by pressing the blocks together, and
e. tap means on each connector for making electrical contact with the connector from outside the assembly.

14. The invention as defined in claim **13** with the additional limitation of
f. cutter means operatively associated with the connectors for cutting the wires.

15. In a cable having
a. a plurality of wires,
b. each wire individually insulated;
c. the improvement in combination with the above comprising:
d. at least one connector assembly having
e. a plurality of connectors therein,
f. each of said connectors being means for electrically connecting itself to a wire by piercing the insulation and by making good contact with said wire,
g. means operatively associated with the assembly for simultaneously piercing the insulation of all the wires and connecting each connector to its wire,
h. each of said wires in the cable so connected to one of said connectors,
j. tap means on each connector for making electrical contact with the connector from outside the assembly,
k. two of said cables,
m. each having a plurality of wires, and
n. a wire from each cable to each connector.

16. The invention as defined in claim **15** with the additional limitation of
o. cutter means operatively associated with the connectors for cutting the wires.

17. The method of splicing communication cables made up of individually insulated wires comprising the steps of:
a. placing a plurality of connectors on a block,
b. placing a wire from each of the cables in each connector,
c. placing a crimp block in operative relationship to the connector block,
d. forcing the blocks together thereby
e. piercing the insulation of each of the wires by its connector, and
f. making good contact between the wires and connector.

18. The invention as defined in claim **17** with the additional limitation of
g. after the connection is complete, tapping into the connector with another conductor.

19. The invention as defined in claim **17** with the additional limitation of
g. cutting the wires after they have been connected to the connector.

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