United States Patent

Holiday

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[54] CONNECTOR FOR CONTROL CIRCUITS FOR A TAPE PERFORATOR

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Related U.S. Application Data

[62] Division of Ser. No. 761,218, Sept. 20, 1968, Pat. No. 3,595,471.

[52] **U.S. Cl.**.....**339/91 R,** 339/156 R, 339/176 M

[51] **Int. Cl.**.....**H01r 13/54**

[58] **Field of Search**.....339/75 R, 75 M, 75 MP, 75 P, 339/91 R, 154, 155, 156, 157, 176 R, 176 MP, 176 MF, 76

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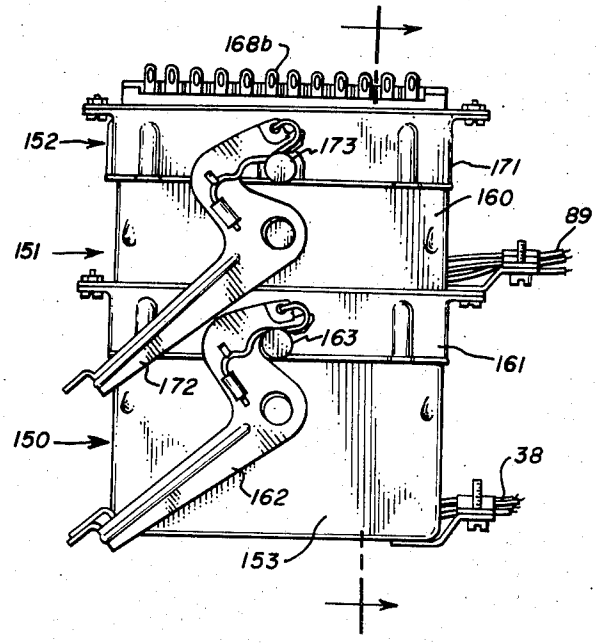
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[57] **ABSTRACT**

A connector for interconnecting corresponding leads of a plurality of branches of a multiple-lead network, such as found in the control systems of a multi-channel tape perforator. The connector comprises a plurality of plug and socket members with a branch of the multiple-lead network at each member.

4 Claims, 6 Drawing Figures



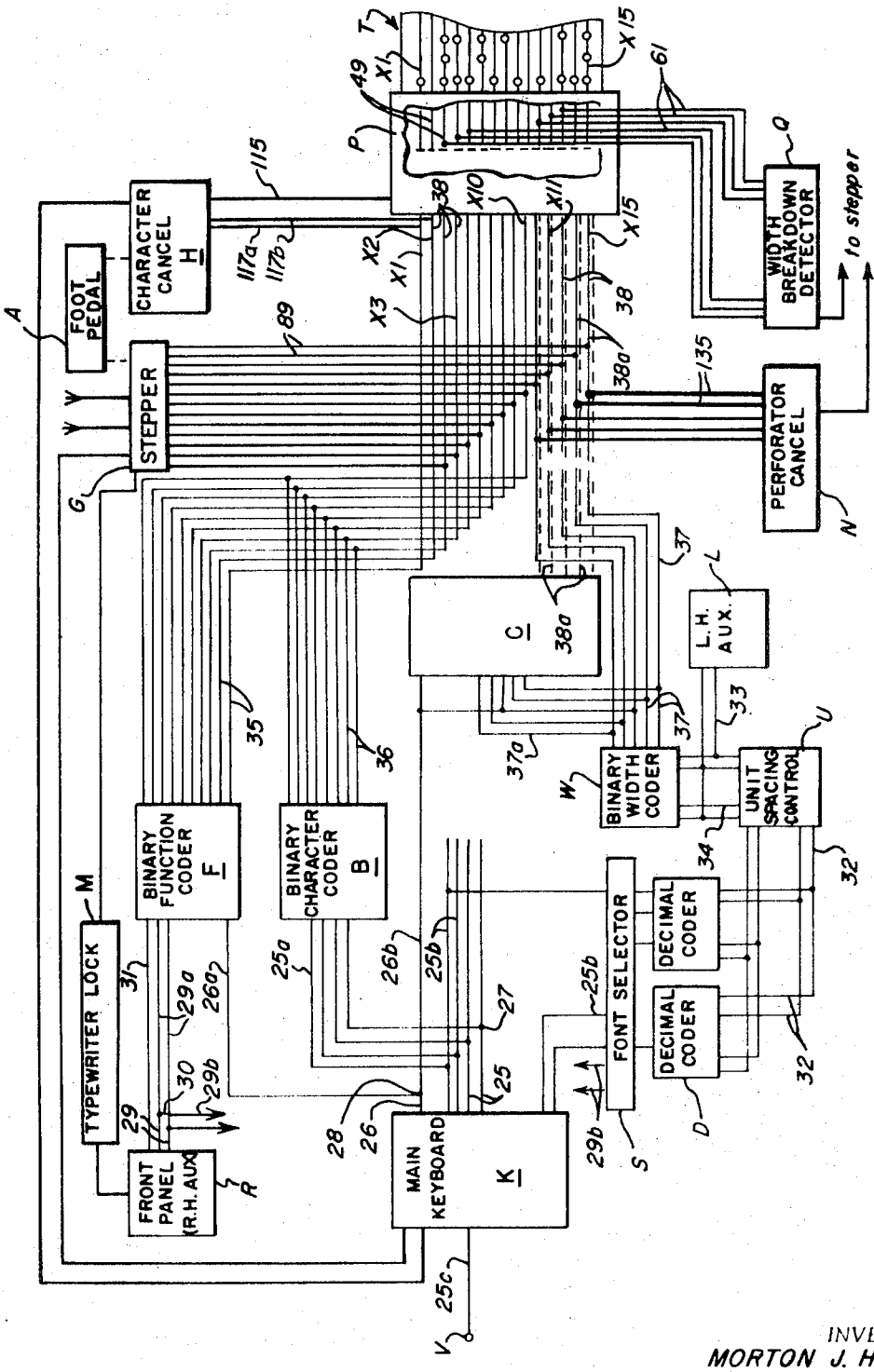


FIG. 1

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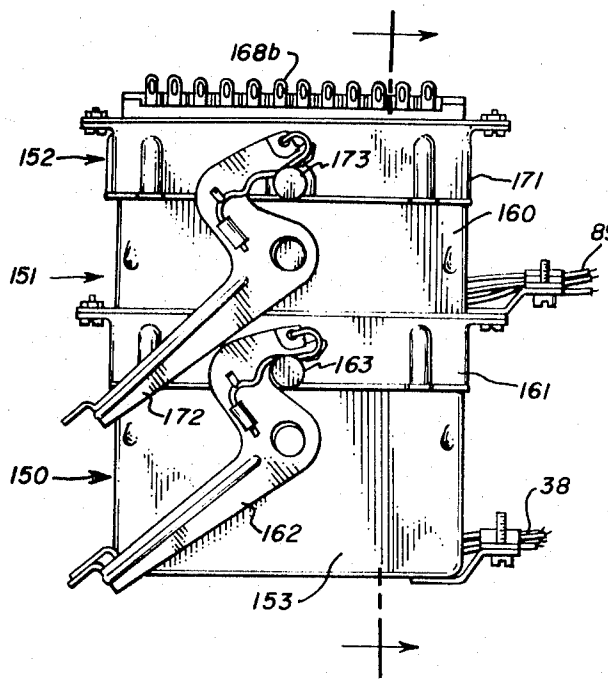


FIG. 2

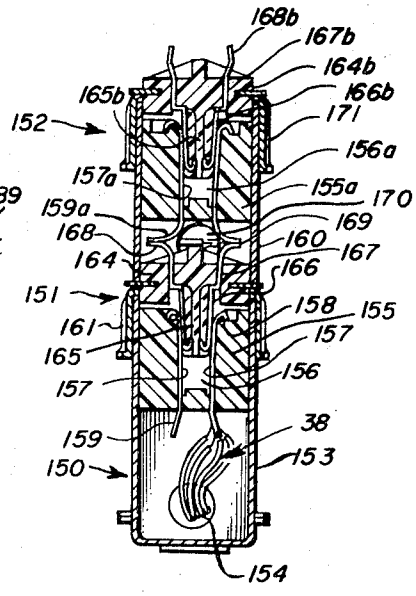


FIG. 3

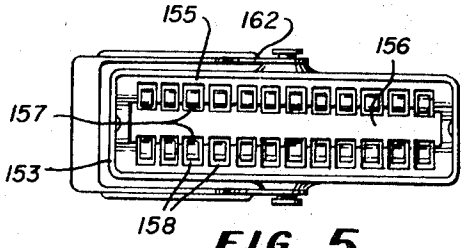


FIG. 5

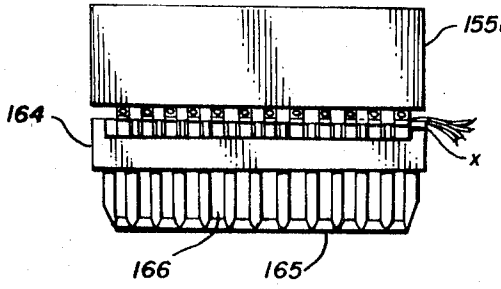


FIG. 4

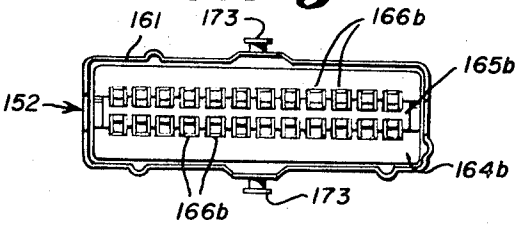


FIG. 6

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CONNECTOR FOR CONTROL CIRCUITS FOR A TAPE PERFORATOR

The present application is a division of my application for "-Control Circuits for Tape Perforators of a Photocomposing Apparatus", filed Sept. 20, 1968, Serial No. 761,218, now U.S. Pat. No. 3,595,471, to include subject matter not now claimed in that application. This invention relates to an improved connector for interconnecting corresponding leads of a plurality of branches of a multi-lead network which may be found in a multi-channel tape perforating apparatus for preparing a control tape for phototypographical machines and the like. As such, the invention will sometimes be hereinafter referred to as a connector.

A primary object of the present invention is to provide a novel and improved connector to facilitate the interconnection of circuit leads of auxiliary controls into the multi-circuit networks of keyboard tape punching machines of the type disclosed in the U.S. patents to Robbins et al., U.S. Pat. No. 2,848,049 of Aug. 19, 1958 and Donahue, et al., U.S. Pat. No. 3,056,545 of Oct. 2, 1952. These machines form the first unit of a two-unit photocomposing apparatus and as such, produce perforated, coded control tapes which contain lines of text material and composing instructions therefor, including the selection of characters, line spacing, width and such details referred to as justification, quad right or centering information. The coded control tape may thereupon be used in the second unit of the photocomposing apparatus, such as in photographic machines of the type disclosed in U.S. patents to Corrado, et al., U.S. Pat. No. 2,923,215 of Feb. 2, 1960 and Rossetto, et al., U.S. Pat. No. 3,106,880 of Oct. 15, 1963. In these machines, the text material, its proper arrangement of lines and spacing as represented by the coded signals on the control tape, is recorded on a sensitized film as latent images. The present invention, however, is not concerned with the use of the control tapes after they are punched and hence, the second unit portions of the apparatus need not be described.

The general operation of a tape perforating apparatus of the type herein considered is effected through a main keyboard having an array of characters, and one or more auxiliary keyboards having controls which regulate and monitor the manner in which the characters on the main keyboard are to be ultimately printed. The character identification signals and the control signals are reduced to a coded form, a binary code, and the coded signals are thereupon reproduced as perforations in the tape.

My application, Ser. No. 761,218, concerns additional control means for tape perforating apparatus, above identified, which are interposed in the apparatus as auxiliary circuits to function automatically and manually. The tape punching machine operates smoothly in the normal sequence of coding lines of text; however, it will not allow, warn or compensate for irregularities or mishaps of the circuit operations, nor permit minor irregularities in the composing of lines of text by the operator. For example, an operator may desire to repeat characters, or to set a line of text for testing purposes without actually perforating the tape or to even cancel out a certain or all portions of a group of coding symbols on the tape.

It follows that another object of the invention is to provide a novel and improved connector to facilitate placing auxiliary circuits in the regular circuits of a tape perforating apparatus.

Another object of the invention is to provide, in an arrangement of auxiliary circuits in a tape perforating apparatus, a novel and improved connector construction which permits a technician to quickly and easily interconnect groups of circuit leads with corresponding groups of auxiliary circuit leads, and without any problem incurred through making improper connections as by crossing leads failing to properly interconnect corresponding leads.

Another object of the invention is to provide a novel and improved connector for interconnecting auxiliary branches or tops in a multi-lead circuit network, which combines conventional components into a neat, economically packaged arrangement capable of being quickly and easily installed in the network and just as quickly and easily removed from the network.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain constructions, combinations and arrangements of parts and elements, as hereinafter set forth, defined in the appended claims and illustrated in the accompanying drawing in which:

FIG. 1 is a schematic circuit diagram in block form showing the basic control circuitry of a tape perforating machine leading to the perforator, and showing further in weighted lines, auxiliary control circuits wherein the present invention may be used.

FIG. 2 is a side elevational view of an improved, composite plug arrangement for interconnecting groups of leads, such as auxiliary control leads to the main leads extending to the tape perforator.

FIG. 3 is a transverse section through the composite plug, as taken from the indicated line 3—3 at FIG. 2.

FIG. 4 is a side elevational view of the components within the intermediate plug section of the composite unit shown at FIG. 2.

FIG. 5 is a plan view of the lower plug section.

FIG. 6 is a bottom view of the top plug section.

Referring first to FIG. 1, the perforator machine includes a multi-channel tape perforator P from whence a coded tape T will extend. The information on this tape is conveyed to the perforator by electrical impulses extending through diverse circuits in the apparatus and which originate by the closing of key switches at an operator's station. Several keyboards are provided for the operator to set in the information and instructions, including a main keyboard K, a lefthand auxiliary keyboard L and a righthand auxiliary keyboard R. The switches in these keyboards close circuits extending to coding devices and controls which translate the information to binary circuits which, in turn, connect with the tape perforator.

The main keyboard K may be the keyboard of a conventional electrical typewriter arranged with switches at the keys and with leads **25** extending from each switch which are to be energized by the closing of the respective switches. An individual circuit lead **25** extends from each upper case and each lower case character on this main keyboard, requiring as many as 88 individual parallel circuits **25**, although the drawing shows only a few of such circuits. Switches for the upper case leads are either on individual keys or are brought into play by the use of a standard typewriter shift key operating a single-pole, double throw switch to shift the character switch from a lower case lead to an upper case lead in any suitable manner, not shown. A lead **26** will also extend from this main keyboard which is connected to a switch at the spacer bar of the typewriter and which parallels the leads **25**.

Each character lead **25** will divide as at a first junction point **27**, and one branch **25***a* of this lead will extend to a binary character identification coder B, while the other branch **25***b* will extend to a font selector S. The lead **26** from the spacer bar divides at a first junction **28**, and one branch **26***a* extends to a binary function coder F. The other branch **26***b* extends to a line-width-indicating computer C.

The right hand auxiliary keyboard R will conventionally include switch closing keys to select a font of type and circuits **29** extend from these key switches. The circuits **29** branch, as at a junction **30**, with one branch **29***a* extending to the binary function coder F and the other branch **29***b* extending to the font selector S. This auxiliary keyboard R will also include other keys for instruction purposes which will extend to the binary function coder F, as by circuits which are indicated as circuit **31**.

The front selector S, controlled by signals from the branches **29***b*, will direct the character leads **25***b* to a selected decimal coder D. This coder D will transmit a width indication signal for each character lead **25***b* and for the font of type of the selected coder D. Thus, as the binary function coder F receives instructions as to a selected font of type, through a circuit **29***a*, the coder D, selected by the same circuit **29***b*, will provide instructions as to the width of each character of the selected font set on the main keyboard K, as through the circuits **25***b*. The width instructions are transmitted from the

decimal coder D through circuits 32 to a unit spacing control U, wherein adjustments to the standard letter spacing are possible and the left hand auxiliary keyboard L will include keys from whence circuits 33 extend to the unit spacing control to regulate such spacing. The circuits 33 and other circuits 34 also extend from the unit spacing control U to a binary width coder W.

With the arrangement above described, the three binary coders, the function coder F, the character identification coder B and the width coder W, are able to receive instructions as electrical impulses concerning a character set on the main keyboard, the selected font of this character, its respective spacing and any other instruction ultimately needed. The coders then transmit such instructions as energy impulses through selected binary leads 35 from the function coder F, binary leads 36 from the character coder B and binary leads 37 from the width coder W. The leads 35, 36 and 37 interconnect with selected, specified leads 38 of an array, fifteen in all, which extend to the tape perforator P and become portions of the basic perforator channel circuits, sometimes hereinafter referred to as circuits or channels X-1 through X-15. When energized by an electrical impulse, the circuits 38 will actuate the perforating mechanisms of their respective channels.

In addition to the leads 38 extending to the tape perforator P, five leads 38*a* of channels X-11 through X-15 return to the computer C. Also, other leads, not shown, extend between the perforator and the computer at stations 3 to 10 to provide each of line information to the computer. Also, lead branches 37*a*, from the width coder, extend to another portion of the computer. In the computer, the widths of the characters and spaces making up a line of composition, are totalled and indicated so that, upon completion of the line, the information as to placing and spacing the line, the justification, the quadding and the centering can be obtained. This information can then be punched into the tape, as from other signals, through closing key switches on the right hand auxiliary keyboard R, which are transmitted through circuits, indicated as 31, to place the necessary instructions in binary form before punching the same on the tape T.

In my parent application, Ser. No. 761,218, there is disclosed further, auxiliary controls and leads which interconnect with groups of the channel leads 38. A width breakdown detector Q includes six leads 61 connecting to leads in the perforator, a stepper G includes leads 89 connecting with thirteen leads 38, a character cancel H includes leads 117*a* and 117*b* connecting with two leads 38 and a perforator cancel includes five leads 135 connecting with leads 38.

It is manifest that the interconnection of these various leads produces a somewhat complex pattern, where several leads may interconnect at a common point. Accordingly, the present invention comprises a simplified multi-lead connector to permit all of these leads to be quickly interlocked into their proper arrangement, and if necessary, quickly and easily disconnected for maintenance of the apparatus. This connector, illustrated at FIGS. 2 through 6, is formed as a compound plug consisting of a base unit 150, intermediate units 151 and a cap 152. Each of these units will carry a set of leads. For example, a base unit 150 will ordinarily carry the main leads 38, the intermediate unit may carry the leads 89 from the stepper and the cap unit may carry yet other leads such as leads 135 and leads 117*a* and 117*b*, although no leads are shown in the cap at FIGS. 2 and 3. Naturally, if it becomes desirable, more than one intermediate unit 151 may be used in the compound plug to provide a separate connector for each and every set of leads. Also, this compound plug may be used as a main disconnect, for example, the base unit 150 may carry the main leads 38 from the coders and an intermediate unit 151, or the cap 152, may carry the main leads 38 extending to the perforator P. In this way, each group of leads may be connected into the apparatus at a single juncture.

The base unit 150, which will preferably carry the leads 38, is formed within a narrow, comparatively deep, rectangular, cup-like body shell 153. The lower portion of this cup is formed as an enclosed cavity to retain the leads, such as 38, and this shell includes an opening 154 at one end thereof to receive these wires. The upper portion of the cup cavity is filled by an insulating block 155 of bakelike or a similar rigid insulating material. A narrow, elongated socket 156 is centered in this block 155 and a number of contact strips 157 are arranged in this pocket in opposing rows. In the unit illustrated, each strip 157 extends from a bell-mouth shaped socket entrance, where the strip is hooked into position, as at 158, and extends downwardly into the socket through the pocket to the underside of the block to project therebelow as a stub 159 within the cavity at the lower portion of the shell 153. There the leads, such as leads 38, are connected to each of the strips, as by soldering, in a proper, easily determined sequence.

The intermediate unit 151, which may carry another group of leads, such as the leads 89 as shown at FIG. 2, or a continuation of leads 38 or any other group, is formed similar to the cup-shaped unit of the base section 153, but within a tubular shell 160 having an open bottom portion which is flared, as at 161, to telescopically fit over the base section 153. A yoke-shaped latch 162 is mounted on the outer face of each side of the base unit 150 to connect with pins 163 at each side of the outer face of the flare 161 to secure the units together, as illustrated at FIG. 2.

The bottom section of this shell 160 is closed by an insulating block 164 having a tongue 165 which projects into the socket 156 heretofore described. This tongue carries an array of copper strips 166 which are arranged to register with and to contact the strips 157 in the socket 156 whenever the two units are interconnected, as illustrated at FIG. 3. These strips 166 project upwardly through slots 167 in the block 164 to terminate as stubs 168 upstanding from within the cavity formed by the central portion of the tubular shell 160.

The upper portion of the shell is formed by an insulating block 155*a* having a narrow, elongated socket 156*a*, conductor contact strips 157*a* in the same arrangement as heretofore described, and the stub ends 159*a* of these strips connect with the stubs 168 and are soldered thereto, as at 169, to provide for a group of strips arranged in a continuous pattern extending through the shell 160. This body shell includes a side opening 170 through which conduits may extend to be soldered to the proper stubs at the juncture point 169.

The cap 152 will carry yet other leads, and it is formed within a narrow, tubular shell 171 which is substantially the same as the enlarged, flared bottom 161 of the shell 160 and is thus adapted to telescopically fit upon the top of the shell 160. A yoke-shaped latch 172 is mounted upon the outer face of the shell 160 to connect with pins 173 at the outer face of the cap 171, to secure the units together, as illustrated at FIG. 2. This cap shell 171 carries an insulating block 164*b* having a tongue portion 165*b* which projects into the socket 156*a*, heretofore described. This tongue carries an array of copper strips 166*b* which are arranged to register with and to contact the strips 157*a* in the slot 156*a* whenever the two units are interconnected, as illustrated at FIG. 3. The strips 166*b* project upwardly through slots 167*b* in the block to terminate as stubs 168*b*. Selected leads, not shown, are soldered to these stubs and the unit may be further enclosed by a cover, also not shown, to protect the stubs 168*b* and any leads soldered thereto.

I have now described a preferred construction of the improved connector in considerable detail. However, it is apparent that other equivalent arrangements can be built and devised which are nevertheless within the spirit and scope of the invention.

I claim

1. A connector for connecting several branches of a multiline network, wherein the specific lines of one branch will connect with corresponding specific lines of another branch, and comprising:

a. a base section block having: an elongated socket at one side thereof; and, an array of contact strips within the

socket which extend through the block to the opposite side thereof and terminate as stubs whereto the wires of a first branch of the network are connected;

b. an intermediate section block having: an elongated tongue at one side thereof adapted to be inserted into the socket of the said base block to interconnect the intermediate section block and the base section block; an elongated intermediate section socket at the opposite side thereof: an array of contact strips within the socket which extend through the intermediate section block and terminate at the tongue, with said strips at the tongue being adapted to engage correlated contact strips within the socket of the aforesaid base section block when the base-section block and the intermediate section block are interconnected; and, an elongated gap means between the tongue and intermediate section socket wherein the contact strips are exposed and form stubs whereto the wires of a second branch of the network are connected; and

c. a top section block having: an elongated top section tongue at one side thereof adapted to be inserted into the socket of the said intermediate section block to interconnect the intermediate section block and the top section block; and, an array of contact strips which extend through the top section block and terminate at the top section tongue with the strips at the top section tongue being adapted to engage correlated contact strips within the socket of the aforesaid intermediate section block and with the ends of the strips opposite the top section tongue forming stubs whereto the wires of a third branch of the network are connected.

2. In the connector defined in claim 1, wherein said base section block is housed within a first open-top shell with said base section socket being at the open-top end of said first shell;

wherein said intermediate section block is housed within an open-top, open-bottom tubular second shell, with its tongue being at the open bottom of said second shell and the intermediate section socket being at the open-top of said second shell, said second shell having the bottom portion formed to telescopically connect with the top of the said first shell when the tongue of the intermediate section block is engaged in the socket of the base section block;

wherein said top section block is housed within an open-bottom third shell with its tongue being at the open bottom of said third shell and having the bottom portion of this shell formed to telescopically connect with the top of the said second shell when the tongue of the top section block is engaged in the socket of the intermediate section block.

3. In the connector defined in claim 2, including an opening in said intermediate section shell in juxtaposition with the gap means whereby to facilitate extending the wires of the said second branch of the network through the opening and to the contact strip stubs.

4. In the connector defined in claim 2, including means adapted to lock the shells together when the shells are telescopically interengaged.

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