United States Patent [19]

Neuber

[11] **3,728,656**

[45] **Apr. 17, 1973**

[54] **TRANSORMER AND TERMINAL ASSEMBLY**

[75] Inventor: **Ralph E. Neuber,** Seneca Falls, N.Y.

[73] Assignee: **GTE Sylvania Incorporated,** Seneca Falls, N.Y.

[22] Filed: **June 26, 1972**

[21] Appl. No.: **266,438**

Related U.S. Application Data

[62] Division of Ser. No. 112,863, Feb. 5, 1971, abandoned.

[52] **U.S. Cl.** **336/147,** 323/49, 336/192, 339/19, 339/222

[51] **Int. Cl.**.....**H01f 21/12**

[58] **Field of Search**.....336/145, 146, 147, 336/192; 323/48, 49; 339/198 R, 19, 22 B, 263, 242, 210 R; 317/119; 310/71

[56] **References Cited**

UNITED STATES PATENTS

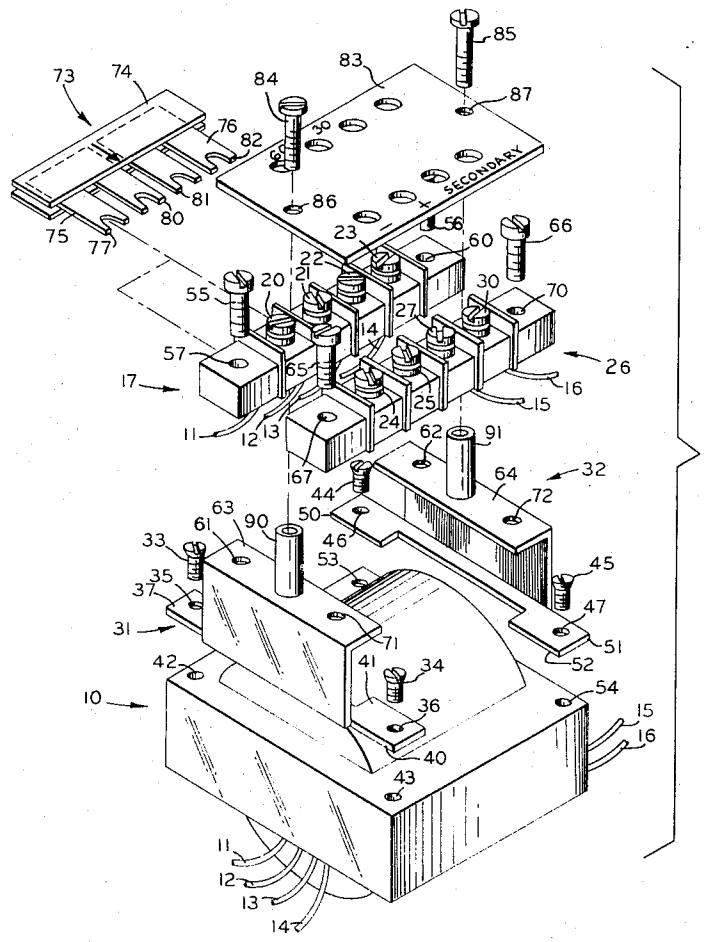
2,464,061	3/1949	Soley, Jr.	323/49 X
531,432	12/1894	Beu	323/49
2,786,162	3/1957	Ballou	317/119
2,552,028	5/1951	Blair	310/71

Primary Examiner—Thomas J. Kozma
Attorney—Norman J. O'Malley et al.

[57] **ABSTRACT**

A terminal assembly is shown wherein connections between selected terminals of a terminal block are made by a jumper strip. The terminal assembly is utilized to change the winding arrangement of a power transformer.

10 Claims, 3 Drawing Figures



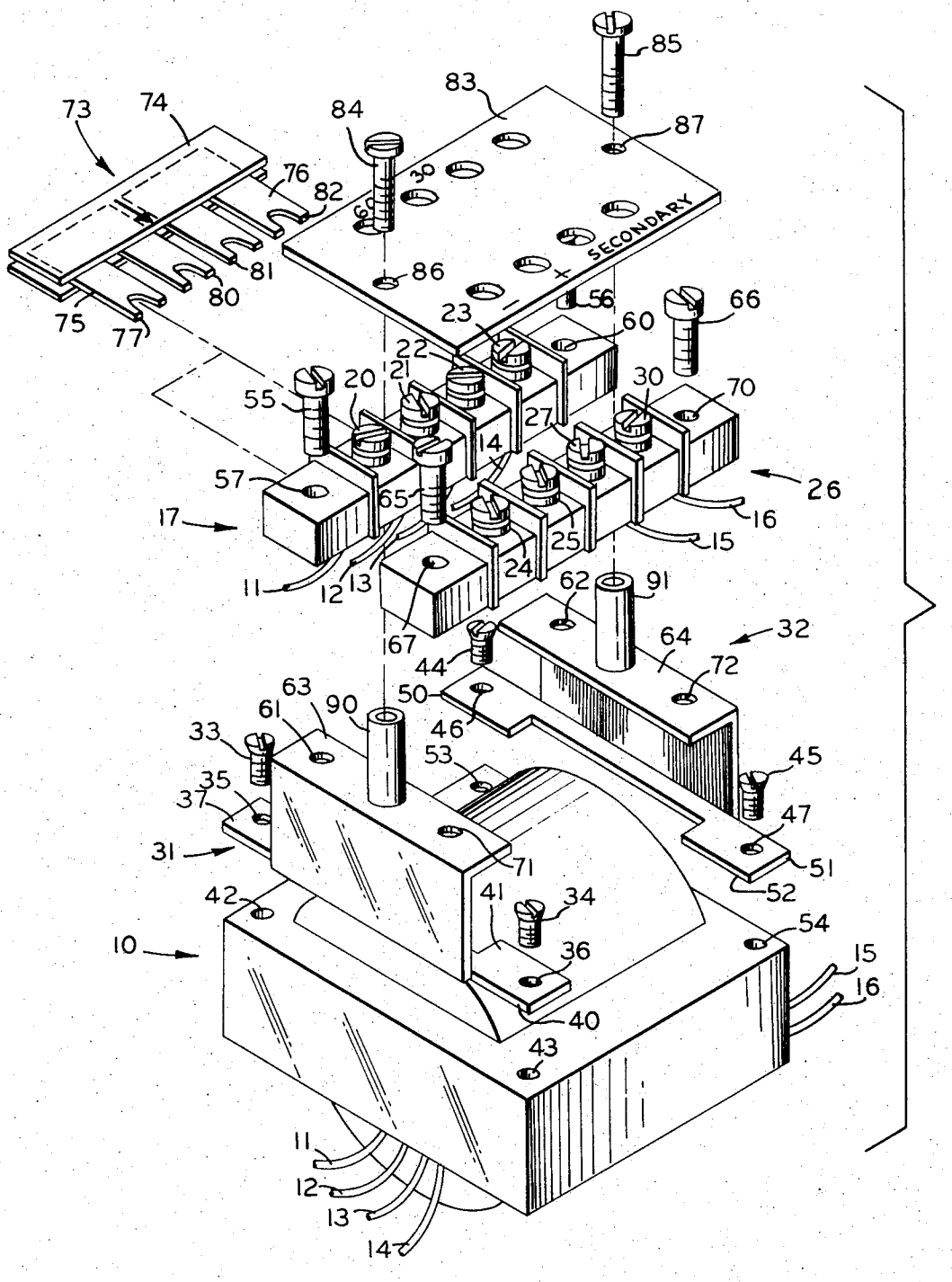

SECONDARY
+
—
73
74
75
76
77
80
81
82
83
84
85
86
87
10
11
12
13
14
15
16
17
20
21
22
23
24
25
26
27
30
31
32
33
34
35
36
37
40
41
42
43
44
45
46
47
50
51
52
53
54
55
56
57
60
61
62
63
64
65
66
67
70
71
72
90
91

Fig. 1

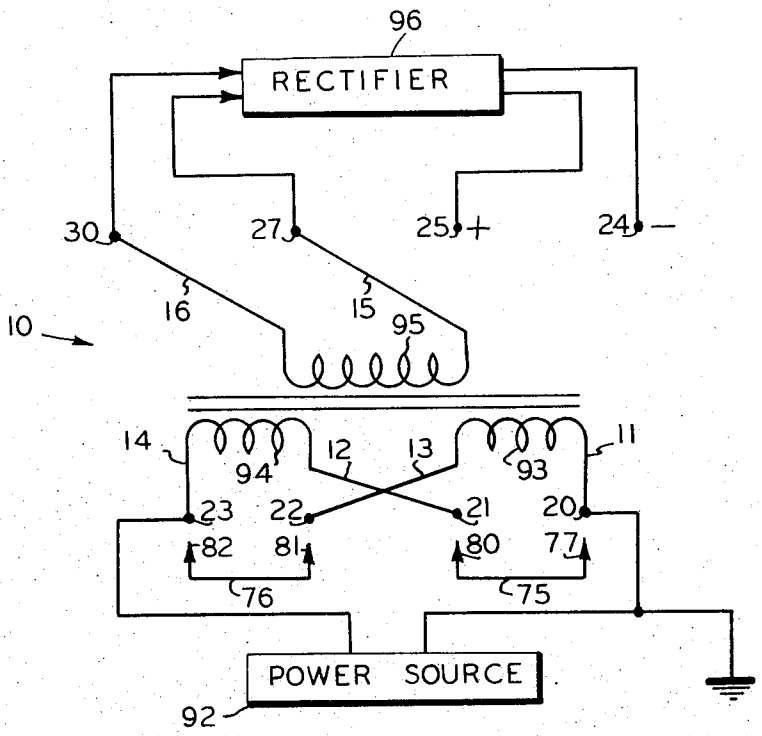

96
RECTIFIER
30
27
25 +
24 −
16
15
95
10
14
94
12
13
93
11
23
22
21
20
82
81
80
77
76
75
POWER SOURCE
92

Fig. 2

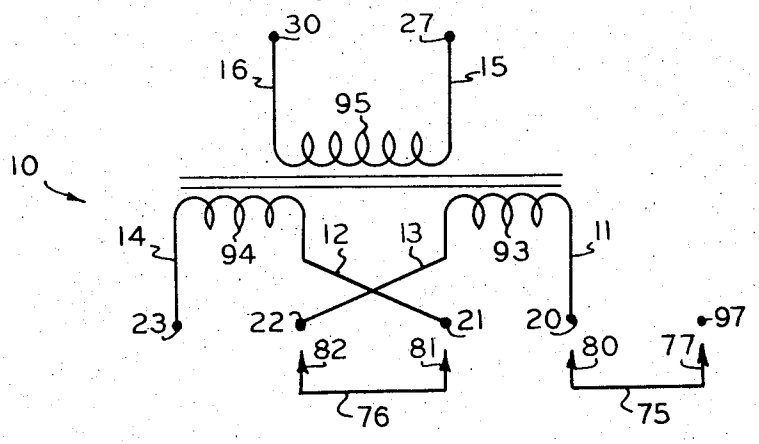

30
27
16
15
95
10
14
94
12
13
93
11
23
22
21
20
97
82
81
80
77
76
75

Fig. 3

TRANSORMER AND TERMINAL ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application is a division of application Ser. No. 112,863, filed Feb. 5, 1971, now abandoned, and assigned to the same assignee as the present invention.

BACKGROUND OF THE INVENTION

This invention relates to terminal assemblies and more particularly to terminal assemblies wherein terminal connections can be changed rapidly and easily with decreased danger of injury to equipment and personnel. In the prior art numerous methods of changing terminal connections have been utilized. These methods include various types of jumper leads with various types of clips, clamps, and plugs.

An example of one setting where the prior art does not provide a satisfactory method of changing terminal connections is in Community Antenna Television (CATV) systems. CATV systems include a transmission cable with amplifier stations dispersed therealong for maintaining proper RF signal levels. Each amplifier station must be powered. Ordinarily, a 60 Hz ac power signal is multiplexed onto the cable and at each amplifier station the 60 Hz ac power signal is separated from the RF signals. The power signal is coupled to a transformer and from there to a rectifier. In the past, most CATV systems used 30 volt power, but it is common to find 60 volt power being used and in some systems both 60 and 30 volt power may be used. To accommodate both 30 and 60 volt power, the transformer is designed with either two primary windings or two secondary windings which are placed in series or parallel depending upon the voltage of the power signal.

The ordinary practice is to solder the winding leads to terminals so that changing a transformer from 30 to 60 volt operation or vice versa requires unsoldering and resoldering a number of connections. In other cases, a terminal board is used with jumpers used to change the connections. In either case there is the danger of incorrect connections which may cause damage to equipment and/or personal injury.

OBJECTS AND SUMMARY OF THE INVENTION

It is the primary object of this invention to obviate the above-noted disadvantages of the prior art.

It is another object of this invention to provide a novel means for changing the jumper arrangement for a terminal assembly.

It is a further object of this invention to provide a novel means for rapidly and safely changing the winding arrangement of a transformer.

In one aspect of this invention, the above objects and advantages are achieved in a transformer and terminal assembly comprised of a transformer, a terminal block, and a terminal jumper wherein the transformer has first and second windings and the terminal block has a plurality of aligned terminals. The windings of the transformer are selectively connected to the terminals. The terminal jumper has a flat conductive strip encapsulated in an insulative handle. The flat conductive strip has a first portion for contacting one of the terminals and a second portion for contacting another of the terminals whereby the contacted terminals are electrically connected together. The terminal jumper is connectable in at least two positions on the terminal block for connecting one pair of terminals together or for connecting another pair of terminals together whereby the transformer windings are connected in series or other than in series.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded isometric view of a structure embodying the invention; and

FIGS. 2 and 3 are schematic and block diagrams illustrating an application of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims in connection with the above drawings.

In FIG. 1 there is shown a transformer **10** having a plurality of leads **11–16**. Leads **11–14** are connected to terminals **20–23**, respectively, of a terminal block **17**. Leads **15** and **16** are connected to terminals **27** and **30**, respectively, of a terminal block **26** which also has terminals **24** and **25** thereon. Terminal blocks **17** and **26** are preferably identical so that one design can be used interchangeably. Terminal blocks **17** and **26** are constructed of insulative material such as plastic, and the terminals preferably each include a conductor protruding through the block with a depending stud on the underside of the terminal blocks to which leads **11–16** are soldered. Each of the terminals has a threaded screw-type insert.

Preferably terminal blocks **17** and **26** are mounted on transformer **10** by a pair of brackets **31** and **32**. Bracket **31** is attached to transformer **10** by screws **33** and **34** which extend through holes **35** and **36** in tabs **37** and **40**, respectively, of a lower flange **41** of bracket **31** and into holes **42** and **43**, respectively, in the casing of transformer **10**. Bracket **32** is attached to transformer **10** by screws **44** and **45** which extend through holes **46** and **47** in tabs **50** and **51**, respectively, of a lower flange **52** of bracket **32** and into holes **53** and **54**, respectively, in the casing of transformer **10**. Terminal block **17** is mounted on brackets **31** and **32** by bolts or screws **55** and **56** which extend through holes **57** and **60**, respectively, near the ends of terminal block **17** and through holes **61** and **62**, respectively, in upper flanges **63** and **64** of brackets **31** and **32**, respectively. Similarly, terminal block **26** is mounted on brackets **31** and **32** by bolts or screws **65** and **66** which extend through holes **67** and **70**, respectively, near the ends of terminal block **26** and through holes **71** and **72**, respectively, in upper flanges **63** and **64** of brackets **31** and **32**. Although terminal blocks **17** and **26** are shown mounted on transformer **10**, they can also be mounted in other ways.

A terminal jumper **73** is shown with a flat insulative handle **74** and two flat conductive strips **75** and **76**. Conductive strips **75** and **76** are fixedly attached to and extend from one edge of handle **74**. Preferably strips **75** and **76** are encapsulated or encased in handle **74**, for example, by laminating or gluing two flat pieces of insulative material such as plastic together on opposite sides of strips **75** and **76**.

Conductive strip 75 has first and second grooved or forked portions 77 and 80. Conductive strip 76 has first and second grooved or forked portions 81 and 82. The forked portions 77, 80, 81, and 82 are designed for cooperative engagement with the threaded inserts of terminals 20–23 of terminal block 17, for example, by loosening the screws in the threaded inserts, inserting the forked portions beneath the screw heads, and tightening the screws into the inserts.

A protective cover 83 of insulative material is also provided as a safety feature. Cover 83 is attached to brackets 31 and 32 by screws 84 and 85 which extend through holes 86 and 87, respectively, in cover 83 into bosses 90 and 91 mounted respectively on the upper flanges 63 and 64 of brackets 31 and 32. Cover 83 has a plurality of holes therein to permit access to the terminal inserts so that changes in the terminal connections can be made without removing cover 83. Cover 83 tends to prevent inadvertent contact with the terminals.

FIGS. 2 and 3 illustrate the electrical configuration of transformer 10 and the terminal connections. A power source 92, which can be the means for providing the ac power signal in a CATV system, has first and second outputs connected to terminals 20 and 23, respectively. One of terminals 20 and 23, for example, terminal 20 can be connected to ground. Transformer 10 has two primary windings 93 and 94 and a secondary winding 95. One end of winding 93 is connected by conductor 11 to terminal 20 while the other end is connected by conductor 13 to terminal 22. One end of winding 94 is connected by conductor 12 to terminal 21 while the other end is connected by conductor 14 to terminal 23. One end of winding 95 is connected by conductor 15 to terminal 27 while the other end is connected by conductor 16 to terminal 30. Terminals 27 and 30 are connected to a rectifier 96 which has a positive dc output connected to terminal 25 and a negative dc output connected to terminal 24.

To understand the operation of the invention, assume that source 92 provides either 30 or 60 volt ac power. If 30 volt ac power is being provided, terminal jumper 73 is connected to terminals 20–23 such that portions 77, 80, 81 and 82 of conductive strips 75 and 76 contact terminals 20-23, respectively, as is shown in FIG. 2. Terminals 20 and 21 are connected together by conductive strip 75 while terminals 22 and 23 are connected together by conductive strip 76 thereby connecting windings 93 and 94 in parallel between terminals 20 and 23.

If 60 volt ac power is being provided, terminal jumper 73 is moved one position left or right. Assume that it is moved to the position illustrated in FIG. 3 such that portions 81 and 82 of conductive strip 76 contact terminals 21 and 22, respectively. Portion 80 of conductive strip 75 contacts terminal 20 while portion 77 contacts a "dummy" terminal 97 which may be screw 55 of FIG. 1. Accordingly, screw 55 is preferably insulating (e.g., plastic) as a safety feature. Thus, terminals 21 and 22 are connected together by conductive strip 76 and windings 93 and 94 are connected in series between terminals 20 and 23.

In general, the voltage across the secondary winding of a transformer v_s is related to the primary winding voltage v_p by the equation $v_s = (N_s/N_p)v_p$ where N_s/N_p is the turns ratio of the secondary and primary windings. If windings 93 and 94 have the same number of turns, the voltage across the secondary winding will be he same in the illustrations of FIGS. 2 and 3. Also, the currents in the primary and secondary windings are related by the equation $i_s = (N_p/N_s)i_p$. Note that if only one of windings 93 and 94 is used in the illustration of FIG. 2, that winding will be required to carry twice as much current for a given secondary winding current as when windings 93 and 94 are connected in series for 60 volt operation as is illustrated in FIG. 3. Connecting windings 93 and 94 in parallel as is illustrated in FIG. 2 decreases the current in the primary winding by half. Note, however, that if only one winding is used in the illustration of FIG. 2, only one of conductive strips 75 and 76 is necessary.

Another feature of this invention is the cooperative indicia provided for indicating the proper position of terminal jumper 73 with respect to terminal block 17. The numbers 30 and 60 are provided on cover 83 and a cooperating arrow is provided on handle 74 in such positions that the arrow points to the proper one of the numbers on cover 83 when terminal jumper 73 is properly positioned.

It should be noted that terminal block 17 could be provided with 6 terminals with two others being used for the secondary winding while the outputs from rectifier 96 are otherwise accommodated, or alternatively, the secondary winding terminals could also be otherwise accommodated. It should also be noted that transformer 10 can have one primary winding and two secondary windings which are discretionarily connected in accordance with the invention to achieve the same result.

While there has been shown and described what is at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. A transformer and terminal assembly comprising:
a transformer having first and second windings;
a terminal block having a plurality of aligned terminals insulated from each other;
means connecting said windings to selected ones of said terminals; and
a terminal jumper having a flat conductive strip encapsulated in an insulative handle, said flat conductive strip having a first portion for contacting one of said terminals and a second portion for contacting another of said terminals whereby said flat conductive strip electrically connects the contacted terminals together, said terminal jumper being connectable in at least two positions on said terminal block for connecting one pair of terminals together whereby said first and second windings are connected in series or for connecting another pair of terminals together whereby said first and second windings are connected other than in series.

2. A transformer and terminal assembly as defined in claim 1 wherein said means connecting said windings to selected ones of said terminals includes means connecting a first end of said first winding to a first terminal of

said plurality of terminals, a first end of said second winding to a second terminal of said plurality of terminals, and a second end of said first winding to a third terminal of said plurality of terminals; and wherein said first portion of said flat conductive strip electrically contacts said first terminal or said second terminal and said second portion electrically contacts said second terminal or said third terminal for alternatively connecting said first ends of said second windings together or connecting said first end of said second winding to said third terminal.

3. A transformer and terminal assembly as defined in claim 1 wherein said insulative handle includes first and second flat strips of insulative material fixedly attached to each other on opposite sides of said flat conductive strip.

4. A transformer and terminal assembly as defined in claim 2 wherein a second end of said second winding is connected to a fourth terminal of said plurality of terminals and said terminals jumper includes a second flat conductive strip encapsulated in said insulative handle and insulated from said first-named flat conductive strip, said second conductive strip having a first portion and a second portion for electrically contacting said first terminal and said fourth terminal, respectively, when said first portion and second portion of said first-named flat conductive contact said second terminal and third terminal, respectively, for connecting said first and second windings in parallel between said third and fourth terminals.

5. A transformer and terminal assembly as defined in claim 4 wherein said insulative handle includes first and second flat strips of insulative material fixedly attached to each other on opposite side of said first-named and said second conductive strips.

6. A transformer and terminal assembly as defined in claim 1 wherein said terminal block is constructed of an insulative material, said terminals each include a conductor protruding through said terminal block with a threaded insert for clamping one of said first or second portions of said flat conductive strip, and each of said first and second portions of said flat conductive strip include a forked portion for cooperative engagement with said threaded inserts.

7. A transformer and terminal assembly as defined in claim 4 wherein said insulative handle and the terminal assembly include cooperative indicia for indicating the proper position of said terminal jumper with respect to said terminal block.

8. A transformer and terminal assembly comprising:

a transformer having first and second windings;

a terminal block having a plurality of aligned terminals insulated from each other;

means connecting first and second ends of said first winding to first and second ones of said terminals, respectively, and first and second ends of said second winding to third and fourth ones of said terminals, respectively; and

a terminal jumper having at least first and second flat conductive strips encapsulated in an insulative handle, said flat conductive strips each having a first portion for contacting one of said terminals and a second portion for contacting another of said terminals whereby each of said flat conductive strips electrically connects the contacted terminals together, said jumper strip being connectable in at least two positions on said terminal block for connecting said second and third terminals together for connecting said first and second windings in series or for connecting said first terminal to said third terminal and said second terminal to said fourth terminal for connecting said first and second windings in series.

9. A transformer and terminal assembly as defined in claim 8 wherein said insulative handle includes first and second flat strips of insulative material fixedly attached to each other on opposite sides of said flat conductive strips.

10. A transformer and terminal assembly as defined in claim 9 wherein said terminal block is constructed of an insulative material and said terminals each include a conductor protruding through said terminal block with a threaded insert for clamping one of said first and second portions of said first and second flat connective strips.

* * * * *