

[54] **ADAPTER ENABLING TELEPHONE SWITCHING EQUIPMENT TERMINALS TO BE WIRE WRAPPED**

[76] Inventor: **Edward L. Lawson**, 538 N. Fifth St., Bayport, Minn. 55003

[22] Filed: **Oct. 9, 1973**

[21] Appl. No.: **404,647**

[52] U.S. Cl. .... **179/98**, 174/88 R, 174/94 R, 179/178, 339/156 A, 339/198 R, 339/276 A

[51] Int. Cl. .... **H04q 1/02**

[58] Field of Search .... 174/84 R, 88 R, 94 R, 72 R; 339/198 R, 198 G, 198 GA, 198 J, 276 A, 156 A; 179/98, 178; 317/118, 119, 122

[56] **References Cited**  
**UNITED STATES PATENTS**

3,365,539	1/1968	Bratsch .....	339/276 A X
3,747,050	7/1973	Hecht .....	339/156 A

**FOREIGN PATENTS OR APPLICATIONS**

1,196,345	6/1970	Great Britain .....	339/276 A
-----------	--------	---------------------	-----------

Primary Examiner—Darrell L. Clay  
Attorney, Agent, or Firm—Stuart R. Peterson

[57] **ABSTRACT**

One end of an adapter structured in accordance with the invention is soldered to a terminal strip of a main distributing frame located in the central office of a telephone exchange. When so soldered, the adapter provides a shank having a square cross section that projects at a preferred angle so as to enable the shank to be wire wrapped by means of an appropriate tool, thereby obviating the need for any hand soldering of wires to the terminal strip as heretofore done. Inasmuch as main frames, even those of the same manufacturer, differ in construction, and obviously the terminal strips incorporated therein do too, several ways are herein disclosed for enabling my adapter to be soldered to the various terminal strips encountered in present installations.

9 Claims, 15 Drawing Figures

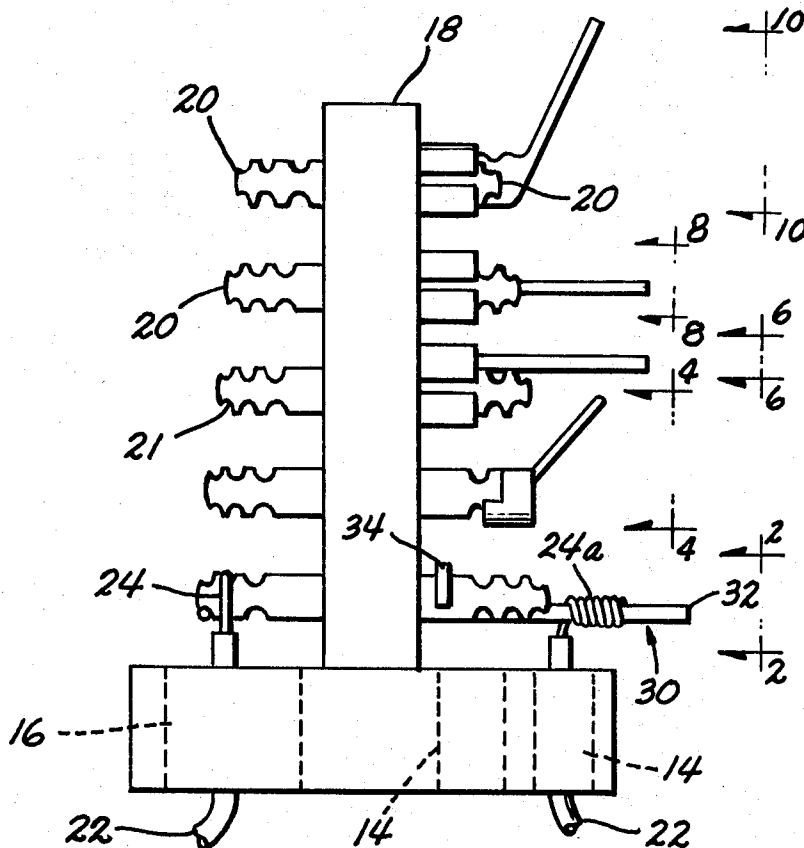


Fig 1

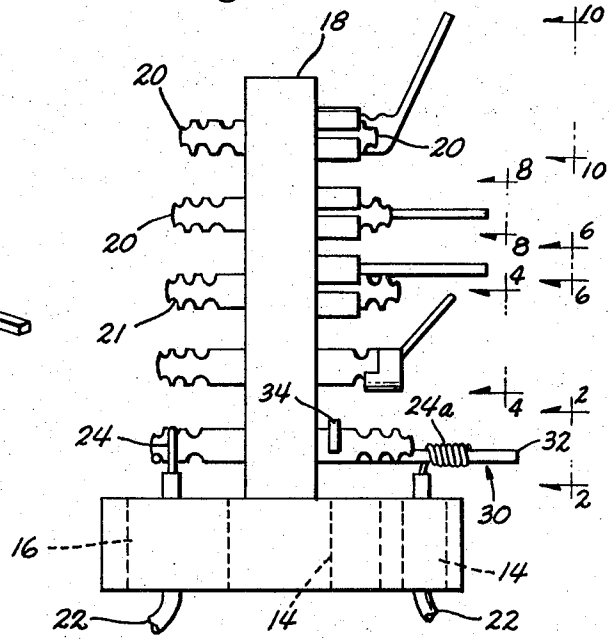


Fig 2

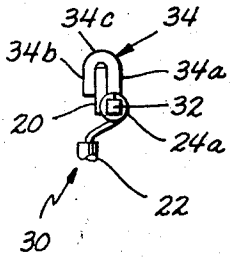


Fig 3

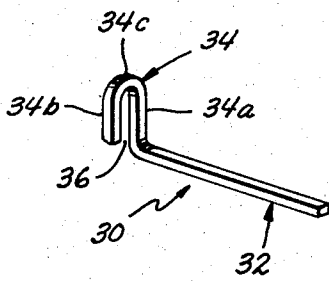


Fig 4

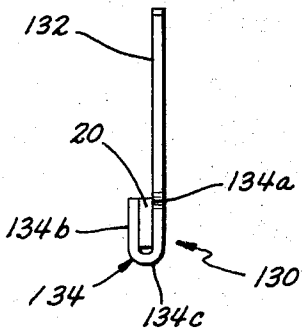


Fig 5

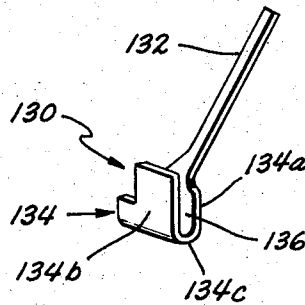


Fig 6

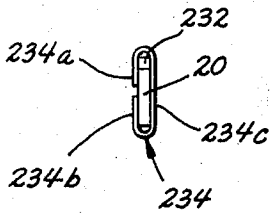


Fig 7

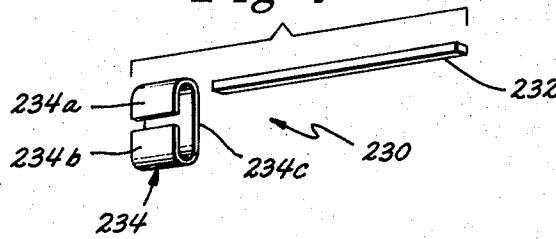


Fig 8

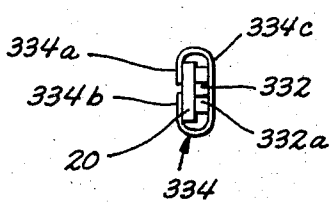


Fig 9

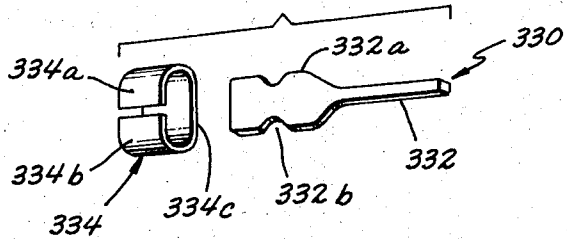


Fig 10

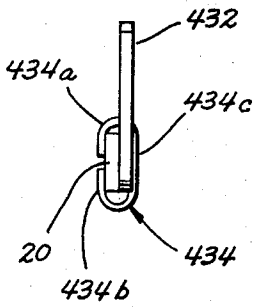


Fig 11

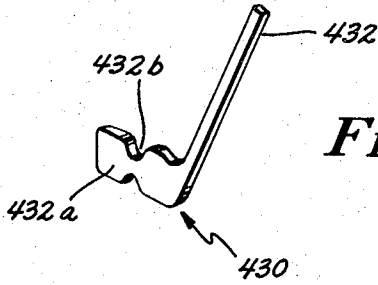


Fig 13

Fig 14

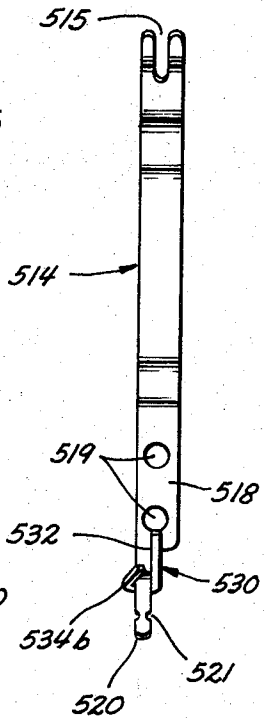
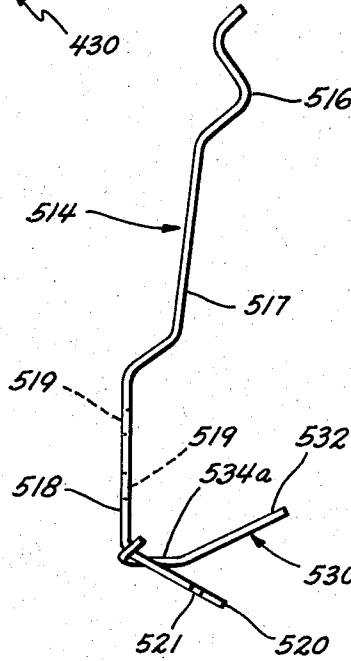


Fig 12

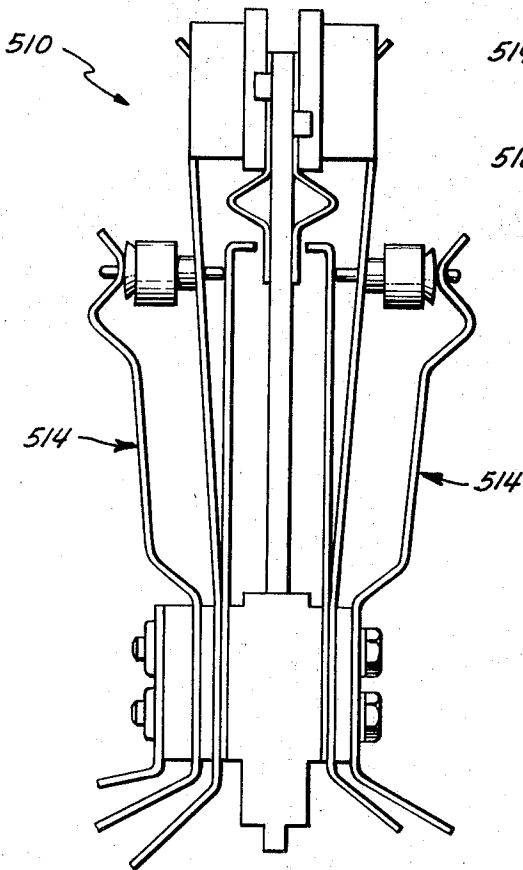
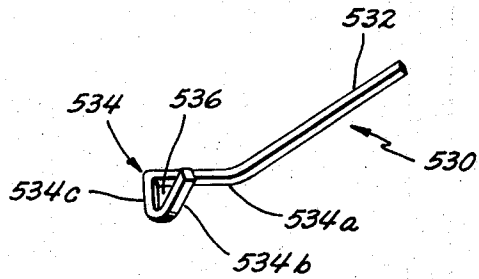


Fig 15



## ADAPTER ENABLING TELEPHONE SWITCHING EQUIPMENT TERMINALS TO BE WIRE WRAPPED

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates generally to main distributing frames commonly utilized in the central offices of telephone exchanges, and pertains more particularly to an adapter which enables a wire wrapping operation to be performed in situations where hand soldering must now be employed.

#### 2. Description of the Prior Art

Those familiar with telephony will know what constitutes a main distributing frame, and also will understand the role played by these frames as far as central office switching equipment is concerned. A number of patents have been issued which deal with the subject matter generally, and also with specific arrangements for effecting desired interconnections between the conductors of an incoming cable from subscriber phones to the central office equipment, this being via the so-called main distributing frame composed of protectors and terminal blocks. The various jumper wires or conductors have been in the past soldered to the terminal strips of both the protectors and terminal blocks of the older style main distributing frames.

In recent years, though, the telephone industry has been changing to terminals which will permit the employment of a solderless Wire Wrap connection. However, there are many, many main frames still in existence that can accommodate only the solder-type connection, such frames representing large capital investments. Any change in connections necessitates the detaching or unsoldering of the present wire, and then soldering a substitute wire in its place. While this is time consuming, it is still less costly than replacing all of the main frames currently in existence. Eventually, though, the main frames will be replaced, but until such time arrives there is a serious disadvantage in having to resort to soldering operations, particularly where there are such a multiplicity of terminal strips involving frequent wire changes.

Two exemplary patents illustrating main frame constructions are U.S. Pat. No. 2,098,321, granted Nov. 9, 1937, and U.S. Pat. No. 2,233,107, granted Feb. 25, 1941.

### SUMMARY OF THE INVENTION

A general object of the present invention is to convert both protectors and terminal blocks of conventional main distributing frames to solderless Wire Wrap connections. In this regard, the so-called Wire Wrap connection is much faster than soldering. Also, it does not necessitate the cleaning of the terminal strips. More importantly, however, is the avoidance of trouble encountered in making soldered connections where very little space is available for the worker to operate. Still further, cold solder joints can result. Also, solder flashes can cause problems, the instant invention doing away with any hot soldering of jumper wires. Additionally, the use of a hot soldering iron, especially in cramped quarters that prevail in main frame environments, can cause injury to personnel working there. Even the long power cords required for such irons pose problems because of the entanglement difficulties that can arise. Consequently, an aim of the invention is to

provide an adapter and method that will be much safer and far less tedious than procedures heretofore utilized.

Another object is to provide an adapter that will accommodate the various configurations of terminal strips that are found in already installed main distributing frames. More specifically, the present invention permits the attachment of my adapter by means of solder, it being only necessary to make one soldered connection per adapter. Thereafter, the newer and superior Wire Wrap technique can be employed for attaching the first wire and all subsequent wires that will be needed to effect subscriber changes. Consequently, my present invention permits the retention of old equipment that might otherwise be considered obsolete by reason of the much greater soldering costs.

Yet another object is to facilitate the attachment of wires by means of a conventional wire wrapping tool, the shank about which the wire is wrapped being disposed at an optimum angle for a given terminal board. In other words, my invention is quite versatile, for the shank about which the wire is to be wrapped can be mounted at any preferred angle which will enable the wire wrapping operation to be performed most expeditiously and concomitantly to avoid undue interference with attached wires.

Still another object of the invention is to provide an adapter, together with various modifications as to its manner of attachment, that can be inexpensively fabricated, thereby encouraging its widespread use on the many main frames still utilizing soldered jumper connections. Of considerable advantage is the fact that, for the small cost of the adapter, tremendous savings of time can be realized over the life of a main frame. Also, the telephone company is not tempted to replace its main frames as soon as it otherwise might. Considerable savings can, therefore, be realized on capital investments which makes my invention particularly appealing.

In summary, the telephone industry could realize a financial savings in at least three ways by using smaller gauge wire, cheaper plastic insulation, and the reduction in maintenance of soldering irons, as well as savings in the solder itself. These savings are all in addition to the manpower economies effected when practicing the invention and also the capital investment savings that have been alluded to above.

Briefly, my invention envisages an adapter with a straight shank having a square cross section which will enable the shank to be wire wrapped. Inasmuch as the shank, depending upon the circumstances at hand, must assume various preferred angles, and also coupled with the fact that terminal strips vary considerably as far as their configuration is concerned, the attaching end of the shank is designed so that the shank can be used with the various types of terminal strips that are encountered in actual practice. Therefore, various modifications of the attaching means, which is soldered to whatever old style terminal strip is encountered, are set forth herein.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end elevational view of a terminal block, a main distributing frame having a large number of such blocks (or similar ones), showing one type of terminal strip which lends itself to depicting my adapter with various modified attaching means which enable

the adapter to be soldered to most of the various types of terminal strips found in main distributing frames already installed in the central telephone offices; 9

FIG. 2 is a view taken in the direction of line 2—2 of FIG. 1 which shows one configuration that the connecting or attaching means may assume; 5

FIG. 3 is a perspective view of the adapter utilizing the attaching configuration of FIG. 2;

FIG. 4 is a view taken in the direction of line 4—4 of FIG. 2 showing my adapter with a different type of attaching means; 10

FIG. 5 is a perspective view of the adapter having the attachment means of FIG. 4 thereon;

FIG. 6 is a view taken in the direction of line 6—6 of FIG. 1, this view depicting still another attaching arrangement; 15

FIG. 7 is an exploded view of the adapter shown in FIG. 6 with the shank separated from the sleeve that is soldered to the terminal strip to effect attachment of the adapter; 20

FIG. 8 is a view taken in the direction of line 8—8 of FIG. 1;

FIG. 9 is a view corresponding generally to FIG. 7 but illustrating the connecting or attaching means of FIG. 8; 25

FIG. 10 is a view taken in the direction of line 10—10 of FIG. 1 showing a still different manner in which the adapter is attached;

FIG. 11 is a perspective view in exploded form showing the arrangement utilized in FIG. 10;

FIG. 12 is an end view of a protector, a device also embodied in a main distributing frame, utilizing still another form of adapter attachment that my invention may assume;

FIG. 13 is a side elevational view of the terminal strip shown in FIG. 12; 35

FIG. 14 is a front elevational view of the strip appearing in FIG. 13, and

FIG. 15 is a perspective view of the adapter utilized in FIGS. 12-14. 40

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

It has already been explained that the usual main distributing frame includes a number of protectors and a number of terminal blocks. While my invention is useful in association with either the protector or terminal block, the invention will first be described with respect to a terminal block. Accordingly, attention is directed at this time to FIG. 1 in which a typical terminal block has been depicted, having been denoted in its entirety by the reference numeral 10. Such blocks 10 can be mounted vertically or horizontally. The vertical orientation shown in FIG. 1 illustrates the block 10 as having a base 12 with a plurality of holes 14 at one side and a plurality of holes 16 at the other side. 55

Centrally disposed with respect to the base 12 is an upstanding panel 18 having molded therein an array of terminal strips 20, each having notches at 21. In the illustrated situation, the terminal strips 20 extend completely through the vertical panel 18 and thus project from each side. The lowermost tier or row of strips 20 (20 per row) project farther from the sides of the panel 18 than do the upper strips 20, there being a progressive shortening of the strips as the level of tiers or rows increases in height, thereby facilitating the soldering of wires thereto as has been conventional for years. 65

It will be recognized that the strips 20 are only exemplary, a number of strips currently found in installed terminal blocks of main distributing frames differing as far as their configuration is concerned. All with which I am acquainted, however, do have a generally rectangular cross section. The rectangular cross section, together with the notches 21, permits the soldering of a conductor 22 having a bared wire end 24 as shown at the left in FIG. 1. The conductor 22 represents one of many incoming conductors, more specifically a conductor that in this instance extends from the protector, such as that shown in FIG. 12, to the terminal block 10. For the sake of discussion, it will be assumed that the wire end 24 has been soldered to the terminal strip 20 at the left in FIG. 1, as has been done for years. Although not yet readily apparent, a corresponding conductor 22 at the right has a bared end 24a that is wire wrapped as can be done when following the teachings of the present invention. More will be said hereinafter concerning the ability to Wire Wrap when employing an adapter now to be described.

At the right in FIG. 1, it will be seen that one embodiment my adapter may assume has been indicated generally by the reference numeral 30, the adapter in this instance being connected to the lowermost terminal strip 20. The adapter 30, which is of any suitable metal, comprises a straight shank 32 having a square cross section. The adapter 30 has a hook portion in the form of an inverted U-shaped connecting or attaching end 34 composed of two parallel legs 34a and 34b, the leg 34a being integrally connected to the shank 32. By means of a bight portion 34c, the leg 34b is maintained in a generally parallel relationship with the leg 34a to form a downwardly facing notch 36. The notch 36 receives therein a portion of the terminal strip 20. 35

As with the bared end 24, which as already explained, is soldered to the lowermost terminal strip 20 at the left, it is difficult to show the soldering of the U-shaped end 34 to the terminal strip 20 at the right. It will be appreciated, though, that the inverted U-shaped end 34 is placed over the upper edge of the terminal strip 20 so that the leg 34a extends downwardly at the right as viewed in FIG. 2 and the leg 34b downwardly at the left, the bight 34c extending over the upper edge. The solder can join the entire U-shaped end 34, that is all of the portions 34a, 34b and 34c, or just one or two of the portions can be soldered to the strip 20 in making the attachment. The soldering of the U-shaped end 34, or any portion thereof, provides support for the adapter 30, and effects an electrical juncture with the terminal strip 20, resulting in shank 32 projecting horizontally in this instance. The shank 32 provides the means by which the wire 22 at the right can be attached. 40

It has already been mentioned that the wire 22 has a bared end 24a; more specifically, the bared end 24a is attached by means of a solderless connection, being wire wrapped with a tool such as that sold by Allied Electronics, 2400 West Washington Boulevard, Chicago, Ill. 60612 under the name Okay Speed Wrap, Type G-100 and described on page 191 of Catalogue No. 730, 1973 edition. Although tools are now well known, if additional written material of a more basic character is needed, reference may be made to U.S. Pat. No. 2,585,010 issued on FEB. 12, 1952 to C. N. Kirkman et al. This particular patent is mentioned in U.S. Pat. No. 2,759,166 granted on Aug. 14, 1956 to

Rudolph F. Mallina which relates to wrapped electrical connections. Even though filed on June 20, 1952 this patent recognizes that many means of that early date had then already been devised for making a so-called wrapped connection.

Since the wire 22 at the right constitutes a jumper and necessitates frequent changing, or at least such wires on the average require frequent changing, the elimination of any soldering of the bared end 24a to the shank 32 permits a ready changing or substitution of one wire 22 for another when circumstances so dictate. In the past, the bared end 24a would have been soldered directly to the terminal strip 20 at the right, in the same fashion as the bared end 24 is soldered at the left in FIG. 1.

Whereas the adapter 30 results in a horizontally projecting shank 32, it is sometimes desired that the shank project angularly upwardly, preferably at approximately a 45° angle. With this in mind, the embodiment appearing in FIGS. 4 and 5 is used. In this instance, the adapter has been labeled generally by the reference numeral 130, having a straight shank 132 that projects angularly from a hook portion in the form of a U-shaped end 134, the end 134 being integral with the shank 132. Unlike the U-shaped end 34 on the shank 32 of the adapter 30, the U-shaped end 134 is in the form of a strip, there being a first panel 134a and a second panel 134b held in a parallel relationship by means of an interconnecting bight portion 134c. This arrangement forms an upwardly facing notch 136.

In attaching the adapter 130, the U-shaped end 134 is brought upwardly from beneath the particular terminal strip 20 to which it is to be soldered. When the bight portion 134c abuts the lower edge, the U-shaped end 134 is soldered to the strip 20. As with the adapter 30, only a section of the U-shaped end 134 need be actually soldered. In any event, the U-shaped end 134 is thus fixedly anchored to the particular strip 20 and the shank, as is evident from FIG. 1, projects upwardly at an angle of approximately 45°.

While the adapter 30 is somewhat less costly to fabricate than the adapter 130, a still additional modification of the invention permits an adapter initially comprising two pieces or parts. Such an adapter has been denoted generally by the reference numeral 230 in FIGS. 6 and 7. In this instance, the adapter 230 is composed of a straight shank 232. Instead of an integral U-shaped end, however, a separate sleeve 234 is contemplated, the sleeve 234 having a portion 234a, a portion 234b and a connecting portion 234c. In this way a passage 236 is provided, this passage 236 accommodating not only a portion of the terminal strip 20 to which the adapter 230 is to be attached, but also receives therein one end portion of the shank 232. When the sleeve 234 is soldered to the terminal strip 20 and also to the shank 232, the shank 232 is then held in a horizontally projecting direction as can be seen from FIG. 1 with respect to this particular embodiment.

It is somewhat easier to hold a shank horizontally, still utilizing the general arrangement suggested by FIGS. 6 and 7, by resort to the adapter 330 shown in FIGS. 8 and 9. In this situation, the adapter 330 comprises a straight shank 332 having a flat end 332a formed with notches 332b. A sleeve 334 which corresponds to the sleeve 234 is used. In this instance, the sleeve 334 encircles the strip 20 and also the end 332a.

When soldered, the shank 332 projects horizontally, as does the shank 232.

When an angled direction is to be imparted to the shank, the embodiment appearing in FIGS. 10 and 11 can be employed. Here, the adapter has been designated generally by the reference numeral 430, having a shank 432 that projects angularly from a flat end 432a having notches 432b therein. A sleeve 434 corresponds to the previously mentioned sleeves 234 and 334, the sleeve 434 simply embracing the strip 20 and retaining the flattened end 432a in a side-by-side relationship therewith. When soldered, the shank 432 projects approximately upwardly at a 45° angle.

Passing now to FIG. 12, a protector denoted generally by the reference numeral 510 has been presented. While the protector 510 is composed of a number of parts, these parts are generally well known to those familiar with telephony, so only the terminal strip 514 will be described with any degree of particularity. Even this description is not absolutely necessary, but it will serve to demonstrate that the basic invention herein described is susceptible to various adaptations which render it quite versatile. The terminal strip labeled 514 has a notch 515 at its upper end, a bowed section 516 just beneath the notch 515, a straight or vertical section 517, and a lower section 518 having attachment holes 519 therein. It is really the lower end portion 520 that functions in the same general fashion as the terminal strips 20 appearing in FIG. 1. As with the strips 20, the strip end 520 has a notch 521 therein. From FIG. 14, it will be perceived that the strip portion 520 is narrower than the main or upper portion of the complete strip 514. However, the strip end 520 resides in a different plane from that in which the strips 20 reside. Stated somewhat differently and more specifically, the strip end 520 presents a flat surface when viewed from the front of the protector. In other words, it resides in a plane generally perpendicular to the plane in which the strips 20 reside.

To enable a Wire Wrap connection to be made with respect to the protector 514, namely its strip end 520, an adapter 530 has been illustrated in FIG. 15. Here again, it includes a straight shank 532, the shank inclining upwardly as in the embodiment of FIGS. 4 and 5 and also as in FIGS. 10 and 11. However, it has a hook portion in the form of a U-shaped end 534 composed of a first leg 534a and a second leg 534b held in parallel relationship therewith by a bight 534c. The arrangement just described results in a notch 536 which receives therein the strip portion 520. As can be discerned from FIGS. 13 and 14, the hook end 534 is simply placed beneath the strip end 520 and soldered thereto so that the shank 532 extends generally at an upward angle of 45°.

In each of the embodiments described above, it should be appreciated that a straight shank is provided that enables the wire wrapping of a jumper wire or connector, such as a connector 22 having a bared end 24a. The appropriate tool is utilized to wrap the bared end 24a around the particular shank that the wire is to be connected to. As herein pointed out, such tools are commercially available, so need not be pictured. The finished Wire Wrap connection has been shown in conjunction with the adapter 30, its end 34 permanently soldered to the lowermost terminal strip 20 in FIG. 1. It must be recognized that wires or conductors 22, such as those we are at this time dealing with, are subject to

frequent change. Thus, when the Wire Wrap connection 24a is to be detached, it can be unwrapped so as to make available once again the shank 32 of the adapter 30 for the new wire. The substitute wire 22 has its bared end 24a wrapped with the tool. It is important to appreciate that the soldered U-shaped end 34 is not unsoldered, being permanently attached. Consequently, no soldering or resoldering is needed as far as actually attaching the bared end 24a. Stated somewhat differently, there is only one soldering operation required, that being to attach or connect the adapter to the terminal strip 20, and once this has been done, then additional soldering operations are not utilized. This simplified situation prevails with respect to all of the adapters 30, 130, 230, 330, 430 and 530.

I claim:

1. In combination with a flat terminal having a generally rectangular cross section embodied in a main distributing frame installed in a central office of a telephone exchange, an adapter comprising an elongated straight shank having a generally square cross section, and means adjacent one end of said shank connecting said one end to said flat terminal, whereby said shank can be wire wrapped.

2. The combination of claim 1 in which said means extends at least partially around the terminal to which it is connected.

3. The combination of claim 2 in which said means is integrally connected with said shank.

4. The combination of claim 3 in which said means has a generally square cross section corresponding to that of said shank.

5. The combination of claim 3 in which said means is hook-shaped.

6. The combination of claim 3 in which said means has a generally rectangular cross section.

7. The combination of claim 6 in which said means is generally U-shaped.

8. The combination of claim 2 in which said means includes a sleeve embracing said one end of said shank and said terminal.

9. In combination with a flat terminal constituting part of a main distributing frame within a telephone exchange, an adapter comprising a generally straight portion projecting at a given angle from said terminal, said straight portion having a cross section dimensioned substantially equally in two perpendicular directions so that a wire can be wrapped therearound, and means connecting said adapter to said terminal for supporting said straight portion at a said given angle, whereby a second wire can be substituted for said first wire and wrapped around said straight portion without disconnecting said supporting means from said terminal.

\* \* \* \* \*

30

35

40

45

50

55

60

65