United States Patent

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[54] **ELECTRICAL CONNECTOR CONSTRUCTION FOR TERMINAL POST**
13 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** ..... **339/223 R,** 339/17 C, 339/95 A, 339/276 R
[51] **Int. Cl.** **H01r 15/12**
[50] **Field of Search** 339/95, 17, 18, 19, 223, 276, 277, 252, 256, 258, 219, 220

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ABSTRACT: A connector of flexible, electrically conductive sheet material having a yoke with two sets of transversely protruding tabs, one set being formable to encircle the strands of wire to electrically connect the wire to the yoke, and the other set being formable to encircle and grasp the insulated wire, and a pair of parallel ears integrally formed at each end of the yoke and extending at right angles thereto. Each ear has a terminal post-receiving aperture, into which opposed longitudinally locating protrusions and opposed transverse tines extend, with the ends of the tines initially being bent away from the plane of the ear to enlarge the effective size of the aperture in order to receive the post, and being crimped toward such plane and into contact with opposed sidewalls of the post to electrically connect and secure the connector to the terminal post.

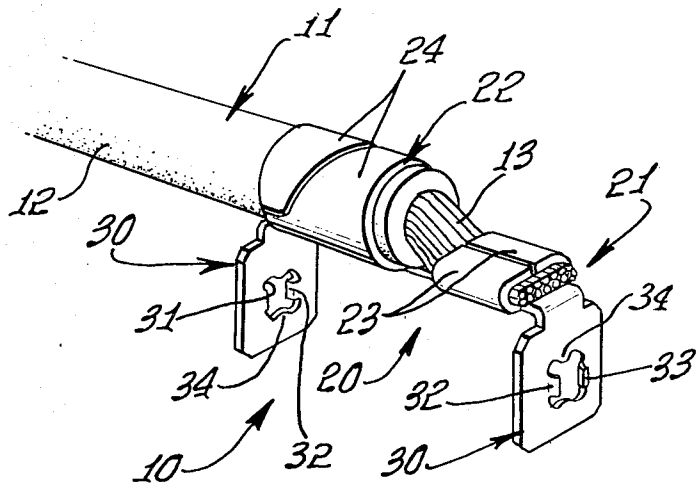


FIG. 1.

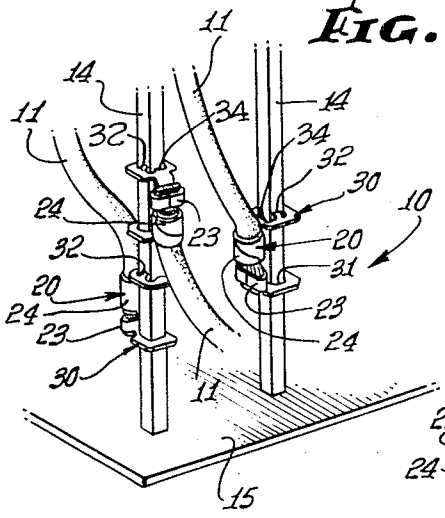


FIG. 2.

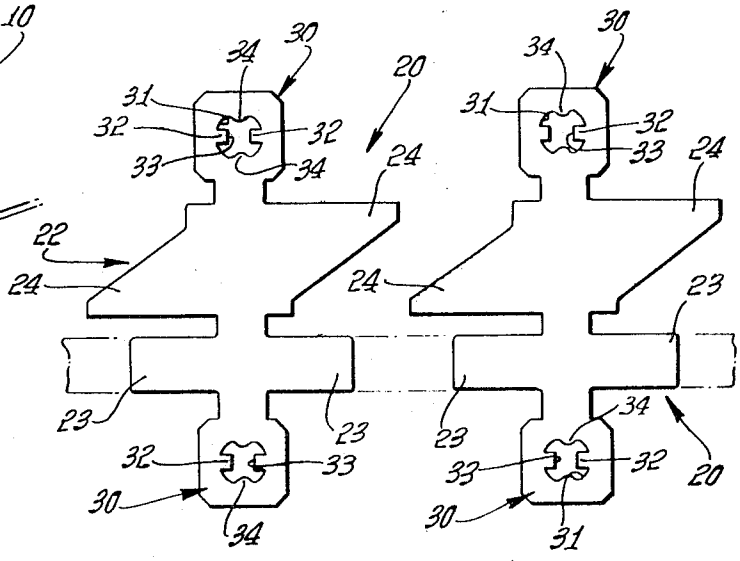


FIG. 3.

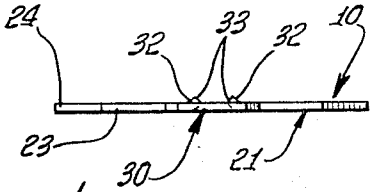


FIG. 4.

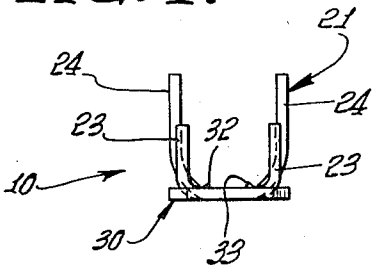


FIG. 5.

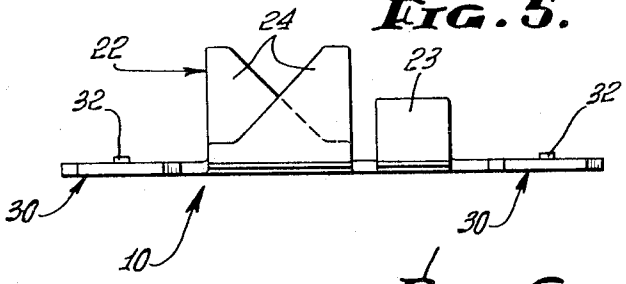


FIG. 6.

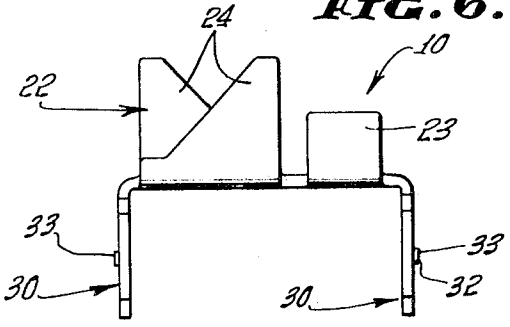
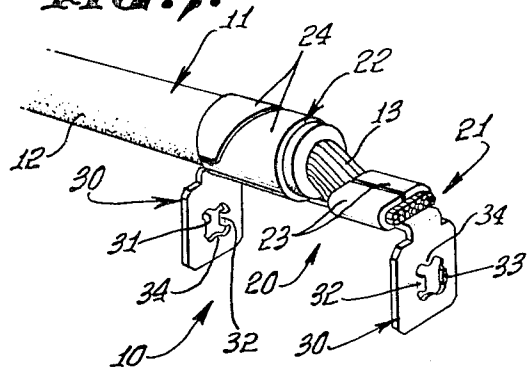


FIG. 7.



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ELECTRICAL CONNECTOR CONSTRUCTION FOR TERMINAL POST

BACKGROUND OF THE INVENTION

This invention relates to electrical connectors, and more particularly to said connectors with crimped tine means for contacting opposed generally planar walls of a terminal post.

In electronic circuitry, there are provided plates, panels, circuit boards, etc. having projecting therefrom one or a multiplicity of terminal posts of rectangular or square section, typically 0.025 or 0.045 inch square or, rectangular, 0.030 by 0.060 inch. These posts are for receiving connectors on the end of the wires to electrically connect and mechanically secure the respective wires to the respective posts as dictated by the particular electrical circuit to be formed. Many times, the posts of a given board are provided in arrays of closely spaced rows and columns so that each connector therefore must occupy a minumum of space while being quickly, easily and securely attachable to the post. Also it is desirable, in order to correct possible mistakes during wiring of the circuit, that the connector be easily removed and replaced on the proper terminal post without disturbing other wires and connectors already installed.

BRIEF DESCRIPTION OF THE INVENTION

Therefore it is the primary object of this invention to provide a novel connector for electrically connecting a wire to a terminal post.

Other and additional objects of this invention are to provide such a connector for receiving and electrically contacting a wire, to provide such a connector which holds the wire by the insulation to relieve the stress on the wire strands themselves to provide such a connector which slides onto the terminal post, to provide such a connector having apertured ears which surround the terminal post, to provide such a connector with ears having apertures through which the terminal post passes, to provide such a connector with tines crimpable into the walls of the terminal post to secure the connector to the post, to provide such a connector with protrusions for limiting its movement relative the terminal post, to provide such connectors which may b stacked one on top of another on a single terminal post to secure a multiplicity of wires thereto, to provide such a connector which may be stacked at different orientations to facilitate the passage of the attached wires from between the protruding posts, to provide a connector which may be installed inverted on the terminal post if desired, to provide such a connector which can be easily installed, and which will be easily removed if need be but which will otherwise remain secured to the terminal post.

Generally the wire connector according to this invention electrically connecting a wire to a terminal post includes a yoke having wire-attaching means for electrically connecting the wire to the yoke, and a pair of ears, one ear at each end of the yoke and extending at right angles thereto, each ear having an aperture therethrough for receiving the post. At least one ear has tines extending into the aperture with the ends thereof being bent at an angle to enlarge the effective size of the aperture and thus to receive the post, and being crimped after the post has been received to engage the post to hold the connector thereto and thereby electrically connect the connector to the post.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a portion of a circuit board having an array of upwardly projecting terminal posts to which wires have been electrically connected and secured by connectors according to this invention;

FIG. 2 is a top view of two blanks for mating the connectors, the blanks being shown in flat pattern, and slightly separated from one another for clarity of illustration;

FIG. 3 is an end view of one of the blanks with the tines thereof bent upwardly;

FIG. 4 is an end view similar to FIG. 3 but with the tabs thereof bent into troughs;

FIG. 5 is a side view of the connector blank of FIG. 4;

FIG. 6 is a side view similar to FIG. 5 but with the ears on the opposite ends of the yoke bent downwardly; and

FIG. 7 is a perspective view of the connector attached to a wire and ready to be installed on a terminal post.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the FIGS. and particularly to FIG. 1, the wire connector according to this invention is generally denoted by the number **10**. In FIG. 1, the wire connector **10** is shown attached to a wire **11** having insulation **12** from which a multiplicity of strands **13** protrude. The wire **11** is shown attached to a respective terminal post **14** of an array of terminal posts **14** extending upwardly from a circuit board **15**. The circuit board **15** conventionally has a series of electrical elements attached to the lower ends of the terminal post **14** on the underside of the board **15** according to the particular circuitry desired. The terminal posts **14** used on such boards are typically 0.025 inch or 0.045 inch square or 0.030×0.060 inch rectangular, with all of the terminal posts **14** on a given board **15** having a uniform size, giving a uniform distance and clearance between the wall of the posts **14**. However the posts **14** could be of any cross-sectional shape though the shape should preferably be polygonal with opposed sides for reasons which appear later.

Referring now to FIG. 7, the wire connector **10** generally includes a yoke **20** with wire-attaching means **21** and a pair of ears **30**, one at either end of the yoke **20**, and at right angles thereto. The ears **30** each containing aperture **31** with tines **32** therein to secure the wire connector **10** to the terminal post **14**. As best seen in FIG. 1, the yoke **20** is elongated and centrally located with the wire-attaching means **21** thereof including traverse protruding tab means **22** which in the preferred embodiment are transversely extending squared end tabs **23** and transversely extending inclined end tabs **24** integrally formed with the yoke **20**. The squared end tabs **23** are for receiving and electrically attaching the strands **13** of the wire **11** to the yoke **20**. The inclined end tabs **24** are for receiving and mechanically clamping to the insulation **12** of the wire **11** to hold the wire **11** to the yoke **20**, and relieve the strands **13** from holding the wire **11** to the yoke **20**.

In the preferred embodiment, the ears **30** are integrally formed with the yoke **20**, at either end thereof. Each ear **30** has an aperture **31** extending therethrough. In the preferred embodiment each ear **30** also has tines **32** extending transversely into the aperture **31** with the distal ends thereof **33** being separated by a distance less than the separation of the walls of the terminal posts **14** in the plane of the respective ear **30**. Each ear **30** also has locating protrusions **34** extending longitudinally into the aperture **31** with the ends thereof separated slightly greater than the distance between the respective walls of the terminal post **14**. Of course it would be possible to provide the tines **32** for only one of the apertures **31** but in such case the other aperture **31** should have locating protrusions **34** in place of the tines **32** as will be apparent later.

It is contemplated that the wire connector **10** will be formed in flat pattern as shown in FIG. 2 from a **4** electrically conductive sheet material such as copper etc. Ideally, the blanks of the wire connector **10** grouped in modules, will be stamped from a flat sheet of copper into the flat pattern shape shown in FIG. 2 but with the individual connector **10** blanks shown closer together. Once the connector blank **10** is formed, the tines **32** will be bent upwardly from the plane of the ear **30** to separate the distal ends **33** thereof a distance greater than the separation of the walls of the contemplated terminal post **14** and thereby enlarge the effective size of the aperture **31** in order to receive the post **14**. Possibly, if the wire connector blanks are to be stamped, the distal ends **33** of the tines **32** could be bent simultaneously with the stamping of the blanks **10** to the position shown in FIG. 3.

After the tines **32** have been bent upwardly, the tabs **23** and **24** would be bent upwardly as shown in FIG. **4** into a trough

for receiving the wire 11. The side view of the connector blank 10 with the tabs 23 and 24 bent into a trough is shown in FIG. 5.

After the tabs 22 and 23 have been bent into a trough, the ears 30 would be bent downwardly to give the connector blank 10 a longitudinal U-shaped configuration to align the apertures 31 on the ears 30 for receiving the terminal post 14 therethrough. THe steps of manufacture of the connector 10 per se are now completed and the connector 10 is ready to be attached to the wire 11.

The wire connector 10 may now receive the wire 11 with the insulation 12 thereof being located between the inclined end tabs 24 and the strands 13 thereof being located between the squared end tabs 23. When the wire 11 is properly positioned, the tabs 23 and 24 are bent over as is shown in FIG. 7 to engage the strands 13 and insulation 12 respectively to electrically connect the wire to the connector 10 and mechanically secure the wire 11 to the connector 10.

The wire connector 10 and wire 11 as shown in FIG. 7 are now ready to be installed on the terminal post 14. The wire connector 10 is slid over the terminal post 14 with the terminal post 14 extending through the aligned apertures 31 in ears 30. It should be noted in FIG. 1 that the wire connector 10 can be inserted on the terminal post 14 with the wire 11 extending upwardly therefrom or the wire connector 10 can be inverted and installed on the terminal post 14 so that the wire extends downwardly therefrom. It should also be noted that if the terminal post 14 is square that the wire connector 10 can be installed on the terminal post 14 in any of four orientations therearound to facilitate the spacing of the wires 11 as they leave the terminal post 14. It should also be noted in FIG. 1 that the wire connectors 10 can be installed on the terminal post 14 one on top of the other.

When the wire connector 10 is slide over the terminal post 14, the locating protrusion 34 center the apertures 31 around the terminal post 14 preparatory to securing the wire connector 10 the the post 14. The wire connector 10 is secured to the terminal post 14 by crimping the distal ends 34 of the upper tines 32 inwardly towards each other and into the walls of the terminal post 14 to hold the connector 10 to the post 14, and thereby electrically connect connector 10 to the post 14. It is contemplated that the crimping on the inner ends of the tines 32 would be accomplished by a suitable tool (not shown).

If a mistake is made connecting a particular connector 10 and wire 11 to a particular terminal post 14, the connector 10 may be removed by spreading the distal ends 33 of the upper tines 32 and sliding the wire connector 10 upwardly from the incorrect terminal post 14. It may be possible to reinstall the incorrectly installed connector 10 on the correct terminal post 14 and bend the distal ends 33 of the upper tines 32 into engagement with the sidewalls thereof. Alternatively, it may be desirable to discard the connector and replace it with a new one, either by opening the tabs 23 and 24 to release the wire or, more probably, by cutting the wire adjacent the connector, stripping the insulation from the end of the wire, and attaching a new connector to the stripped end.

The upward inclination of the distal ends 33 of the upper tines 32 against the sides of the terminal post 14 tends to press the distal ends 33 into the sides of the terminal post 14 when the wire 11 is pulled upwardly thereby preventing the connector 10 from being pulled upwardly off of the terminal post 14, unless of course the distal ends 33 have been suitably spread as has been previously explained. Thus, the provision and construction of the tines 32 suitably secures and electrically connects the wire connector 10 to the terminal post 14.

We claim:

1. A connector for electrically connecting a wire to a upwardly protruding terminal post said connector comprising:
- an elongated central yoke having integral transversely protruding tab means for being formed about the wire to electrically attach the wire to the yoke, and
- a pair of ears integrally formed with the yoke at opposite ends thereof and extending at generally right angles thereto in U-shaped configuration, each of said ears having an aperture therethrough for receiving the terminal post, at least one ear having tines with distal ends thereof extending into the aperture and when in the plane of the ear, being separated by a distance less than the given thickness between the respective post walls, said tines being both bent away from the plane of the ear to enlarge the effective size of the aperture in order to receive the terminal post through the aperture, and being crimped after the post has been received, towards such plane and into contact with the walls of the post to hold the connector thereto and thereby electrically connect the connector to the post.

2. The connector as in claim 1 wherein the tines are bent away from the other ear.

3. The connector as in claim 1 wherein each ear also includes locating protrusions, each protrusion being located between the two tines and extending into the aperture, said protrusions being separated by a distance slightly greater than the thickness of the respective sidewalls of the post for receiving the post therebetween the while limiting the movement of the connector on the post.

4. The connector as in claim 1 wherein the tines are an opposed pair of tines.

5. The connector as in claim 4 wherein the opposed pair of tines extend tranversely.

6. The connector as in claim 3 wherein the tines are an opposed pair of tines, and the protrusions are also opposed, and located at right angles to the tines.

7. The connector as in claim 6 wherein the tines extend transversely, and the protrusions extend longitudinally of the ears.

8. The connector as in claim 1 wherein the tab means includes a pair of squared end tabs, said tabs being formed into a trough to receive the wire, and formable into a loop to electrically attach the wire.

9. The connector as in claim 1 wherein the tab means includes a pair of inclined end tabs, said tabs being formed in a trough to receive the wire, and formable into a loop to hold the wire.

10. A connector for electrically connecting wire to terminal post, said connector comprising:
- a central yoke having wire-attaching means for electrically attaching the wire to the yoke, and
- a pair of ears at opposite end of the yoke and extending generally at right angles from the yoke in U-shaped configuration, each of said ears having an aperture therethrough for receiving the terminal post, at least one ear having tines with the distal ends thereof extending into the aperture and separated by a distance less than the given thickness between the terminal post walls, at least one of said tines being bent away from the plane of the ear to enlarge the effective size of the aperture in order to receive the post through the aperture, and being crimped after the post is received, towards such plane and into contact with at least one wall of the post to hold the connector to the post and thereby electrically connect the connector to the post.

11. A method of constructing a wire connector electrically connecting a wire to a terminal post comprising the steps of:
- forming a yoke with transverse tabs and ears at the ends thereof, each ear having a post-receiving aperture therein and at least one ear having tines with the distal ends thereof extending into the aperture,
- bending the tines from the plane of the ears to separate the ends thereof for receiving the post,
- bending the tabs upwardly to form a wire-receiving trough, and
- bending the ears downwardly at generally right angles to the yoke, to bring the apertures of the ears into alignment for receiving the post therethrough.

12. The method of claim 11 wherein the step of bending the tines, bends the tines upwardly.

13. The method of claim 11 wherein the step of forming, includes the simultaneous stamping of the yoke, and bending of the tines.

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