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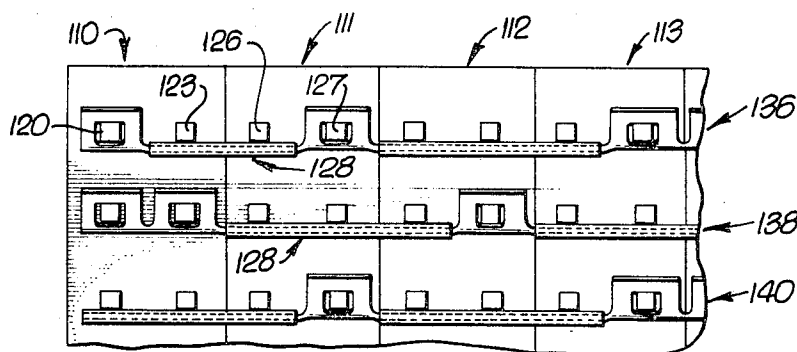
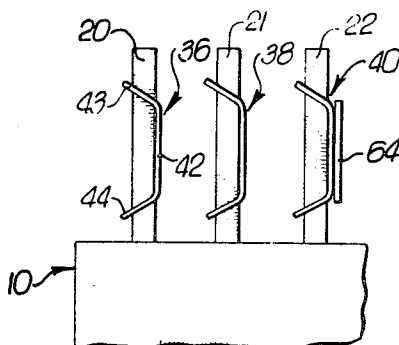
[54] **ELECTRICAL CONNECTOR**
2 Claims, 7 Drawing Figs.

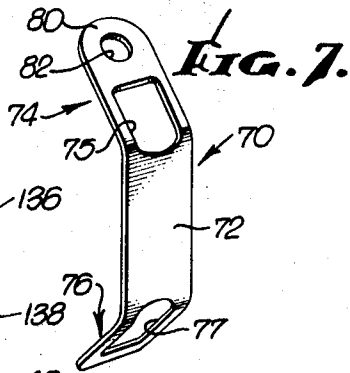
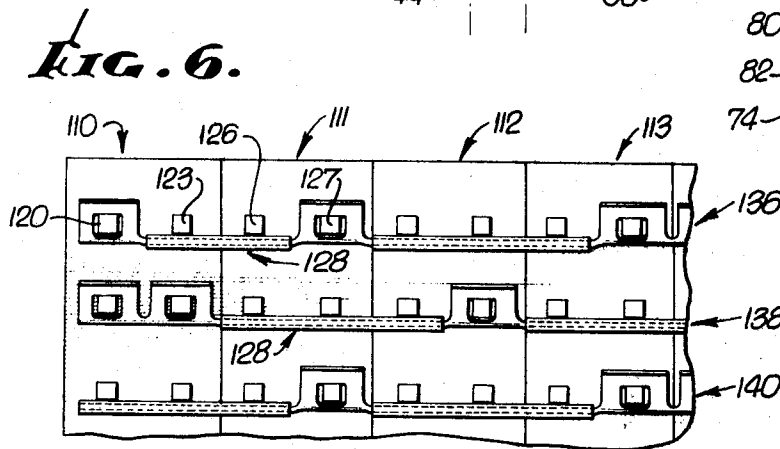
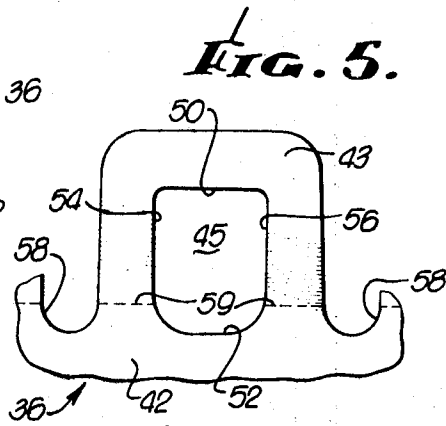
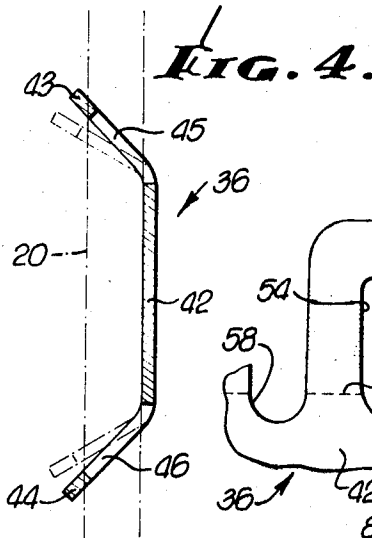
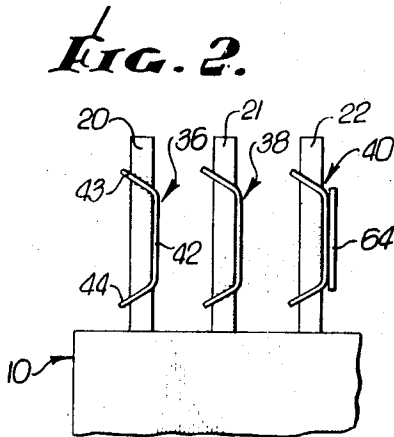
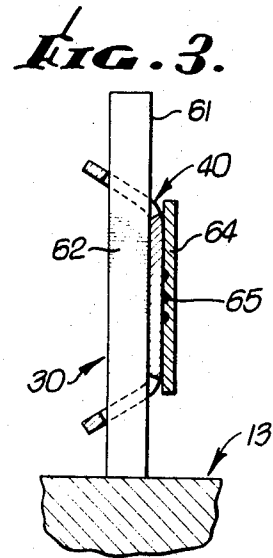
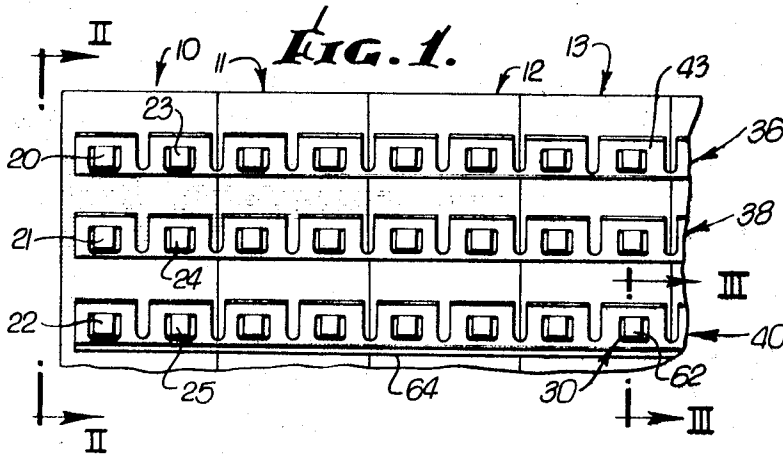
- [52] U.S. Cl. **339/19,**
339/22 B, 339/243, 339/256 C
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241, 243, 256, 252, 258, 273, 277; 24/243.12

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ABSTRACT: An electrical connector of resilient conductive material such as copper for attachment to a longitudinally extending terminal post. The connector may constitute one of a plurality of identical modular connectors formed integrally in a strip for electrically connecting together a number of such posts in spaced parallel relation such as wire wrap posts projecting from a plate or panel having an array of posts arranged in columns and rows. The connector includes a generally flat central web provided with a pair of integrally formed wings projecting oppositely from the web and being resiliently bendable forwardly from the plane of the web, each wing having a post-receiving aperture formed therein. In use, with a terminal post projecting through the apertures of a pair of wings, the resiliency of the material causes the wings to contact the post along the aperture distal edges and thus to retain the web in close abutment and good electrical contact with the terminal post. The entire joint is visible for inspection, and may be soldered if desired. Bypassing of a selected terminal post may be accomplished by cutting off the wings corresponding to that post, and insulating the web from contact with the bypassed post, as by a sleeve of dielectric material surrounding the web. A backing strip of conductive material may be attached to the web as by spot welding, in order to increase the strength and current-carrying capacity of the strip.





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ELECTRICAL CONNECTOR

BACKGROUND AND SUMMARY OF THE INVENTION

In many applications of electrical circuitry, there are provided plates, panels or similar components having, projecting therefrom in aligned rows and columns, an array of parallel terminal post, typically of rectangular or square cross section approximately 0.025 inch on a side. It is necessary, in completing a circuit, to connect together a large number of such posts in alignment, and frequently to bypass certain selected terminal posts in a particular row or column. The upper portions of such terminal posts are typically connected by a wire wrap machine or the like. It is thus desirable to provide a longitudinally extending connector strip for electrically interconnecting a number of aligned posts, and the present invention accomplishes this in the form of a longitudinally extending strip having a central web portion and, projecting angularly therefrom, pairs of aligned wings having apertures formed therein for receiving the terminal post projecting through the apertures of a pair of wings. When so mounted near the base of the post, the web of the strip is retained in close contact with the lower portion of the terminal post, leaving the upper portion free for connections to be made by wire wrap machines.

An advantage of the strip of the present invention is that the joint or connection made thereby with a terminal post is open for visible inspection, and the joint can be easily and conveniently soldered if vibration or other environmental conditions so require. Moreover, since the central web portion has an outer or rear surface which is essentially planar, a backing strip of conductive material can be conveniently attached to the rear surface of the web, as by spot welding or the like, in order to increase the strength and the current-carrying capacity of the strip. The strip construction furthermore permits the modular arrangement of connectors with their apertured wings on any desired center-to-center spacing from as close as 0.100 inch up to many times that spacing.

It is accordingly a principal object of the present invention to provide novel improvements in an electrical connector for attachment to a longitudinally extending terminal post. Additional objects are to provide a strip for interconnecting a plurality of spaced parallel terminal posts; to provide, in such a strip, a longitudinally extending central web portion and, formed integrally therewith, a plurality of spaced pairs of post-receiving apertured wings resiliently bendable forwardly from the plane of the web; to provide such a strip wherein the resiliency of its material causes the wings to retain the web in close electrical contact with a sidewall of a terminal post, with minimum contact with a sidewall of a terminal post, with minimum contact resistance; and for other and additional objects as will be understood from a reading of the following description of a preferred embodiment, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary plan view of portions of four plates or panels, each having an array of upstanding rectangular wire wrap posts, together with three connector strips of the present invention mounted thereon; one strip has a conductive backing strip spotwelded or otherwise conductively attached to its central web.

FIG. 2 is a fragmentary end view taken on the arrows II of FIG. 1.

FIG. 3 is a fragmentary sectional view, on an enlarged scale, taken on the arrows III—III of FIG. 1.

FIG. 4 is a vertical sectional view on an enlarged scale showing, in solid lines, a pair of wings in their unstressed or rest position before connection to a post and, in dotted outline, a portion of such a post and the wings forced temporarily away from the plane of the web to their transitional positions.

FIG. 5 is a fragmentary view, on an enlarged scale, of one of the wings of the connector strip and of the adjacent slots separating successive wings.

FIG. 6 is a view similar to FIG. 1, except that insulator sleeves are provided on portions of a strip, in order to electrically bypass selected wire wrap posts.

FIG. 7 is a perspective view of a single connector having an attachment tab extending from one of its wings.

DETAILED DESCRIPTION

In FIG. 1 there are seen end portions of four plates or panels, each having projecting therefrom multiplicity of upstanding terminal posts, here shown as square in section, of the type adapted for use in wire wrap machines, the panels being indicated generally at 10, 11, 12 and 13. The panels are arranged in side-by-side relation in an array, and in the configuration shown each panel includes two columns of upstanding terminal posts. In board 10 the first three posts in one column are indicated at 20, 21, 22 and posts in the next column are indicated at 23, 24 and 25. In panel 13 one of the posts is indicated generally at 30, and will be described in greater detail later.

Connector strips shown mounted in position on the array of posts include a strip indicated generally at 36, connecting the terminal posts in the upper row; a connector strip of similar construction indicated generally at 38, connecting the terminal posts in the second row; and a connector strip indicated generally at 40, connecting the terminal posts of the third row.

Each of the connector strips in accordance with the present invention includes a longitudinally extending central flat web portion flanked by pairs of apertured wings projecting from aligned opposite edges of the web and bent toward another or forwardly from the plane of the web through small acute angles.

As will be described with reference to FIGS. 2, 3, 4 and 5, a distal edge defines the outer extent of each wing aperture. The transverse dimension of the terminal post between its front and rear walls is some predetermined or given value. When the strip is in unstressed condition, its aperture distal edges are closer to the plane of the front face of the web than that given value. In mounting the strip on the post, wings of a pair are temporarily forced away from the web plane, digitally or by a suitable tool, into transitional positions wherein the distal edges are spaced from the web plane by a distance greater than the given value, to permit the pair of apertures to be slipped onto the post. Release of the external force on the wings, then permits the resiliency of the material to swing the wings toward the plane of the web front face. It will be seen that at some point in that wing movement, the aperture distal edges will come into contact with the front wall of the post, with the web front face in abutting contact with the rear wall of the post. Resiliency of the material then retains the connector in that position on the post.

Thus connector strip 36 includes central web portion 42 and a pair of aligned wings 43 and 44. As more clearly appears in the enlarged sectional view of FIG. 4, wing 43 has formed therein an aperture 45, while the lower wing 44 has formed therein an aperture 46. In FIG. 4 it is to be kept in mind that the solid line showing of the connector strip is that existing when the wings are unstressed, with each wing bent forwardly from the plane of web 42 by a small acute angle.

The construction and shape of the apertures in the wings will be understood by reference to FIG. 5. Taking wing 43 as exemplary, (lower wing 44 is identical) it will be seen that the outer extent of aperture 45 formed therein is defined by distal edge 50 and inwardly by an edge 52, these edges being parallel to one another and to the general longitudinal axis of strip 36. Laterally aperture 45 is defined by side edges 54 and 56, and desirably the edges are curved at their intersections as shown. Each wing is spaced from an adjacent wing by a slot 58. The wings are bent along the axis of a borderline 59, constituting an edge of the web and spaced outwardly from the base of the slots, so that the bending of each wing relative to the central web is accomplished independently of the bending of an adjacent wing.

In order to mount the connector strip on a post, an external force is applied to the wings 43 and 44, swinging them forwardly from the web plane about the web edge axes into transitional positions shown in dotted outline in FIG. 4. It will there be seen that the effective area of the apertures 45 and 46 in a direction normal to the plane of web 42 is larger than the corresponding effective area of the apertures in the unstressed position of the wings, and is sufficient to permit the connector to be slipped downwardly on a contact post, into its position seen in FIG. 2. The force on the wings 43 and 44 is then released, permitting the resilience of the material to swing the wings toward the web plane into their operative positions, with their aperture distal edges biased into contact with the front wall of the terminal post and the web front surface in contact with the rear wall of the terminal post.

The planarity of the central web portion characteristic of the present invention is advantageous in permitting the connection thereto of a backing strip, such strip being connected to the web portion as by welding or other electrically conductive means, in order to increase the strength and current-carrying capacity of the strip. Such an arrangement is seen in connector strip 40, and will be best understood by reference to FIG. 3. Thus, the central web portion 60 is there shown with its front surface in abutting electrical contact with rear wall 61 of post 62. On the opposite or rear face of web 60 there is attached a backing strip 64, fixed to web 60 by suitable electrically conductive means such as spot weld 65. As will be seen in FIG. 1, backing strip 64 desirably extends the entire length of connector strip 40, although current load conditions may permit the backing strip to extend only partially of the length of the connector strip itself, bridging between contact posts between which comparatively large currents flow.

In some installations it may become necessary to bypass certain terminal posts, and the present invention is well adapted for such installations, by cutting off the wings associated with the terminal posts to be bypassed, and surrounding the central web portion with a sleeve of insulating material. FIG. 6 shows such an arrangement.

In FIG. 6, panels indicated generally at 110, 111, 112 and 113 include, as in the case of panels 10, 11, 12 and 13 of FIG. 1, a number of upstanding terminal posts, each panel having two columns of such posts and the posts being arranged in parallel rows. Connector strips 136, 138 and 140 connect certain of the terminal posts in the upper three rows respectively. With particular reference to strip 136, it will be noted that contact is made with post 120, but not with posts 123 and 126. Contact is made with the next post 127, and the portion of the central web between the wings in contact with posts 120 and 127 is covered by a dielectric material, here shown as an insulating sleeve indicated generally at 128. Any suitable insulating material may be used for the sleeve 128; a preferred material is a tubing of heat-shrinkable, irradiated, polyvinylidene fluoride marketed as "Thermofit Kynar" by Raychem Corporation of Menlo Park, California. This material has the property, when formed as a tube, of shrinking peripherally to about 50 percent of its original size upon application of heat, but does not shrink longitudinally to any substantial degree. Connector strips 138 and 140 illustrate the versatility of the present construction, by permitting bypassing of any selected combination of posts.

It will accordingly be seen that there is here provided a connector strip for interconnecting a number of aligned terminal posts, particularly of the type having flat sidewalls forming rectangular or square cross sections, such as the conventional wire wrap posts. Such posts typically have a length projecting from the panel of approximately 0.6 inch, and a typical overall height of the connector strip in accordance with the present invention as seen, for example, in FIG. 2, is approximately 0.18 inch. Thus the use of the present connector strips on conventional terminal posts leaves sufficient extent of the post above the connector strip available for use in connection with wire wrap machines or for making other connections, as may be dictated by circuit design considerations. A terminal post

of the type with which the present invention is advantageously used may be approximately 0.025 inch on a side.

When a backing strip is used in accordance with the invention, as shown, for example, in FIG. 3, such strip may have a width equal to or slightly greater than the width of the web to which it is attached, and a thickness of approximately the same as, or slightly greater than, the thickness of the web itself. The web thickness may be of the order of 0.010 inch, and the material is of high conductivity, such as beryllium copper. In accordance with known techniques, the connector may be plated, as by gold or tin, to resist corrosion and improve contact conductivity.

Advantageous features of the present invention may be incorporated in a single connector for attachment to a longitudinally extending terminal post. Such a device is indicated generally at 70 in FIG. 7, and includes a flat web portion 72 and, projecting from opposite edges or borderlines thereof, upper and lower wings indicated generally at 74 and 76 respectively, each wing being provided with an aperture 75 and 77. These apertures are similar in size and shape to the apertures previously described, such as aperture 45 of wing 43. Upper wing 74 also includes an extension tab 80, which itself may be provided with an opening or perforation 82 in order to facilitate soldering a wire or other conductor thereto.

It will be understood that the connector 70 of FIG. 7 is attached to a longitudinally extending terminal post in the same manner as previously described in connection with, for example, FIG. 5. Thus, connector 70 is initially formed so that the rest or unstressed positions of wings 74 and 76 are relatively close to the plane of web 72. The wings may then be bent forwardly from their rest positions into transitional positions for slipping over the post. The wings are then released so that the inherent resilience of the connector biases the wings rearwardly toward the plane of the web, thereby securely grasping the terminal post between the distal edges of the wing apertures and the web.

Thus, the connector of the present invention may be attached to a single terminal post to facilitate connection thereto from external circuitry; or the connector may constitute one of a plurality of modular connector elements formed integrally in a strip by which to facilitate connection of a plurality of longitudinally extending terminal posts arranged in spaced parallel relation. In both forms of the invention, the distal edge defining a wing aperture is resiliently biased into contact with the front wall of a terminal post, while the connector or web is biased into contact with the rear wall of the post. The wings and the distal edges defining their apertures thus constitute means formed integrally with the web for at least partially surrounding the post and retaining the front surface of the web in contact with the post rear wall.

We claim:

1. An electrical connector for attachment to longitudinally extending parallel terminal posts each having a thickness between front and rear walls of a given value comprising:
 - a longitudinally extending strip of resilient conductive material comprising a series of flat web portions each having a front surface bounded by spaced parallel upper and lower borderlines;
 - means formed integrally with the strip for retaining each web front surface in abutting contact with a post rear wall, including successive pairs of wings equally spaced along the strip and projecting oppositely from each web, each wing having formed therein a post-receiving aperture defined distally by a distal edge, each wing being swingable forwardly from the plane of the front surface of the web about one of said borderlines to a transitional position wherein said distal edge is more distant from said plane than said value, and being resiliently biased toward a rest position wherein said distal edge is rearward of its transitional position;
 - and a sleeve of insulating material surrounding the web between successive pairs of wings.
2. The invention as defined in claim 1 wherein successive wings are separated from one another by slots.