

Dec. 25, 1962

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3,070,769

MULTIPLE CONTACT CONNECTOR WITH WIRE WRAP TERMINALS

Filed June 22, 1959

3 Sheets-Sheet 1

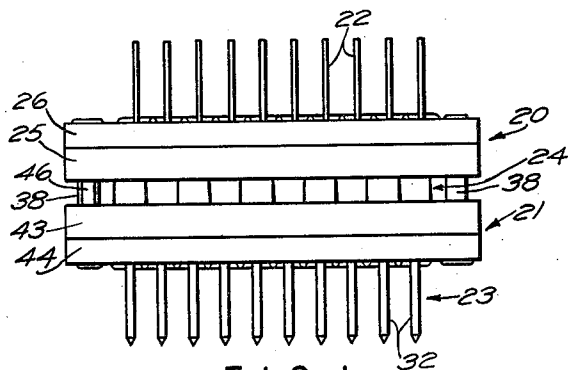


FIG. 1

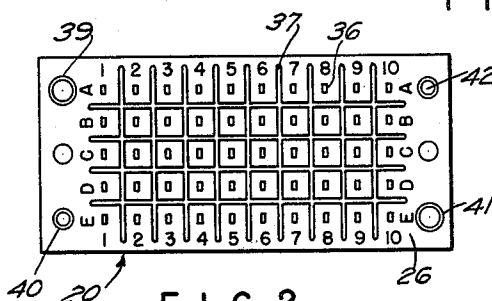


FIG. 2

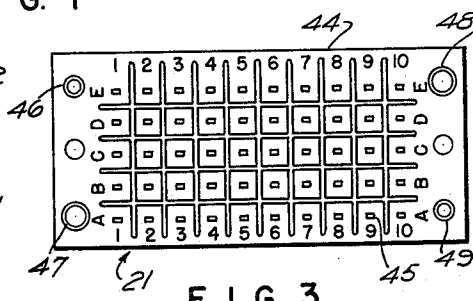


FIG. 3

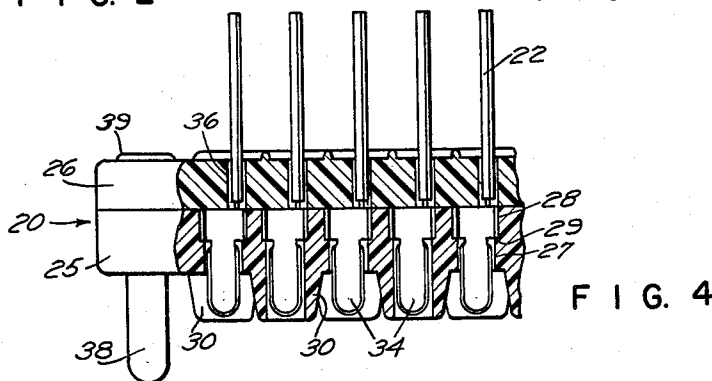


FIG. 4

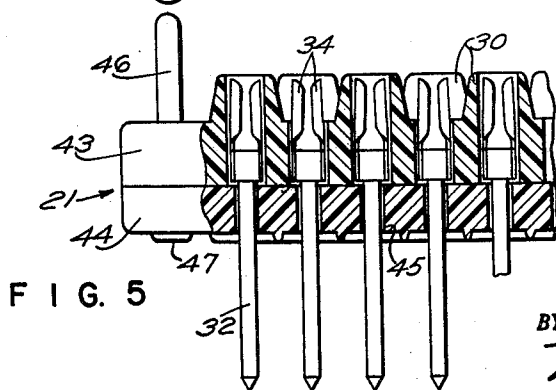


FIG. 5

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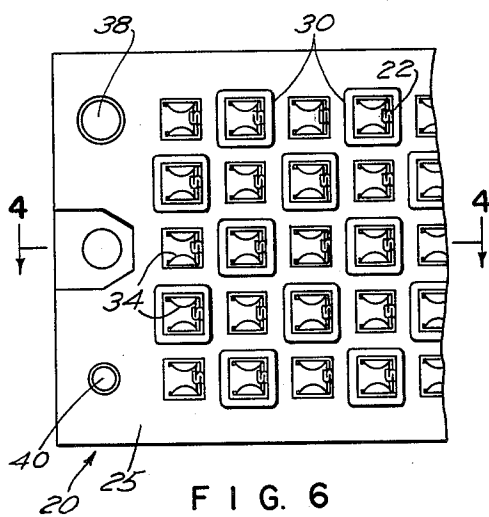


FIG. 6

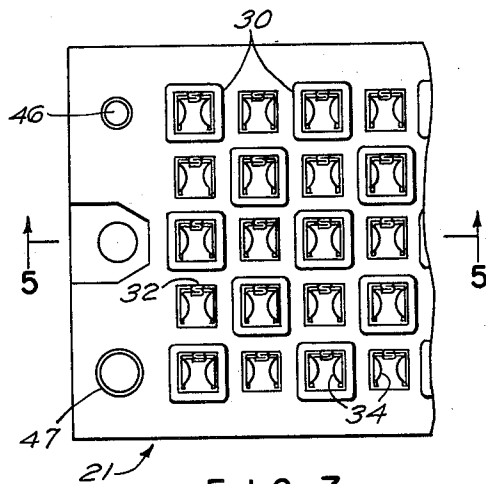


FIG. 7

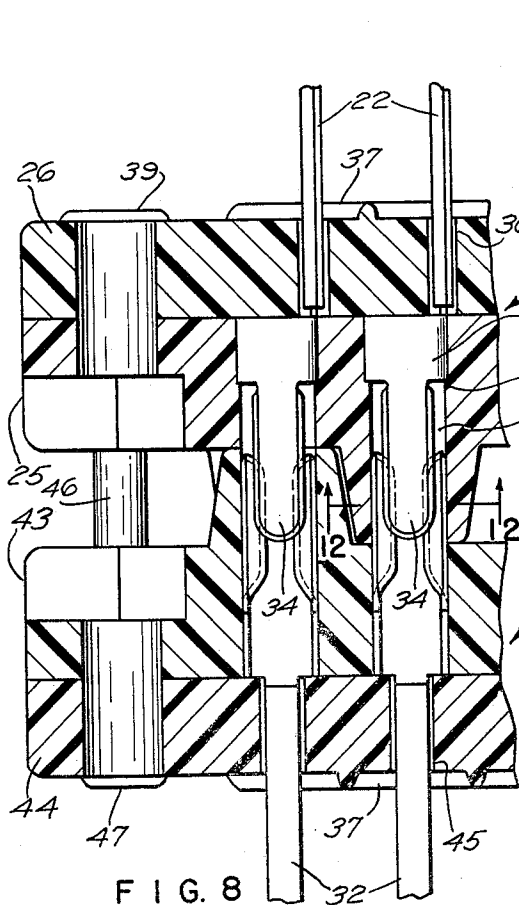


FIG. 8

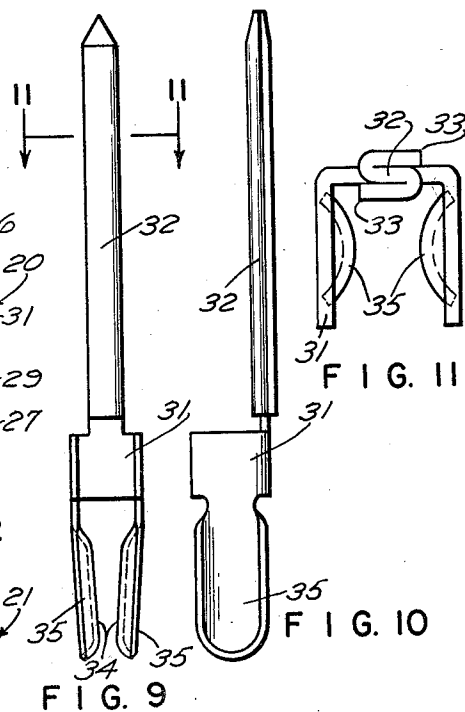


FIG. 9

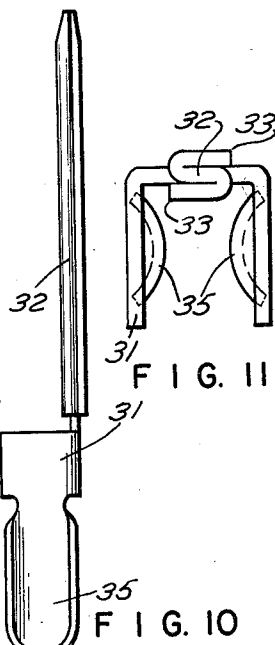


FIG. 10

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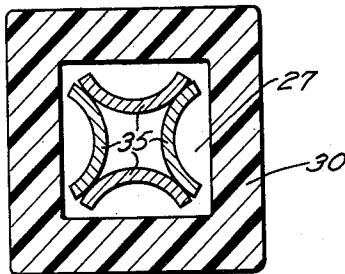


FIG. 12

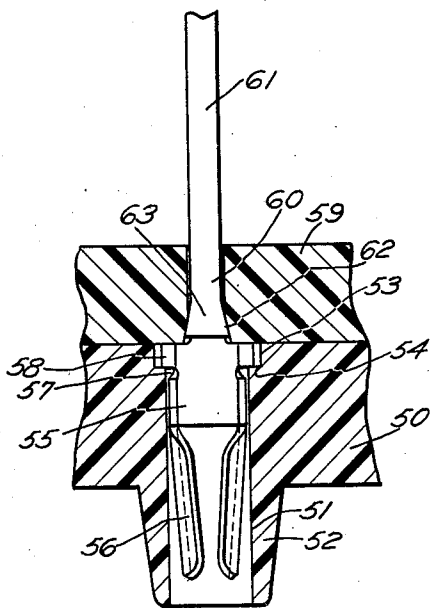


FIG. 13

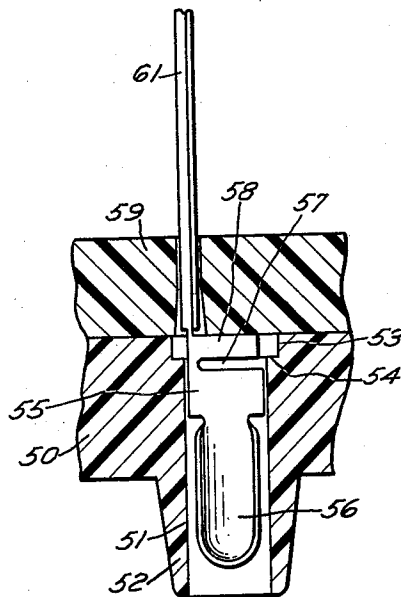


FIG. 14

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MULTIPLE CONTACT CONNECTOR WITH WIRE WRAP TERMINALS

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6 Claims. (Cl. 339-49)

My present invention relates to the electronic art and more particularly to a multiple contact connector having wire wrap terminals.

The principal object of the present invention is to provide a multiple contact connector using a single type of terminal for both the male and female elements of the connector.

Another object of the present invention is to provide a multiple connector using a single base construction for both the male and female elements of the connector.

Another object of the present invention is to provide a multiple connector in which the electrical contacts provide a positive four point connection between the male and female elements.

A further object of the present invention is to provide a multiple connector which materially reduces the cost of manufacture and greatly increases production by providing a uniform base and contact element which can be used interchangeably for both the male and female portions of the connector.

With the above and other objects and advantageous features in view, my invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more particularly defined in the appended claims.

In the drawings,

FIG. 1 is a side elevation of a multiple contact connector with the male and female portions in engagement.

FIG. 2 is a top plan view of the upper element shown in FIG. 1.

FIG. 3 is a bottom plan view of the lower element shown in FIG. 1.

FIG. 4 is an enlarged fragmentary section of the upper contact element taken on line 4-4 on FIG. 6.

FIG. 5 is an enlarged fragmentary section of the lower contact element taken on line 5-5 on FIG. 7.

FIG. 6 is an enlarged fragmentary plan view of the bottom of the upper contact element shown in FIG. 2.

FIG. 7 is an enlarged fragmentary plan view of the top of the lower contact element shown in FIG. 3.

FIG. 8 is an enlarged fragmentary vertical section of the upper and lower contact elements in engagement as shown in FIG. 1.

FIG. 9 is a front elevation of one of the contact blades.

FIG. 10 is a side elevation of the blade shown in FIG. 9.

FIG. 11 is a section taken on line 11-11 of FIG. 9.

FIG. 12 is a section taken on line 12-12 on FIG. 8.

FIG. 13 is an enlarged fragmentary section showing another form of blade assembly.

FIG. 14 is a view similar to FIG. 13 showing the side elevation of the blade shown in FIG. 13.

In modern electronic constructions it has become necessary to provide multiple connectors capable of handling large quantities of connections simultaneously. These connectors are therefore provided with male and female elements in an effort to ensure good electrical contact. Terminals are usually of the pin type which are pushed into tubular females. However, it has been found that the electrical loss is high due to the fact that the pin terminal provides only two or three haphazard points of contact. Furthermore, the connectors are costly and slow to manufacture and assemble. Separate molds must

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be provided for the male and female elements and separate contacts must be made, one male and one female. The mold and assembly must be accurate within small limitations to ensure proper meshing of the elements.

The present invention provides a multiple contact, fifty contacts illustrated, which can be molded and assembled much more rapidly and economically than the conventional types and which utilizes a single form of contact blade for both the male and female elements. The blades of the present invention are designed to provide a firm and positive four point contact at each blade. The molded base of the connector of the present invention is also interchangeable so that both the male and female elements use the same base. This eliminates a separate mold and materially facilitates assembly operations.

Referring more in detail to the drawings, FIG. 1 illustrates the multiple connector of the present invention with the two elements in electrical engagement. Since both elements are virtually identical they will hereinafter be referred to as the upper element and lower element, rather than male and female. The illustrated form shows a connector with fifty contacts. However, as it will be evident from the construction, it is possible to form the connector with as many contacts as desired. The connector illustrated in FIG. 1 comprises an upper element 20 and a lower element 21. The rear portion 22 of the upper contact blades extend upwardly from the upper element 20 and the rear portion 23 of the lower contact blades extend downwardly from the lower element 21. Intermediate the elements 20 and 21 the blades mesh at 24. The extended portions 22 and 23 of the contact blades may be designed for any type of electrical connection. The illustrated form shows a contact blade designed for the new type of wrapped wire connection.

Referring to FIG. 4, the upper element 20 comprises a base or holder 25 and a cover 26. The base 25 comprises a rectangular dielectric member molded of plastic or similar material and provided with a plurality of openings 27 for receiving the contact blades. In the illustrated form the openings are arranged in five longitudinal rows, ten openings to a row to provide fifty contacts. Each opening 27 is rectangular in cross section and is provided with an upper wider portion 28 to form a shoulder 29 between the upper and lower portions of the opening. The bottom portion of the base 25 is formed as shown in FIGS. 4, 6 and 8 with alternate openings being provided with tapered extensions 30. For purposes of identification the various positions have been numbered longitudinally from 1 to 10 and the rows lettered from A to E. Thus in row E positions 2, 4, 6, 8 and 10 are provided with the tapered extensions 30 leaving a valley surrounding the openings 27 in positions 1, 3, 5, 7 and 9. In row D position 1 is formed with the extension 30 to provide a complete checkerboard effect. This is important because the base or holder 25 must also be used as the base or holder for the lower element 21. If the upper member 20 should be turned 180 degrees as shown in FIG. 3 the lettered rows will move to opposite sides. Now when the arrangement shown in FIG. 3 is flipped over into the upside down position shown in FIG. 5, position E1 which was the equivalent of position E10 in FIG. 2 will fall under position E1 in FIG. 2. Since position E10 in FIG. 2 is provided with the tapered portion 30 position E1 in FIG. 3 is also thus provided with the tapered portion. Therefore, viewing FIGS. 4 and 5, the tapered portion on the lower member 21 in position E1 will coincide with the depressed portion in position E1 on the upper member. This permits the upper and lower bases to telescope as shown in FIG. 8. However, as heretofore pointed out it is actually the same base in reverse position so that one mold will provide the base for both the upper and lower members.

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Each opening 27 is now provided with a contact blade such as shown in FIGS. 9, 10 and 11. Each blade is provided with a U-shaped portion 31. Extending upwardly from the upper edge of the base of the U-shaped portion 31 is a contact strip 32 folded into an S-shaped cross section to provide a sharp edge at 33 on each side of the portion 32. The electrical wire connection is wrapped around the strip 32 in a conventional manner. However, to ensure a firm grip on the wires it is desirable to provide sharp corners such as 33. The contact portion of the blade comprises a pair of depending contact portions 34, extending integrally from the arms of the U-shaped portion 31. Viewing FIG. 9, it should be noted that the portions 34 are bent slightly inwardly towards each other with a tapered effect. The contact surfaces comprise arcuate portions 35 facing each other as shown in FIG. 11. The bottom of each contact portion is formed in a spherical radius so that at the time of engagement, a lead in effect is created even if the intermeshing contact is out of alignment.

In assembly a contact blade is positioned in the openings 27 of the upper element as shown in FIGS. 4, 6 and 8. The contact portions 34 extend downwardly through the openings 27 and the intermediate U-shaped portions 31 are positioned with the arms resiliently pressing against the sides of the opening portion 28 and resting on the shoulders 29. In the position shown in FIGS. 4, 6 and 8 the contact blades have been inserted with the U-shaped portion facing one end as in the position shown in FIG. 10. The cover 26 for the upper member 20 is therefore provided with rows of rectangular slots 36 transversely disposed through which the upper strips 32 of the blades extend. The upper surface of the cover 26 may be provided with separating ribs 37 between the slots 36. The cover is slipped over the ends of the strips 32 and down upon the base 25 as shown in FIGS. 4 and 8 so that it rests on the upper edges of the U-shaped portion 31 of each blade locking the blade between the cover and the shoulder 29.

The cover 26 and holder 25 are locked together at the four corners. On one side a large guide pin 38 extends downwardly from one corner of the upper member 20. The shank of the pin 38 acts as a rivet which extends through the base 25 and cover 26 and is swedged over at the top at 39. At the opposite corner on the same side a small eyelet 40 extends through the base 25 and cover 26 to lock them together. At the opposite end the upper member 20 is provided with a large eyelet 41 and a small guide pin 42 diagonally disposed so that the large eyelet is diagonally opposite the large pin and the small pin is diagonally opposite the small eyelet. When the lower element 21 is placed beneath the upper element 20, the large and small pins will coincide with the large and small eyelets so that they will guide the parts together. The use of different sized pins ensures the positioning of the parts in the right relationship.

The lower element 21 is shown in FIGS. 5, 7 and 8 and is virtually a duplicate of the upper element 20. The lower element base or holder 43 is actually the same piece as the upper base or holder 25. The contact blades are now inserted into the base 43 in the position shown in FIG. 9 which is a front elevation and turned 90 degrees from the position shown in FIG. 4. The lower member cover 44 is therefore formed with the rectangular slots 45 extending longitudinally since the strips 32 on the lower blades now are in a longitudinal plane. The lower member is also formed with a small guide pin 46 and a large eyelet 47 on one side and a large guide pin 48 and a small eyelet 49 on the other side.

In use the parts mesh with each other as shown in FIGS. 8 and 12. When the upper and lower members 20 and 21 are pushed together as shown in FIG. 8 the tapered extended opening portions 30 on one member slide between the tapered portions 30 of the opposite member and the pins on one member enter the eyelets on

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the opposite member. As this takes place the opposed contact surfaces 35 on the upper and lower blades telescope into each other as shown in FIG. 12. Because of the slight taper provided, a spring action presses the arms 34 of each blade apart so that a firm friction contact is provided at the four corners as shown in FIG. 12. Thus a positive four point electrical contact is made at each station. The shape and location of the arms 34 of the contact blades will provide a good contact even if the location of the blades is inaccurate by a few thousandths of an inch.

In the form shown in FIGS. 1 to 12 inclusive each contact blade is permanently locked in place. However, it is sometimes desirable to change a blade in the field due to inadvertent breakage or other defect. To provide a replaceable blade, the blade may be modified as shown in FIGS. 13 and 14. In this form the base 50 is provided with a plurality of openings 51 and the usual alternate extensions 52. However, the rectangular openings 51 are provided with only a small wide portion 53 adjacent the upper end to form shoulders 54. The contact blades are formed with the U-shaped bases 55 and the spaced contact portions 56 as in the previous form. However, the upper portion of the U-shaped portion 55 is provided with a transverse slot 57 which produces thin spring arms 58 adjacent the upper edges. These arms 58 snap into the slot portions 53 and rest on the shoulders 54. The blades are locked in place by the covers 59 having openings 60 for the upper end 61 of each blade. If it is necessary to remove a broken blade, a simple tool is inserted from beneath to squeeze the portions 56 and the arms of the U-shaped portion 55 towards each other. This will swing the spring arms 58 towards each other and away from the shoulders 54 and allow the blade to be withdrawn. To insert a new blade the spring arms 58 are pressed towards each other sufficiently to enter the opening 51 and the blade is pushed upwardly until the spring arms snap into the portion 53 and lock over the shoulders 54. Thus a blade can readily be replaced in the field if required.

In addition to the foregoing it may be found that the strips 32 tend to wiggle slightly because the openings 36 in the cover 26 must be large enough to permit easy and rapid assembly. To prevent any loose wiggling, the blades can be formed as shown in FIGS. 13 and 14. It will be noted that the cover 59 is provided with openings 60. However, the lower portions of these openings taper outwardly at 62 in a bell mouth. The strip 61 on each blade is formed with a wedged shaped bottom portion 63 which wedges into the opening portion 62 to hold the blade tightly in position. This provides a wedged fit at each blade so that the strip portions extending from each element will be rigid for the attachment of the electrical wire connections.

The present invention therefore provides a multiple contact connector in which the number of parts to be molded has been reduced, in which a single construction of contact blade is used for the male and female portions of the connector and in which the construction is designed for easy and rapid assembly. Furthermore, the contact blades of the present invention provide positive four point contacts at each connection under all conditions. Other advantages of the present invention will be readily apparent to a person skilled in the art.

I claim:

1. A multiple connector comprising a pair of complementary contact members, each contact member comprising a rectangular base of dielectric material having a plurality of openings therethrough, each of said bases being identical, a contact blade seated in each opening having a contact portion extending from said base in one direction and a conductor connecting portion extending from said base in the opposite direction, each base having a cover locking the respective blades therein, said conductor connecting portions of the respective blades ex-

4. A multiple connector comprising a pair of comple-

6. A multiple connector comprising a pair of complementary contact members, each contact member comprising a rectangular base of dielectric material having a plurality of openings therethrough, each of said bases being identical, a contact blade seated in each opening having a contact portion extending from said base in one direction and a conductor connecting portion extending from said base in the opposite direction, each base having a cover locking the respective blades therein, said conductor connecting portions of the respective blades extending through said cover, and complementary interlocking means on the opposed base surfaces of said contact members, each of said blades comprising a U-shaped member seated in its respective base, each said conductor connecting portion extending integrally from

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the base of each said U-shaped member, each said contact portion comprising spaced arms extending integrally from the arms of each said U-shaped member, each of said contact arms having opposed convex surfaces and tapering toward each other from said base outwardly, the contact blades in one of said contact members being turned 90 degrees in relation to the contact blades in the other of said contact members whereby said convex surfaces will intermesh to form a frictional electrical contact when said complementary members are pushed into intermeshing relation, said complementary interlocking means comprising tapered wall portions extending from the surface of each of said contact members around alternate base openings in staggered relation to each other, each of said base openings having a restricted portion forming an abrupt shoulder, said U-shaped mem-

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bers having horizontal resilient portions resting on said shoulders to releasably retain the blades in the openings.

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