Aug. 31, 1954 C. M. BENHAM ET AL 2,688,123

ELECTRICAL CONNECTOR

Filed April 9, 1952 2 Sheets-Sheet 1

FIG. 1.

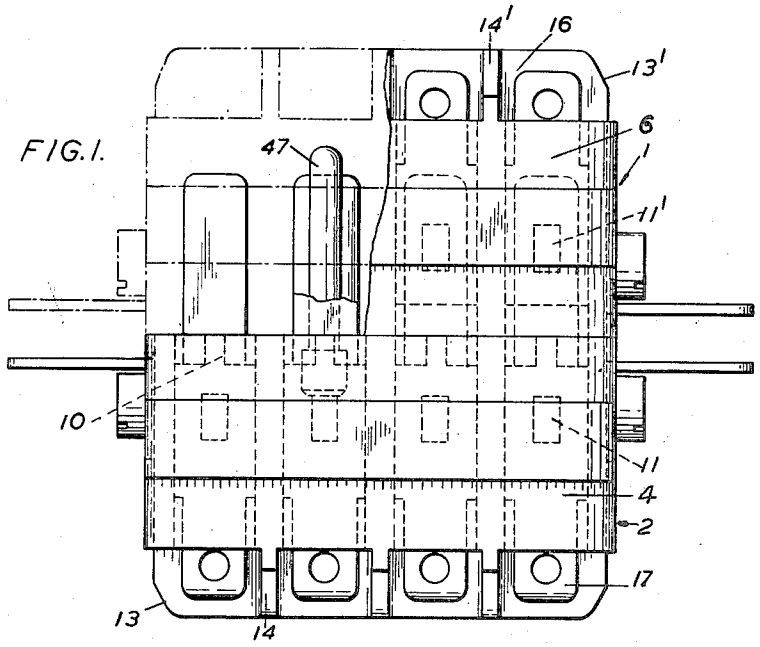


FIG. 2.

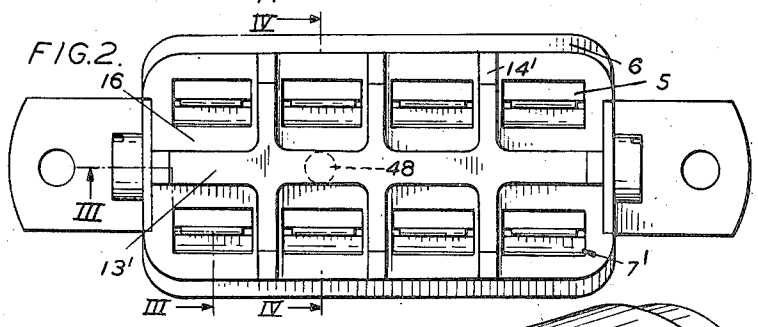
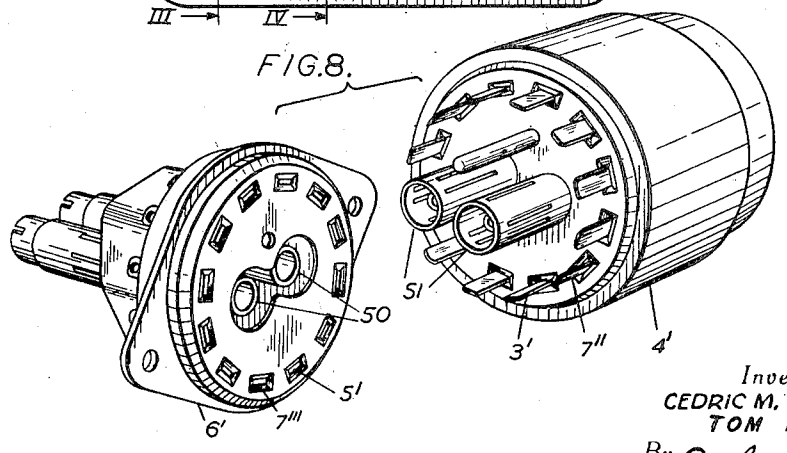


FIG. 8.



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ELECTRICAL CONNECTOR

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FIG. 3.

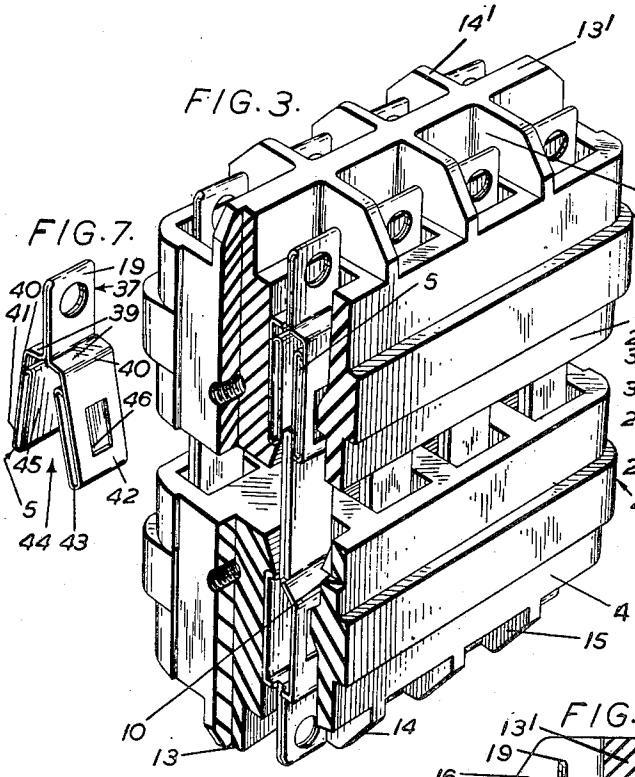


FIG. 6.

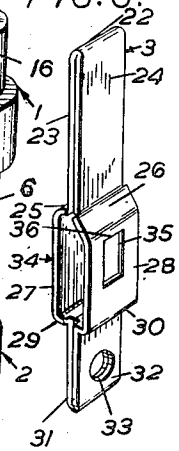


FIG. 7.

FIG. 4.

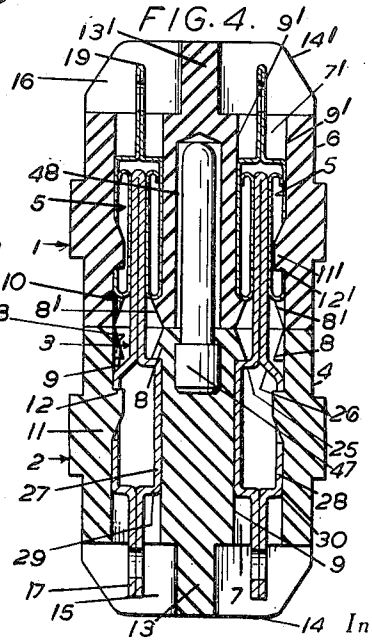
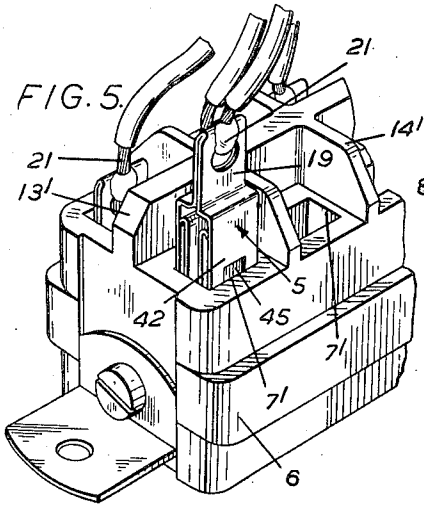


FIG. 5.



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UNITED STATES PATENT OFFICE

2,688,123

ELECTRICAL CONNECTOR

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Application April 9, 1952, Serial No. 281,412

Claims priority, application Great Britain April 10, 1951

6 Claims. (Cl. 339—176)

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This invention concerns improvements in or relating to electrical connectors, and particularly relates to plug and socket connectors of the kind in which co-operating metal electrical contacts in the form of metal blades and corresponding sockets are respectively mounted in moulded electrically insulating bodies or holders (hereinafter referred to as "holders"), such holders each having a plurality of channels therethrough according to requirements, and having one of said contacts slidden endwise into each channel; in many cases the holders each include as many as thirty contacts arranged in a row or rows.

A variety of methods have been used hitherto for retaining the contact blades and sockets in their moulded holders but none of these has been entirely satisfactory either as to the method of manufacture, or as to their subsequent service. Thus in some cases contact blades have been moulded in situ in their holder; in other cases, contact blades or sockets have been retained in their holder by "staking," i. e. by expanding portions of the blades or sockets on to the adjacent end face of the holder, or by twisting the protruding parts of the contact blades or sockets out of their normal planes after assembling the contacts in the holder. In still further arrangements the blade or socket contacts have each been retained in a channel in the holder either by being located between a shoulder in the latter and a cover piece mounted on the holder, or by being clamped between shoulders in two parts of the holder clamped or otherwise secured together.

A further and important problem in connection with plug and socket connectors of the kind above referred to is satisfactorily to effect the mating of the blade contacts with the socket contacts especially where there are a relatively high number, for example eighteen or more, of such contacts in a row, it usually being required commercially, not only that a particular pair of holders, e. g. one blade contact holder and one socket contact holder, should mate together, but that all blade contact holders of a given size should mate with all socket contact holders of the same size even when these have been manufactured at different periods. Furthermore, the blade contacts should be capable of entering into the socket contacts without undue force having to be applied, and should have ample electrical engagement with such sockets.

With the intention of attaining some of these objects it has been usual to employ insulated moulded holders of the best possible quality, these holders being moulded very precisely as to their

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dimensions. Moreover to avoid difficulties arising from the lack of alignment of co-operating blade and socket contacts, the latter have been made with wide mouths and either the socket contacts or the blade contacts have been provided with a certain degree of freedom for movement (usually spoken of as "float") to permit the co-operating socket and blade contacts to align themselves with one another in order to give good electrical engagement. However, in some respects this freedom for movement or float has been found not to be entirely satisfactory since, whilst it allows movement of one of the contacts relative to the other, it may also result in such relative displacement of the contacts prior to the interengagement thereof that, in fact, the blade contacts will not enter the socket contacts. This has been found to happen in practice, particularly with miniature assemblies.

The primary object of this invention is to provide improved electrical plug and socket connectors of the kind referred to and particularly those in which the blade and socket contacts are made of sheet metal and mechanically locked in their holders.

According to this invention there is provided an electrical connector comprising a moulded rigid insulating holder having a plurality of channels of rectangular cross-section arranged in a row therein, and electrical contacts slidden endwise into each of said channels from the rear end thereof; said electrical contacts each comprising a strip-like sheet metal blank doubled upon itself to provide adjacent parallel limbs positioned at the front part of the contact to engage and make electrical connection with a mating contact, stop means formed by parts of said blank immediately adjacent one end of said parallel limbs and located transversely thereto, resilient bearing portions formed by spaced parts of said blank disposed parallel to said limbs and connected thereto by said stop means, and, at the rear part of the said contact, a connecting portion adapted to be connected to an electrical supply lead, formed by cranking said spaced bearing portions together; abutment means on said holder extending into each of said channels adjacent the front end of the same positively to limit, by engagement with the said stop means thereof, the insertion of the corresponding contact therein; and sawtooth-like locking projections on said holder and extending inwardly into each of said channels between the ends of the same, the plane of the front end of each said projection being substantially at right angles to the walls of the

channel and the height of said locking projection from the wall of the channel by which it is carried progressively decreasing from the said front end in a direction away from said abutment means, one of said spaced bearing portions of said contact having between its ends an opening the front end of which will, when said contact has been forced past said locking projection and transversely compressed thereby, engage the front end of said locking projection to prevent the contact being withdrawn from the channel, the resilient bearing portions of the contact thereafter engaging the walls of the channel and forming substantially continuous bearing surfaces accurately to align the contact in the channel.

Thus the said contact may be so constructed as to have a pair of spaced parallel longitudinally disposed bearing portions of substantial length which are adapted to press on the opposite adjacent surfaces of the channel in the holder into which the blade or socket is placed, the said engagement providing firm location and retention of the contact in its holder and thus eliminating any substantial float of the contact with respect to the holder. At the same time the contact is preferably constructed so as to have such a degree of springiness or resilience as will allow two cooperating contacts satisfactorily to accommodate one another when being interengaged.

Further objects and features of the invention will become apparent from the following description and claims.

In order that the invention may be more readily understood, two embodiments of the same will now be described with reference to the accompanying drawings in which:

Figure 1 is a side elevation of an electrical connector constructed in accordance with this invention and formed in two parts, one of which has two straight rows of equally longitudinally spaced blade contacts and the other of which has two straight rows of corresponding longitudinally spaced socket contacts into which said blade contacts are adapted to enter when the two parts of the connector are fitted together;

Figure 2 is a plan of the electrical connector shown in Figure 1;

Figure 3 is a part-sectional perspective view of the connector shown in Figures 1 and 2 with the two parts of the connector partially separated, the section being taken on line III—III, Figure 2;

Figure 4 is a vertical section on line IV—IV, Figure 2;

Figure 5 is a fragmentary perspective view of the socket part of the connector shown in Figures 1 to 4 with one of the socket contacts shown as being only partially inserted into its holder;

Figure 6 is a perspective view of one of the blade contacts of the connector;

Figure 7 is a similar perspective view of one of the socket contacts of the connector; and

Figure 8 is a perspective view of a further form of connector constructed in accordance with this invention, the figure showing the invention applied to a coaxial type of connector in which the blade contacts and the socket contacts are arranged in a ring instead of in straight rows.

Referring to Figures 1 to 7 of the drawings it will be seen that the connector there illustrated comprises two parts respectively marked 1 and 2, these two parts respectively comprising a holder 4 and a holder 6, the holders 4 and 6 being formed of thermoset synthetic resin, ceramic vulcanised rubber, ebonite or other suitable dielectric. The holder 6 carries a plurality of socket contacts 5

arranged in two parallel straight rows with the socket contacts equally spaced in these rows, whilst the holder 4 is furnished with two straight rows of blade contacts 3, these rows being parallel to one another and the blade contacts being equally spaced in the rows whilst the arrangement of the blade contacts corresponds to that of the socket contacts so that the blade contacts can easily be inserted into and engaged with the socket contacts.

In this arrangement, each of the holders 4 and 6 comprises a good quality rigid moulding of a thermoset synthetic resin, each holder being rectangular (except for rounded corners) in plan and also rectangular in side and end elevation. In each of the holders is or are moulded one or more rows (the drawings show two rows) of similar parallel channels or passages 7 and 7' (hereinafter called "channels") extending completely through the holder from its inner or front surface to its outer or rear surface, the channels of the or each row being equally spaced from one another along the length of the holder, and being of rectangular shape in plan or transverse cross-section.

The two rows of channels of each holder are parallel to one another and the channels are correspondingly disposed in the two holders so that when these are placed face to face in register with one another, the channels of the two holders are in alignment with one another.

At its inner or front end, each of the said channels 7 or 7' is provided with an internal abutment shoulder 8 or 8' on each of those two opposite internal surfaces 9, 9 or 9', 9' which are parallel to the longitudinal outer surfaces of the holder, these abutment shoulders projecting slightly inwardly of the channel and being inwardly bevelled so as to form a flared or inwardly convergent mouth to the inner or front end of each channel. One of the two said abutment shoulders of each pair is centrally gapped as shown at 10 (Figures 1, 3 and 4) to facilitate the moulding of a projection (subsequently described) within the channel 7 or 7'.

Between the inner and outer ends of the holder, each of the said channels 7 and 7' is provided on one of the said opposite surfaces 9, 9' with a projection 11 or 11' of approximately saw-tooth, ratchet-tooth or buttress form with its square or plane front end 12 or 12' facing the adjacent abutment shoulder 8 or 8' and with its height progressively increasing from its rear towards its front end, i. e. in the direction of insertion of a contact into one of said channels.

At its outer end each holder is integrally furnished with longitudinal and transverse upstanding intersecting ribs 13, 14 or 13', 14' which form a plurality of cells or pockets 15 or 16 to receive the outer or rear end shanks 17 of the blade contacts 3 or the outer or rear end shanks 19 of the socket contacts 5 and the electrical connections thereto (such as the soldered connections marked 21 in Figure 5) so as thereby to segregate the connections of the several blade or socket contacts and to increase the electrical insulation between each of them.

The said blade contacts 3 are (as will be clearly seen from Figure 6) each formed by a single strip-like blank of springy sheet metal which is a good electrical conductor and which is doubled upon itself at 22 substantially midway between its ends so as to have two portions 23 and 24 lying one upon the other to form the blade proper which will fit into a socket contact to make an

electrical connection. The said two portions 23 and 24 of the metallic blank are then cranked or joggled away from one another at 25, 26, then have portions 27 and 28 extending parallel to one another for a substantial distance and lying on opposite sides of the longitudinal medial plane of the contact, before being cranked inwardly again at 29 and 30 respectively so as to produce two further portions 31 and 32 lying one upon the other and in alignment with the blade proper, the last two parallel parts of the blank forming the rear end shank 17 of the contact and being soldered or interlocked together, as for example, by bending one over the other, and being furnished with a terminal hole 33, screw or any other suitable means, e. g. a hook-like part, for connecting an electric lead thereto with or without the aid of solder or the like.

By cranking or joggling the two portions of the blank forming the blade element outwardly and then again inwardly, the blade contact is furnished with a hollow open-sided box-like body generally indicated by the reference 34, the opposite parallel sides 27 and 28 of which are somewhat resilient and adapted, when the blade contact is introduced endwise into its channel 7 in the holder, resiliently to bear respectively against the two abutment shoulder-provided walls or surfaces 9, 9 of the channel 7 and thereby firmly to centralize the blade proper with respect to such channel and firmly to hold the blade in this position.

The side 28 of the box-like body 34 of the blade contact is provided with a rectangular opening 35, the front end 36 (i. e. the end nearest to the blade proper of the contact) of which acts as a shoulder which is adapted eventually to engage behind the blunt or plane end 12 of the locking projection or tooth 11 of the channel 7 into which the contact is introduced. Thus on sliding the blade contact into its channel from the outer or rear end of the holder, the said locking projection 11 will first somewhat inwardly compress the side 28 of the box-like body 34 of the blade contact but will eventually pass into the opening 35 in the adjacent side of such body when the blade contact has passed so far into the channel 7 that at least one of the outwardly cranked parts 25 and 26 (i. e. those nearest to the blade proper) of the contact have come into engagement with at least one of the abutment shoulders 8 adjacent to the inner or front face of the holder. Thus the blade is firmly located against endwise movement in the holder between the said locking projection 11 and the said abutment shoulders 8.

Whilst the cranked part 25 of the blade contact element is substantially square cornered to form a stop, the cranked part 26 of the contact is sloped to form a ramp which rides along the inclined inner surface of the projection 11 as the contact is pushed into place in its holder, the side 28 of the body of the contact thus being progressively displaced inwardly until it finally springs outwardly again on the projection 11 registering with and entering the opening 35 in the body of the contact to lock the latter in the holder.

The box-like body 34 of the blade contact is of substantially the same width (i. e. measured in the longitudinal direction of the holder) as the channel 7 in which the contact is mounted so that lateral movement, as well as transverse and endwise movement, of the blade is prohibited except in so far as is afforded by the resilience

of the metal of which the contact is made. The blade and the shank 17 of the contact are preferably rather narrower than the body of the contact.

Each socket contact 5 is, as shown in Figure 7, also constructed from a strip-like blank 37 of springy sheet metal, this blank being, midway between its ends, doubled upon itself to provide the terminal shank 19 to which the electrical connections to the contact can be made, each doubled over portion of the said blank then being cranked at 39 outwardly more or less at right angles and then cranked again at 40 through rather less than a right angle to form two somewhat divergent side limbs 41 and 42 of substantial length and which are doubled inwardly upon themselves to form rounded tips 43 and so that the socket proper 44 actually comprises two hollow or double resilient side limbs 41 and 42 arranged opposite one another, the blade of the blade contact 3 of the connector being adapted to be introduced between, and to be gripped by, the inner parts 45 of these two limbs when the socket contact is in use in its holder. The said double side limbs 41 and 42 also constitute a resilient body for the socket contact, such body being a close fit in any one of the channels 7' of the holder 6.

A socket contact as above described is introduced into its channel 7' of the holder from the rear of the latter, the side limbs 41 and 42 being first compressed somewhat together; the extent to which the socket contact can be passed into the holder is limited by the engagement of the rounded tips 43 of the said side limbs 41 and 42 of the contact with the said abutment shoulders 8' adjacent the inner or front face of the holder. The socket contact is located and locked against endwise movement in the holder by the interengagement of the locking projection 11' behind a shoulder formed by one end of a rectangular opening 46 provided in the adjacent side limb 42 of the socket contact and into which opening the projection 11' enters, the limb 42 being resiliently pressed on to the locking projection 11' due to the resilience of the body of the socket contact; moreover this body of the contact tends to expand in its channel and as the said body is of substantially the same width as the channel in which it is placed, the contact is firmly and non-floatingly carried by the holder. The shank 19 is slightly narrower than the said body.

The blade contacts 3 and the socket contacts 5 can be inserted into their respective holders 4 and 6 from the outer or rear sides thereof as is illustrated in Figure 5, where one of the socket contacts 5 is shown in the process of being pushed into its channel 7' in the holder 6.

It will be appreciated that as the socket contact is pushed into its channel, as above explained, the tip 43 of the side limb 42 of this contact rides over the rear sloping surface of the saw-toothed shaped projection 11' within the corresponding channel 7' and the said side limb eventually clicks over this projection almost simultaneously with the front end 43 of the side limb reaching the corresponding abutment shoulder 8'.

The electrical connections, such as 21 indicated in Figure 5, may be made to the blade or socket contacts before these are inserted into their holders, thus facilitating the making of the electrical connections.

The abutment shoulders 8 and 8' prevent the release of the contacts 3 and 5 by the insertion of instruments from the front ends of the holders 4 and 6, and in addition the abutment shoulders

8' space the tips 43 of the side limbs 41 and 42 of the socket contacts from the front face of the holder 6 and protect the tips 43 of the socket contacts which are inset from the front end of the holder. This is particularly advantageous in connection with the socket contacts since they are frequently at a high electrical potential and users of the connector are safeguarded against shock by the accidental touching of the socket contacts by the protection afforded by the abutment shoulders 8'; thus this part of the connector may be regarded as electrically "safe" even when in an alive electrical socket. Covers may be provided to enclose the outer or rear ends of the contacts.

Once the electrical contacts have been introduced into their channels in their respective holders they cannot be withdrawn without the use of some instrument inserted into the rear of the holder to pry the bodies of the contacts away from the locking projections 11 or 11'.

It is preferred to provide at least one of the two holders 4 and 6 with one or more guide or registration pins adapted, or each adapted, to fit into a corresponding location hole or passage provided in the other of the holders when the two holders are being placed together to interengage the blade and socket contacts thereof. Thus, as illustrated in the drawings, the holder 4 may have moulded therein one end of a cylindrical guide or registration pin 47 which projects at right angles from the front face of the holder and is adapted to engage in a correspondingly located guide hole or passage 48 in the other holder 6. Preferably the guide or registration pin 47 and the hole or passage 48 are asymmetrically arranged with respect to their holders so that the latter can only be fitted together in one relative position.

Figure 8 shows a coaxial electrical connector which is useful for many purposes but which is particularly useful in connection with television apparatus, the connector comprising two electrically insulating holders 4' and 6' having coaxial plug and socket connectors 50 and 51, and the holder 4' having a ring of blade contacts 3' similar to those already described with reference to Figures 1 to 7 and each mounted in a channel 7'' in the holder 4', also in the same way as that already described with the exception that these channels are arranged in a circular ring instead of in a straight row. The holder 6' is similarly provided with a ring of channels 7''' similar to the channel 7' already described with reference to Figures 1 to 7 and each containing a socket contact 5' very similar to the socket contacts 5 already described.

With the exception of the socket and blade contact arrangement and their mounting, the connector shown in Figure 8 is substantially the same as known coaxial connectors and therefore will not be described in greater detail.

With electrical connectors constructed as above described and the two parts 1 and 2 of the connectors can be quickly and easily assembled, tools not being necessary for introducing and securing the blade contacts or the socket contacts in their holders, all necessity for staking or twisting the contacts, or the use of extra locking pieces, retaining covers or split holders being avoided; thus the disadvantages inherent in the various prior contact holding arrangements are avoided or reduced. Moreover, the tips of the socket contacts are shielded against accidental contact by the user of the connector as hereinbefore described, and firmer positioning of the blade and socket contacts in their holders is achieved with the consequent avoidance of misalignment of the contacts and the accompanying difficulty in joining together the two parts of the connector.

We claim:

1. An electrical connector comprising a moulded rigid insulating holder having a plurality of channels of rectangular cross-section arranged in a row therein, and electrical contacts slidden endwise into each of said channels from the rear end thereof; said electrical contacts each comprising a strip-like sheet metal blank doubled upon itself to provide adjacent parallel limbs positioned at the front part of the contact to engage and make electrical connection with a mating contact, stop means formed by parts of said blank immediately adjacent one end of said parallel limbs and located transversely thereto, resilient bearing portions formed by spaced parts of said blank disposed parallel to said limbs and connected thereto by said stop means, and, at the rear part of the said contact, a connecting portion adapted to be connected to an electrical supply lead, formed by cranking said spaced bearing portions together; abutment means on said holder extending into each of said channels adjacent the front end of the same positively to limit, by engagement with the said stop means thereof, the insertion of the corresponding contact therein; and saw-tooth-like locking projections on said holder and extending inwardly into each of said channels between the ends of the same, the plane of the front end of each said projection being substantially at right angles to the walls of the channel and the height of said locking projection from the wall of the channel by which it is carried progressively decreasing from the said front end in a direction away from said abutment means, one of said spaced bearing portions of said contact having between its ends an opening the front end of which will, when said contact has been forced past said locking projection and transversely compressed thereby, engage the front end of said locking projection to prevent the contact being withdrawn from the channel, the resilient bearing portions of the contact thereafter engaging the walls of the channel and forming substantially continuous bearing surfaces accurately to align the contact in the channel.

2. The connector specified in claim 1, wherein two of such abutment means extend into each said channel of the holder and said abutment means are, on the side of such channel carrying said locking projection, centrally gapped to facilitate the moulding of the said locking projection and to permit the insertion of a tool to compress the contact and permit the same to be withdrawn.

3. An electrical connector comprising a moulded rigid insulated holder having a plurality of channels of rectangular cross-section arranged in a row therein, and electrical contacts slidden endwise one into each of said channels; abutment means extending into each of said channels adjacent one end of the same positively to limit the insertion of the corresponding contact therein; a locking projection of saw-tooth shape formed integrally with said holder and extending inwardly into each of said channels between the ends of the same. the plane of the front end of said projection being substantially at right angles to the walls of said channel and the height of said locking projection progressively decreasing from the said front end in a direction away from said

abutment means; and said electrical contacts each comprising a sheet metal strip-like blank doubled upon itself to provide adjacent parallel limbs positioned to engage and make electrical connection with a mating contact, resilient bearing portions formed by spaced parts of said blank adjacent said parallel limbs, and a connecting portion, adapted to be connected to an electrical supply lead, formed by cranking said spaced bearing portions together at the end of the doubled blank and remote from said parallel limbs, the portions of said blank joining said parallel limbs and said spaced bearing portions forming stop means positioned to engage said abutment means positively to limit the insertion of said contact into said channel and spacing said connecting portions from said abutment means; one of said spaced bearing portions having between its ends an opening, the front end of which may, when the said contact has been forced past said locking projection and transversely compressed thereby, engage the front end of said locking projection to prevent the contact being withdrawn from the channel, the resilient bearing portions of the contact engaging the walls of the channel and forming a substantially continuous bearing surface accurately to align the said contact in the channel.

4. An electrical connector comprising a moulded rigid insulating holder having a plurality of channels of rectangular cross-section arranged in a row therein, and electrical contacts slidden endwise into each of said channels from the rear end thereof; said electrical contacts each comprising a strip-like sheet metal blank doubled upon itself to provide the blade of a male contact, stop means formed by parts of said blank adjacent said blade being joggled outwardly to be located transversely to said blade, spaced resilient bearing portions formed by joggling parts of said blank adjacent said stop means to lie in planes parallel to said blade but extending in a direction away therefrom, and, at the rear part of the said contact, a connecting portion adapted to be connected to an electrical supply lead, formed by cranking said spaced bearing portions together; abutment means on said holder extending into each of said channels adjacent the front end of the same positively to limit, by engagement with the said stop means thereof, the insertion of the corresponding contact therein; and saw-tooth-like locking projections on said holder and extending inwardly into each of said channels between the ends of the same, the plane of the front end of each said projection being substantially at right angles to the walls of the channel and the height of said locking projection from the wall of the channel by which it is carried progressively decreasing from the said front end in a direction away from said abutment means, one of said spaced bearing portions of said contact having between its ends an opening the front end of which will, when said contact has been forced past said locking projection and transversely compressed thereby, engage the front end of said locking projection to prevent the contact being withdrawn from the channel, the resilient bearing portions of the contact thereafter engaging the walls of the channel and forming substantially continuous bearing surfaces accurately to align the contact in the channel.

5. An electrical connector comprising a moulded rigid insulating holder having a plurality of channels of rectangular cross-section arranged in a row therein, and electrical contacts slidden endwise into each of said channels from the rear end thereof; said electrical contacts being female contacts and each comprising a strip-like sheet metal blank doubled upon itself, the doubled portion forming, at the rear part of the contact, a connecting portion adapted to be connected to an electrical supply lead, spaced resilient bearing portions formed by cranking outwardly the blank adjacent said connecting portion to lie in planes parallel to said connecting portion but extending in a direction away therefrom, contact parts formed by doubling the parts of said blank adjacent said spaced bearing portions inwardly to lie in planes parallel to said spaced bearing parts and therebetween, and stop means formed by the parts of said blank joining said contact parts and said spaced bearing portions, such stop means being located transversely to said bearing portions; abutment means on said holder extending into each of said channels adjacent the front end of the same positively to limit, by engagement with the said stop means thereof, the insertion of the corresponding contact therein; and saw-tooth-like locking projections on said holder and extending inwardly into each of said channels between the ends of the same, the plane of the front end of each said projection being substantially at right angles to the walls of the channel and the height of said locking projection from the wall of the channel by which it is carried progressively decreasing from the said front end in a direction away from said abutment means, one of said spaced bearing portions of said contact having between its ends an opening the front end of which will, when said contact has been forced past said locking projection and transversely compressed thereby, engage the front end of said locking projection to prevent the contact being withdrawn from the channel, the resilient bearing portions of the contact thereafter engaging the walls of the channel and forming substantially continuous bearing surfaces accurately to align the contact in the channel.

6. An electrical connector comprising a moulded rigid insulating holder having a plurality of channels of rectangular cross-section therethrough, and electrical contacts slidden endwise into each of said channels from the rear end thereof; said electrical contacts each being formed of flat strip metal and comprising four successive parts, these being, respectively, a connecting portion for making electrical wiring connections to the contact, said connecting portions being located, when the contact is in position in said holder, at the rear end of said channel and having its direction of length approximately parallel to the longitudinal axis of the channel; a resilient bearing part located forwardly of said connecting portion and comprising two portions, movable together in a longitudinal direction, but resiliently spaced transversely from each other, said bearing portions being substantially parallel to said connecting portion and positioned to engage opposite internal walls of the channel, when the contact is inserted therein, to locate the contact in said holder; a part serving as stop means between said bearing part and a contact part and located transversely of the length of the contact; and the contact part, approximately parallel to the connecting portion and positioned to engage and make electrical contact with a mating contact; abutment means on said holder extending into said channel to engage with said stop means; and a saw-tooth-like locking

projection on said holder extending inwardly into each channel, said locking projection permitting entry of the contact into the channel but, when the contact is fully inserted therein, engaging in a correspondingly located hole provided in the said contact thereby to lock the contact in the holder and prevent the contact being withdrawn.

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