Sept. 6, 1966 R. BAKKER ETAL 3,271,729

CLUSTER RECEPTACLE WITH BASAL LANCE AND ONE PIECE HOUSING

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Fig. 1

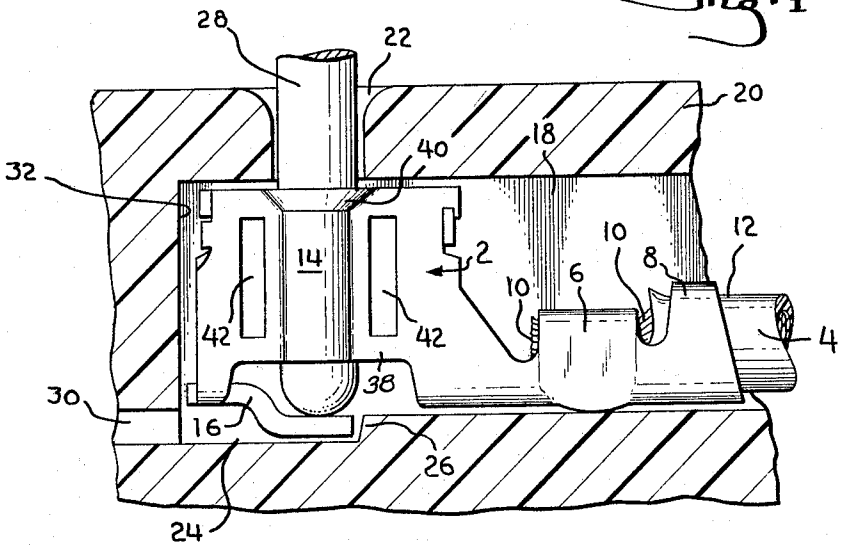
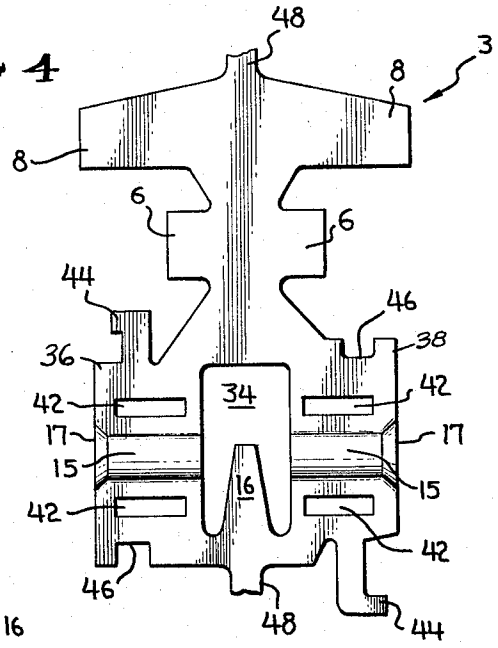


Fig. 4



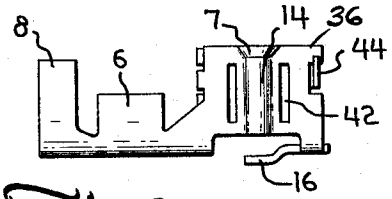


Fig. 2

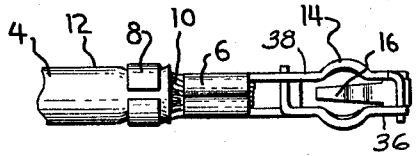


Fig. 3

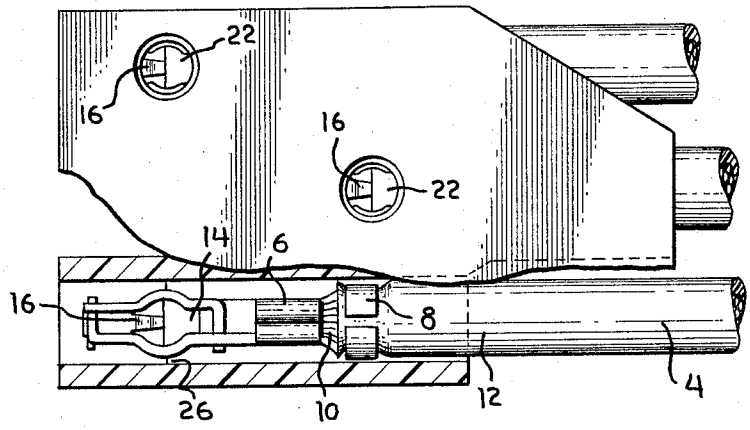
INVENTORS
ROEL BAKKER
BY LUCIANO OBERT
Curtis, Morris & Safford

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CLUSTER RECEPTACLE WITH BASAL LANCE AND ONE PIECE HOUSING

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Fig. 5



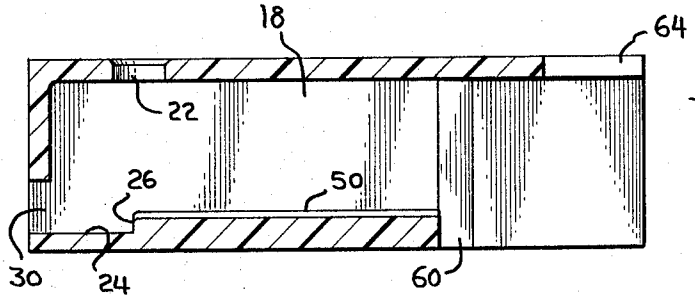
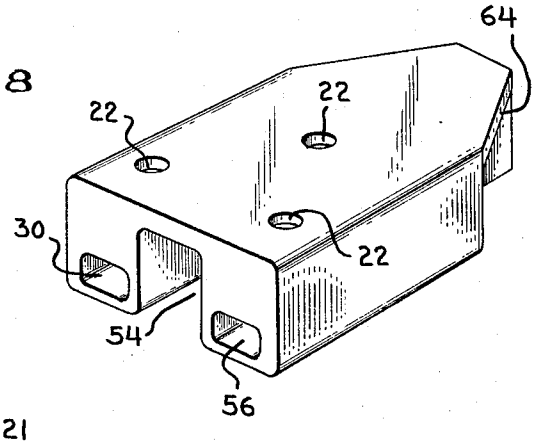


Fig. 6

Fig. 8



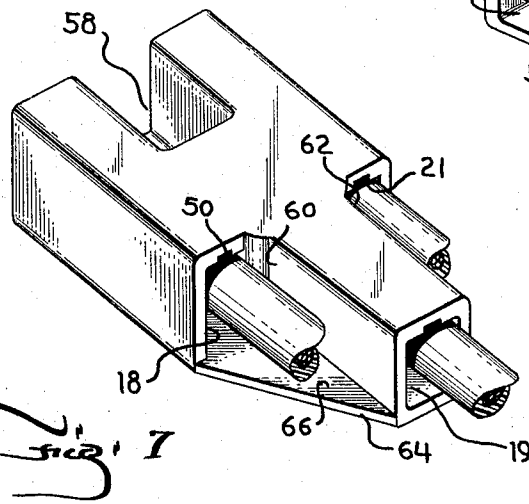


Fig. 7

INVENTORS
ROEL BAKKER
BY LUCIANO OBERT
Curtis, Morris & Safford

United States Patent Office 3,271,729 Patented Sept. 6, 1966

3,271,729

CLUSTER RECEPTACLE WITH BASAL LANCE AND ONE PIECE HOUSING

Roel Bakker and Luciano Obert, Turin, Italy, assignors to AMP Incorporated, Harrisburg, Pa.

Filed Nov. 30, 1964, Ser. No. 414,758
Claims priority, application Italy, Nov. 30, 1963, 24,446/63
6 Claims. (Cl. 339—217)

This invention relates to electrical connectors and housings therefor and is particularly useful in relation to electrical connector receptacles mounted in an insulating housing for use with cluster pin connectors.

Electrical pin connectors are commonly known in the art as Fusite connectors and generally comprise three pins disposed in juxtaposed relationship rigidly mounted in an insulating housing which is secured to a fluid-tight casing.

Suitably designed electrical connectors for receiving the pins are mounted in an insulating housing which is commonly known as a cluster block and is adapted to shield the connectors and pins when in connection from contacting each other or other inadvertent contacting means. Such components are usually used where access for repair or maintenance purposes are often necessary.

A known cluster block comprises a body having recesses receiving receptacles and grooves leading from the recesses to accommodate conductors secured to the receptacles. The receptacles and the conductors have been secured in position by a second part of the block comprising a flat plate of insulating material adapted releasably to engage the block. While the two-piece block has allowed free access for replacement of connectors, assembly is complicated.

Another known cluster block comprises a single piece of insulating material formed with longitudinal passages for conductors having enlargements at one end for accommodating the receptacles, the enlargements having respective apertures for receiving pins connecting with the receptacles. The receptacles are provided with a detent or lip at their sides adapted to engage the pin apertures releasably to secure the receptacles in position. This cluster block requires that the conductors be threaded through the passages to project beyond the block so that the receptacles can be secured to the projecting ends and drawn rearwardly into the block. This has the disadvantage that a receptacle can only be removed by cutting a conductor or breaking a block which complicates maintenance.

According to the present invention, an insulating housing is provided with a plurality of channels, each channel having adjacent one end an aperture for transversely receiving an electrical pin, and opposite the aperture a recess with a shoulder facing the one end. An electrical connector receptacle is disposed in the channel in alignment with the aperture for receiving the connecting pin, and opposite the pin-receiving end the connector is formed with a detent member engaging a shoulder, with a conductor extending from the electrical connector through the other end of the channel.

An object of the present invention is to provide a housing member having a receptacle member therein in alignment with an aperture in the housing member for receiving a connector element through the aperture and the connector element in engagement with the receptacle member supplying additional retention to the receptacle member to maintain it within the housing member.

A further object of the invention is the provision of a housing member having a connector member in a channel thereof which is in alignment with an opening of the channel, the connector member includes a detent member in alignment with a shoulder in the channel so that upon

insertion of a connector element into the connector member, it engages the detent member and urges it into locking alignment with the shoulder.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration and principles thereof and the manner of applying them in practical use so that they may modify them in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is an enlarged fragmentary cross-sectional view of an insulating housing containing a connector in engagement with a connecting pin;

FIGURE 2 is a side elevational view of the electrical connector shown in FIGURE 1;

FIGURE 3 is a top plan view of the electrical connector shown in FIGURE 1;

FIGURE 4 is a plan view of a flat stamping for forming the electrical connector illustrated in FIGURES 1–3;

FIGURE 5 is an enlarged top plan view with a partial section of an insulating housing containing several connectors;

FIGURE 6 is a cross-sectional view of the insulating housing illustrated in FIGURE 5;

FIGURE 7 is a bottom perspective view of the insulating housing with electrical connectors and conductors mounted therein; and

FIGURE 8 is a top perspective view of the insulating housing with the electrical connectors and conductors removed therefrom.

Turning now to the drawings and more particularly to FIGURES 1 through 5, there is illustrated an electrical connector **2** which is secured to a conductor **4** by ferrule portions **6** and **8**, respectively, secured to stranded core **10** and insulation **12** of the conductor by crimping or cold-forging. Connector pin receptacle portion **14** of electrical connector **2** is arranged transversely with respect to ferrule sections **6** and **8** which are an integral part of the connector and extend from the rear portion of the receptacle portion at its lower side. Electrical connector **2** at its forward lower end is formed with a detent finger member **16** which extends downwardly and rearwardly below receptacle portion **14** at a level below the base of ferrule sections **6** and **8**.

Electrical connector **2** is mounted in a channel **18** which has a substantially rectangular-shaped uniform cross section in insulating housing **20**. Adjacent the end of channel **18**, insulating housing **20** is formed with an aperture **22** which extends transversely of the channel and open at an upper side thereof. Opposite aperture **22** insulating housing **20** is formed with a recess portion **24** at the lower side of the channel, thus providing a forward facing shoulder member **26**. Recess portion **24** accommodates detent finger member **16**, and, in turn, the rearward end of the detent finger member engages shoulder **26** to resist rearward longitudinal movement or withdrawal of electrical connector **2** from the channel.

An electrical connecting pin **28** extends through aperture **22** and engages receptacle portion **14** of electrical connector **2** as can be noted in FIGURE 1. The forward or lower end of connecting pin **28** engages detent finger member **16** to urge it downwardly into recess portion **24** so as to move the detent finger in alignment with or against shoulder **26** in order to lock the electrical connector in the housing to prevent withdrawal therefrom.

Forwardly and opposite shoulder 26, insulating housing 20 is formed with an opening 30 for admission of a suitably designed tool to release detent finger member 16 from shoulder 26 by lifting member 16 above the floor of the channel so that electrical connector 2 may be withdrawn rearwardly therefrom. The channel has a cross-sectional configuration adapted to receive electrical connector 2 in a slidably fitting manner and the conductor in a snug fit so as to support and prevent electrical connector 2 from vibrating. End wall 32 of the channel is so spaced from forward facing shoulder 26 so as to provide free access of detent finger member 16 into recess 24 with a slight clearance between the end of electrical connector 2 between shoulder 26 and end wall 32.

The electrical connector (see FIGURES 2–4) is suitably formed from a flat metal stamping 3 of the configuration illustrated in FIGURE 4 wherein rearwardly spaced transverse pairs of ferrule ears 6 and 8 are adapted to be bent upwardly into U-shaped ferrule sections for crimping to the core 10 and insulation 12 of insulated electrical conductor 4. Forwardly of ferrule-forming ears 6, the stamping is formed with a surface having a centrally-located aperture 34 between side portions 36 and 38 which are adapted to be folded upwardly so as to provide opposite sides of receptacle portion 14. Side portions 36 and 38 are formed with central arcuate recesses 15 adapted to form opposite sides of cylindrically-shaped receptacle portion 14 of electrical connector 2 when side portions 36 and 38 are folded upwardly on opposite sides of aperture 34. Remote portions of arcuate recesses 15 are formed with chamfered portions 17 adapted to form an enlarged opening 40 of receptacle portion 14 of electrical connector 2 for guiding pin connector 28 into cylindrically-shaped portion 14. Each side portion 36 and 38 is formed on opposite sides of central arcuate recess 15 with slots 42. Side portion 36 is formed at its rear end with a hook 44 and at its respective forward end with a slot 46 and the other side portion 38 is formed with a similar hook arrangement 44 at its forward end and a slot 46 at its rearward end. Detent finger member 16 extends into central aperture 34 rearwardly from a forward portion of the stamping, thus bridging side portions 36 and 38 in a rearward and slightly tapered manner. At its forward and rearward ends, the stamping is formed with carrier strip portions 48 which serve to connect the stamping with a similar stamping in a longitudinal arrangement.

Upon folding up of stamping 3, as illustrated in FIGURES 2 and 3 to form electrical connector 2, ferrule-forming ears 6 and 8 and opposite side portions 36 and 38 are folded to form U-shaped sections. Rearward hook portion 44 on side portion 36 is folded to engage slot 46 at the rear of side portion 38 and similarly forward hook portion 44 on side portion 38 is folded to engage forward slot 46 on side portion 36 in order to secure side portions 36 and 38 together. Detent finger member 16 is deformed downwardly and rearwardly to terminate below receptacle portion 14 at a level below ferrule portions 6 and 8. Thus, hook portions 44 in engagement with respective slots 46 maintain receptacle portion 14 in a position to apply constant pressure onto pin 28 when disposed therein. Also, slots 42 on each side of arcuate recesses 15 provide proper resiliency to side portions 36, 38 so that receptacle portion 14 has a low insertion force and high pull-out force.

Insulating housing 20, as illustrated in the drawings (see FIGURES 5–8), comprises a housing of dielectric insulating material formed with three parallel spaced channels 18, 19 and 21 of identical cross-sectional configuration. Each channel is open at the rear for connector entry and partially closed at the forward end of insulating housing 20. Outer channels 18 and 21 extend substantially through the length of the insulating housing and terminate adjacent the forward end thereof. Central channel 19 extends approximately two-thirds through the insulating housing from the extreme rear end forwardly.

Each channel is formed along its base with a longitudinal recess 50 adapted to cooperate with detent finger member 16 upon insertion of an electrical connector 2 into insulating housing 20 so as to guide it into the channel the desired distance. Forward ends of the channels communicate at lower portions thereof with respective openings of reduced height 30, 54 and 56 which open at a forward end of the insulating housing. Forward ends of the channels are formed with respective recesses 24, as previously described, which have a floor common to openings 30, 54 and 56, recesses 24 defining the forward facing shoulders 26 which are exposed through openings 30, 54 and 56.

Insulating housing 20 at its upper side (see FIGURE 8) is formed with apertures 22 communicating with respective channels 18, 19 and 21 adjacent forward ends thereof opposite recesses 24 and shoulders 26. Apertures 22 are slightly flared at their outer sides so as to facilitate the entry of connecting pins 28 upon assembly.

As can be noted in FIGURE 7, insulating housing 20 is recessed on the side remote from apertures 22, between channels 18 and 21, as shown at 58, recess 58 being separated from the forward end of channels 18 and 21 by an end wall in which opening 54 is located. At the rear of insulating housing 20, rearward ends of outer channels 18 and 21 terminate forwardly of the rear end of centrally-located channel 19 with the centrally-located wall portion of insulating housing 20 extending rearwardly of the rear ends of channels 18 and 21. Sidewalls are inclined forwardly and outwardly towards the rear ends of channels 18 and 21, as indicated at 60 and 62. Sidewalls 60 and 62 serve to guide the connectors with conductors attached into channels 18 and 21. Side edges 64 of the housing are inclined rearwardly and inwardly from the outer rear sides of channels 18 and 21 to the rear sides of channel 19 to provide a triangular-shaped platform 66 on either side thereof overlying the entrance to channels 18 and 21. Triangular-shaped platforms 66 serve both to strengthen insulating housing 20 and also to guide electrical connectors 2 into channels 18 and 21.

As can be noted in the drawings, channels 18, 19 and 21 are of a suitable width so that wire insulation 12 of conductor 4 is in a snug slidable fit in the channels which serve to resist lateral movements of the electrical connectors while in the channels.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

What is claimed is:

1. An electrical connector comprising a housing member of dielectric material formed internally with a channel extending therethrough open at one end, said housing member having an aperture in communication with the channel, the channel opposite said aperture being formed with a shoulder, an electrical connector having a receptacle portion being disposed in said channel with said receptacle portion in alignment with said aperture for receiving a connecting pin therethrough, said receptacle portion being provided with detent means engaging said shoulder to prevent said connector from being withdrawn from said channel, said connecting pin being disposable within said receptacle portion and engageable with said detent means to urge said detent means into locking alignment with said shoulder to prevent withdrawal of the connector from said channel.

2. An electrical connector, as claimed in claim 1 wherein the electrical connector is formed from a flat stamping including an opening formed centrally therein, said stamping being folded upwardly to form side portions defining said receptacle portion, said detent means extending outwardly from an edge of said opening.

3. An electrical connector as claimed in claim 1 wherein the housing member is formed with three parallel channels with the outer channels terminating adjacent the forward end of the said housing member and the inner channel terminating intermediate the forward and rearward ends of said housing, openings in sidewalls of the channels at one side thereof, said openings being arranged in a generally triangular pattern with a side of the triangle parallel to a forward edge of the housing member.

4. An electrical connector comprising a dielectric housing member having a channel therein terminating at a wall thereof and having an aperture through another wall proximate said first-mentioned wall in communication with said channel, said channel having a shoulder in a surface opposite said aperture, an electrical connector member disposed in said channel and having a receptacle portion disposed in alignment with said aperture for receiving a pin connector therein, and a detent member on said connector member extending along said surface for engagement with said shoulder to maintain said receptacle portion of said connector member in alignment with said aperture, said pin connector upon engagement with said receptacle portion through said aperture engaging said detent member to urge same into locking alignment with said shoulder to prevent withdrawal of the connector from said channel.

5. An electrical connector as claimed in claim 4 wherein said first-mentioned wall has an opening in alignment with said shoulder to allow an extraction tool to be passed therethrough for engagement with said detent member to bias same above said shoulder to allow said connector element to be withdrawn from said channel.

6. An electrical connector comprising a dielectric housing member having a channel therein, said channel having a shoulder in one surface thereof, a connector member having a receptacle portion in said channel in alignment with an opening thereof for receiving a connector element therein, and detent means on said connector member in alignment with said shoulder to maintain said connector element in said channel, said connector element upon being inserted into said receptacle portion to make electrical connection therewith engaging said detent means to urge same into locking alignment with said shoulder to prevent withdrawal of said connector member from said housing member.

References Cited by the Examiner

UNITED STATES PATENTS

2,457,703	12/1948	Merkel	339—150
2,728,060	12/1955	Doeg	339—192
2,989,724	6/1961	Woofter	339—217
3,065,448	11/1962	Hopkins et al.	339—217
3,101,985	8/1963	Skony	339—192
3,206,715	9/1965	Skony	339—192

EDWARD C. ALLEN, *Primary Examiner.*

PATRICK A. CLIFFORD, *Examiner.*