March 4, 1969 B. W. OLSON 3,431,536

WIRE TERMINATION ELECTRICAL JUNCTION AND CONTACT RETENTION SYSTEM

Filed July 5, 1967

FIG. 1.

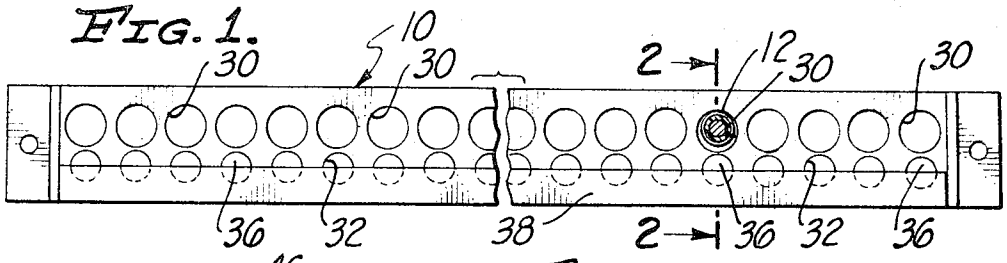


FIG. 2.

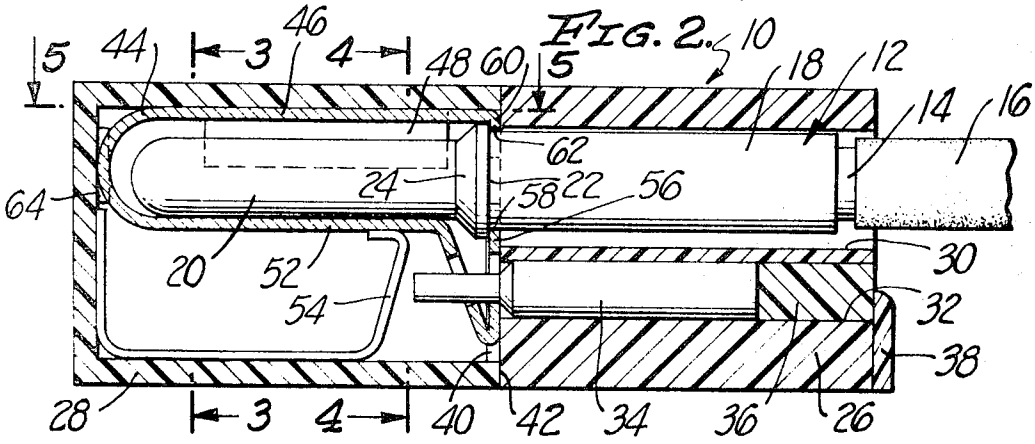


FIG. 3.

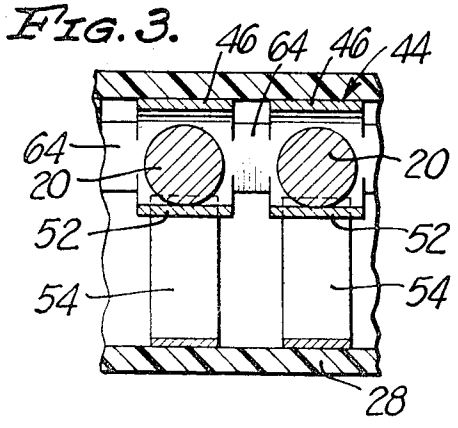


FIG. 4.

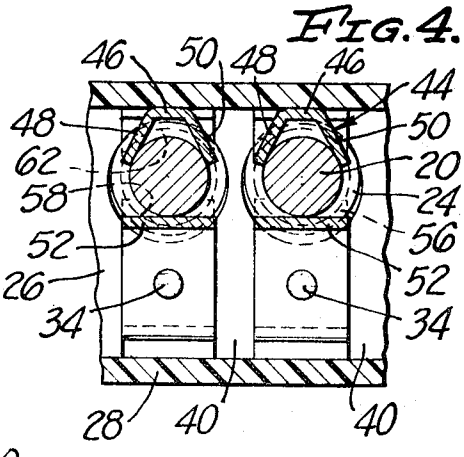
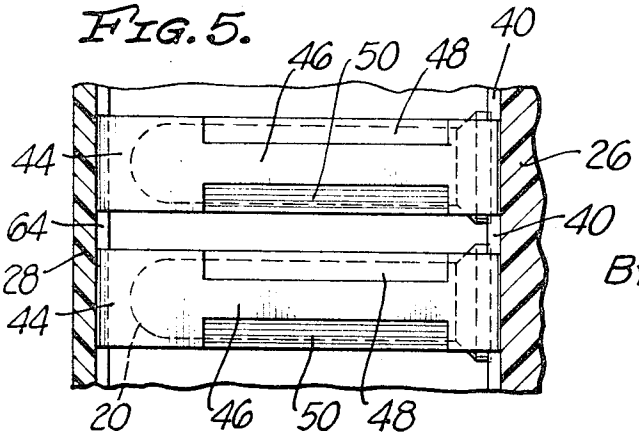


FIG. 5.



INVENTOR

BYRON WESLEY OLSON

BY

EDWARD D. O'BRIAN

ATTORNEY

United States Patent Office

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WIRE TERMINATION ELECTRICAL JUNCTION AND CONTACT RETENTION SYSTEM

Byron W. Olson, 518 Santa Barbara,
Fullerton, Calif. 92632

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ABSTRACT OF THE DISCLOSURE

A wire termination has a termination body which includes a cylindrical nose and a retention flange. The rear of the body is crimped upon the wire in conventional manner. The termination body is inserted into a contact body. The contact body is inserted into a contact body. The contact body has contact blades which mechanically and electrically engage the cylindrical nose. At least one of the blades is resilient to maintain contact pressure. This resilient blade engages on the outer side of the retention flange on the termination body to retain the termination body in place. A release pin, accessable from the exterior is arranged to move the resilient blade so that it can disengage from the retention flange so that the termination body can be withdrawn.

Background

This invention is directed to a wire termination electrical junction and contact retention system and is in such form that each separate wire in an electrical wiring system carries a termination body thereon and each termination body is received in an opening in a contact body. Each opening in the contact body has contact blades therein and retention means therein for retaining the termination body. The retention means is releasable. Electrical contact from the contact blades in the contact body can go to adjacent contact blades, or can electrically extend in any convenient manner.

There have been many previous attempts to provide reliable electrical contact on the ends of electric wires where they are electrically connected to parts of the electrical system. The connection means which are permanent can be made quite reliable, but previous attempts at positive retention and reliable electrical contact for disconnectable electric connections have not been fully satisfactory.

Summary

This invention is directed to a wire termination electrical junction and contact retention system. It includes a termination body which is crimped onto the end of the wire. The termination body is designed for a single wire and as a single wire termination. The termination body includes a cylindrical nose and a retention flange. The cylindrical nose lies in mechanical and electrical contact with contact blades in the contact body. The contact blades include a resilient blade which engages the nose of the termination body and maintains it in reliable electrical contact with the contact blades. The resilient blade has a locking flange which engages behind the retention flange on the termination body to retain the termination body in the contact body. There are two contact blades in relatively fixed position within the contact body and these contact blades engage on adjacent portions of the cylindrical nose. The resilient blade is positioned opposite to the relatively fixed contact blades and urges the cylindrical nose into reliable electrical contact. If desired, a spring can supplement the spring force of the resilient blade. Release is accomplished by a release pin which is accessable from the exterior of the contact body, which release pin moves the lock flange from behind the retention flange on the termination body to thus permit withdrawal of the termination body from the contact body.

By means of the arrangement between the relatively fixed contact blades and resilient blade, reliable electrical contact is established between the blades and the cylindrical nose on the termination body. Furthermore, retention of the termination body within the contact body is reliable because of the locking flange in the contact body in engagement with the retention flange on the termination body. Such reliability has been absent from the prior art structures, and is especially important in environments where vibration is a factor.

Accordingly, it is an object of this invention to provide a wire termination electrical junction and contact retention system wherein electrical contact is maintained with reliability. It is another object of this invention to provide an electrical connection system wherein a termination body on the end of a wire can be securely positioned within a contact body and can be removed therefrom, when desired. It is another object to provide a termination body having a contact nose and a retention flange together with a contact body which electrically contacts with the contact nose and disengageably locks the retention flange so that thetermination body is firmly retained, but can be removed. It is a further object to provide a contact body which is small yet contains all the necessary structure for proper electric contact with the termination body and its retention. It is a further object of this invention to provide a contact body which can be arranged to have a plurality of openings therein for electric contact with a plurality of termination bodies, such being closely spaced for space conservation. Other objects and advantages of this invention will become apparent from a study of the specification, claims and the attached drawings.

Description of the drawings

FIG. 1 is a front elevational view of the contact body of this invention.

FIG. 2 is an enlarged section taken generally along the line 2—2 of FIG. 1, showing the termination body within the contact body.

FIG. 3 is a section taken generally along the line 3—3 of FIG. 1, with parts broken away.

FIG. 4 is a section taken generally along the line 4—4 of FIG. 2, with parts broken away.

FIG. 5 is a section taken generally along the line 5—5 of FIG. 2, with parts broken away.

Description

Referring to the drawings, the contact body **10** is indicated in front elevational view in FIG. 1. Termination body **12** is indicated in side elevation in FIG. 2. Termination body **12** is arranged to be connected onto the end of a wire having conductor **14** and insulation **16**. The insulation is stripped back for the proper distance to expose conductor **14** from the end of the wire. Conductor **14** may be either a single conductor or a plurality of individual conductors. Termination body **12** has a tubular sleeve **18** into which the conductor **14** is inserted, and sleeve **18** is thereupon crimped down upon the conductor in conventional manner. If preferred, other fastening means such as soldering or welding can be used. The forward end of the termination body **12** has a nose **20** which is cylindrical through a major portion of its length and is rounded at its front end. Between the nose **20** and sleeve **18** is retention flange **22**. Retention flange **22** has a conical section **24** on its forward side and its rear side is planar, substantially at right angles to the axis of termination body **12** so that the retention flange is substantially of arrowhead shape. Termination body **12** is metal-

lic and is preferably of suitable malleable material for the crimping of sleeve 18. Furthermore, the metal is preferably of low resistance to make it suitable for contact usage.

Contact body 10 comprises receptacle 26 and housing 28. Receptacle 26 has one or more terminal openings 30. Openings 30 are preferably cylindrical and extend all the way through the receptacle portion of body 10 so as to open into the housing portion thereof. A plurality of such terminal openings are shown in FIG. 1, and the length of the contact body 10 is appropriate for the desired number of such openings for each one of the openings corresponds to one termination body 12 which can be inserted therein. Directly below each terminal opening 30 is a release pin opening 32. Positioned within the release pin opening 32 is release pin 34 and insulated plunger 36. In some cases it is desirable to make the release pin 34 of metallic material in order to provide it with long life. In that case it is necessary to use a separate insulated plunger 36 to prevent a conductive portion, in contact with the electrical circuit parts from being exposed on the outside. When the release pin 34 is made of insulating material, it may be unitary with the plunger 36. Stop 38 is secured to the front of receptacle 26 to retain the release pin and plunger within the opening 32. However, stop 38 does not completely cover the openings so that it permits access to the top of the insulated plunger so that it may be manually depressed from the outside.

Both receptacle 26 and housing 28 are preferably made of synthetic polymer composition material having good insulating qualities. The housing 28 is preferably of uniform cross section so that it can be extruded. Usually the receptacle 26 will require a considerable number of terminal openings 30 and thus it will be too long to extrude. Thus, the receptacle 26 is preferably injection molded. Additionally, the inner wall of receptacle 26 carries dividers 40 which are positioned between the several openings 30 to retain the internal parts within housing 28 in proper position. Housing 28 is of channel configuration with its upper and lower flanges joined to receptacle 26 at joint 42. Joining may be accomplished by any convenient means, and since both are preferably made of polymer composition material, solvent welding or ultrasonic bonding are suitable for joining.

A contact 44 is placed with the interior of housing 28 for each of the terminal openings 30. Each of the contacts 44 comprises an upper contact web 46 which lies against the top flange of the housing 28. Contact flanges 48 and 50 are bent down from contact web 46 and are positioned so that nose 20 lies in engagement with both of these flanges. These flanges serve as contact blades with which nose 20 is in electrical contact. The contact 44 extends toward the back wall of housing 28 and is curved downwardly to form resilient blade 52 which extends beneath nose 20. Resilient blade 52 preferably has sufficient resiliency to properly urge nose 20 into contact with contact flanges 48 and 50. Should the metallic material of contact 44 be insufficient to provide the necessary contact force, an optional supplemental spring 54 can be positioned to provide the necessary force.

Toward the front end of housing 28, contact 44 extends downward and then upward to form locking flange 56. Both the downwardly extending portion of contact 44 and the upwardly extending locking flange 56 have openings therein through which a guide on release pin 34 can be inserted. This guide aids in maintaining the parts in position during vibrational situations. The upwardly extending locking flange 56 engages behind retention flange 22 on the termination body 12. Furthermore, the upwardly extending portion of the locking flange has a circular surface 58 so that the fingers of the locking flange embrace around a portion of the circumference of the retention flange. Similarly, the facing portion of the contact 44 extends downwardly to provide hook 60 which has a similar circular surface 62 which is defined by two legs which also engage upon the back of retainer flange 22 and partly embrace its circumference. The contact body 10 is thus of such nature that it can accept termination bodies 12 therein and make electrical contact therewith.

When it is desired that adjacent contact blades 44 be in contact with each other, they are joined by a common back wall 64. This back wall is an integral portion of the series of contacts 44 so that the contacts are mechanically and electrically joined. External electrical connection can be permanently made at the portion of contact 44 which approaches the back wall, or can be made at the back wall 64 which joins adjacent contacts 54. Preferably, no further electrical connection is made in contact body 10 but adjacent contacts 44 are electrically connected by the joining metallic back wall 64 so that adjacent termination bodies 22 are in electrical contact with each other through their contacts 44 and joining back walls 64. Thus, there is no need for electrical connection to the contacts 44. By this means the entire structure can be made very small with full flexibility of connecting and disconnecting termination bodies with respect to the contact body 10. Thus, any number of adjacent contacts 44 can be in electrical connection through their integral back wall 64. This also provides the mechanical stability which is necessary to keep parts from shifting within housing 28. When such portion is removed, an insulating dividing wall is preferably secured in place thereof.

In operation, the contact body 10 is built with the appropriate numbers of contacts 4 in electrical connection with each other and appropriate numbers separated from each other so that the desired electrical arrangement is made. This electrical arrangement can be identified by different colors of the stop 38 and/or appropriate indicia printed upon stop 38. Termination bodies 12 are crimped upon the appropriate wires for which connection is desired and the termination bodies are ready to be inserted into the contact body. Appropriate termination bodies are inserted in their respective terminal openings 30. As they are thrust into place, the conical section 24 on retention flange 22 thrusts the locking flange 56 downward. The upper portion of the retention flange 22 slips under the circular surface 62 and snaps in place behind hook 60. At the same time, locking flange 56 engages behind retention flange 22. During insertion of the termination body 12, it is in sliding contact with contact flanges 48 and 50 and in sliding contact with resilient contact blade 52. Thus, proper electrical contact is assured when the termination body is fully in place.

When disconnection is desired, plunger 36 and release pin 34 are thrust inward by means of engagement with the outside face above stop 38. This inward thrust causes the face of release pin 34 to urge resilient blade 52 and locking flange 56 downward so that the retention flange 22 is released from hook 60 and locking flange 56. At this point termination body 12 can be withdrawn. The termination body 12 is undamaged and can be reused in the contact body 10 as often as is desired. The contact body 10 need only be slightly deeper in the front to back direction than the length of the termination body 12, and its height is approximately twice the height of termination body 12. This is also true with respect to the spacing between the terminal openings 30. Only slightly more center to center distance is required between the terminal openings 30 than the maximum diameter of the termination body 12. Thus, a very compact structure is possible so that many terminations can be made in a very small space.

This invention having been described in its preferred embodiment, it is clear that it is susceptible to numerous modifications and embodiments within the scope of those skilled in the art and without the exercise of the inventive faculty.

I claim:

1. A wire termination electrical junction and contact retention system comprising a termination body arranged to be secured to the end of an electrical conductor and a

contact body into which said termination body is inserted and detachably restrained in electrical contact with a contact blade within said contact body;

said termination body comprising a retention flange and a nose extending beyond said retention flange, the improvement comprising:

said contact blade in said contact body having a contact flange thereon, said nose lying in electrical contact with said contact flange, a resilient contact blade in engagement with said nose opposite said contact flange to maintain electrical contact force between said nose and said contact flange, a locking flange on said resilient contact blade, said locking flange engaging behind said retention flange on said termination body to retain said termination body in said contact body and in electrical engagement with said contact blade; said contact blade, said resilient blade and said locking flange being formed from a unitary piece of conductive material.

2. The electrical junction contact retention system of claim 1 wherein said contact body has a terminal opening therein, said termination body being arranged to pass into said terminal opening and said retention flange on said termination body being arranged to pass said locking flange on said resilient blade to retain said termination body within said contact body.

3. The electrical junction contact retention system of claim 2 wherein said contact blade comprises a web fixed relatively stationary within said contact body, first and second contact flanges integrally formed with said web and positioned to be engaged by said nose on said termination body, said resilient blade being positioned to resiliently urge said nose on said termination body into electrical contact with said flanges.

4. The electrical junction contact retention system of claim 3 wherein said locking flange comprises a leg on said contact blade directed away from said flange and said locking flange is secured to said leg and extends generally toward said flange to substantially lie in a plane perpendicular to the axis of said terminal opening.

5. The electrical junction contact retention system of claim 4 wherein said locking flange has a substantially circular surface thereon to engage part way around said termination body adjacent said retention flange.

6. The electrical junction contact retention system of claim 5 wherein said contact blade has a hook thereon, said hook lying substantially fixed within said contact body and being directed towards said locking flange, said hook having a substantially circular surface thereon arranged to extend partially around said termination body adjacent said retention flange thereon.

7. The electrical junction contact retention system of claim 6 wherein a release pin opening is provided in said contact body and a release pin is slidably positioned within said release pin opening, said release pin engaging said locking flange so that motion of said release pin within said release pin opening causes disengagement of said locking flange from said retention flange on said termination body.

8. The electrical junction contact retention system of claim 1 wherein there are a plurality of contact blades positioned within said contact body and a terminal opening positioned in line with each of said contact blades.

9. The electrical junction contact retention system of claim 8 wherein at least some of said contact blades are adjacent each other and at least some of said adjacent contact blades are electrically connected to each other so that a plurality of termination bodies inserted in adjacent terminal openings are in electrical contact with each other.

10. The electrical junction contact retention system of claim 9 wherein adjacent contact blades in electrical contact with each other are unitary.

11. The electrical junction contact retention system of claim 8 wherein dividing walls are positioned in said contact body between at least portions of said adjacent contact blades to mainatin said contact blades in line with said terminal openings.

12. The electrical junction contact retention system of claim 1 wherein a spring is positioned adjacent said resilient blade and in contact with said resilient blade, said spring urging said resilient blade toward said contact flange.

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RICHARD E. MOORE, *Primary Examiner.*