United States Patent [19]

Newman

[11] **3,777,298**

[45] **Dec. 4, 1973**

[54] **ELECTRICAL CONNECTOR**

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[73] Assignee: **Empire Products, Inc.,** Cincinnati, Ohio

[22] Filed: **Dec. 2, 1971**

[21] Appl. No.: **204,194**

[52] **U.S. Cl.** ..... **339/16 R,** 339/91 R, 339/137

[51] **Int. Cl.** **H01r 3/04**

[58] **Field of Search** ..... 339/15, 16 R, 16 C, 339/117, 118, 74, 91, 136, 137

[56] **References Cited**

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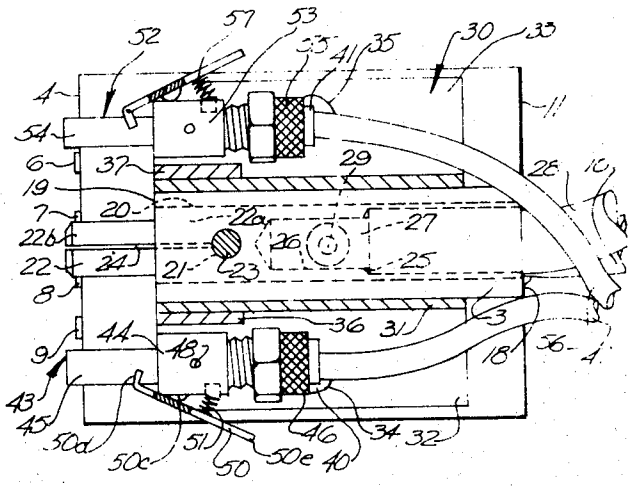
Assistant Examiner—Robert A. Hafer
Attorney—John W. Melville et al.

[57] **ABSTRACT**

A connector for electrical and fluid conduits. The connector comprises first and second body members, the first body member having one or more male electrical contacts and one or more male fluid conduit couplers. The second body member has one or more female electrical contacts and one or more female fluid conduit couplers. The first and second body members are adapted to be joined in abutting relationship with their respective male and female electrical contacts and their respective male and female fluid conduit couplers in engagement. Latch means are provided to maintain the first and second body members in joined relationship and protective means are provided for the various male and female electrical contacts and male and female fluid conduit couplers when the first and second body members are in their joined or separated conditions.

9 Claims, 12 Drawing Figures



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SHEET 1 OF 3

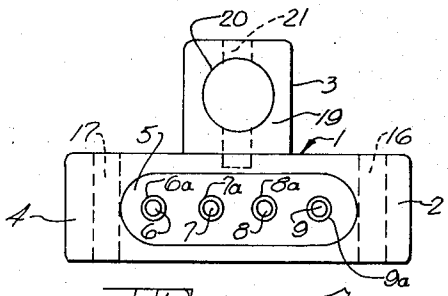

FIG 1

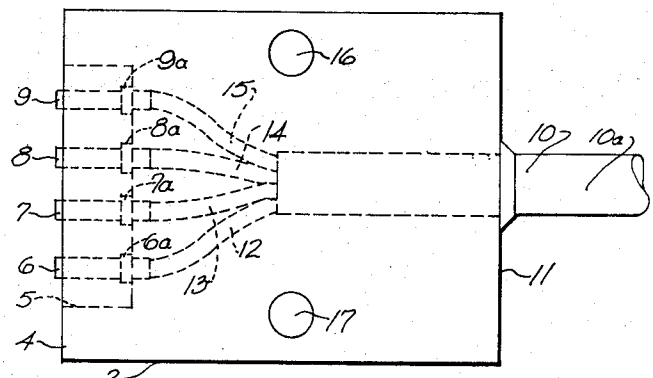

FIG 2

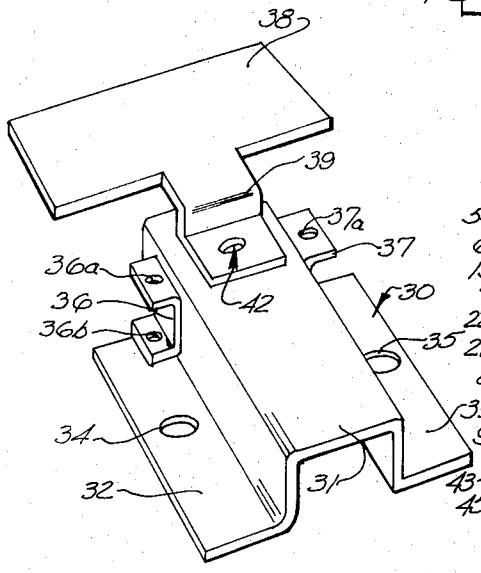

FIG 3

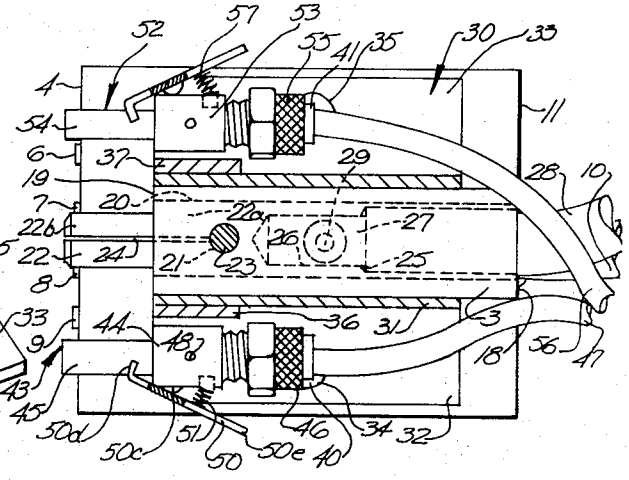

FIG 5

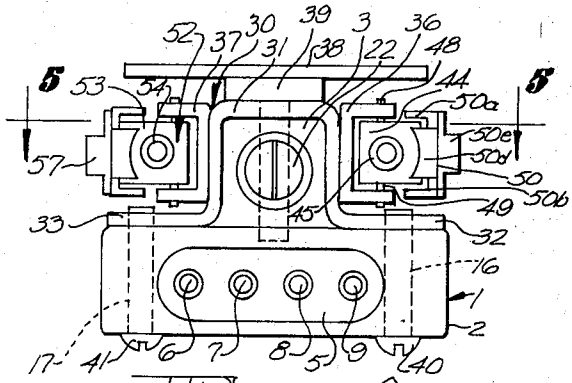

FIG 4

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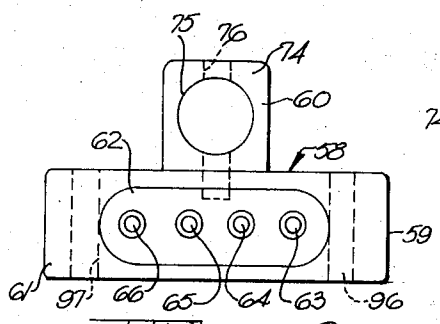

FIG 6

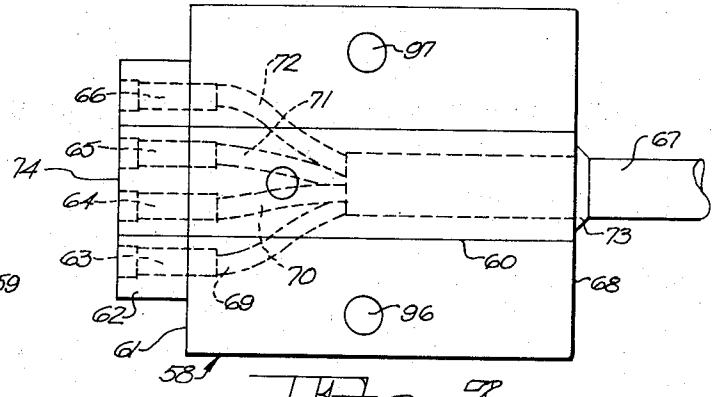

FIG 7

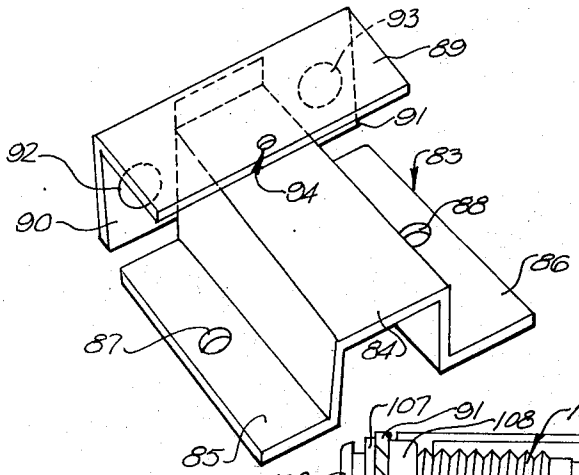

FIG 8

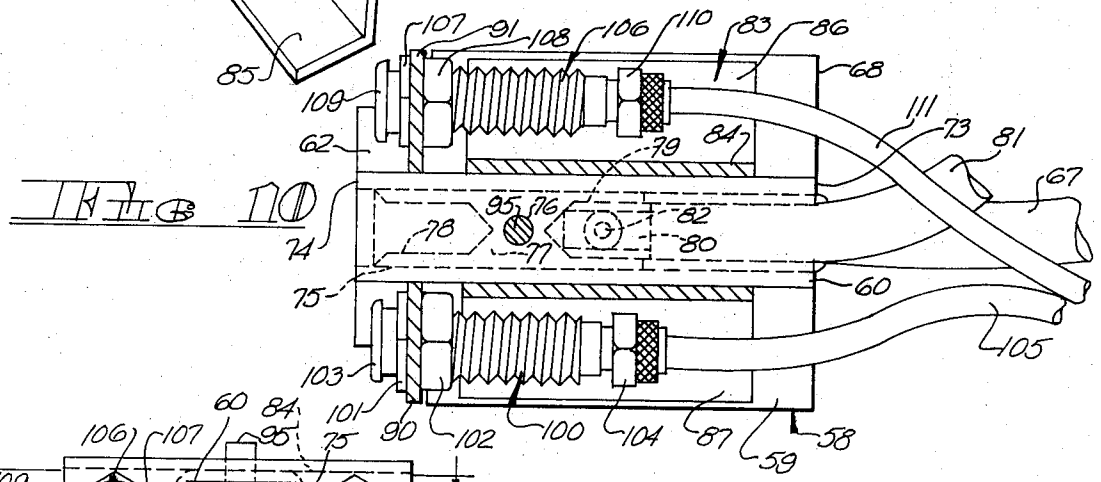

FIG 10

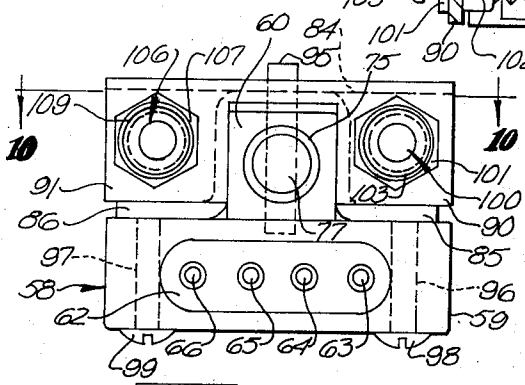

FIG 9

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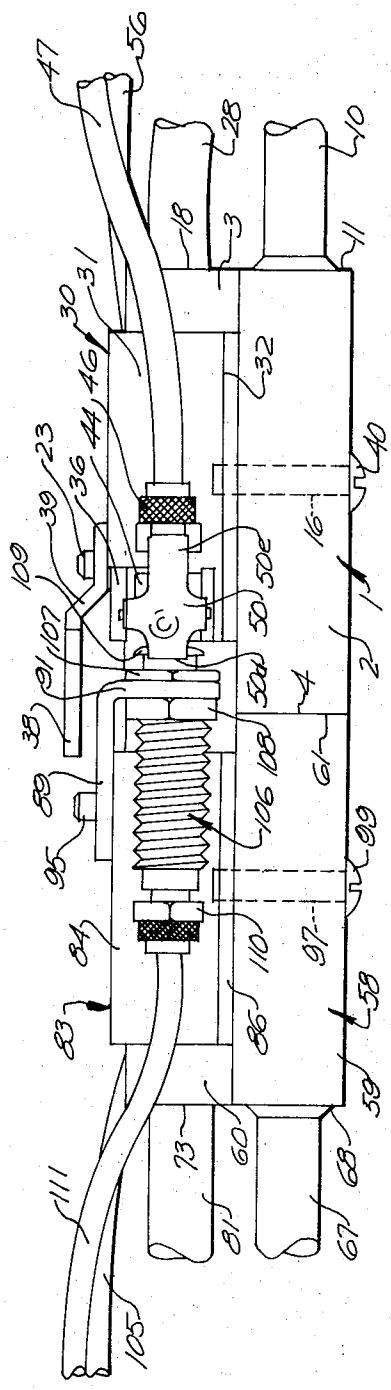

FIG. 11

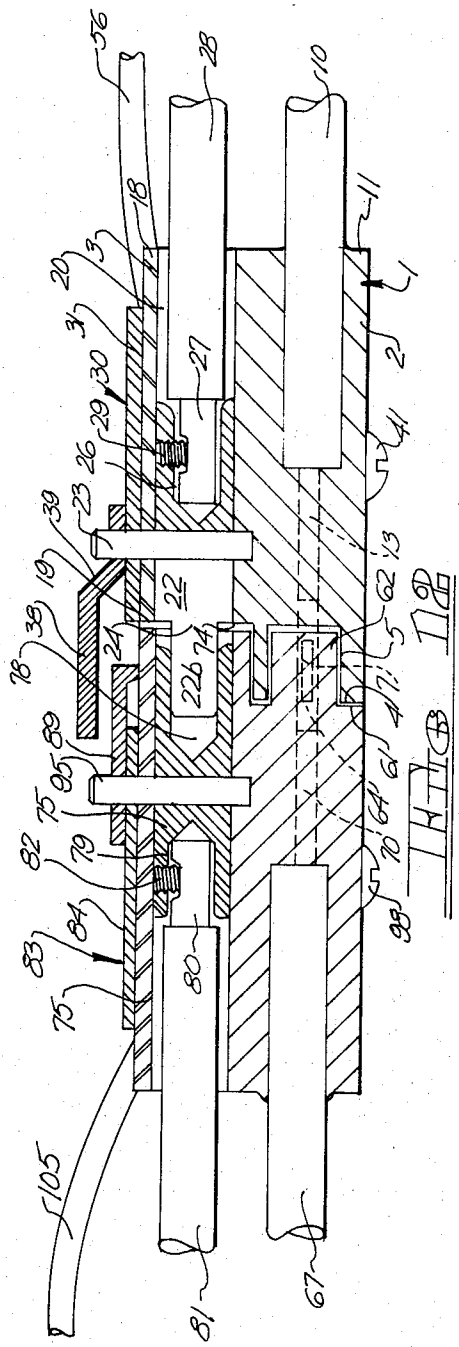

FIG. 1D

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ELECTRICAL CONNECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a connector, and more particularly to a connector for both electrical and fluid conduits.

2. Description of the Prior Art

The connector of the present invention is substantially unlimited in use, finding application whenever it is required that one or more electrical conductors and one or more fluid conduits be joined. For purposes of an exemplary illustration, the connector will be described in its use with a welding means, and more particularly a stud welding gun.

A conventional stud welding gun, (as for example the ones manufactured by Nelson Stud Welding Company, a United Carr Division of TRW, Inc.; KSM Division, Omark Industries, Inc.; and USM Corp., Warren Fastener Division) requires a power cable for the welding current, a pair of air hoses to operate the stud feeding cylinder and four additional electrical conductors for various control purposes. Thus, if these various conduits and conductors are to be connected to their respective sources of air and electricity, seven connections meed be made, whether the stud welding gun is being used in the field or in the factory.

Heretofore, it was not uncommon that each connection was made separately. Furthermore, these connections had to be made correctly lest a dangerous condition arise or a malfunction of the stud welding gun result. Such a malfunction might further result in damage to the material being welded, as well as to the stud welding gun itself.

In various manufacturing processes, it is common that a plurality of stud welding guns are used simultaneously. For example, in assembling the trim about the windshield of a vehicle, as many as 40 or more studs are required. In an assembly line operation, a frame is provided mounting as many stud welding guns as there are studs to be provided so that all of the studs may be welded in a single, simultaneous operation. It will immediately be seen that when a plurality of stud welding guns are used, each requiring multiple connections, the problem of connecting and disconnecting them may be a difficult and time consuming one.

The present invention provides a simple connector whereby the various connections for each stud welding gun may be made quickly and safely by a single, simple operation. The device of the present invention assures that the various conduits and conductors are properly and adequately connected. Latch means are provided so that inadvertent disconnection cannot occur. Furthermore, the various male and female electrical contacts and the various fluid conduit couplers are protected from damage when the connector of the present invention is in either its connected and/or disconnected condition.

It will be understood by one skilled in the art that the number of male and female contact means does not constitute a limitation on the present invention. The same is true with respect to the fluid conduit couplers. It is further within the scope of the invention to provide one or more fluid conduits carrying liquids, or gasses other than air. This may be true, for example, when the welding being performed is of the "submerged" type.

SUMMARY OF THE INVENTION

The connector of the present invention comprises first and second bodies of insulative material. The first body surrounds a plurality of male contacts, each of which is connected to an electrical conductor within the body. The body further surrounds a male power contact, connected within the body to an electrical cable. There is a support means affixed to the exterior of the first body to which a pair of male fluid conduit couplers are affixed.

The second insulative body surrounds a plurality of female control contacts, each connected to an electrical conductor within the body. The second body also surrounds a female power contact, connected to a high amperage cable within the body. A support means is affixed to the exterior of the second body. A pair of female fluid conduit couplers is affixed to the last mentioned support means. All of the male and female control contacts, the male and female power contacts and the male and female fluid conduit couplers are so oriented on their respective bodies that they are engaged when the forward ens of the first and second bodies are placed in abutting relationship.

Latch means are provided on each of the male fluid conduit couplers. Each latch means engages an adjacent portion of that female fluid conduit coupler engaged with its respective male fluid conduit coupler. The latch means insure the integrity of all of the connections made by the connector and prevent their inadvertent disconnection. Finally, both connector bodies and their respective support means are so configured as to prevent damage to the male connector of the present invention is in either its connected or disconnected condition.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the first body of the connector of the present invention, with the male control contacts embedded therein.

FIG. 2 is a bottom view of the body of FIG. 1.

FIG. 3 is a perspective view of the support means for the first body.

FIG. 4 is a front elevational view of the first body in fully assembled condition.

FIG. 5 is a cross sectional view taken along the section line 5—5 of FIG. 4.

FIG. 6 is a front elevational view of the second body of the connector of the present invention with the female control contacts embedded therein.

FIG. 7 is a top view of the body of FIG. 6.

FIG. 8 is a perspective view of the support means for the second body.

FIG. 9 is a front elevational view of the second body in fully assemblied condition.

FIG. 10 is a cross sectional view taken along the section line 10—10 of FIG. 9.

FIG. 11 is a side elevational view of the connector of the present invention with the first and second bodies thereof in their connected condition.

FIG. 12 is a side elevational view similar to FIG. 11, and with parts in cross section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As indicated above the connector of the present invention comprise a pair of insulative bodies. The first body is illustrated in FIGS. 1 through 5.

Turning first to FIGS. 1 and 2, the first body is generally indicated at 1 and comprises a bottom portion 2 and a top portion 3. The portions 2 and 3 may comprise an integral casting of insulative material such as rubber. Other insulative materials including plastics and ceramics may be used.

The bottom portion 2 has a forward surface 4 with a recess 5 therein. The recess 5 is illustrated as having four male control contacts extending forwardly from the rear surface of the recess. At the point where each male control contact enters the rear surface of the recess 5, the back surface of the recess is provided with an integral annular shoulder about the contact. These annular shoulders are shown at 6*a* through 9*a*.

As will be evident from FIG. 2, the rear end of each of the male control contact 6 through 9 is embedded in the bottom portion 2 of the body 1. Also embedded in this bottom portion is an electrical cable 10 which extends outwardly from the rear surface 11 of the body portion 2. The cable 10 is of the type comprising an outer layer of insulation 10*a* surrounding four individually insulated conductors or wires 12 through 15. A portion of the outer insulation 10*a* of cable 10 is removed, so that the individual conductors 12 through 15 may be connected to the male control contacts 6 through 9, respectively. The nature of these connections does not constitute a limitation on the present invention and may be accomplished in any conventional and well known manner. For example, the male control contacts 6 through 9 may be hollow, or have a hollow rear portion adapted to receive the stripped ends of the conductors 12 through 15. The ends of the conductors may be held in their respective contacts in any suitable manner including the crimping of the contact ends.

The male control contacts 6 through 9, the conductors 12 through 15 and a portion of the cable 10 are permanently embedded in the bottom portion 2 of the body. These elements may be properly positioned and the body molded about them utilizing conventional molding techniques, again not constituting a limitation or part of the present invention. In the exemplary application of the connector of the present invention, the cable 10, its individual conductors 12 through 15 and their respective male control contacts 6 through 9 are adapted to carry current for the various control means in association with the stud welding gun.

The lower portion 2 of the body 1 is also provided with a pair of perforations 16 and 17 extending vertically therethrough near the side edges thereof. The purpose of perforations 16 and 17 will be described hereinafter.

The upper body portion 3 extends longitudinally and centrally of the top surface of the lower body portion 2. As will be evident from FIG. 5, the upper body portion 3 has a rear surface 18 coplanar with the rear surface 11 of the lower body portion. The upper body portion also has a forward surface 19 which is located rearwardly of the forward surface 4 of the lower body portion 2 and is substantially coplanar with the rear surface of the depression 5.

The upper body portion 3 has a longitudinally extending perforation 20 forming openings in the rear surface 18 and the forward surface 19. There is also a vertical hole 21 intersecting the perforation 20 and extending partially into the lower body portion 2.

A male power contact 22 is located in the perforation 20. The male power contact has a cylindrical body portion 22*a* of a diameter such that it is snuggly received in the perforation 20. At its forward end, the male power contact has a nose portion 22*b* extending forwardly of the front surface 19 of the upper body portion and having a slightly reduced diameter.

The body portion 22*a* of the male power contact has a transverse hole therein adapted to be coaxial with the hole 21 in the upper portion 3 of the body 1. This permits the insertion of an insulative pin 23 through the hole 21 and the coaxial hole in the male power contact, so that the male power contact is firmly held in the upper body portion 3 and is incapable of axial movement in the perforation 20. The nose portion 22*b* and an adjacent part of the body portion 22*a* of the male power contact may be split, as at 24. The longitudinal slot 24 permits slight movement of the nose halves toward each other, and is a conventional method to assure a tight fit and a good electrical contact between the male power contact and the female power contact to be described hereinafter.

The rear end of the male power contact is indicated at 25 and is spaced from the rear surface 18 of the upper body portion 3. The rearward part of the body portion 22*a* has an axial recess 26. The axial recess 26 is adapted to receive the stripped end 27 of an insulated electrical cable 28. It will be noted that the cable 28 passes outwardly through the opening in the rear surface 18 of the upper body portion 3 formed by the perforation 20.

The stripped end 27 of the cable 28 may be firmly held in the recess 26 by any suitable means such as a set screw or pin, indicated at 29. The cable 28 and male power contact 22 are intended to carry the welding current.

FIG. 3 illustrates the support means (generally indicated at 30) by which the male fluid conduit couplers are affixed to the body 1. The support means 30 has a body portion 31 of inverted, U-shaped cross sectional configuration. The sides of the body portion 31 terminate in outwardly extending flanges 32 and 33. The flanges 32 and 33 have threaded perforations 34 and 35.

A pair of channel-shaped brackets 36 and 37 are affixed to the sides of the body portion 31 adjacent the forward end thereof. The brackets may be affixed to the body portion in any suitable manner including welding. The legs of the bracket 36 are provided with holes 36*a* and 36*b*. The legs of the bracket 37 are provided with similar holes, one of which is shown at 37*a*. The purpose of these holes will be described hereinafter.

A protective plate is shown at 38. The protective plate has a rearwardly extending tongue 39. The tongue is affixed, as by welding or the like, to the top surface of the body portion 31. The tongue 39 is so positioned on the top of the body portion 31 and so configured that the plate is maintained in parallel spaced relationship to the top of the body portion 31 and forwardly thereof (see FIGS. 4, 11 and 12). The purpose of the protective plate 38 will be described hereinafter.

As will be evident from FIGS. 4 and 5, the support means 30 is adapted to be affixed to the body 1 with the U-shaped body portion 31 of the support means straddling the upper body portion 3 of the body 1, and the flanges 32 and 33 lying on the upper surface of the lower body portion 2. As may be seen in FIGS. 4 and 5, the support means 30 is maintained in position on the body 1 by means of a pair of round head machine screws 40 and 41. The machine screws 40 and 41 extend through the perforations 16 and 17 in the lower portion 2 of the body 1 and are threadedly engaged in the perforations 34 and 35 of the support means flanges 32 and 33, respectively. It will further be noted from FIG. 3 that the top surface of the support means body portion 31 and the tongue 39 have coaxial perforations therein, generally indicated at 42. These perforations are adapted to accommodate the pin 23 which maintains the male power contact in position. This is clearly shown, for example, in FIGS. 11 and 12.

Returning to FIGS. 4 and 5, it will be noted that the bracket 36 supports a male fluid conduit coupler generally indicated at 43. The coupler 43 is of conventional construction having a body portion 44 with a tubular male member 45 at one end and a conventional fitting 46 at the other by which a fluid conduit 47 is affixed to the coupler.

The body portion 44 of the coupler 43 is pivotally affixed to the bracket 36 by means of pins 48 and 49 passing through the perforations 36*a* and 36*b*, respectively, in the bracket legs. In addition, the body portion 44 of the coupler 43 has a latch means 50 pivotally affixed thereto. The latch 50 has spaced legs 50*a* and 50*b* pivotally affixed to the body portion 44 by pins. The inside surface of the latch 50 has a dimple or stop 50*c* which rests against the coupler body 44 when the latch is not in use. At its forward end, the latch 50 has a hook-shaped latching nose 50*d*. At its rearward end it has a handle portion 50*e* by which it may be manually operated. Finally, the latch 50 is biased to its latching position by a spring 51. One end of the spring is located in a perforation in the coupler body 44, the other end of the spring abuts the latch 50.

The bracket 37 pivotally supports an identical coupler, generally indicated at 52. The coupler 52 has a body portion 53 with a tubular male member 54 at one end and conventional means 55 at the other by which the fluid conduit 56 is affixed thereto. Finally, the coupler 52 has a latch means 57 identical to the latch means 50.

While the fluid conduits 47 and 56 may be wholly separate, it is perferred that they be integral, as shown in FIGS. 5 and 11, being split or separated for a sufficient length to enable their attachment to the coupler 43 and 52. In the exemplary application for the connector of the present invention, the fluid conduits 47 and 56 comprise air lines to operate the stud feeding cylinder of the stud welding gun.

FIGS. 6 through 10 illustrate the second insulative body of the connector of the present invention. Turning first to FIGS. 6 and 7, the second insulative body is generally indicated at 58 and comprises a lower portion 59 and an upper 60. The lower portion 59 has a front surface 61 with an extension 62 thereon configured to be received in the depression 5 in the lower portion 2 of the body 1. The extension 62 has embedded therein a series of female control contacts 63 through 66, adapted to cooperate with the male control contacts 6 through 9, respectively, of FIG. 1. It will be noted from FIG. 7 that the female control contacts 63 through 66 are inset slightly from the forward surface of the extension 62 so that the annular shoulders 6*a* through 9*a* of FIG. 1 may be accommodated.

FIG. 7 further shows a four conductor cable 67 embedded in the bottom portion 59 of the body 58 and extending beyond the rear surface 68 thereof. The conductors 69 through 72 are connected to the female control contacts 63 through 66, respectively. The nature of these connections does not constitute a limitation on the present invention and may be made in the same manner described with respect to the similar connections in FIG. 2. The embedding of the female control contacts 63 through 66 and the cable 67 within the lower portion 59 of the block 58 may again be accomplished by any suitable molding process. It will be understood that the cable 67 may be identical to the cable 10 of FIG. 2 and it and the female control contacts 63 through 66 are again intended to carry the current for the various control means in association with the stud welding gun.

The upper portion 60 of the body 58 extends longitudinally and centrally of the upper surface of the lower body portion 59. The upper portion 60 has a rear surface 73 coplanar with the rear surface 68 of the lower body portion 59. The upper body portion 60 has a forward surface 74 which extends beyond the forward surface 61 of the lower body portion and is substantially co-planar with the forward surface of the extension 62.

The upper body portion 60 has a longitudinally extending perforation 75 equivalent to the perforation 20 in FIG. 1. A hole 76 is also provided, intersecting the perforation 75 and extending part way into the lower body portion 59. The hole 76 is equivalent to the hole 21 in FIG. 1.

A female power contact 77 is located within the longitudinal perforation 75 in the upper body portion 60. The female power contact comprises a cylindrical body having a recess 78 in its forward end and a recess 79 in its rearward end. The recess 78 is configured to accept the nose portion 22b of the male power contact with a tight fit to make good electrical contact. The recess 79 is adapted to receive the stripped end 80 of a cable 81. Again, a set screw or pin means 82 may be provided to maintain the cable end 80 in position within the recess 79.

The female power contact is located in the perforation 75 of the upper body portion 60 with its forward end recessed slightly from the forward end 74 of the upper body portion, so as to prevent damage thereof. The rear end of the female power contact is spaced from the rear surface 73 of the upper body portion so as to accommodate a part of the cable 81. It will be understood that the cable 81 is a high amperage cable identical to the cable 28 of FIG. 5 and it and the female power contact are intended to carry the welding current.

A support means (generally indicated at 83) is shown in perspective in FIG. 8. The support means is intended to carry the female fluid conduit couplers and to be affixed to the body 58, as will be described hereinafter. The support means 83 has a body portion 84 of inverted, U-shaped cross section. The downwardly depending legs of the body portion 84 terminate in outwardly extending flanges 85 and 86, bearing threaded perforations 87 and 88, respectively. The body portion

84 and its flanges 85 and 86 may be identical to the body portion 31 of FIG. 3 and its flanges 32 and 33.

A plate 89 is affixed to the top surface of the body portion 84 in any suitable manner such as welding or the like. The plate 89 extends forwardly of the body portion 84 and terminates in a pair of downwardly depending legs 90 and 91. The legs 90 and 91 are spaced from each other by a distance sufficient to permit the passage of the upper portion 60 of the body 58 therebetween (as will be evident from FIGS. 9 and 10). The legs 90 and 91 have holes 92 and 93 respectively in which the female fluid conduit couplers are mounted, as will be described hereinafter.

Finally, the upper surface of the body portion 84 and the plate 89 have co-axial perforations therethrough, generally indicated at 94. The perforations 94 are intended to be coaxial with the hole 76 in the upper portion 60 of the body 58. The female power contact 77 has a matching hole therethrough and an insulative pin 95 is positioned in these holes to maintain the female power contact in position and to prevent its axial movement in the perforation 75.

FIGS. 9 and 10 illustrate the support means 83 affixed to the body 58. It will be noted that the body portion 84 of the support means straddles the upper portion 60 of the body 58 with the flanges 85 and 86 resting on the top surface of the lower portion 59. The lower portion 59 has a pair of perforations 96 and 97 therethrough (see FIGS. 6 and 7). As is evident from FIG. 9, the support means 83 is affixed to the body 58 by means of a pair of round head machine screws 98 and 99 located in the holes 96 and 97 and threadedly engaged in the holes 87 and 88 in the support means flanges 85 and 86.

Turning to FIG. 10, a conventional female fluid conduit coupler 100 is shown mounted in the perforation 92 in the support means leg 90. The coupler 100 has a threaded exterior and is held in position by a pair of nuts 101 and 102 on either side of the leg 90. The forward end of the female coupler 100 is provided with an annular lip 103. The rearward end of the coupler is provided with conventional means 104 by which a fluid conduit 105 is affixed to the coupler. An identical female fluid conduit coupler 106 is shown mounted in the support means leg 91 by nuts 107 and 108. As in the case of the coupler 100, the coupler 106 has a forward end provided with an annular lip 109. At the other end of the coupler 106 conventional means 110 are provided by which a fluid conduit 111 is affixed to the coupler.

It will be understood that the female coupler 100 is adapted to receive the nose 54 of the male coupler 52 of FIG. 5. Similarly, the female coupler 106 is intended to receive the nose 45 of the male coupler 43 of FIG. 5. When the male couplers are fully engaged in the female couplers, the hooked portion 50d of the latch 50 will engage the annular lip 109 of the female coupler 106 and the latch means 57 will similarly engage the annular lip 103 of the female coupler 100. When the couplers are thus connected the fluid conduits 105 and 111 will constitute continuations of the fluid conduits 56 and 47, respectively. As described with respect to the conduits 47 and 56 of FIG. 5, the conduits 105 and 111 may be integral, being split for a distance sufficient to permit their connection to the female couplers 100 and 106.

FIGS. 11 and 12 illustrate the connector of the present invention in its fully assemblied and connected condition. In this condition, the bodies 1 and 58 face each other with the front surface 4 of the lower portion 2 of body 1 in abutting relationship to the front surface 61 of the lower portion 59 of the body 58. Similarly, the forward surface 19 of the upper portion 3 of the body 1 is in abutting relationship to the forward surface 74 of the upper portion 60 of the body 58. The extension 62 of the body 58, bearing the female control contacts 63 through 66 is received within the depression 5 of the body 1, bearing the male control contacts 6 through 9. When this is true, the male control contacts 6 through 9 are received within the female control contacts 63 through 66, respectively. For example, male control contact 7 is illustrated in its position within female control contact 64 in FIG. 12.

The nose portion 22*b* of the male power contact 22 is engaged in the recess 78 in the female power contact 75. Similarly, the tubular male member 45 of the male fluid conduit coupler 43 will be engaged in the female coupler 106. The tubular male member 54 of the male coupler 52 will be engaged in its respective female coupler 100.

As indicated above, when the male and female fluid conduit couplers are engaged the latch means 50 and 57 will engage the adjacent female coupler. This is illustrated in FIG. 11, wherein the hook-shaped latching nose 50*d* of the latch 50 is illustrated as engaging the rear surface of the annular lip 109 on the female coupler 106. It will be understood that a similar engagement will be achieved by the latch 57 on the female coupler 100. The latches 50 and 57 not only insure that their respective male and female fluid conduit couplers are fully and properly joined, but also serve to lock the entire connector together. With the latches 50 and 57 in latching position, the connector bodies 1 and 58 cannot be inadvertently separated.

As will be evident from FIGS. 11 and 12, the plate 38 of the body 1 extends part way over the body 58. Thus, when the connector is in its connected condition as shown in FIGS. 11 and 12, the plate 38 and the plate 89 with its downwadly depending legs 90 and 91 will serve to protect the upper and side portions of the male and female fluid conduit couplers. The male power contact 22 and female power contact 75 are wholly enclosed in the upper portions 3 and 60 of the bodies 1 and 58, respectively. Similarly, the male control contacts 6 through 9 and female control contacts 63 through 66 are wholly enclosed by the lower portions 2 and 59 of the bodies 1 and 58, respectively. These lower body portions also serve to protect the male and female fluid conduit couplers.

It will further be evident that when the connector is in its disconnected condition, the plate 38 and the lower portion 2 of the body 1 will serve to prevent damage to the male power contact 22 and the male fluid conduit couplers 43 and 52. Since the male control contacts 6 through 9 are located in the depression 5, they too are protected. The female power contact 77, being slightly recessed in the perforation 75, will also be protected. The same is true of the female control contacts 63 through 66 which are slightly recessed in and totally surrounded by the extension 62 on the body 58. Finally, the plate 89 and its downwardly depending legs 90 and 91 will serve to protect the female fluid conduit couplers.

The cables 10 and 28 and the fluid conduits 47 and 56 of the body 1 may be taped or clamped together at spaced intervals rearwardly of the body 1. This is true because their proper connecting positions are determined on the body 1. Such clamping or taping will render the cables and fluid conduits unitary and prevent their entanglement. The same may be done to the cables 67 and 81 and the fluid conduits 105 and 111 of the body 58.

Modifications may be made in the invention without departing from the spirit of it. For example, it is not required that all of the contacts and coupler on the body 1 be of the male type and all of the contacts and coupler on the body 58 be of the female type. This is a mere matter of convenience. Furthermore, the number of male control contacts 6 through 9 and female control contacts 63 through 66 may be varied. More than one male and female power contact may be provided. Finally, the number of fluid conduit couplers may be varied as well. As indicated above, one connected pair of the fluid conduits illustrated in the Figures, or an additional connected pair may be used to carry appropriate gasses when submerged welding is practiced.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A connector for electrical conductors and fluid conduits, said connector comprising first and second insulative bodies, at least one pair of conductors to be connected and at least one pair of fluid conduits to be joined, one of said first and second bodies having a male electrical contact mounted therein, the other of said first and second bodies having a female electrical contact mounted therein, one of said pair of conductors being affixed to said male electrical contact within its respective body, the other of said pair of conductors being affixed to said female contact within its respective body, one of said first and second bodies having a male fluid conduit coupler affixed thereto, the other of said first and second bodies having a female fluid conduit coupler affixed thereto, one of said pair of fluid conduits being affixed to said male fluid conduit coupler, the other of said pair of fluid conduits being affixed to said female fluid conduit coupler, said male and female contacts and said male and female fluid conduit couplers being so oriented with respect to their respective first and second bodies as to be in connected engagement when said bodies are in abutting relationship, latch means to releasably maintain said bodies in said abutting relationship, said latch means comprising a separate hook-shaped latch pivotally affixed to one of said male and female fluid conduit couplers and swingable between latching and unlatching positions, the other of said male and female fluid conduit couplers having a flange thereon, said latch engaging said flange when said bodies are in said abutting relationship and said latch is in said latching position, means to bias said latch to said latching position and means to protect said contacts and couplers from damage when said bodies are separated and when said bodies are in said abutting relationship.

2. The structure claimed in claim 1 including a plurality of pairs of electrical conductors to be joined and at least two pairs of fluid conduits to be joined, a male and female contact for each of said pairs of conductors to be joined, a male and female fluid conduit coupler for each of said pairs of fluid conduits to be joined, one of said male and female contacts for each conductor pair being mounted in said first body, the other of said male and female contacts for each conductor pair being mounted in said second body, said conductors of each pair being connected to their respective male and female contacts within their respective first and second bodies, one of said male and female fluid conduit couplers for each fluid conduit pair being mounted on said first body, the other of said male and female fluid conduit couplers for each fluid conduit pair being mounted on said second body, the fluid conduits of each pair being connected to their respective male and female fluid conduit couplers, said male and female contacts and said male and female fluid conduit couplers being so oriented with respect to their respective first and second bodies as to be in connected engagement when said bodies are in abutting relationship, said latch means comprising a pair of separate hook-shaped latches, each of said latches being pivotally affixed to one of said male and female fluid conduit couplers for each fluid conduit pair, and swingable between latching and unlatching positions, the other of said male and female fluid conduit couplers for each fluid conduit pair having a flange thereon, each of said latches engaging said flange of the adjacent fluid conduit coupler when said bodies are in said abutting relationship and said latches are in said latching position and means to bias said latches to said latching position.

3. The structure claimed in claim 2 wherein at least one of said pairs of conductors to be joined are high amperage conductors.

4. The structure claimed in claim 2, wherein all of said male contacts are mounted in said first body, said male fluid conduit couplers being mounted on said first body, all of said female contacts being mounted in said second body and said female fluid conduit couplers being mounted on said second body.

5. The structure claimed in claim 3 wherein each of said first and second bodies comprises a lower portion an an upper portion, said upper portion being narrower than said lower portion and extending longitudinally and centrally of the upper surface of said lower portion, said male and female contacts for said high amperage conductors being mounted in the upper portion of their respective one of said first and second bodies, the remaining male and female contacts being mounted in said lower portion of their respective one of said first and second bodies.

6. The structure claimed in claim 5 including a support means for each of said first and second bodies, each of said support means comprising an inverted U-shaped body portion with laterally extending flanges, each of said support means being affixed to its respective one of said first and second bodies with its inverted U-shaped body portion straddling said upper portion of that body and its flanges lying atop said upper surface of said lower portion of that body, and means for mounting said male and female fluid conduit couplers to the support means of their respective bodies.

7. The structure claimed in claim 6 wherein each of said latch means is pivotally affixed to one of said male fluid conduit couplers.

8. The structure claimed in claim 7 wherein said male contact for said high amperage conductor pair is mounted in said upper portion of said first body, said female contact for said high amperage conductor pair being mounted in said upper portion of said second

body, said lower portion of said first body having a depression therein, said remaining male contacts being mounted in said lower portion of said first body with their free ends located in said depression, said lower portion of said second body having an extension thereon configured to be received in said depression whe said first and second bodies are in said abutting relationship, said remaining female contacts being embedded in said extension, said male fluid conduit couplers being mounted on said support means of said first body and said female fluid conduit couplers being mounted on said support means of said second body.

9. The structure claimed in claim **8** wherein all of said contacts are wholly enclosed in the insulative material of said bodies when said bodies are in said abutting relationship, said support means of said first body having a plate thereon extending part way over said second body when said bodies are in said abutting relationship to protect said male and female couplers from damage.

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