

Aug. 11, 1959.

B. J. JOHANSON
ELECTRICAL CONNECTOR

2,899,669

Filed May 23, 1955

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FIG. 4.

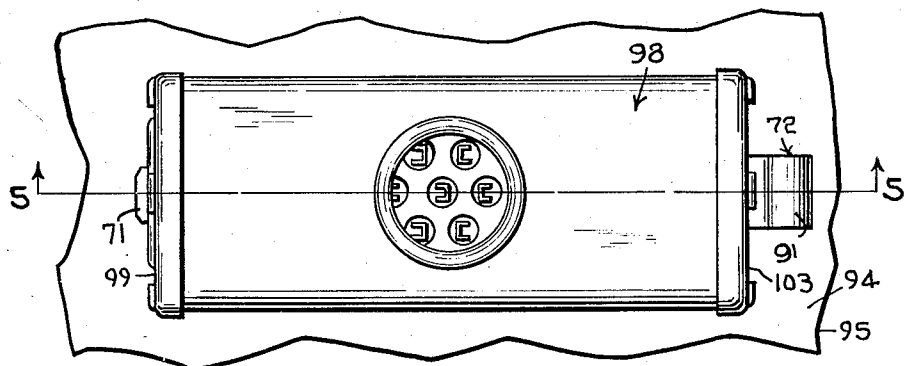


FIG. 5.

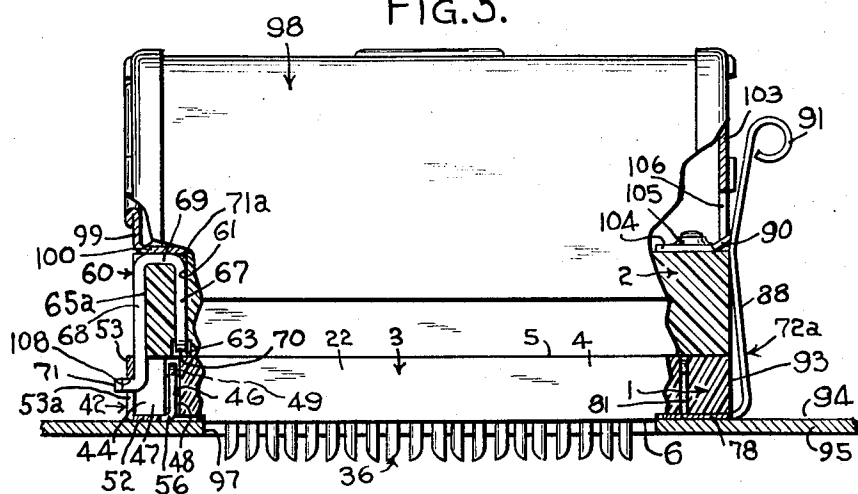


FIG. 7.88

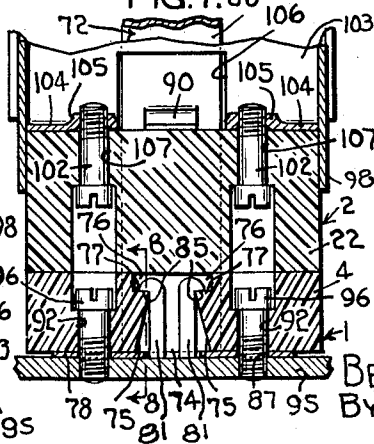
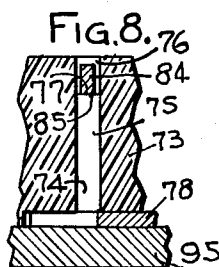


FIG. 8.7/



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Fig. 9.

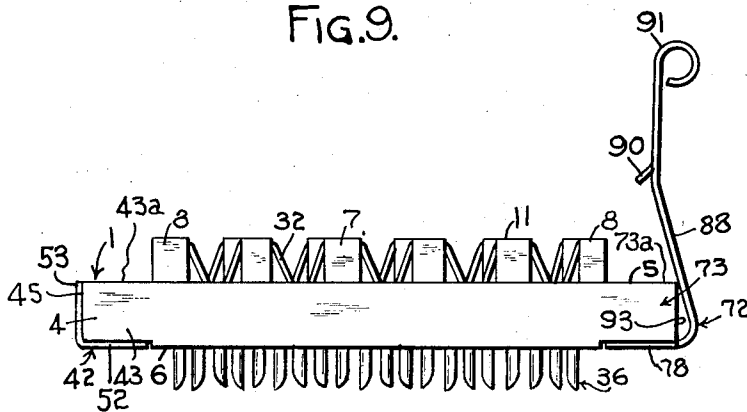


FIG. 10.

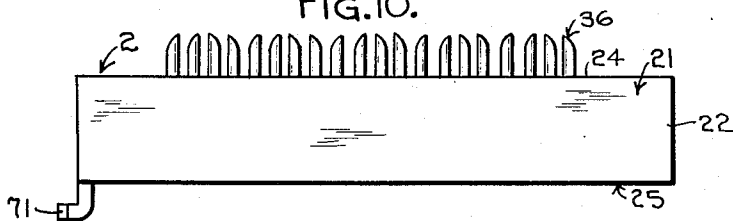


FIG. 11.

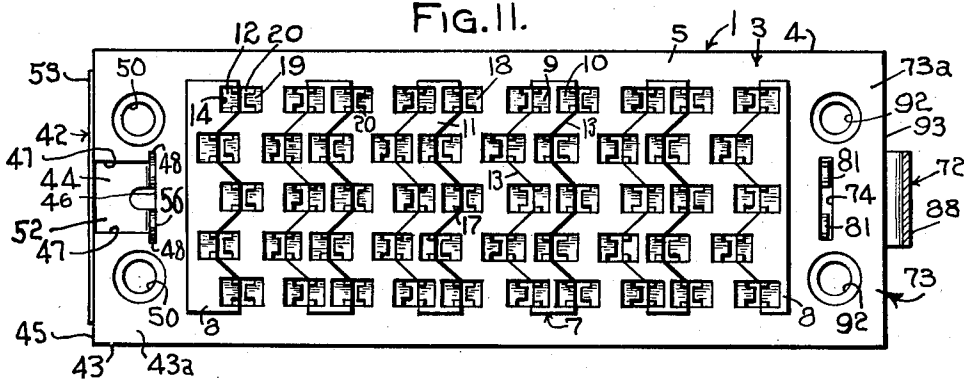
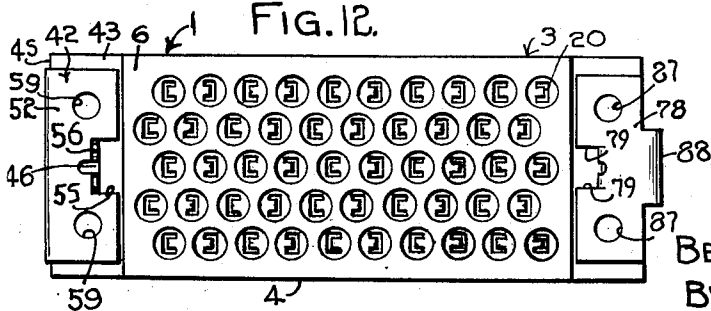


FIG. 12.



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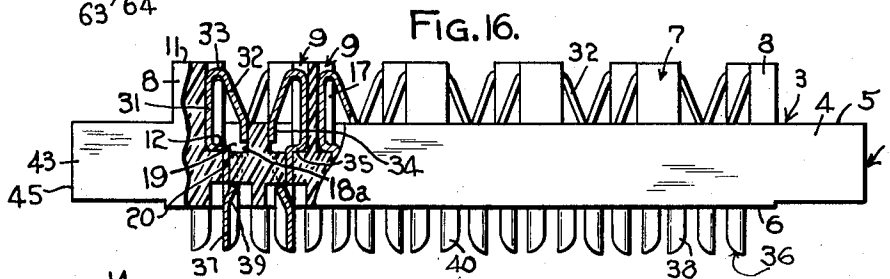
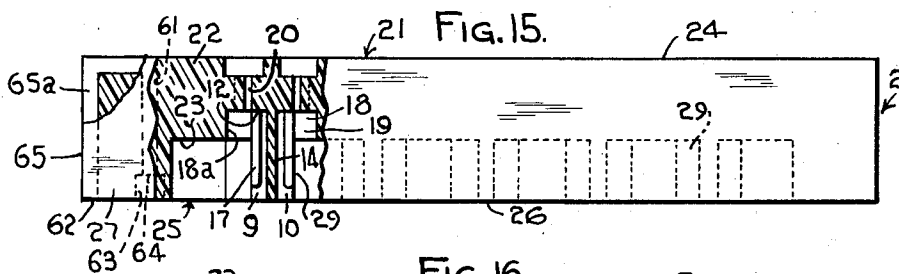
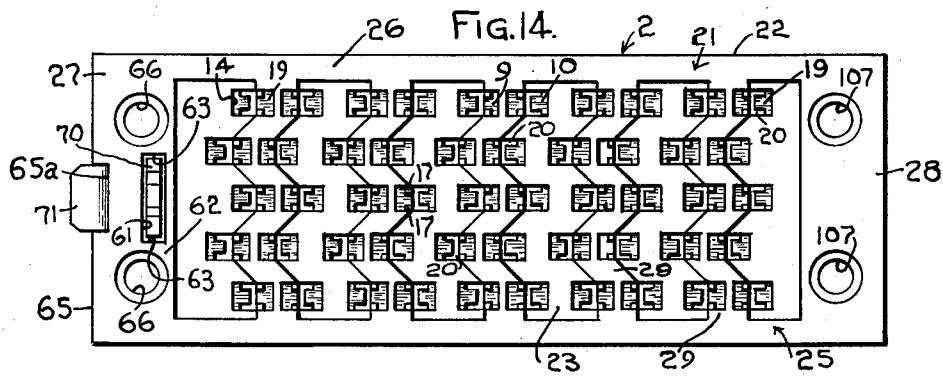
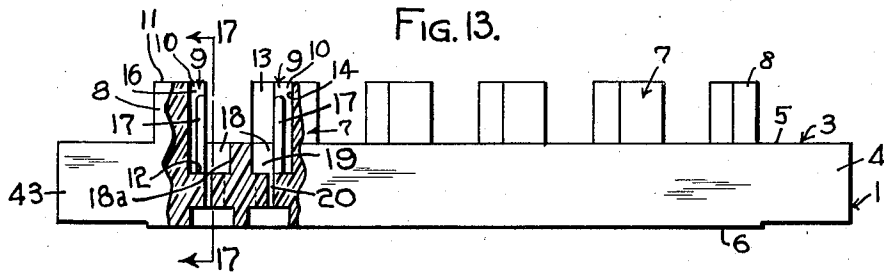
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FIG. 18.

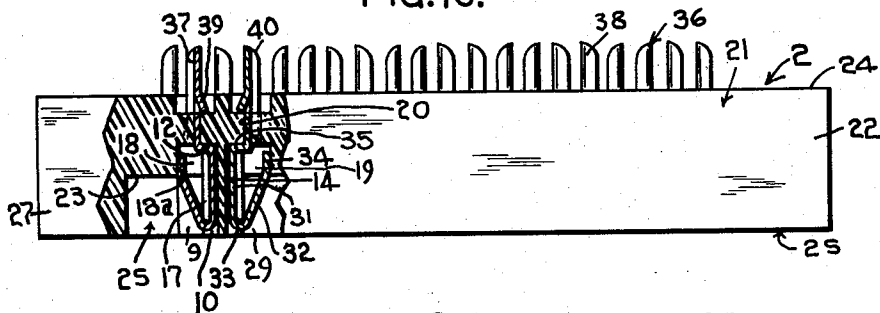


FIG. 19.

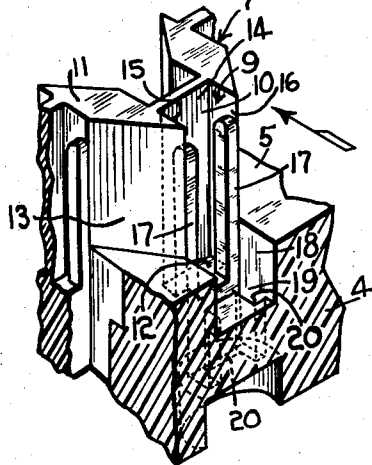


FIG. 20.

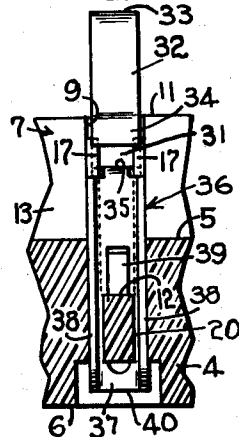


FIG. 21.

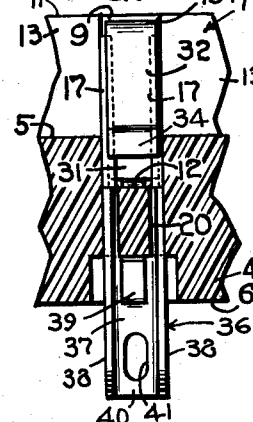


FIG. 22.

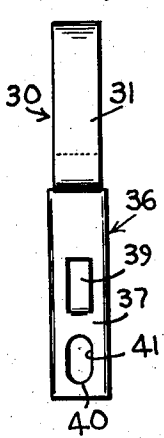


FIG. 23.

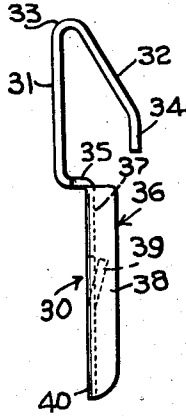


FIG. 24.

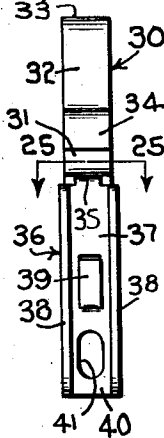


FIG. 26.

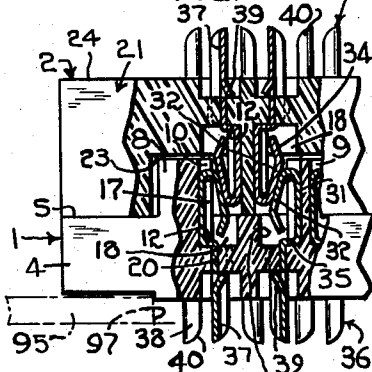
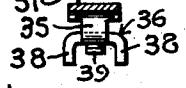


FIG. 25.



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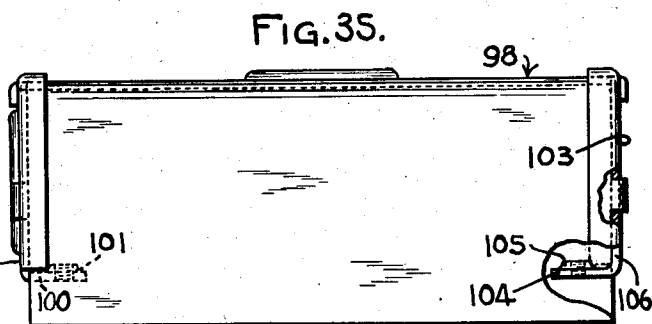
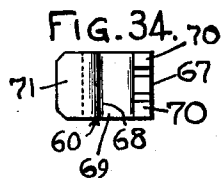
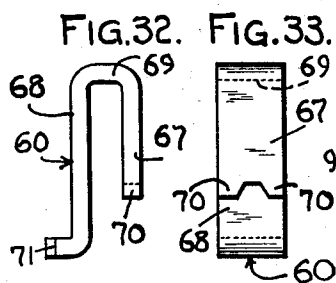
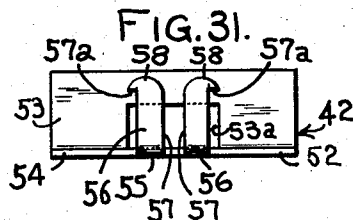
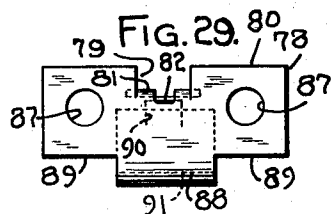
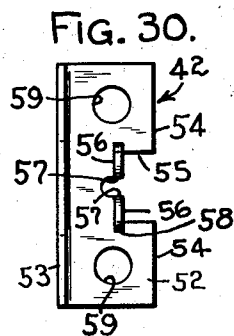
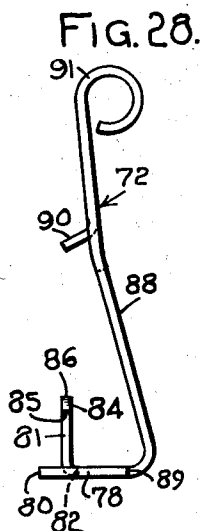
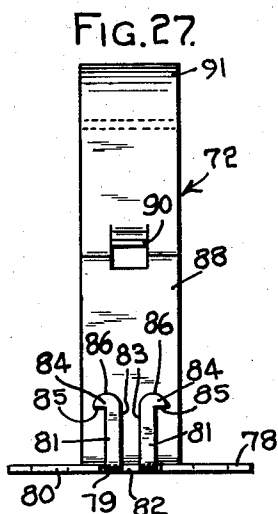
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2,899,669

ELECTRICAL CONNECTOR

Bengt J. Johanson, Des Plaines, Ill., assignor, by mesne assignments, to United-Carr Fastener Corporation, Boston, Mass., a corporation of Delaware

Application May 23, 1955, Serial No. 510,152

14 Claims. (Cl. 339-45)

This invention relates to separable electrical connectors and more particularly to the type providing two body members of insulating material each of which carries a plurality of independent contact members arranged so that the contact members of one body member frictionally engage the contact members of the other body member when the body members are coupled together.

One object of the present invention is to provide a connector in which complementary contact members of the two body members are compressed under spring tension while electrically engaged and maintained in tensioned engagement by an extraneous fastener means operating to lock the body members in coupled relation. As a result, the tensioned contact members operate when the fastener means is released to force the body members apart by their own untensioning action. Accordingly, no manual force or other hand manipulation in the way of tugging or rocking is necessary to separate the connector bodies.

It is another object of the invention to provide a quick-disconnect connector in which identical contact members are carried by each of the body members thereby effecting advantages in tool costs.

Also, according to the present invention, both of the engaging elements of mating contact members are compressed under spring tension when the body members are in connected relation with the result that a reliable and efficient electrical engagement between complementary contact members is effected.

A further object of the invention is the provision of interengaging contact members having blade-like elements in which broad surfaces of mating blade elements wipe against each other during electrical engagement and disengagement with the result that the surfaces clean themselves.

Another object of the invention is to provide a connector in which one of the body members has a fulcrum member extending into an opening provided by the other of the body members so as to effect a hinge action when the body members are moved together for electrically engaging complementary contact members.

Other objects and uses of my invention will be apparent from inspection of the drawings and specification hereinbelow set forth.

Referring to the drawings in which I have illustrated a preferred embodiment of my invention;

Fig. 1 is a perspective view of a connector showing the male part in initial hinged relation to the female part prior to coupling the parts in electrical engagement,

Fig. 2 is a top view of the male part carried by a supporting plate,

Fig. 3 is a top view of the female part,

Fig. 4 is a top plan view of the connector parts in coupled relation,

Fig. 5 is a section taken along the line 5-5 of Fig. 4,

Fig. 6 is a section taken along the line 6-6 of Fig. 2,

Fig. 7 is a section taken along the line 7-7 of Fig. 2,

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Fig. 8 is a section taken along the line 8-8 of Fig. 7,

Fig. 9 is a side elevation of the male part,

Fig. 10 is a side elevation of the female part,

Fig. 11 is a top view showing the casting of the male part before the contact members are assembled,

Fig. 12 is a bottom view reduced in size of the casting shown in Fig. 11,

Fig. 13 is a side elevation of the casting shown in Figs. 11 and 12,

Fig. 14 is a top view showing the casting of the female part before contact members are assembled,

Fig. 15 is a side elevation of the casting shown in Fig. 14,

Fig. 16 is a side elevation of the male part with the casting broken away to show the assembled contact members,

Fig. 17 is a section taken along the line 17-17 of Fig. 13,

Fig. 18 is a side elevation of the female part with the casting broken away to show the contact members,

Fig. 19 is an enlarged perspective view of a portion of the male part showing a cavity for a contact member,

Fig. 20 is an end section looking in the direction of "arrow" of Fig. 19 showing a contact member in position prior to being moved into final assembly with the casting,

Fig. 21 is a view similar to Fig. 20 showing a contact member in final assembled engagement with the casting,

Fig. 22 is a front elevation of a contact member per se,

Fig. 23 is a side elevation of a contact member shown in Fig. 22,

Fig. 24 is a rear elevation of the contact member shown in Figs. 22 and 23,

Fig. 25 is a section taken along the line 25-25 of Fig. 24,

Fig. 26 is a partial side elevation of the connector in section showing the complementary contact members in electrical engagement,

Fig. 27 is a front elevation of the latch spring,

Fig. 28 is a side elevation of the latch spring,

Fig. 29 is a bottom view of the latch spring,

Fig. 30 is a top elevation of the hinge plate,

Fig. 31 is a front view of the hinge plate,

Fig. 32 is a side elevation of the fulcrum member,

Fig. 33 is a front view of the fulcrum member,

Fig. 34 is a bottom view of the fulcrum member, and

Fig. 35 is a side elevation of a cover for the female part.

Referring now in detail to the drawings, the improved electrical connector of the present invention includes, generally, a male part 1 and a female part 2 each providing a body of insulating material and carrying contact members and hinge and latch elements for securing the parts in electrical connection.

The male part 1, in my preferred embodiment, has an insulating body 3 (Fig. 13) providing a base 4 of generally rectangular shape having a front face 5 and a rear face 6 (Fig. 12). The base part 4 has a series of barrier elements 7 projecting above the surface 5 of the base part 4 and molded integrally with the same. The barrier elements 7 are disposed in spaced, generally parallel relation and extend across the front face 5 in transverse relation to the longitudinal axis of the base part. Each of the barrier elements 7 is recessed to receive in assembled relation thereto pairs of contact members insulated laterally one from another with the contact members of each pair arranged in opposed relation and disposed on opposite sides of the barrier with which the pair is assembled. In my preferred embodiment, end barriers 8 project outwardly from the front surface 5 at opposite ends of the series of barriers 7, each of which is adapted for re-

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ceive contact members on its inner face only so that the contact members carried by the barriers 8 are disposed in facing, spaced relation to contact members carried by the facing side of its respective adjacent barrier 7.

Each of the barrier elements 7 has a series of pairs of contact-receiving openings 9 (Fig. 13) arranged in opposed relation on opposite sides of the respective barriers. Each of the barrier elements 8 has a series of laterally spaced contact-receiving openings 9 which are disposed on its inner face only. The openings 9 of the barrier elements 7 and 8 are identical in form so as to receive and anchor contact members which are identical in construction. In my preferred connector, laterally adjacent openings 9 of the respective barriers 7 and 8 are disposed in staggered relation as most clearly shown in Fig. 11 for a purpose to be described. Each of the openings 9 comprises a recess 10 (Figs. 13 and 19) which extends from the outermost end face 11 (Fig. 19) of the barriers 7 and 8 into the base member 4 and terminates in an abutment 12. The recess 10 intersects the side face 13 of the barrier element for the entire length of the face with the result that the recess 10 is bounded by a rear wall 14 and sidewalls 15 and 16 extending in spaced generally perpendicular relation from the rear wall 14 (Fig. 19). Each of the side walls 15 and 16 has a rib element 17 (Fig. 19) adjacent the face 13 of the barrier and extending from a point on its respective sidewall spaced from the outer end face 11 of the barrier down to the abutment 12. The rib elements 17 extend toward each other laterally and terminate short of each other to leave a space therebetween. As a functional adjunct of each of the openings 9, the base member 4 has a cavity 18 extending from the front surface 5 and terminating in a bottom portion 19. The cavity 18 communicates with the recess 10 as is most clearly shown in Fig. 13. The bottom portion 19 of the cavity 18 has a slot 20, which is preferably of U-shape, extending through the base member and intersecting the rear face 6 of the base member.

The female part 2 has a body of insulating material 21 (Fig. 15) having a base 22 of generally rectangular shape providing a front face 23 (Fig. 14) and a rear face 24. The base 22 has an annular peripheral wall 25 extending from the front face 23. The wall 25 comprises side portions 26 extending longitudinal of the base 22 and connected at opposite ends of the base by end portions 27 and 28 (Fig. 14) which are preferably thicker than the portions 26 so as to carry out objectives to be described. The wall 25 operates to surround the barrier elements 7 and 8 of the male part 1 when the parts of the connector are in electrical connection and the outermost marginal edge of the wall 25 is concentric with the marginal edge of the front face 5 of the base 4 of the male part 1.

The female part 2 has a series of barrier elements 29 projecting above the surface 23 of the base 22 and molded integrally with the same in the manner of the barrier elements 7 of the male part 1. The barrier elements 29 are disposed in spaced, generally parallel relation and extend transversely across the front face 23 to be joined integrally with the side wall portions 26. The barrier elements 29 are identical in form to the barrier elements 7 of the male part 1 and are constructed to carry pairs of contact members arranged with respect to the barrier elements by which they are carried in the manner of the contact members carried by the barrier elements 7 of male part 1. The female part 2 carries one less barrier element 29 than the combined number of the barrier elements 7 and 8 of the male part 1 with the result that when the connector parts 1 and 2 are electrically connected the end barrier elements 29 of the female part 2 will be disposed between a barrier element 7 and the adjacent barrier element 8 carried by the male part 1. The barrier elements 29 of the female part 2 intermediate the end barriers will be disposed between adjacent barrier elements 7 of the male part 1. Each of the barriers 29 has a series of pairs of contact-receiving openings with

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the individual openings constructed to be identical to the contact-receiving openings 9 formed in the barrier elements 7 and 8 of the male part 1. Thus, it will be seen that each of the parts 1 and 2 of the connector provide contact-receiving openings which are designed to receive contact members of identical construction.

Referring specifically to Figs. 22-25 of the drawings, I have shown a preferred form of contact member 30 which, as hereinbefore mentioned, is carried by both the male and female parts of the connector. Each of the contact members 30 is formed of resilient sheet metal and provides a stem portion 31 in the form of a substantially straight flat strip. A contact finger 32 is formed integrally with an end 33 of the strip 31 and extends outwardly from the stem 31 at an angle of junction with the stem which is preferably about 45°. A hook element 34 is formed integrally with the outermost end of the contact finger 32 and forms a continuation of the finger 32 extending in a direction substantially parallel to that of the stem 31. A laterally extending element 35 is integrally joined to an opposite end of the stem 31 from that to which the finger 32 is attached and projects outwardly away from the stem 31 in substantially perpendicular relation to the plane thereof. The laterally extending element 35 (Fig. 25) is of less width than the distance between the ribs 17-17 of each of the openings 9 for a purpose which will be described. A terminal element 36 is integrally joined to the outermost end of the laterally extending element 35 and extends downwardly in generally perpendicular relation thereto so as to be generally parallel to an imaginary extension of the plane of the stem 31. The terminal element 36 provides a backwall 37 in integral junction with the laterally extending element 25 and sidewalls 38 projecting away from the backwall 37 in spaced parallel relation to effect a U-shaped cross-sectional form as most clearly illustrated in Fig. 25. A spring tongue element 39, in my preferred form, is pressed out of the plane of the material of the backwall 37 at a point substantially midway between the outer end 40 of the terminal element 36 and the laterally extending element 35, and a wire-receiving opening 41 is formed in the backwall 37 at a point between the tongue element 39 and the outer end 40.

In assembling the contact members 30 in the respective openings 9 of the connector parts 1 and 2, the outermost end 40 of the terminal element 36 is moved from the front face of the respective base parts 4 and 22 into the cavity 18 of the respective base member to insert the terminal element 36 into the U-shaped slot 20 provided in the bottom portion 19 of the cavity 18 (Fig. 20). During this action, the laterally extending element 35 of the contact member will be received between the ribs 17-17 of the opening 9 and the stem 31 will extend into the recess 10 so as to be disposed adjacent the backwall 14 of the recess 10 and between the rib elements 17-17 and the backwall 14. As the result of the fact that the width of the stem 31 is greater than the distance between cooperating rib elements 17-17, the stem 31 will be anchored in assembly with the base member between the ribs 17 and the backwall 14. As downward pressure upon the contact member is continued, the laterally extending element 35 will become seated against the abutment 12 at the bottom of the recess 10. At this point, the spring tongue element 39 which has been contracted into substantially the plane of the backwall 37 of the terminal element 36 during passage through the slot 20, will expand toward normal position to engage behind the rear face of the respective base parts 4 and 22 thereby cooperating with the laterally extending element 35 to secure the contact member in assembly with the base. It will be noted that after final assembly of each contact member with the base, the contact finger 32 extends outwardly and downwardly with respect to the barrier element with which it is assembled and the hook element 34 abuts the wall 18a (Figs. 6 and 18) of the

cavity 18 which is directly opposite the recess 10. Thus, when the contact members 30 are disposed in final assembly within the openings 9 of the base parts 4 and 22, opposed, facing contact members of adjacent barriers of the respective base parts 4 and 22 will be spaced one from another to receive a complementary pair of contact members assembled with a barrier element of the other base member. Extension of the hook elements 34 of facing contact members 30 into the cavities 18 to abut the walls 18a prevents short circuiting engagement between the contact members.

The male part 1 and female part 2 are maintained in electrical connection by a hinge and latch device formed as integral parts of the connector units and operating to permit quick and easy engagement and disengagement of the contact members of the respective parts. Referring specifically to the hinge device, a hinge member 42 is secured in assembly with an end 43 of the base 4 of the male part 1. In accomplishing this objective, a recess 44 is formed in the base 4 which extends into the base from an end face 45 thereof so as to form a back wall 46 and spaced sidewalls 47 adjacent the recess 44. The recess 44 extends through the thickness of the base 4 so as to intersect the front face 5 and rear face 6 of the base. Opposed slots 48 (Fig. 5) are formed in the material of the sidewalls 47-47 at points adjacent the back wall 46. In the preferred construction, the depth of the slots 48 is greater adjacent the rear face 6 with the result that the walls 48a adjacent the slots 48 converge from the rear face 6 toward the front face 5 as most clearly shown in Fig. 6. At ends of the slots 48 adjacent the front surface 5 of the base 4, each of the slots 48 is widened laterally to form abutments 49 (Fig. 6) which are disposed on opposite sides of the recess 44 beneath the plane of the front face 43a of the end 43. Openings 50 (Fig. 11) are provided on each side of the recess 44 for receiving an attaching member by which the part 1 may be secured to a cover device or a supporting part.

The hinge member 42 is preferably formed of spring steel and, as most clearly shown in Figs. 30-31, provides a base element 52 and a plate element 53 integrally joined to an edge of the base element and extending substantially perpendicular thereto. The plate element 53 has an opening 53a corresponding generally in size and shape to the recess 44 in the end face 45. The opposite edge 54 of the base element 52 has an opening 55 therein from which material was taken to form attaching elements 56-56. The attaching elements 56 are integrally joined to the base element 52 adjacent the inner edge of the opening 55 and extend outwardly from the base element in the direction taken by the plate element 53. The attaching elements 56 have spaced, facing inner edges 57 (Fig. 31) so that their inner and outer broad surfaces are disposed in the same plane. Each of the attaching elements 56 is preferably constructed in the form of a finger-like portion having a lateral projection adjacent its outermost end to form a shoulder element 57a (Fig. 31). The shoulder elements 57a of the complementary attaching elements 56 extend in opposite directions and the outermost end of each of the attaching elements 56 is rounded, as at 58. The base element 52 has openings 59 on opposite sides of the attaching elements 56 for receiving screws or the like devices by which the base 4 is secured to a cover or supporting part.

In assembling the hinge member 51 with the base 4 the rounded ends 53 of the attaching elements are moved into the slots 48-48 from the rear face 6 of the base 4. As movement of the attaching elements 56 in the direction of the front face 5 is continued, the converging walls 70 portions 48a-48a adjacent the slots 48-48 operate upon the rounded end portions 58 of the attaching portions to contract the attaching portions edgewise against their normal spring tension. As soon as the lateral extensions of the attaching portions pass the ends of the slots

48-48, the attaching elements 56 will expand toward normal position to engage the shoulders 57a with the respective abutments 49 thereby locking the hinge member in assembly with the base. When the hinge member 51 is secured in assembly with the base 4, the base element 52 of the hinge member will be disposed adjacent the rear face 6 of the base 4 and operating to close the opening 47 at its intersection with the rear face 6. At the same time, the openings 59 in the base element 52 will be aligned with the openings 50 of the base part 4. The plate element 53 of the hinge member will be disposed adjacent the end face 45 of the base 4 with the opening 53a in the plate element in alignment with the opening 44 of the end face 45.

The complementary part of the hinge member 51 is in the form of a fulcrum member 60 which is mounted at an end 27 of the base 22 of the female part 2. As a means of receiving the fulcrum member 60, the base 22 has a slot 61 extending from its rear face 24 through the material of the base 22 and intersecting the outer face 62 (Fig. 14) of the end wall 27. The slot 61 has lateral extensions 63 on each side thereof adjacent the face 62 forming shoulders 64 (Fig. 6) spaced from the plane of the face 62 of the end wall 27. The end face 65 of the base 22 has a recess 65a extending from the rear face 24 of the base 22 and intersecting the outer face 62 of the end wall 27. Openings 66 are provided on opposite sides of the slot 61 and extend through the base element 22 for receiving screws or the like attaching means by which the female part 2 is secured to a cover or supporting part.

The fulcrum member 60 is most clearly shown in Figs. 32-34 and is formed of a generally U-shaped construction having an attaching portion 67 and a leg portion 68 disposed in spaced parallel relation and connected by a connection portion 69. The attaching portion 67 is preferably of a bifurcated construction at its free end forming a pair of tangs 70. A hook element 71 is integrally joined to the free end of the leg portion 68 and extends outwardly from the leg portion in substantially perpendicular relation thereto.

In assembling the fulcrum member 60 with the base 22, the attaching portion 67 is inserted into the slot 61 of the base 22 from the rear face 24. The attaching portion 67 is moved through the slot 61 until the tangs 70 have passed the shoulder elements 64. The tangs 70 are thereafter swaged outwardly by impact of a suitable tool against the outer free edge of the attaching portion 67 to force the tangs into overlapping engagement with the shoulder elements 64. When the fulcrum member is secured in assembly with the base 22 the connecting portion 69 is preferably seated within a depression 71a (Fig. 6) in the rear face 24 of the base 22 and the leg portion 68 is seated within the recess 65a of the base 22. In assembly of the fulcrum member with the base 22 the leg portion 68 extends beyond the outer face 62 of the wall 27 so as to dispose the hook element 71 beyond and outwardly of the face 62 as shown in Fig. 10.

A latch member 72 is secured to an opposite end 73 of the base 4 from the end 43 with which the hinge member 42 is assembled. For receiving the latch member 72, the base 4 has a slot 74 which extends from the rear face 6 and intersects the front face 73a of the end 73. The slot 74 is widest adjacent the rear face 6 and tapers toward the front face 73a with the result that opposed walls 75 adjacent the slot 74 converge from the face 6 toward the face 73a as most clearly shown in Fig. 7. Lateral extensions 76 of the sides of the slot 74 are provided at the end of the slot 74 adjacent the front face 73a so as to form abutments 77 (Figs. 7 and 8) on opposed sides of the slot 74 spaced from the plane of the front face 73a.

The latch member 72 is most clearly shown in Figs. 27 and 28 and comprises a base element 78 having an open-

ing 79 (Fig. 29) in a front edge 80 thereof. A pair of spring tongues 81 are integrally joined to the inner edge 82 of the opening 79 and extend from the base 78 in generally perpendicular relation thereto. The tongues 81 are disposed with their inner narrow edges 83 in spaced opposed relation and each tongue has a lateral projection 84 adjacent its outermost end extending away from the other of the tongues so as to provide a pair of shoulders 85 extending laterally of the tongues in opposed directions. The outermost ends of the tongues are preferably rounded as at 86. Openings 87 are formed on opposite sides of the tongues 81 for receiving screws or other attaching means by which the base element 78 is secured to a support or cover. A spring latching arm 88 is integrally joined to the rear edge 89 of the base 78 and extends away from the base and slightly inwardly relative to the same. The arm 88 has an inwardly-extending shoulder or projection which is preferably in the form of a lug 90 struck from the plane of the arm. The lug 90 is spaced a predetermined distance from the base 78 to engage the rear face 24 of the base 22 of the female part 2 when the parts of the connector are in connection as will be described. The outer end 91 of the arm 88 serves as a manually operative element for releasing the latch mechanism.

The latch member 72 is assembled with the base 4 by inserting the rounded ends 86 of the tongues 81 into the slot 74 from the rear face 6 of the base. As movement of the tongues 81 in the direction of the front face 5 is continued, engagement of the rounded ends 86 with the converging walls 75 of the slot 74 compress the tongues edgewise relative to each other. After the shoulders 85 of the tongues have passed the abutments 77 of the base 4, the tongues will spring laterally to engage the shoulders 85 with the abutments 77 (Fig. 7) to secure the latch member in assembly with the base. In final assembled position, the base element 78 of the latch member will be seated in a depression in the rear face 6 of the base 4 with the openings 87 in alignment with screw-receiving openings 92 formed in the base 4. The latching arm 88 will be disposed laterally of the end face 93 of the base 4 and extending outwardly and inwardly with respect to the base 4 so as to dispose the lug 90 above the plane of the front face 73a of the end 73 as most clearly shown in Fig. 9.

In practical application of the parts of the connector, the male part 1 is preferably secured to the upper surface 94 of a supporting plate 95 by screw members 96 (Fig. 2). At the end 43 of the male part, the screws 96 extend through the openings 50 of the base 4 and the openings 59 of the base element 52 of the hinge member to enter threaded engagement with the support 95. At the other end 73 of the base 4, the screws 96 extend through the openings 92 of the base 4 and the openings 87 of the base element 78 to engage the plate 95. When the male part 1 is in assembled relation with the plate 95 the terminals 37 of the contact members 30 will project through an opening 97 in the support 95 as most clearly shown in Fig. 5.

A metal cover part 98 is preferably secured in assembly with the female part 2. The cover 98 has an end wall 99 (Fig. 5) at one end providing an inwardly turned flange 100 at its lowermost end. The flange 100 has a pair of threaded portions 101 (Fig. 6) for receiving screw members 102. The opposite end of the cover 98 has an end wall 103 having a pair of inwardly extending flange elements 104 at its lowermost edge which are spaced laterally one from another as most clearly shown in Fig. 7. Each of the flange elements 104 has a threaded portion 105 (Fig. 7) for receiving a screw member 102. The end wall 103 has an opening 106 adjacent its lowermost edge communicating with the space between the flange elements 104 for a purpose to be described. At the end 27 of the female part 2, the

screw members 102 extend through openings 66 in the base 22 to engage the threaded portions 101 (Fig. 6). At the opposite end 28 of the part 2, the screw members 102 extend through openings 107 in the base 22 to engage the threaded portions 105 (Fig. 7).

In connecting electrically the male part 1 and the female part 2, the part 2 is moved toward the part 1 to project the hook element 71 of the fulcrum member 60 through the opening 53a of the hinge member 51 to engage the element with the edge 108 adjacent the upper side of the opening 53a (Fig. 1). As pressure upon the female part 2 is continued, it will be fulcrumed by co-operative engagement between the hook 71 and the edge 108 into final connected engagement with the part 2. During the fulcruming action, the opposite end of the base 22 from that to which the fulcrum member 60 is attached will engage the arm 88 of the latch member 72 moving the arm outwardly against its normal spring tension. After the rear face 24 of the base 22 has passed the lug 90 of the arm 88, the arm 88 will spring toward normal position to engage the lug 90 with the rear face 24 through the opening 106 of the cover 98 as most clearly shown in Fig. 5. As a result of this latching action, the bodies 4 and 22 of the male part 1 and female part 2 are maintained in firm connection with the outer face of the wall 25 of the female part 2 pressed firmly against the front face 5 of the male part 1.

During the action by which the male part 1 is moved into locked connection with the female part 2, the end barrier elements 29 of the female part 2 will move between the respective end barriers 8 and the adjacent barrier elements 7 of the part 1. The barrier elements of the female part 2 intermediate the end barrier elements will move between appropriate barrier elements 7 of the part 2. As the barrier elements move into position, complementary pairs of contact members 30 disposed in opposed relation on opposite sides of the barriers 29 will move into engagement with complementary pairs of facing contact members 30 carried by adjacent barrier elements of the male part 1. It will be noticed that the distance between the contact fingers of complementary pairs of contact members disposed in opposed relation or opposite sides of the barrier elements is greater than the distance between the contact fingers of complementary pairs of facing contact members. Consequently, as the contact members 30 of the part 1 move into contact with the appropriate contact members of the part 2, the contact fingers 32 of mating contact members will engage each other in a wiping action to force the fingers 32 of each pair of engaging contact members in the direction of their respective stem portions 31 and against their inherent spring tension. Thus, when the contact members are in complete electrical engagement, the outer faces of both of the mating fingers 32 will be engaged under spring tension, as most clearly shown in Fig. 26, effecting a positive electrical connection.

In uncoupling the parts of the connector the manually operative portion 91 of the arm 88 of the latch member 72 is moved outwardly away from the connector to disengage the lug 90 from the rear face 24 of the base 22 of the female part 2. As soon as the lug 90 is free of the rear face 24, action of the tensioned contact fingers 32 of the mating contact members to return to normal untensioned position relative to the stem portions 31 of the respective contact members causes the fingers 32 of each pair of mating contact members to exert a force against each other which moves the female part 2 away from the male part 1 thereby effecting complete disengagement of the contact members of the connector parts. In practice, the forces separating the contact members of the two connector parts may be great enough, particularly if the female part 2 is not held, to cause the female part to swing away from the male part on an arc of a length that will cause the fulcrum member 60 to be disengaged completely from the hinge member 51.

Thus, as a result of the construction of the connector wherein the connector parts are disengaged by untensioning forces inherent in the contact members, the parts may be uncoupled without the necessity of manual rocking or tugging action as required in the disconnection of conventional plug and socket connectors such as the well known "Jones" connector. As a result of the "automatic" separation effected by the present connector, the chances of damage to the contact members during the uncoupling operation is substantially non-existent. It is noted, also, that the wiping action between the contact fingers 32 of pairs of mating contact members takes place during the uncoupling action as well as in the action in which the parts of the connector are connected. This wiping relation assists self-cleaning of the surfaces of the contact members which are brought into mutual engagement when the parts of the connector are electrically connected.

As a result of the fact that laterally adjacent contact members carried by the barrier elements are disposed in staggered relation, greater spacing is effected between portions of laterally adjacent contact members than could efficiently be accomplished if the contact members were to be positioned in lateral in-line relation. The staggered positioning increases insulation resistance between laterally adjacent contact members and, at the same time, disposes the terminal elements in uniform, maximum spaced relation one to another so as to facilitate the soldering of wires thereto.

Although I have illustrated and described a preferred embodiment of my invention, I do wish to be limited thereby because the scope of my invention is best defined by the following claims.

I claim:

1. A connector for connecting a plurality of electrical terminals comprising a body of insulating material including a base portion having front and rear surfaces, a barrier element projecting outwardly from said front surface, said barrier having an opening in one face extending from its outer end into said base portion and terminating in a land well, said opening intersecting said face for its entire length whereby said opening is bounded by a rear wall and opposed sidewalls, each of said sidewalls having a lateral edge portion adjacent the face of said barrier having said opening, said edge portions extending toward each other laterally and terminating short of each other so as to leave a space therebetween, said base portion having a cavity extending from said front surface and terminating in a bottom portion, said bottom portion having a slot therein intersecting said rear surface of said base portion, a contact member assembled with said body, said contact having a back element disposed in said opening of said barrier between said rear wall and said edge portions, a shoulder element extending laterally from said back element at one end thereof and seated against said land well, a terminal portion integrally joined to said shoulder element and extending angularly thereto, said terminal portion extending through said slot in the bottom portion of said base, a yieldable contact element integrally joined to an opposite end of said back element from said shoulder element, said contact element extending outwardly from said back element in the direction of said front surface of said body, and said terminal element having attaching means engaging said rear surface of said body and cooperating with said shoulder element to prevent removal of said contact member from said body.

2. A connector for connecting a plurality of electrical terminals comprising a body of insulating material including a base portion having front and rear surfaces, a barrier wall projecting outwardly from said front surface, said barrier having an opening in one face extending from its outer end into said base and terminating in a land well, said opening intersecting said face for its entire length whereby said opening is bounded by a rear wall and opposed sidewalls, each of said sidewalls having a lateral edge portion adjacent the face of said barrier

having said opening extending from a point on its respective sidewall spaced from the outer end of said barrier to said land well, said edge portions extending toward each other laterally and terminating short of each other to leave a space therebetween, said base portion having a cavity extending from said front surface and terminating in a bottom portion, said cavity intersecting said opening in said barrier, said bottom portion having a slot therein intersecting said rear surface of said base portion, a contact member assembled with said body, said contact member having a back element disposed in said opening of said barrier and held in substantially rigid assembly therewith between said rear wall and said edge portions, a shoulder element extending laterally from said back element at one end thereof, said shoulder having a width less than the space between said edge portions and being seated against said land well between said edge portions, a terminal portion integrally joined to said shoulder element and extending in angular relation thereto in a direction substantially parallel to said back element, said terminal portion extending through said slot in the bottom portion of said base, a yieldable contact element integrally joined to an opposite end of said back element from said shoulder element, said contact element extending outwardly from said back element and toward said front surface of said body to dispose its free end in said cavity of said body, and said terminal element having attaching means engaging said rear surface of said body and cooperating with said shoulder element to prevent removal of said contact member from said body.

3. A connector for connecting a plurality of electrical terminals comprising a first base member of insulating material having a front face, a pair of barrier wall elements projecting from said front face and extending across said base member in spaced, generally parallel relation, a first set of resilient contact elements carried by facing sides of said wall elements, said contact elements being arranged in oppositely-facing pairs with the contact elements carried by each face being insulated one from another, a second base member of insulating material having a front face and a barrier element projecting from said front face and extending across the same, a second set of resilient contact elements disposed on opposite sides of said barrier element of said second base member, said second set of contact elements being arranged in pairs with the contact elements of each pair being disposed on opposite sides of the barrier element of said second base member and insulated one from another, said barrier element of said second base member being dimensioned to enter between said spaced barrier elements of said base member when said base members are connected together, and the pairs of contact elements carried by said barrier element of said second base member registering with said oppositely-facing contact elements of said respective pairs carried by said barrier elements of said first base member, and said registering contact elements being resiliently engaged one with another when said base members are coupled together.

4. A connector for connecting a plurality of electrical terminals comprising a socket base member of insulating material having a front face and opposed sidewalls and end walls projecting outwardly from said front face forming a receptacle, a pair of barrier elements projecting from said front face and extending across said base member from sidewall to sidewall in spaced, generally parallel relation, a first set of contact members carried by facing sides of said barrier elements, said contact members being arranged in pairs with the contact member of each pair disposed in opposed, spaced relation, each of said contact members having a spring element disposed in said space between said barrier elements and operable for free movement in the direction of the barrier element by which it is carried, a plug base member of insulating material having a front face and

a barrier wall element projecting from said front face and extending across the same, a second set of contact members carried by opposed sides of said barrier element of said plug base, said second set of contact members being arranged in pairs with the members of each pair disposed on opposite sides of said barrier element and insulated one from another, each of said contact members of said second set having a spring element operable for free movement in the direction of said barrier element, said barrier element of said plug base being dimensioned to enter said receptacle of said socket base between said spaced barriers thereof when said base members are connected, the pairs of contact members carried by said barrier element of said plug base registering with said oppositely-facing, spaced contact members of said respective pairs carried by said barrier elements of said socket base, and said spring elements of said respective registering contact members being resiliently engaged one with another when said base members are coupled together.

5. A connector for connecting a plurality of electrical terminals comprising a socket base member of insulating material having a front face and opposed sidewalls and end walls projecting outwardly from said front face so as to form a receptacle, a series of at least three barrier elements projecting from said front face and extending across said base member from sidewall to sidewall in spaced, generally parallel relation, a first set of contact members carried by said barrier elements, each of said barrier elements carrying a series of pairs of contact members with the contact members of each pair disposed oppositely on opposed sides of said barrier element, each pair of contact members carried by one barrier being arranged in opposed relation to a pair carried by an adjacent barrier and the contact member of each of said pairs on the inner sides of said respective barriers being in spaced oppositely facing relation, each of said contact members having a spring element disposed in said space between said barrier elements and operable for free movement in the direction of the barrier element by which it is carried, a plug base of insulating material having a front face and a pair of barrier elements projecting from said front face and extending across the same in spaced, generally parallel relation, a second set of contact members carried by said pair of barrier elements, each of said pair of barrier elements carrying a series of pairs of contact members arranged thereon in the same manner as the contact members carried by the barrier elements of said socket base, said barrier elements of said plug base being designed to enter the spaces between the first and second and the second and third barrier elements of said socket base when said base members are connected, the pairs of contact members carried by each of the barrier elements of said plug base registering with said oppositely-facing, spaced contact members carried by said respective adjacent barrier elements of said socket base, and said registering contact members being electrically engaged one with another when said base members are coupled together.

6. A connector for connecting a plurality of electrical terminals comprising a pair of mating base members of insulating material, each of said base members having a front face and barrier elements projecting outwardly therefrom, said barrier elements of each of said base members carrying a series of contact members for registering interengagement when said base members are coupled together, said contact members being anchored relative to said associated barrier elements and having spring contact elements, said spring elements being disposed laterally of said respective barrier elements and arranged for resilient contraction when engaged with registering contact elements, fastener means carried by said base members for pressing said base members together to secure said contact members in tensioned interengaged relation, and said contact members operating when said fastener means is

released to force said base members apart by untensioning of said contact elements.

7. A connector for connecting a plurality of electrical terminals comprising a pair of mating base members of insulating material, said first base member having a front face and a pair of barrier elements projecting outwardly therefrom and disposed in spaced, generally parallel relation, a first set of contact members assembled with said barrier elements, said contact members being anchored relative to said associated barrier elements and having spring contact elements disposed laterally of facing sides of said barrier elements, said second base member having a front face and a barrier element projecting outwardly therefrom, a second set of contact members assembled with said barrier element of said second base for registering interengagement with said contact members of said first base, said second set of contact members being anchored relative to said barrier element and having spring contact elements disposed laterally of said barrier element on opposed sides thereof, said barrier element of said second base member being dimensioned to enter between said barrier elements of said first base thereby compressing in tensioned engagement said registering contact elements, fastener means carried by said base members for pressing said base members together to secure said contact members in said tensioned interengagement, and said contact members operating when said fastener means is released to force said base members apart by untensioning of said contact elements.

8. A connector for connecting a plurality of electrical terminals comprising a pair of mating base members of insulating material, said first base member having a front face and a series of barrier elements projecting outwardly therefrom, said barrier elements being disposed in spaced, generally parallel relation and extending across said front face in transverse relation to the longitudinal axis of said base member, a first set of contact members assembled with said barrier elements, said contact members carried by each of said barrier elements being arranged in pairs, the contact members of each pair having an anchoring portion in anchored relation with said respective barrier element and flat, wiping contact elements disposed in opposed relation on opposite sides of said barrier element, said contact elements being resiliently compressible in the direction of said respective barrier element with which it is assembled when in registered engagement with contact members carried by the other of said base members, a second base member having a front face and a series of barrier elements projecting outwardly therefrom, said barrier elements being disposed in spaced, generally parallel relation and extending across said front face in transverse relation to the longitudinal axis of said base member, said barrier elements of said second base member being arranged with respect to said front face so as to be disposed between said barrier elements of said first base member when said base members are in coupled relation, a second set of contact members assembled with said barrier elements of said second base member, said contact members carried by each of said last-mentioned barrier elements being arranged in pairs, the contact members of each pair having an anchoring portion in anchored relation with said respective barrier element of said second base member and flat, wiping contact elements disposed in opposed relation on opposite sides of said barrier element, said pairs of contact members of said second set being arranged to engage and be compressed by contact elements of said first set on facing sides of adjacent barrier elements of said first base member when said barrier elements of said second base members are disposed between said barrier elements of said first base member to couple said base members, fastener means carried by said base members at opposed longitudinal ends thereof for pressing said base members together to secure said contact members in tensioned interengaged relation, and said contact members operating when said

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fastener means is released to force said base members apart by untensioning of said contact elements.

9. A connector for connecting a plurality of electrical terminals comprising a first base member of insulating material having a front face, a pair of barrier wall elements projecting from said front face and extending across said base member in spaced, generally parallel relation, a first set of resilient contact elements carried by facing sides of said wall elements, said contact elements being arranged in oppositely-facing pairs with the contact elements carried by each face being insulated one from another, alternate contact elements carried by each face being disposed in staggered relation, a second base member of insulating material having a front face and a barrier element projecting from said front face and extending across the same, a second set of resilient contact elements disposed on opposed sides of said barrier element of said second base member, said second set of contact elements being arranged in pairs with the contact elements of each pair being disposed on opposed sides of the barrier element of said second base member and insulated one from another, alternate pairs of contact elements of said second set being disposed in staggered relation, said barrier element of said second base member being dimensioned to enter between said spaced barrier elements of said base member when said base members are connected together, and the pairs of contact elements carried by said barrier element of said second base member registering with said oppositely-facing contact elements of said respective pairs carried by said barrier elements of said first base member, and said registering contact elements being resiliently engaged one with another when said base members are coupled together.

10. A unit of a multiple connector comprising a body part of insulating material, said body part having a plurality of contact members for cooperative electrical engagement with the contact members of a mating unit, said body part having a metal fulcrum member secured in assembly with said part at one end thereof, said body part having an opening extending from a front face thereof through a rear face thereof, said fulcrum member being in the form of a U-shaped part comprising a leg portion and an attaching portion in spaced substantially parallel relation and a connecting portion connecting the ends of said leg and attaching portions adjacent one end of said U-shaped part, said attaching portion extending through said opening of said body part and having laterally-extending elements engaging said body part adjacent said front face thereof, said connecting portion being disposed adjacent said rear face of said body part, said leg portion extending from said connecting portion adjacent an end of said body part to a position beyond the plane of said front face of said body part, a hook portion integrally joined to the other end of said leg portion from said connecting portion and extending laterally outwardly relative to said second body part.

11. A unit of a multiple connector comprising a body part of insulating material, said body part having a plurality of contact members for cooperative electrical engagement with the contact members of a mating unit, said body part having an end face at one end thereof, said body part having an opening intersecting said end face and extending from a front face of said end to the rear face, said body part having a metal hinge member secured in assembly with said part adjacent said end, said hinge member having a base element disposed adjacent said rear face and a plate element disposed adjacent said end face exteriorly of said body part, said plate element having an opening communicating with said opening of said end, and said hinge member having fastener means in fastened engagement with said body part for securing said hinge member in assembly therewith.

12. A unit of a multiple connector comprising a body part of insulating material, said body part having a plurality of contact members for cooperative electrical en-

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gagement with the contact members of a mating unit, said body part having an end face at one end thereof, said body part having an opening intersecting said end face and extending from the front face of said body part to the rear face, said body part having a metal hinge member secured in assembly with said body part adjacent said end, said hinge member having a base element disposed adjacent said rear face and a plate element disposed adjacent said end face exteriorly of said body part, said plate element having an opening communicating with said opening of said body part, and said hinge member having spring shouldered attaching elements extending from said base element, said attaching elements extending into said opening of said body part and engaging material of said body part adjacent said opening for securing said hinge member in assembly with said body part.

13. A unit of a multiple connector comprising a body part of insulating material, said body part having a plurality of contact members for cooperative electrical engagement with the contact members of a mating unit, said body part having an end face at one end thereof, said body part having an opening adjacent said end extending from the front face of said body part to the rear face thereof and intersecting said end face, said body part having a metal hinge member secured in assembly with said body part adjacent said end, said hinge member having a base element disposed adjacent said rear face and a plate element disposed adjacent said end face exteriorly of said body part, said plate element having an opening communicating with said opening of said body part, and said hinge member having spring shouldered attaching elements extending from said base element, said attaching elements extending into said opening of said body part and engaging material of said body part adjacent said opening for securing said hinge member in assembly with said body part, said plate element and said body part each having an aperture in alignment with each other for receiving a fastener member such as a screw extended through said apertures for securing said body part to a supporting member.

14. A self-separable multiple connector comprising two complementary body portions of insulating material to be releasably connected to one another, the first of said body portions carrying a pair of contact members, each of said contact members having a stem portion in the form of a flat straight strip extending in the direction of the second body portion and a resilient flat contact finger integrally secured at one end to the free end of said stem portion and extending in a reverse angular direction with respect to said stem portion and in spaced relation thereto, said contact fingers of said pair of contact members lying in outwardly facing relation with reference to said stem portions and forming resilient inclined wiping surfaces on opposite sides of the pair of contact fingers, the second of said body portions carrying a second pair of contact members, each of said second contact members having a stem portion in the form of a flat strip extending in the direction of the first body portion, and a resilient flat contact finger extending inwardly in a reverse angular direction with respect to said stem portion and in spaced relation thereto, said contact fingers of said second pair of contact members lying in inwardly facing relation with reference to their associated stem portions and forming resilient inclined wiping surfaces extending in the direction of one another, said body portions having separable hinge means at one end thereof for hinging said body portions together, and having fastener means disposed in opposed relation to the hinge means for retaining the hinged body portions in coupled relation, the inclined wiping surfaces of each pair of contact fingers being compressed independent of said body portions toward their stem portions when in mating relationship with those of the other pair of contact fingers when said body portions are in coupled relation, said mating wiping surfaces springing outwardly with respect to their associated stem por-

tions to uncouple said body portions when said fastener means is released.

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