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3,086,191

STAB CONTACT ASSEMBLIES

Filed Sept. 13, 1961

2 Sheets-Sheet 1

FIG. 1.

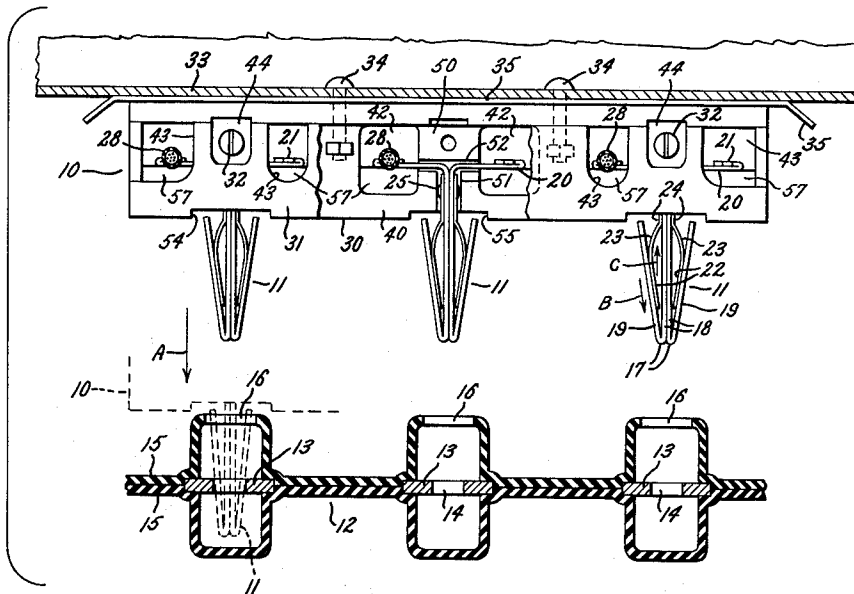


FIG. 6.

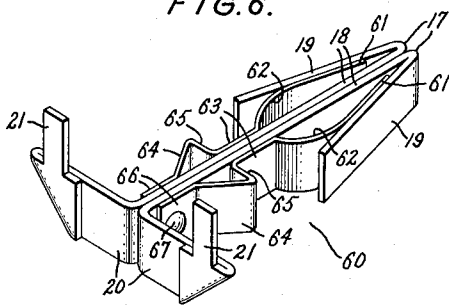
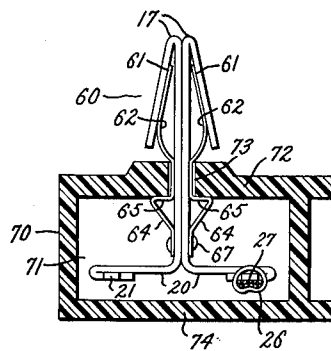


FIG. 7.

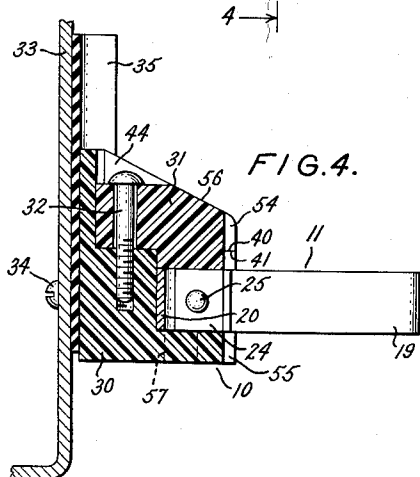
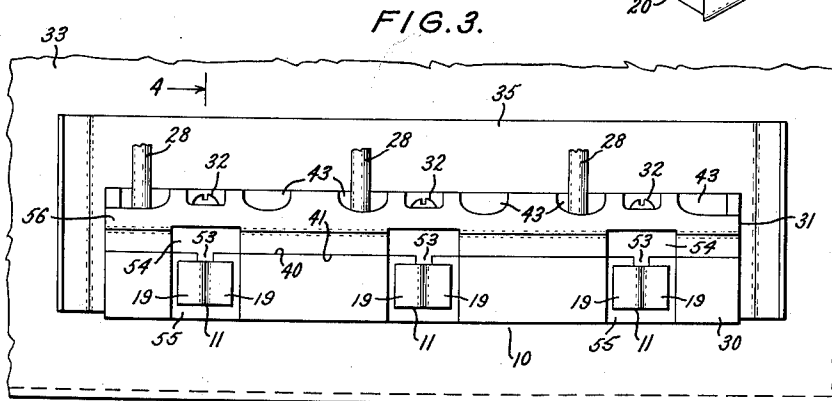
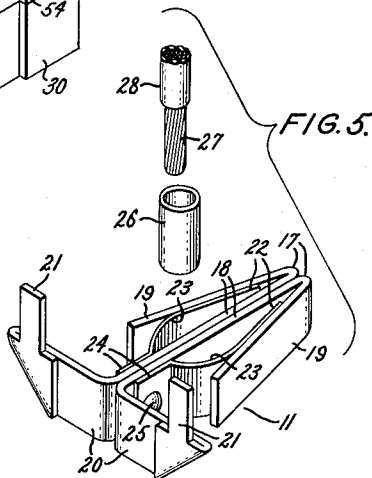
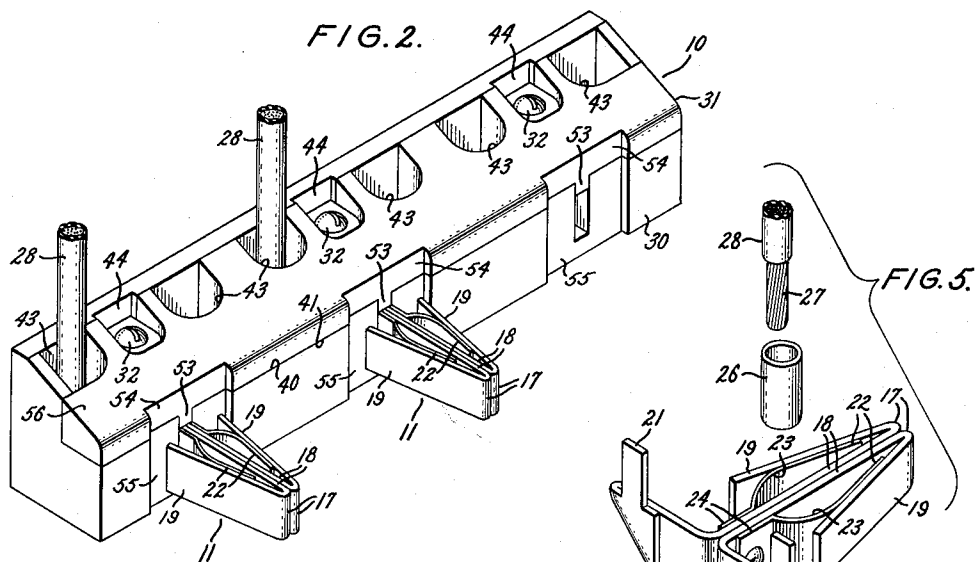


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STAB CONTACT ASSEMBLIES

'2 Sheets-Sheet 2



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1

3,086,191

STAB CONTACT ASSEMBLIES

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12 Claims. (Cl. 339-196)

This invention relates to stab contact assemblies and particularly to stab contact assemblies of the male type for detachable engagement with conductors such as bus bars.

Stab contact assemblies have heretofore been employed to make detachable electrical connections between electrical conductors and have assumed various forms. For example, stab contacts have been utilized to electrically connect apparatus, such as circuit breakers, to bus bars with the stab end of the contact in engagement with the bus bar and with a terminal end of the contact electrically connected to the apparatus.

Stab contacts have previously assumed a variety of forms. One well known type of stab contact is referred to as a male stab contact which is designed for insertion into slots formed in bus bars to engage the inner walls of the bus bars. Heretofore, difficulty has been encountered in providing a male stab contact which when inserted into a bus bar slot provides high contact pressure between the stab contact and the inner walls of the bus bar. Also, male stabs of previous design have been difficult to insert and withdraw relative to the bus bar slots, and have not had satisfactory terminal connections to conductors of apparatus associated therewith. In addition, such stab contacts have become disengaged from the bus bars in response to heavy currents such as short circuit currents flowing in the bus bars.

In order to facilitate insertion and removal of a plurality of stab contacts with respect to a plurality of bus bars, it is desirable that the stab contacts be firmly mounted within a housing or stab block which insulates the several stab contacts from each other, which permits movement of the stab contacts as a unit relative to the bus bars and which prevents the build up of dust and foreign matter which may result in short circuits between stab contacts. Stab blocks of previous design have been of expensive and bulky construction, requiring special means for retaining the several stabs in position and requiring time consuming operations to assemble and disassemble the contacts relative thereto.

It is therefore a primary object of the invention to provide a male stab contact of improved construction which is readily inserted and withdrawn relative to a bus bar, and which effects tight engagement with the bus bar when in contact therewith.

It is another object of the invention to provide a male stab contact of improved construction which is of both simple and inexpensive design, and which increases its contact pressure with a bus bar in response to heavy currents such as short circuit currents through the bus bar.

It is a still further object of the invention to provide a stab contact having improved terminal means permitting effective connection of conductors to the contact.

It is a further object of the invention to provide a stab contact assembly of improved construction including a contact block which mounts a plurality of stab contacts in a manner permitting quick insertion and removal of

2

the contacts relative to the contact block, and which retains the contacts firmly to prevent relative movement with respect thereto.

It is still another object of the invention to provide a stab contact assembly including a novel contact block configured to rigidly support a plurality of stab contacts without the provision of special means for securing the contacts to the block, and which prevents the build up of foreign matter adjacent the contacts.

In carrying out the invention in one preferred form, there is provided a male stab contact formed of a pair of copper strips of identical configuration secured together in face to face relation and having end portions bent back and spaced from intermediate body portions so as to provide a contact of tapered, wing-shaped configuration. A pair of leaf springs are secured to the body portions of the strips and include bowed portions in the spaces between the terminal portions and the associated body portions, and engaging the inner faces of the bent back end portions. The other ends of the two strips extend laterally from the body portions away from each other to provide electric terminals to which conductors are to be attached.

A plurality of contact stabs of the type above-described are supported by a contact block including detachable cover and base portions. The base portion includes for each contact a pair of cavities to receive the electrical terminal parts of the contacts and T-shaped slots in which are positioned parts of the contact so that when mounted, the contact is retained against movement in directions parallel to the plane of the base. The cover includes a plurality of projections which, when the cover is attached to the base, extend into parts of the T-shaped slots to restrict movement of the contacts in directions toward the cover. The cover includes a downwardly sloped top surface, and vertical slots are formed in the base which place the cavities in communication with the atmosphere to prevent the build up of foreign matter adjacent the contacts.

Other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which

FIG. 1 is a view in top plan with parts broken away showing the stab block and contacts spaced from a vertical busway;

FIG. 2 is a view in perspective of the stab block with one of the stab contacts removed therefrom;

FIG. 3 is a view in front elevation showing the stab block mounted upon a supporting saddle parts of which are broken away;

FIG. 4 is a view in section taken along the line 4-4 of FIG. 3;

FIG. 5 is a view in perspective showing the stab contact employed in the assembly of FIG. 1;

FIG. 6 is a view in perspective showing a different embodiment of a male stab contact; and

FIG. 7 is a view in top plan with parts broken away showing a portion of a contact block with the contact of FIG. 6 mounted therein.

Referring now to the drawings there is shown in FIG. 1 a male contact stab assembly including a stab contact mounting block represented generally by the numeral 10 which supports a plurality of stab contacts 11, and which is movable towards and away from a busway 12 including

bus bars 13 having slots 14 for receiving the stab contacts 11. The bus bars 13 are insulated and are retained in operative positions by a pair of insulation members 15 secured in face to face opposing relation. Such a bus bar assembly is described and claimed in the form herein illustrated in application S.N. 80,112, filed January 3, 1961, by Albert H. Adams, and in its more generic aspects in Application S.N. 135,880, filed September 5, 1961, by Albert H. Adams and William F. Olashaw, both of which applications are assigned to the same assignee as the present application. The member 15 includes a plurality of plug-in openings 16 through which the contacts 11 extend into engagement with the slots 14. The busway 12 is of the vertically-extending type and the block 10 is moved with respect thereto in horizontal directions. The block 10 is movable from its illustrated position in the direction of the arrow A to a position partly shown in dotted lines wherein the contacts 11 enter the slots 14 to electrically connect the bus bars 13 with apparatus connected to the contacts 11.

Details of construction of one of the stabs 11 are best shown in FIG. 5, and as there illustrated the stab includes a pair of electroconductive strips 17 of similar configuration comprising body portions 18 in face to face engagement, and resilient end portions 19 bent back toward the body portions 18 and spaced from the associated body portions to provide a tapered, wing-shaped configuration. The strips 17 are preferably made of copper and include terminal portions 20 projecting transversely of the body portions 18 away from each other to provide electrical terminals. The ends of these terminals are folded back thereupon and include projections 21 extending upwardly as viewed in FIG. 5.

Resilient means preferably in the form of a pair of hardened steel spring strips 22 include outwardly bowed portions 23 positioned in the spaces between the end portions 19 and the associated body portions 18 in engagement with the inner surfaces of the end portions 19. The springs also include flat parts 24 which engage outer faces of the body portions 18, and the entire assembly including the strips 17 and the springs 22 are secured together by means of a rivet 25 or other fastening means. The springs 22 serve to resist movement of the end portions 19 toward the associated body portions 18, and when the contact 11 is in operative engagement with a bus bar 13, the springs 22 bias the portions 19 outwardly into tight engagement with the sidewalls of the bus bar slot 14 to provide a very high pressure contact between the stab 11 and bus bar.

It has also been observed that the contact pressure between the stab contact and bus bar is increased in response to the passage of high currents, such as short circuit currents, through the bus bar. This may be explained by considering that when the stab contact engages a bus bar, current from the bus bar flows through the body portion 18 and end portion 19 in the directions indicated by the arrows B and C associated with the left-hand strip 17 of the right-hand contact of FIG. 1. Such current flow establishes two magnetic fields which repulse each other causing the portion 19 to be repelled from the portion 18 against the side wall of slot 14. This action also holds true for the right-hand strip 17.

In order to electrically connect conductors to the terminals 20 the projections 21 are received within a pair of deformable tubular collars 26, only one of which is shown in FIG. 5, and the bare end 27 of a conductor 28 is positioned within the collar to engage the side surface of the projection 21. The collar 26 is then deformed so as to press the conductor end 27 into tight engagement with the projection 21 to provide a very efficient and strong electrical connection. It is appreciated that one or two conductors can be connected to the stab contact as desired.

In order to mount a plurality of the contacts 11 for movement as a unit there is provided a contact block 10 having detachable base and cover parts 30 and 31 re-

spectively preferably formed of molded insulating material. The cover and base are secured together by screws 32 extending therethrough and the resultant assembly is attached to a mounting device or saddle 33 by screws 34 which pass through the saddle into the base 30. The saddle 33 mounts electrical devices such as circuit breakers, relays, etc., and interposed between the saddle 33 and the block 10 is a strip of insulation 35. The base 30 and cover 31 include respectively, surfaces 40 and 41 which engage when the cover and base are attached, and the cover and base are separable from each other in a plane defined by the surfaces 40 and 41.

As shown in FIG. 1 the base 30 includes a pair of spaced vertically-extending cavities 42 in which are positioned the terminal parts 20 of one of the contacts 11. It is appreciated that for each contact 11 the base 30 includes a pair of cavities 42. As shown in FIGS. 1 and 2 the cover 31 includes three pairs of spaced vertically-extending openings 43 in vertical alignment with the associated cavities 42 when the cover and base are attached. These vertically-aligned cavities 42 and openings 43 are provided to permit extension of the conductors 28 connected to the terminals 21 of the contacts 11 out of the block 10 and into electrical connection with apparatus mounted on the saddle 33. Intermediate each pair of the openings 43 is positioned a recess 44 for receiving the screws 32 which extend vertically into the base 30 as shown in FIG. 4.

As illustrated in FIG. 1 the cavities 42 in the base 30 are spaced by a web 50 including a T-shaped slot having perpendicular slot portions 51 and 52 in which are received parts of the contact 11. It is understood that a separate T-shaped slot is provided for each of the contacts 11. In order to operatively position a contact 11 with respect to the base 30, the contact 11 is positioned such that the flat parts 24 of the springs 22 and adjacent parts of the body portions 18 are located within the slot 51, and parts of the terminals 20 are located in the slot 52. With this arrangement the contact 11 is restricted against movement in horizontal directions, and the projections 21 are located each within a separate one of the associated cavities 42 to be effectively isolated from each other. As best shown in FIG. 2, the depths of the slots 51 are greater than the heights of the parts of the contacts 11 positioned therein. The cover 31 includes a plurality of spaced projections 53 extending from the surface 41 thereof as shown in FIGS. 2 and 3, and these projections are aligned with the slots 51 and extend into such slots to engage the upper surfaces of the adjacent parts of the contact 11 when the cover 31 is attached to the base 30. This arrangement restricts movement of the contacts 11 in vertical directions toward the cover 31. As illustrated in FIGS. 2 and 3 the cover and base include respectively a plurality of spaced aligned indentations 54 and 55 which define recesses adjacent the rear tips of the bent back parts 19 of the strips 17.

As best shown in FIGS. 2 and 4, the cover 31 includes an upper surface 56 which slopes downwardly when the block is operatively positioned to prevent the build up thereon of foreign matter. Also, the base 30 is formed with a plurality of apertures 57 which extend vertically through the base to place the cavities 42 in communication with the atmosphere at the bottom of the base to provide an exit for foreign material.

In order to assemble the contact assembly above described, the following steps are taken. One or two conductors 28 are first secured to the projections 21 by inserting the bare ends 27 of the conductors into the collars 26 located on the projections 21. The collars 26 are then deformed to provide the connections. The contacts 11 are next mounted on the base 30 by dropping the contacts into the slots 51 and 52 in the manner above described. The cover 31 is then positioned on top of the base 30 with the surfaces 40 and 41 in

5

engagement and with the projections 53 extending into the slots 51. The conductors 28 are extended upwardly through the openings 43, and the screws 32 are then placed in position and tightened to secure the cover and base together. The block 10 is next secured to the saddle 33 by means of the screws 34, and the conductors 28 are passed through openings (not shown) in the saddle and connected to apparatus mounted on the saddle.

It is thus seen that the block 10 is of very simple construction with a minimum number of parts and retains the contacts 11 firmly in position without the necessity of special means for securing the contacts to the block 10. Also, the block 10 is designed to prevent build up of foreign material thereon, and the contacts 11 may be readily removed from the block 10 by merely detaching the cover 31 and lifting the contacts 11 out of the slots 51 and 52. The contacts themselves are of unique design and provide a very high contact pressure between the end portions 19 thereof and the inner surfaces of the bus bar slots 14. Also, the arrangement of the contacts is such that they increase their contact pressure with the bus bars in response to heavy currents through the bus bars. In addition, the contacts are of tapered configuration so as to be readily inserted and withdrawn relative to the slots 14, and due to the springs 22 the contacts retain their original configuration after repeated usage.

FIGS. 6 and 7 illustrate a further embodiment of the invention and show a male stab contact 60 having a pair of springs 61 corresponding to the springs 22 of the embodiment of FIG. 5, and of different configuration than the springs 22. Identical parts of the contacts 60 and 11 are represented by the same reference numerals. The springs 61 are of identical configuration and include bowed portions 62 positioned between the bent back terminals 19 and the associated body portions 18 in the manner of FIG. 5. The springs 61 also include intermediate flat portions 63 which engage the outer surfaces of the body portions 18, and laterally projecting portions 64 having shoulders 65 and terminating in flat end portions 66 in engagement with outer surfaces of the body portions 18. A rivet 67 extends through the portions 66 and the adjacent parts of the body portions 18.

Referring now to FIG. 7 the contact 60 is shown in position with respect to a base 70 forming part of a contact block for mounting several of the contacts 60. The base 70 includes a cavity 71 defining a front wall 72 having a slot 73 therein which extends between the cavity 71 and the outer surface of the wall 72. The contact 60 is positioned within the slot 73 such that the spring portions 63 and the adjacent parts of the body portions 18 are within the slot 73 with the shoulders 65 adjacent the inner surface of the wall 72, and with the terminal parts of the bowed spring portions 62 adjacent the front surface of the wall 72. With such arrangement movement of the contact 60 is restricted in vertical directions as viewed in FIG. 7.

The terminal portions of the strips 17 may be modified as desired. For example, instead of the deformed collar terminal arrangement shown in FIGS. 5 and 7, the terminals 20 may be secured to the inner surface of the rear wall 74 of the base 70 by a screw (not shown) passing through the wall 74, and a connector of a conductor positioned between the screw (not shown) and the terminal 20.

While I have shown and described a particular embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention in its broader aspects and I, therefore, intend in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

6

1. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of electroconductive strips having body portions secured together in face-to-face relation, said strips having adjacent resilient end portions reversely bent and spaced from the associated body portions, and resilient means secured to the strips including part in the space between the end portions and the associated body portions, said resilient means resisting movement of said end portions toward the associated body portions, said resilient means having a laterally extending projection spaced from and intermediate said parts of said resilient means and the ends of said strips other than said resilient end portions.

2. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of metallic strips having body portions secured together in face-to-face relation, said strips having adjacent resilient end portions reversely bent and spaced from the associated body portions, resilient means secured to the strips including parts in the spaces between the end portions and the associated body portions, said resilient means resisting movement of said end portions toward the associated body portions, and a terminal extension projecting laterally from one of said body portions at an area spaced longitudinally from said reversely bent end portions, said resilient means having a laterally extending projection spaced from and intermediate said parts of said resilient means and said terminal extension.

3. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of metallic strips having body portions secured together in face-to-face relation, said strips having adjacent resilient end portions reversely bent and spaced from the associated body portions, resilient means secured to the strips including parts in the spaces between the end portions and the associated body portions, said resilient means resisting movement of said end portions toward the associated body portions, and a terminal extension projecting laterally from one of said body portions at an area spaced longitudinally from said reversely bent end portions, said terminal extension having a projection extending generally perpendicular to the direction of extension thereof and of said body portions, a tubular collar surrounding said projection, and a conductor having a bare portion within the collar engaging said projection, said collar being deformed to force said bare portion into tight frictional engagement between said projection and a wall of said collar.

4. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of metallic strips having body portions secured together in face-to-face relation, said strips having first resilient end portions reversely bent and spaced from the associated body portions, and a pair of springs secured to the outer faces of said body portions having outwardly bowed portions in the spaces between the reversely bent portions and the associated body portions and engaging the inner surfaces of the reversely bent portions, said strips having second end portions extending laterally from said body portions in opposite directions and spaced longitudinally from said reversely bent end portions, said springs having laterally extending projections spaced from and intermediate said bowed portions and the second end portions of said strips.

5. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of metallic strips having body portions secured together in face-to-face relation, said strips having first resilient end portions reversely bent and spaced from the associated body portions, and a pair of springs secured to the outer faces of said body portions having outwardly bowed portions in the spaces between the reversely bent portions and the associated body portions, and engaging the inner surfaces of the reversely bent portions, said

strips having second end portions extending laterally from said body portions in opposite directions and spaced longitudinally from said reversely bent end portions, said second end portions having parallel spaced terminal projections extending generally perpendicular to the directions of extension of said second end portions and of said body portions on opposite sides of said body portions, a tubular collar surrounding one of said projections, and a conductor having a bare portion within the collar engaging said projection, said collar being deformed to force said bare portion into tight frictional engagement between said projection and a wall of said collar, said springs having laterally extending projections spaced from and intermediate said bowed portions and the second end portions of said strips.

6. A male stab contact for insertion into a slot of a conductor to engage the inner walls thereof, comprising a pair of metallic strips having body portions secured together in face-to-face relation, said strips having adjacent resilient end portions reversely bent and spaced from the associated body portions, and a pair of springs secured to the outer faces of said body portions, each spring having an outwardly bowed portion within the space between the reversely bent portion and the body portion of the associated strip in engagement with the inner surface of the reversely bent portion, and having a laterally extending projection spaced from the bowed portion longitudinally of the associated strip.

7. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a plurality of insulated cavities and a front wall which has a plurality of spaced parallel slots extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, and a plurality of stab contacts each including a body portion extending from within said housing through the associated slot to an area outside said housing, a contact portion on said body portion outside said housing, said body portion having an end within an associated cavity providing an electric terminal, said cover including a plurality of parallel extensions each configured to project into a separate one of said slots when the cover and base are attached to restrict movement of said stab contacts in directions toward said cover, said cover including a plurality of passages each opening to the atmosphere and each aligned with and in communication with a separate one of said cavities to receive conductors connected to said terminals.

8. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a plurality of insulated cavities and a front wall which has a plurality of spaced parallel slots extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, and a plurality of stab contacts each including a body portion extending from within said housing through the associated slot to an area outside said housing, a contact portion on said body portion outside said housing, said body portion having an end within an associated cavity providing an electric terminal, said cover including a plurality of parallel extensions each configured to project into a separate one of said slots when the cover and base are attached to restrict movement of said stab contacts in directions toward said cover, said cover having an upper surface which slopes downwardly when the housing is operatively positioned, said base having a separate vertical aperture placing each of said cavities in communication with the atmosphere at the bottom of the base.

9. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a cavity defining a front wall which has a plurality of spaced parallel slots extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, a plurality of stab contacts each including a body portion extending from within said housing through the associated slot to an area outside said

housing, a contact portion on said body portion outside said housing, said body portion having an end within said cavity providing an electric terminal, said cover including a plurality of parallel extensions each configured to project into a separate one of said slots when the cover and base are attached to restrict movement of said stab contacts in directions toward said cover, and means on said contacts within said housing engageable with parts of said housing to restrict movement of the contacts in directions parallel to said plane of separation, said cover including a plurality of passages each opening to atmosphere and each aligned with and in communication with a separate one of said cavities to receive conductors connected to said terminals.

10. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a plurality of aligned pairs of cavities with each pair spaced by a web portion, said web portions having a plurality of T-shaped slots each extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, and each communicating with the associated pair of cavities and with the exterior of said housing, a plurality of stab contacts each including a body, contact means on one end of the body and laterally extending terminals on the other end of the body, said stab contacts being positioned each with portions of the body and of the terminals within a separate T-shaped slot with the contact means outside the housing and with ends of the terminals within a pair of cavities, said cover including a plurality of parallel extensions configured to project into portions of said T-shaped slots when the cover and base are attached to restrict movement of the stab contacts in directions toward the cover.

11. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a plurality of aligned pairs of cavities with each pair spaced by a web portion, said web portions having a plurality of T-shaped slots each extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, and each communicating with the associated pair of cavities and with the exterior of said housing, a plurality of stab contacts each including a body, contact means on one end of the body and laterally extending terminals on the other end of the body, said stab contacts being positioned each with portions of the body and of the terminals within a separate T-shaped slot with the contact means outside the housing and with ends of the terminals within a pair of cavities, said cover including a plurality of parallel extensions configured to project into portions of said T-shaped slots when the cover and base are attached to restrict movement of the stab contacts in directions toward the cover, said cover including a plurality of passages each aligned with a separate one of said cavities to receive conductors connected to the ends of said terminals.

12. A stab contact block comprising, a housing having separable cover and base portions, said base portion including a plurality of aligned pairs of cavities with each pair spaced by a web portion, said web portions having a plurality of T-shaped slots each extending generally perpendicular to the plane of separation of said cover and base portions and opening at said plane, and each communicating with the associated pair of cavities and with the exterior of said housing, a plurality of stab contacts each including a body, contact means on one end of the body and laterally extending terminals on the other end of the body, said stab contacts being positioned each with portions of the body and of the terminals within a separate T-shaped slot with the contact means outside the housing and with the ends of the terminals within a pair of cavities, said cover including a plurality of parallel extensions configured to project into portions of said T-shaped slots when the cover and base are attached to restrict movement of the stab contacts in directions to-

ward the cover, said cover including a plurality of passages each aligned with a separate one of said cavities to receive conductors connected to the ends of said terminals, said cover having an upper surface which slopes downwardly when the housing is operatively positioned, said 5 base having a separate vertical aperture placing each of said cavities in communication with the atmosphere at the bottom of the base.

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