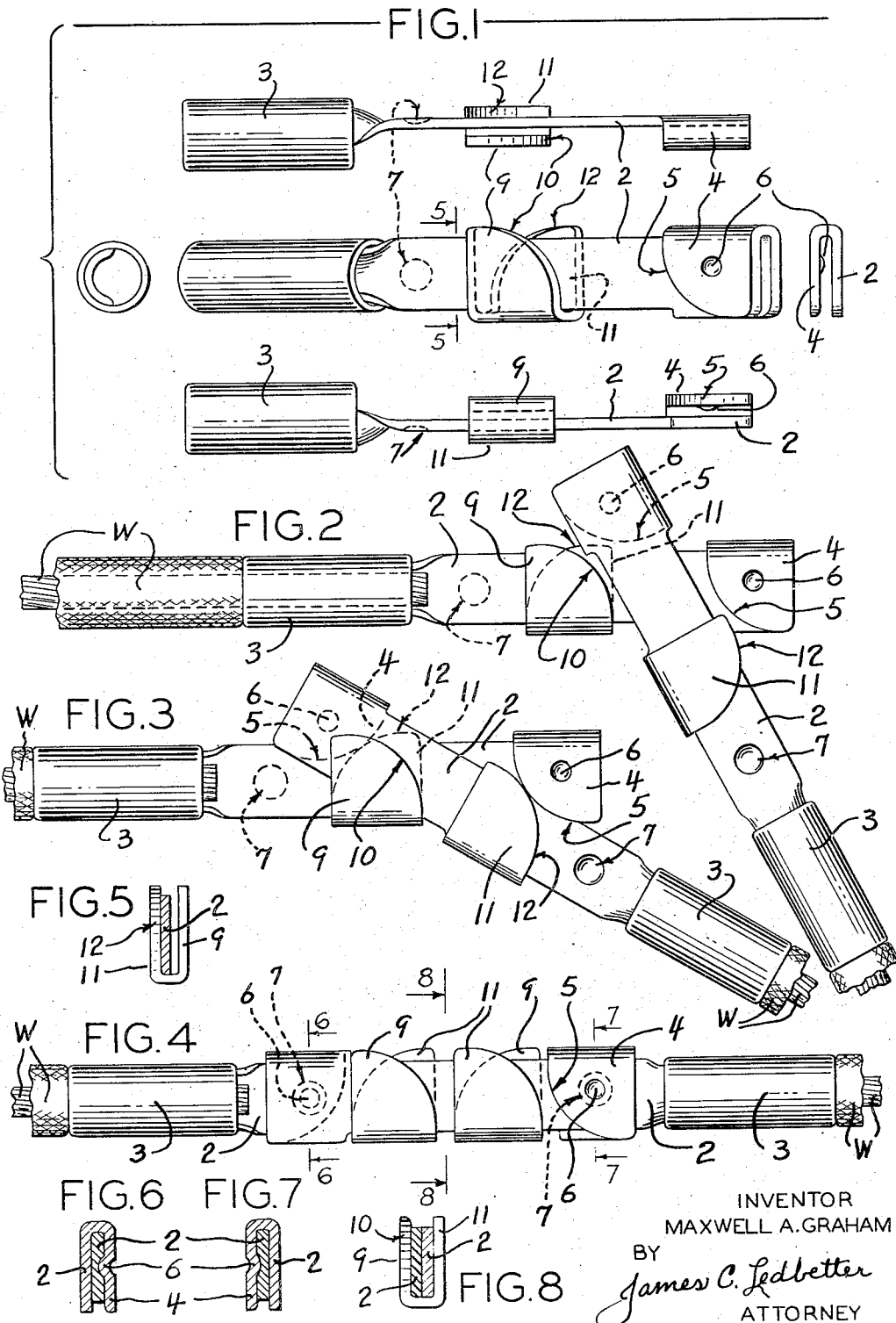


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M. A. GRAHAM
DISCONNECTOR BLADE TERMINAL

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DISCONNECTOR BLADE TERMINAL

Maxwell A. Graham, Elizabeth, N. J., assignor
to The Thomas & Betts Co., Elizabeth, N. J., a
corporation of New Jersey

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This invention relates to wire and cable connectors and more particularly to a new and useful disconnector blade terminal, having special utility in electrical installations, two of which terminals are employed to make a complete connector.

Wire and cable connector terminals, particularly for electrical wiring connections, of the pivotal blade disengageable type and of duplicate or twin construction, have been suggested before with varying degrees of success. The present-day pivotal blade species of detachable connector (sometimes referred to as a disconnector) lacks adequate contact engaging area to make a good electrical connection and likewise lacks adequate holding or latching means by which to secure the two terminals together to also make a good mechanical connection.

A purpose of this invention is to produce a new pivotal blade type of duplicate or twin-terminal wire connector having a quick connect and disconnect function for a variety of wiring installations (such as wire splicing, panel and terminal block installations, and binding post connections and the like) which has maximum contacting area for a given size terminal, as well as positive latching engagement, and which is simple and convenient to connect and disconnect in any operation where it is desired to make an electrical wiring connection.

A further purpose is to produce a twin blade disconnector having a dual function comprising an independent electrical connection embodying a spring-loaded contact means which expands and remains expanded to exert an undiminished and sustained contacting pressure in combination with a contractile or spring-loaded latching means which also expands while engaging but thereafter contracts and thus diminishes its pressure to exert a holding force and establish a good mechanical connection.

Concerning the next above dual function purpose, the invention goes further and includes a pair of such spring-loaded contacts and also a pair of such latching means, by reason of one each thereof on each of the two terminals joined together to make a complete connector, thus providing quadruple engaging means in this new connector.

This description and the accompanying drawings explain the invention and indicate further purposes thereof, present it in a manner preferred at this time, and demonstrate the features thereof in order to disclose the scope and principle of the invention, thus suggesting

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further examples of construction which may develop out of the teachings herein or which may occur to others who wish to avail themselves of the benefits of the invention, and also aid in understanding the problems sought to be solved.

The drawings illustrate the invention adapted to what is generally known as an electrical splice connector, that is, the joining of two wire ends together but is of course adaptable for use in connection with the manufacture of other types of wire connectors for the variety of wiring installations heretofore mentioned.

Fig. 1 comprises a group of five views illustrating this new disconnect terminal of the twin blade or shank type, two of which constitute a complete connector when assembled, as shown in the other figures of the drawing.

The central view in the group of Fig. 1 is a front side elevation placed in a position more particularly to show its inner (right) end in perspective, adjacent to which is an elevation of said inner end, and at the left there is shown an outer end elevation of a conventional wire receiving sleeve. Above the central view there is shown a top edge elevation or plan view; and below there is shown a bottom edge plan view. Hence, the rear or reverse side is not shown in Fig. 1, but it does appear in Figs. 2, 3 and 4, as will be explained.

Figs. 2 and 3 show action-views in aid of demonstrating the sequence of a characteristic movement of two of the twin blade terminals into electrically connecting and mechanical holding engagement.

Thus, Fig. 2 shows two identical terminals first placed together (by holding one in each hand) in angular relation preliminary to pivoting them into final position; and Fig. 3 advances the pivotal movement to a position where a novel camming action starts the two terminals sliding by a compound motion (pivotal and longitudinal) upon each other under pressure toward final straight-line position.

Also Figs. 2 and 3 show to best advantage the rear or reverse side of the terminal, that is, the right-hand terminal in these two views has its rear side turned forward.

Fig. 4 shows the two terminals in final straight-line position with the dual connection in action, comprising the electrical and mechanical connections augmented by virtue of two electrical contacts and two mechanical joints, cooperating with each other, to make the quadruple joint earlier mentioned.

Fig. 5 is a section on the line 5-5 showing an

edge view of a friction hook mounted in spaced resilient relation on the front side of the shank and a cam follower plate mounted rigidly on the surface of the rear side of said shank.

Figs. 6 and 7 are cross sections, respectively, on the lines 6—6 and 7—7 showing twin clasping hooks, having twin latching detent means, which apply a double mechanical latching connection on the two terminals when in their finally connected position of Fig. 4.

Fig. 8 is a cross section along the line 8—8. As a matter of fact, Figs. 5 and 8 may well be read together, the first (Fig. 5) through one terminal and the second (Fig. 8) through the two terminals when engaged to make a complete connector.

Referring further to the drawings, it is pointed out that the connector terminal comprises a blade-like or straight rectangular piece of good electrical conducting flat bar-stock, of nominal hardness or tempered metal, in the form of a body or shank 2. A wire holding socket, such as a barrel or sleeve 3, is shown as made separately (in this example of the invention) and mounted on the outer end of the shank 2 to receive a wire or cable W. More particularly, the electrical conductor W illustrated is of the insulated type and secured in the sleeve 3. The wire receiving sleeve 3 may be made integrally with the shank 2, by rolling up the shank stock, which is a known practice. In any case, the sleeve 3 is sufficiently ductile as to be compressed onto the wire W to make a good solderless joint or otherwise connected therewith in any conventional manner.

For the purpose of illustration, the method of mounting the wire receiving sleeve 3 on the shank 2 is adopted from the Thomas, Jr. Patent 2,275,163 showing a known form of electrical connector manufactured and sold to the trade under the registered trade-mark "Sta-Kon," which patent is in the name of the same assignee as herein. Reference now is made to that patent for a further description of one satisfactory method of establishing a solderless connection between the wire W and shank 2, my connector herein being new in other particulars, as will be seen from the present description and drawings or by actual use of the connector.

A clasping hook 4 is carried on the inner end of the body or shank 2 of the terminal. In this example of the invention, the clasping hook 4 is shown as being integrally formed; at its inner or top portion, with the upper edge of the shank 2, by folding down a portion of the flat blank of the shank to position the clasping hook in spaced parallel relation with the flat surface of said shank. Thus the lower edge or outer portion of the clasping hook 4 is resiliently free where it provides an entry to the open space left between it and the shank 2.

According to the foregoing, the resilient clasping hook 4 is also of flat formation. The intervening space between this hook and the shank 2 is made about equal to, or more particularly slightly less than, the thickness of the shank in order to receive under spring pressure the shank of another duplicate connector into said space. It is observed that this clasping hook 2, 4 provides an expansible hook-opening entry, at the bottom edge of the shank, leading up into the resilient hook.

The clasping hook 4 is made with a concentric camming edge 5 on its outer side edge, that is, away from its inner (right) end. The cam 5 curves downwardly from the upper edge of the

shank and forwardly toward the inner end of the terminal. In effect, the cam 5 is of segmental form and, as will be further explained, is adapted to coact with another cam carried by the shank of a twin terminal adapted to be received into the resilient clasping pressure hook 2, 4 to tension and spring load it.

A detent or latching boss 6 is provided at the inner end of the terminal 2 and, in this example, shown as being indented or extruded inwardly from the outer surface of the resilient clasping hook 4. This latching or detent boss 6 may be formed about centrally of the area of the clasping hook 4. Preferably, the boss is concentrically disposed with respect to the segmental cam 5, as shown in the drawings, and it extends into the expansible space between the resilient clasping hook 4 and shank 2. It is the detent boss 6 nosed into the shank receiving space of the clasping hook 2, 4 which performs one of the characteristic functions of this connector, as hereinafter explained. Since the boss 6 is carried on the resilient clasping hook 4, it yields or gives under pressure and follows the tensioned movement of said clasping hook relatively to the rigid shank portion 2.

A detent or latching socket 7 is formed in the shank 2 toward its outer end proximate the wire receiving sleeve 3. It is important to note that this detent socket 7 is compressed into the flat surface of the shank 2 on the rear side thereof and hence on the side opposite to that of the detent boss 6. Furthermore, the detent socket 7 is formed in the surface of the shank by a tool compressing action which does not extrude or nose the metal through (as in the case of the detent boss 6) and hence leaves the front face of the shank in its original smooth and flat condition.

As an illustration of the foregoing feature, it will be noted in the Fig. 1 group of views that the socket 7 is shown in dotted lines as being compressed into the rear side surface of the shank, thereby preserving the original plane of surface smoothness on the front face. In Figs. 2 and 3, the right hand duplicate terminal of Fig. 1 has its front face turned over or reversed to show its rear side at the front, and thus the detent socket 7 is shown in full line form. The detent or latching socket 7 is provided in the more or less rigid shank 2 of the terminal outside the spaced defined by the friction hook 9, whereas the boss 6 is formed in the resilient clasping hook 4 inside of its space.

Next, there is shown a resilient friction hook 9 carried on the shank 2 and set back, separated or spaced, from the clasping hook 4 a distance about equal to or slightly greater than the width of the shank. This separation is made because another or a duplicate terminal of Fig. 1 is adapted to be initially placed in between the two hooks 4 and 9 (as demonstrated in Fig. 2) preliminary to pivotally plugging two of these identically formed terminals together to make a complete connector. This friction hook 9 is also spaced in parallel relation from the shank 2 with a space therebetween just adequate to receive under pressure the shank or body 2 of another like terminal. In other words, the two similar pressure hooks 4 and 9 are themselves of a flat straight surface formation and are similarly spaced from the shank 2.

In considering the resilient friction hook 9, reference also is made to Fig. 5 and Fig. 8. It will be noted that the friction hook 9 is made

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integral (in this example of the invention) with a cam follower plate 11 and together they comprise a U-shaped part 9, 11 made of flat bar stock. The cam follower portion 11 is secured rigidly and fixed against flexure on the rear side of the shank 2, as by brazing or soldering it thereon, while the friction hook 9 is mounted resiliently free on the front side and adapted to flex in relation to the stiff shank 2 by which to tension and spring load itself. It is seen that the friction hook 9 is carried by the lower edge of the shank 2, whereas the clasp hook 4 is carried by the upper edge thereof. The rigid follower 11 is made with a segmental camming edge 12 formed reversely to the camming edge 5 of the clasp hook 4. Thus, it is noted that the reversely formed cams 12 and 5 are disposed on opposite sides of the shank 2 and in segmentally reversed relation.

The resilient friction hook 9 has its inner edge rounded off as at 10 in order to be symmetrical in appearance and construction with camming edge 5 of the clasp hook 4. The rounded edge 10 is not utilized as a cam but is thusly formed to more readily receive another terminal, in reverse position and angularly disposed (as in Fig. 2), when initially starting the operation of connecting two terminals together. Thus the rounded over edge 10 permits a pair of the duplicate terminals to be placed in initial angular position against each other, preliminary to pivotally plugging them together.

It will now be seen that the rigid shank 2 is provided with a pair of resilient hook means 4, 9 and since both act under pressure they are sometimes similarly referred to as pressure hooks, although distinguishing in their particular functions. While both hooks 4 and 9 perform a frictional clasp and gripping action in connection with the mating or registering twin shank of another terminal, nevertheless, the clasp hook 4 in operation dissipates a portion of its spring loaded tension, while in contrast thereto the friction hook 9 does not do so. The description of the operation more fully explains the independence of this dual feature.

The foregoing describes one terminal and since two are required to make a complete connector, the description of one suffices. Take for example, Figs. 2, 3 and 4, the terminal at the right is a duplicate of the one at the left and is simply turned over with its rear side placed forward.

In joining two of the twin terminals together, to make a complete connector, one terminal is held in each hand and initially placed together in angular relation (Fig. 2), one transversely over the other, with their front faces toward each other, and with the rigid shank 2 of each terminal placed between the spaced resilient pressure hooks 4 and 9 of the other. Next, the two terminals are relatively pivoted (as in Fig. 3) toward straight-line position, whereupon the alternate and reversely placed segmental camming edges begin to coact. In other words, the two cams 5 and 12 of one terminal engage and climb the same cams 5 and 12 of the other terminal and continue this coaction as the two terminals 2 and 2 continue their straightening motion advancing from Fig. 3 to Fig. 4 positions. As the two shanks 2 pass into the two clasp hooks 4 and 4, and simultaneously into the two friction hooks 9, all four resiliently expand under tension, spring load themselves, and apply spring pressure against the shank pair.

As the pair of shanks 2 approach straight-line

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position (Fig. 4), they slide under resilient pressure all the way into the four pressure hooks. Accordingly, each shank 2 is engaged by a clasp hook 4 as well as by a friction hook 9 and is also engaged by the other shank 2 in two places through the cooperation of hooks 4 and 9 of this shank. This arrangement means that the pair of shanks are gripped and squeezed together by four pressure hooks, thereby making a quadruple mechanical and electrical connection.

As the foregoing pressure engagement advances (from Fig. 2 to Fig. 3), the operation of the camming means enforces a compound motion (angular and longitudinal) between the shank pair, in that the four cams 5, 12 and 5, 12 are climbing each other in pairs as an incident to the reduction of the angular relationship of the two terminals approaching (Fig. 4) final position. In other words, the simple pivotal causes the climbing cams to impart a relative longitudinal motion between the shank pair 2, 2 within the the four pressure hooks simultaneously with their pivotal motion.

During such straightening travel, a very certain and definite scraping and pressure wiping action occurs between the four pressure hooks (4 and 9 on each shank) which cleans all contacting surfaces of oxide and other foreign matter to provide a virgin metallic contact surface between the parts. The relatively sliding shank pair 2, 2 (advancing from Fig. 3 to Fig. 4 position) causes the pressure hook pair 9, 9 to act as blades and wipe off any foreign matter which would tend to insulate the connection. By reason of this feature, the electrical connection is one of low resistance and avoids heating.

As the compound pivotal and longitudinal motion continues (from Fig. 3 to Fig. 4), the resilient detent or latching boss 6 of each terminal rides on the surface of each rigid shank 2 and thus both bosses expand to a considerable extent each clasp hook 4, thereby spring loading said clasp hook pair 4, 4. But as each detent boss 6 approaches the circle of each detent or latching socket 7—under the simultaneous guiding action of the camming means 5, 12 and 5, 12—there follows a characteristic double latching detent action to make an effective disengageable mechanical joint independently of the sustained pressure contact of the two friction hooks 9 establishing electrical connection. Thus one of the purposes of the quadruple camming arrangement 5, 12 and 5, 12 is to guide simultaneously the boss pair 6 into the socket pair 7.

As the spring loaded detent boss pair 6 approach position to slide into registry with the detent socket pair 7, their tensioned registering action (under the resilient pressure of the spring loaded clasp hook pair 4) takes over the guiding action of the camming means 5, 12 and 5, 12 and completes the movement of the shank pair 2 into final straight-line position (Fig. 4). In other words, just as the bosses 6 slide into the sockets 7, the shanks 2 and 2 snap together under the action of the spring loaded bosses centering themselves in the sockets, thereby causing the coacting cam pairs 5, 12 and 5, 12 to retract (Fig. 4) and free themselves of engaging pressure.

The foregoing latching detent action and simultaneous cam retraction serves to free the coacting camming edges 5, 12 and 5, 12 which previously were climbing each other under pressure and conditions the two terminals for a simple disconnect operation. In other words, the joined terminals 2 and 2 (Fig. 4) now may be

disengaged by pivoting them reversely, as shown from Fig. 4 back to Figs. 3 and 2 positions, without placing the camming means under engaged operating pressure.

It is important to observe, that in a given size connector embodying the principles herein, a maximum area electrical contact and mechanical joint is provided by virtue of substantially the entire lengths of two engaged terminal shanks 2 being under the engaging action of the pressure hooks 4, 9 and 4, 9. Furthermore, the connector cannot be accidentally disconnected by an axial pull on the wiring W; only by effecting a pivotal action may the terminals be uncoupled and the electrical connection broken.

The characteristic latching detent means 6, 7 in pairs is effective and unique, among other features, in that the socket 7 leaves a surface plane which is smooth on the front face of each shank 2, thereby tensioning and spring loading the friction hook 9 and maintaining it spring loaded without a drop in pressure to thus establish an effective electrical connection; while the detent boss 6 stands in the form of a nose within the shank receiving space at the inner end 2, 4 of the terminal, thereby also spring loading (initially) the clasp hook 4 but subsequently permitting the latter to contract and diminish its pressure in order to engage the boss 6 within the socket 7 for establishing a resiliently disengageable mechanical connection.

Such a dual connection with its cooperating separately acting parts possesses numerous advantages, in that a more perfect and lower resistance electrical connection is established by the high pressure sustaining friction hooks 9, and a more perfect and higher pull-out valve mechanical joint is established by the reaction and dissipation of a portion of the tension in the clasp hook 4. Each independent pressure hook 4 and 9 performs its separate function more effectively than when the two functions are combined into one pressure hook as in conventional connectors.

The disclosure herein explains the principle of the invention and presents the best mode contemplated in applying such principle, so as to distinguish the invention from others; and there is particularly pointed out and claimed, the part, improvement or combination, which constitutes the invention or discovery, as understood by a comparison thereof with the prior art.

This invention is presented to fill the need for a useful disconnecter blade terminal. Various modifications in construction, mode of operation, use and method, may and often do occur to others skilled in the art, especially so after acquaintance with an invention. Accordingly, this disclosure is exemplary of the principles and equivalents without being limited to the present showing of the invention.

What is claimed is:

1. An electrical connector comprising a shank, a clasp hook carried by the shank, a detent boss provided inside the clasp hook, a detent socket formed in the shank in separated relation from the clasp hook, and a friction hook carried by the shank, the clasp hook and the friction hook being spaced from the shank a distance slightly less than the thickness of the shank.

2. An electrical connector comprising a flat shank, a flat clasp hook and a flat friction hook disposed parallel with and spaced from the

flat shank a distance slightly less than the thickness of said shank; said flat hooks having their inner ends carried by the shank in fixed relation thereto and extending from opposite edges thereof, their outer ends being resiliently free and defining an entry to the aforesaid spaces formed between said flat hooks and the shank; a detent boss formed on the connector and projecting into the space between the flat clasp hook and the shank, and a detent socket formed in the shank adjacent the flat friction hook.

3. An electrical connector formed of flat stock material, comprising a shank, a clasp hook having an inner portion fixed at one edge of the shank, and an outer portion resiliently free and defining an entry to a space provided between the shank and the clasp hook, a depression indented from one side of the flat stock with the material thereof expanded into the space thus forming a detent boss within said space, and a depression formed into the shank from the other side of the flat stock providing a detent socket, the surface of the flat stock material being formed smooth on the side opposite the detent socket, the detent boss and detent socket being separated from each other on the connector and on the opposite sides of the shank.

4. The electrical connector described in claim 3 further modified by a friction hook having an inner portion thereof fixed at the other edge of the shank, thus carrying the clasp hook and friction hook at opposite edges of the shank, the friction hook also having an outer portion resiliently free and defining an entry to a space left between the shank and said friction hook, the resiliently free outer portions of the clasp hook and of the friction hook being thus disposed in opposite directions to each other, and the friction hook being positioned adjacent the detent socket.

5. An electrical connector comprising a flat shank, a pair of flatly formed pressure hooks separated from each other on the same side of the flat shank, and disposed in spaced parallel relation from said shank, thus providing a space between each hook and the shank; said pair of pressure hooks being carried on opposite edges of the shank, and having resiliently free portions disposed at opposite edges of the shank, each resiliently free portion defining an entry to the space between the shank and each pressure hook; and one-half of a latching detent means provided on the connector, including a detent boss provided within the space between one pressure hook and the shank, and a detent socket formed in the shank on the other side of said shank and in separated relation to the detent boss.

6. A connector comprising twin parts, each of which includes a shank; and a pair of pressure hooks provided on one side of each shank, the pressure hooks being disposed in separated relation on the shanks, as well as being spaced parallel from the side surfaces of the shanks, and also fixed at opposite edges of said shanks, thus leaving resiliently free portions at opposite edges of such shanks; whereby the twin parts are adapted to have their shanks placed together in crossing relation, each shank between the separated pressure hooks of the other, for movement toward straight-line position with each other, each shank being thus moved into the pair of pressure hooks of the other.

7. A connector comprising a flat shank having a pressure hook at its inner end, the pressure hook being integral with and carried by one edge of the flat shank, a separate pressure hook

secured to the flat shank at a position spaced from the integral pressure hook; and a camming edge formed on each pressure hook on opposite sides of the flat shank, each pressure hook being spaced in parallel position from the flat shank a distance adapted to receive and grip the flat shank of another connector of identical form.

8. An electrical connector comprising a pair of cooperating disengageable shanks, each of which has a clasping hook spaced from and on the same side of each shank, a detent boss formed within each space between the two shanks and the two clasping hooks, and a detent socket provided in each shank in registry with each detent boss, whereby the two clasping hooks first expand during engaging movement of the pair of shanks thereinto and subsequently contract to register the two detent bosses into the two sockets to establish a double mechanical joint between said shanks, and each shank also having a friction hook spaced from and in parallel relation with and on the same side of the shank as the clasping hook, the detent socket aforesaid being disposed adjacent to but outside of the space formed between the friction hook and shank, by which the two friction hooks also expand during engaging movement of the pair of shanks thereinto and remain expanded to apply sustained pressure contact between said shanks and friction hooks to establish a double electrical connection.

9. The electrical connector described in claim 8, having additional structural and functional features, comprising two cooperating camming edges of duplicate form provided on opposite sides of said pair of shanks, the two camming edges being spaced apart on each shank a distance to receive said shanks thereinbetween in angular position with each other, by which an initial pivotal movement of the shanks from said angular position toward straight-line position forces the camming edges to climb each other

thereby enforcing relatively longitudinal movement of the shanks on each other with a wiping action under pressure of the friction hooks.

10. A connector comprising twin parts, each of which includes a shank; and a pair of pressure hooks provided on one side of each shank, the pressure hooks being disposed in separated relation on the shanks, as well as being spaced parallel from the side surfaces of the shanks, and also fixed at opposite edges of said shanks, thus leaving resiliently free hook portions at opposite edges of such shanks; a pair of cams carried in separated relation on opposite sides of each shank, a detent boss disposed within the space between each shank and one of its pressure hooks, a detent socket compressed into each shank on the side thereof opposite the detent boss; the twin parts having their shanks initially placed together in crossing relation, each shank between the separated pressure hooks of the other, for movement toward straight-line position with each other, and each moved into the pair of pressure hooks of the other; the pair of cams of one shank engaging the pair of cams on the other shank, the cams acting to guide the movement of the two detent bosses into the two detent sockets, the tensioned registration of the bosses and sockets acting to complete the movement by snapping the shanks into final straight-line position and simultaneously retracting the cams from engagement with each other.

MAXWELL A. GRAHAM.

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