Feb. 24, 1959 S. G. YOUNG 2,875,422

ELECTRIC SOCKET CONNECTORS

Filed Jan. 19, 1954

Fig. 1.

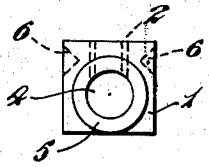


Fig. 2.

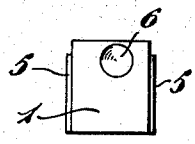


Fig. 3.

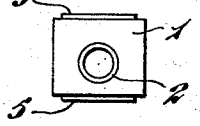


Fig. 4.

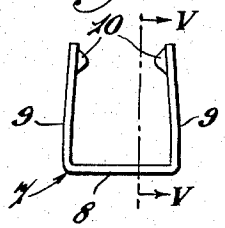


Fig. 5.

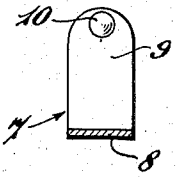


Fig. 6.

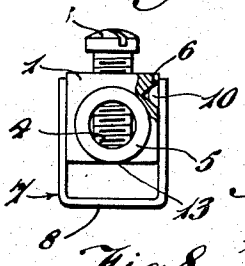


Fig. 7.

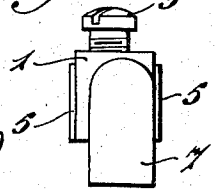


Fig. 10.

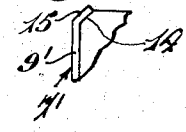


Fig. 8.

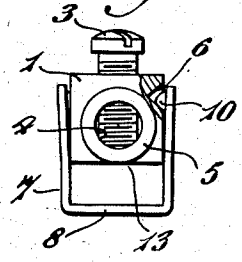


Fig. 9.

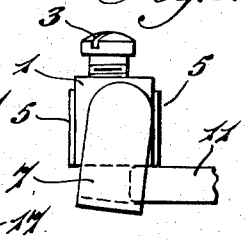
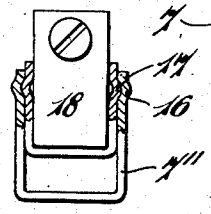


Fig. 11.



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United States Patent Office 2,875,422
Patented Feb. 24, 1959

2,875,422

ELECTRIC SOCKET CONNECTORS

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Application January 19, 1954, Serial No. 405,017

Claims priority, application Great Britain January 27, 1953

3 Claims. (Cl. 339—64)

This invention relates to improvements in the construction of socket connectors of the type employed to receive and grip a pin connector resiliently, in order to establish an electric circuit; and relates particularly to the type of socket connector which comprises a terminal block embraced by a strap of resilient metal so as to define a space between the block itself and the strap, into which the pin of a plug may be inserted and firmly gripped.

The invention has as its object the provision of a construction which is simple to manufacture, is economical in material, requires few parts, and is easy to assemble, while having highly advantageous electrical properties.

Examples of construction according to the invention are illustrated, by way of example only, in the accompanying drawing, in which:

Figure 1 is a plan view of the preferred form of terminal block;

Figure 2 is a side view of the block in Figure 1;

Figure 3 is an end view of the block in Figure 1;

Figure 4 is a plan view of a strap for use with the block shown in Figures 1 to 3;

Figure 5 is a view taken on the line V—V in Figure 4;

Figure 6 is a plan view of an assembled socket connector employing the parts shown in the previous figures;

Figure 7 is a side view of the connector in Figure 6;

Figure 8 is a view similar to that of Figure 6, demonstrating an aspect of the operation of the connector;

Figure 9 is a view similar to that of Figure 7, demonstrating one effect of insertion of a pin into the connector;

Figure 10 is a fragmentary view of a modified form of connector, seen from the same aspect as Figure 6; and

Figure 11 is a plan view of a further modification, also seen from the aspect of Figure 6.

Referring particularly to Figures 1 to 3, the terminal block 1 comprises a rectangular piece of electrically conducting material, preferably brass, having a threaded hole 2 to receive a binding screw 3 (Figures 6 to 9) and a clearing hole 4 to receive the end of an electric conductor (not shown). The block 1 also has slightly raised bosses 5 at each end of the hole 4, and two conical cavities 6, one on each side of the block, each of which cavities includes a surface which is inclined outwardly toward the adjacent side of the block and in a direction toward the base of the block as clearly illustrated in Figs. 6 and 8 of the accompanying drawing.

The strap 7 (shown separately in Figures 4 and 5 and assembled with the block 1 in Figures 6 to 9) consists of a central limb 8 and two side limbs 9 which extend for a short distance perpendicularly from each end of the central limb 8 and then converge slightly to terminate in inwardly projecting substantially conical studs 10 which may advantageously be formed from the material of the strap itself by pressure applied at appropriate points on the outer face of each of the limbs 9. Each conical stud 10 includes a surface which is inclined outwardly toward the adjacent side limb 9 and in a direction toward the central limb 8 of the strap 7 as clearly illustrated in

Figs. 4, 6 and 8 of the accompanying drawing. The strap 7 is constructed of a suitable resilient, electrically conducting material, such as Phosphor bronze.

To assemble the connector, the strap 7 is simply slipped over the block 1, so that the studs 10 enter the cavities 6 and the side limbs 9 of the strap 7 embrace the side walls of the block 1, the limbs 9 being slightly flexed in this position due to their normal convergence. This assembled position of the connector is seen in Figs. 6 and 7.

The effects of the insertion of a plug pin are illustrated in Figs. 8 and 9. As appears from Fig. 9, during initial introduction of a rectangular plug pin 11 into the space provided between the end face 13 of the block 1 and the central limb 8 of the strap 7, the strap 7 is able to swing about the pivots formed by the studs 10 engaged with the cavities 6. The pivoting action greatly facilitates entry of the pin 11. On further movement of the pin into the connector, the strap 7 is returned thereby to its normal position parallel to the end face 13 of the block 1.

Simultaneously with this pivoting action, the studs 10 may be drawn forward and outwardly from their respective cavities 6 by the entry of the pin, as illustrated diagrammatically in Fig. 8, such action resulting from the provision of the cooperating inclined surfaces on studs 10 and cavities 6, which surfaces, as explained above and as clearly illustrated in the accompanying drawing, are angularly disposed with respect to the axis of rotation of the strap 7 with respect to block 1, and are inclined outwardly toward the adjacent side limbs 9 and in a direction toward the end surface 13 of the block. By virtue of this construction, including the aforesaid cooperating inclined surfaces, the side limbs 9 of the strap 7 are permitted to slide along the two opposite side faces of block 1 to thus move the central limb or connecting portion 8 of the strap away from the end surface 13 of the block whereby to enlarge the socket space on insertion of plug pin 11. It will be appreciated that this action may take place in respect of either one or other of the studs 10, or both of them as shown, but need not necessarily be fully symmetrical as in the example given. This flexibility of operation of the present connector is valuable in compensating for irregularities in shape or dimension of a plug pin, or variations in centre line spacing of the pins of a multi-pin plug.

The connector illustrated has not been shown in its housing, but it will be evident that sufficient clearance will be provided therein to permit the strap to have the desired degree of freedom of movement. In particular, the block may be mounted in the housing on a spacing piece in order to allow the lower outer edge of the strap to swing below the bottom level of the block during the movement illustrated in Fig. 9.

It is to be understood that, although the form of connector illustrated is adapted to receive a plug pin of rectangular shape, the invention is applicable to socket connectors for receiving pins of other sections and especially for receiving round pins. In this latter case the strap would be of U-shape, i. e. the present central limb 8 being semi-cylindrical instead of flat, and the end face 13 of the block 1 could be correspondingly hollowed out semi-cylindrically to receive the surface of the pin. If a square pin were to be received, this could be accomplished as in the illustrated embodiment with appropriate dimensional modifications; or, alternatively, the pin could be arranged to enter the connector with a corner edge extending into a right-angled groove formed in the face 13 of the block 1, the strap then being V-shaped at its centre to engage the opposite edge of the pin.

According to a modification illustrated in Fig. 10, instead of employing cavities in the block, the rear edges of the block could be chamfered to provide inclined sur-

faces 14 to cooperate with inwardly inclined lugs 15 formed on the limb 9' of a strap 7'.

It will also be evident that the arrangement of projections and cavities may be reversed, projections being formed on the block to enter depressions or holes in the strap limbs. A construction of this latter nature is shown in Fig. 11, in which depressions 16 are formed in a strap 7'' and projections 17 to cooperate therewith are provided on a block 18. This block 18 also illustrates another alternative feature of the invention in that such block, instead of being of a solid nature such as the block 1, is made of bent or otherwise deformed sheet metal.

The forms illustrated are merely representative of the numerous possible constructions, by means of which the strap may be mounted to pivot on the block and to have a degree of resilient sliding movement relatively thereto. For example, other possibilities (unillustrated) are to form a groove in the block instead of a cavity, sliding of the projection along such groove being restricted as desired by suitable means on the block or a surrounding casing; to employ spherical instead of conical projections and/or cavities of almost any shape provided the shape is suitable for reception of the projection; and, in the case in which the cavity is formed on the strap, making such cavity in the form of a through hole rather than merely a depression.

From the foregoing it may be seen that in one of its broad aspects the invention consists of a socket connector comprising a terminal block bearing a resilient strap so arranged as to define therebetween a space for the reception and firm engagement of a plug pin, wherein the strap is pivotable on the block about an axis inclined and preferably perpendicular to the direction of insertion of the pin. In this manner the entrance area of the said space presented to the pin may be increased by the initial pressure of the pin and entry thereof consequently facilitated. This pivoting action of the present connector is important but it is to be understood that the invention is not restricted in its scope to the exact method described above of obtaining this effect.

Alternatively however, the invention that is embodied in the socket connector illustrated, may be defined as consisting basically of a terminal block having one end face for making electrical contact with a pin to be inserted between such face and a strap connected to the block, and two plane side faces provided with cavities (or projections) in which engage correspondingly shaped projections (or cavities) formed on limbs of the strap that lie against such side faces. By means of these plane side faces the strap limbs are free to slide longitudinally thereto when the strap is urged away from the block by insertion of a plug pin, such sliding movement being however resisted by the projections. The degree of such resistance may be regulated at will by choice of the slope of the cavity face nearer the portion of the strap that engages the pin.

I claim:

1. An electrical socket connector comprising a terminal block, a resilient strap having a pair of resilient side limbs and a connecting portion, each said side limb being in opposed relation to one of two opposite side faces of the said block and said connecting portion being spaced from a third surface of the block to define therebetween a socket space for the reception of a plug pin, and pivotal connections disposed between the two opposite side faces of said block and the side limbs of said strap providing an axis of rotation transverse to the direction of insertion of the plug pin about which axis the strap is capable of pivoting without translational displacement, said pivotal connections each comprising a male part engaging in a female part, said male and female parts having co-operating inclined surfaces which are angularly disposed with respect to said transverse axis of rotation and which are inclined outwardly toward the adjacent side limbs and in a direction toward said third surface of said block permitting said side limbs to slide along said two opposite side faces of said block to move said connecting portion of said strap away from said third surface of said block against the inherent resiliency of the strap whereby to enlarge the socket space on insertion of said plug pin.

2. A socket connector as claimed in claim 1, wherein each pivotal connection comprises a conical projection engaging in a conical recess.

3. An electrical socket connector comprising a terminal block having opposite parallel side faces, a U-shaped resilient strap whose side limbs are in adjacent opposed relation to said sides of the block and whose connecting limb is spaced from a third surface of the block to define therebetween a space for the reception of a plug pin, and pivotal connections between the side faces of the block and said side limbs providing an axis of rotation transverse to the direction of insertion of the plug pin, each such pivotal connection comprising a conical projection engaging in a conical recess.

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