Dec. 3, 1940. F. W. MEBOLD 2,223,853

METHOD OF PRODUCING BODY PORTIONS OF ELECTRICAL CONNECTORS

Original Filed March 22, 1937

Fig. 1

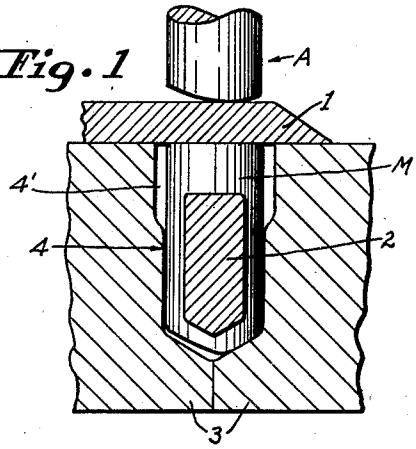


Fig. 2

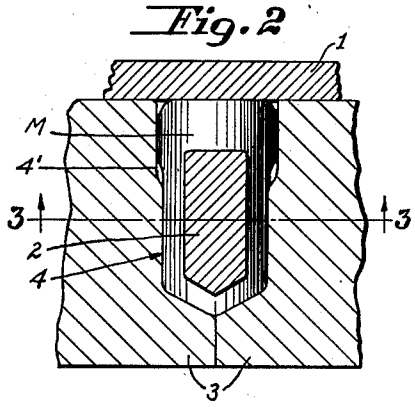


Fig. 3

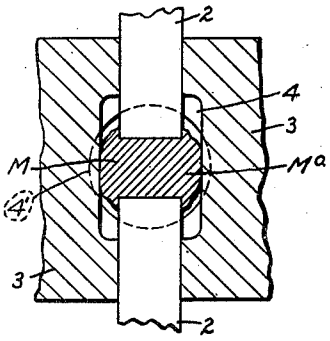


Fig. 4

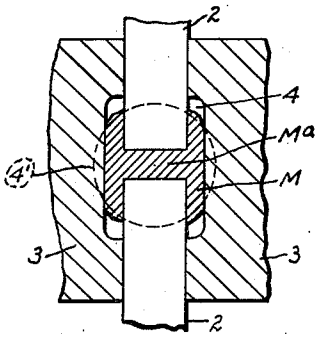


Fig. 5

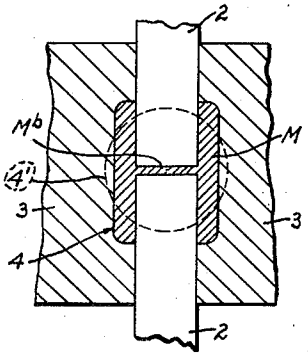


Fig. 6

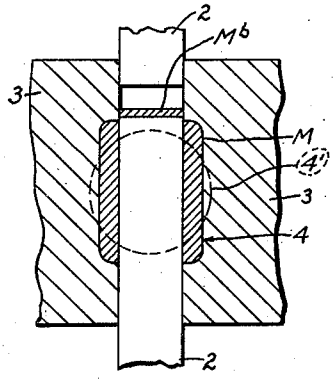


Fig. 7

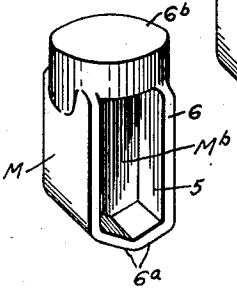


Fig. 8

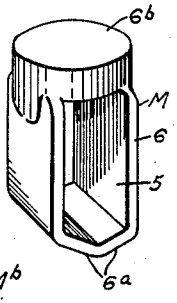
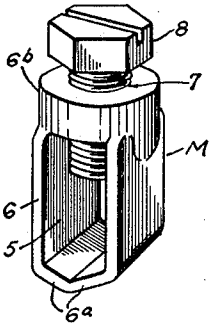


Fig. 9



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METHOD OF PRODUCING BODY PORTIONS OF ELECTRICAL CONNECTORS

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Original application March 22, 1937, Serial No. 132,205, now Patent No. 2,179,753, dated November 14, 1939. Divided and this application October 27, 1939, Serial No. 301,537

2 Claims. (Cl. 29—155.55)

This invention relates generally to clamping devices of a type employed for mechanically and electrically connecting electrical conductors, the predominant object of the invention being to provide an improved method of producing body portions of such connecting devices so that durable devices which are capable of efficient use may be produced in an economical manner.

Fig. 1 is a vertical sectional view of a punch and die assembly employed in producing a connector body in accordance with this invention, and illustrating a connector in the course of production.

Fig. 2 is a view similar to Fig. 1 but illustrating the situation where the production of the connector body has progressed beyond the stage illustrated in Fig. 1.

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 3 but illustrating the situation where the production of the connector body has progressed beyond the stage illustrated in Fig. 3.

Fig. 5 is a view similar to Fig. 4 but illustrating the situation where the production of the connector body has progressed beyond the stage illustrated in Fig. 4.

Fig. 6 is a view similar to Fig. 5 but illustrating a later stage in the production of a connector body in accordance with this invention.

Fig. 7 illustrates a perspective of a connector body as it appears when its production reaches the stage illustrated in Fig. 5.

Fig. 8 illustrates a perspective of a connector body as it appears when its production reaches the stage illustrated in Fig. 6.

Fig. 9 is a perspective of the complete connector.

In producing the connectors of the type disclosed herein copper and brass are the metals generally used for this purpose, copper being best adapted for such use because of its relatively low cost and higher conducting properties. Prior to this invention connectors produced from brass were preferred by some manufacturers because of their greater hardness. However I prefer the use of copper in the manufacture of connectors by the process to be presently described because of its higher electrical conducting properties, and since by reason of its high ductility, this metal readily lends itself to the extruding operation which forms an important part in the present method. The extruding process as employed in connection with the present invention greatly increases the density of the metal and results in the production of an article having the maximum degree of hardness which copper is capable of having imparted to it.

Describing, now, the method of making the body portion of a connector in detail, copper, or other suitable ductile metal, preferably in the form of a rod A, is fed into a power press which includes cut-off means 1 (Figs. 1 and 2), punch parts 2, and die parts 3 (Figs. 1, 2, 3, 4, 5, and 6). The rod of metal is cut off to the proper length by the cut-off means 1 and as a result thereof a short section M of material is disposed in a cavity 4 produced by cavity portions formed in the opposed die parts 3. In this connection it is to be noted, as shown in Fig. 1, that the cut-off means 1 serves as a closure element of the cavity 4 at one end thereof, and by referring to Figs. 1 to 6 inclusive it will be noted that the cavity 4 is of the exact shape and dimensions of the body portion of the connector. The punch parts 2 are associated with the die parts 3 as shown clearly in Figs. 1 to 6 inclusive, and as shown in Figs. 3 to 6, inclusive, said punch parts are arranged in opposed relation. The power press employed in producing the body portion of the improved connector includes means (not shown) for moving the inner adjacent ends of the associated punch parts 2 toward and from each other within the cavity of the associated die parts.

With the short section of material M disposed in the cavity 4 the punch parts are moved toward each other by mechanism of the power press that is not shown and which is intended to perform this function, and the material of which the body portion of the connector is being formed is extruded by the inwardly moving punch parts 2 to force the metal outwardly in all directions to completely fill the cavity in the die parts and force the metal into close contact with the walls of the cavity. By referring to Figs. 3, 4, and 5 it will be noted that in forcing the metal outwardly in all directions against the walls of the cavity the inwardly moving punch parts 2 force their way into the metal to provide an opening which in the completed body portion extends entirely through said body portion. This opening is shown clearly in Figs. 8 and 9, wherein it bears the reference character 5. The inner ends of the punch parts 2 move toward each other to gradually reduce the thickness of the portion *Ma* of the body of material in the cavity 4 as shown in Figs. 2, 3, and 4, until as shown in Fig. 5 only a very thin web of material *Mb* remains. If the partially completed connector body illustrated in Fig. 5 were removed

from the die parts 3 it would appear as shown in Fig. 7. When this stage of the operation is reached the upper part 2 as illustrated in Fig. 6 is withdrawn and the associated punch 2 is subjected to a quick inward movement against the web of material M*b* with the result that said web of material is sheared loose from the opposed walls of the opening 5 as shown in Fig. 6.

Upon performance of the last-described step of removing the web of material M*b* the die parts 3 are separated and the partially completed body portion of the connector and the displaced web of material M*b* are ejected. At this time the body portion appears as shown in Fig. 8; that is to say said body portion comprises a wire-embracing portion 6 through which the opening 5 extends, said wire-embracing portion having a tapered portion 6*a* at one end and having a solid boss portion 6*b* at its opposite end. Obviously the wire-embracing portion 6 of the body portion is formed in the portions of the cavity 4 of the die parts which are arranged at the sides and bottoms of the punch parts 2 as illustrated in Fig. 1, while the boss portion 6*b* is formed in the cavity portion 4' between the top faces of the punch parts and the cut-off means 1 as illustrated in said view.

After formation of the body portion of the connector has progressed to the stage illustrated in Fig. 8 the next step is to drill a hole 7 (Fig. 9) through the solid boss portion 6*b* and tap said hole so that it is provided with the proper screwthreads. The body portion of the connector is then completed and is ready to have a clamping screw 8 assembled therewith, as shown in Fig. 9, to provide the complete connector.

From an inspection of Fig. 9 the use of the connector, the body portion of which is produced in accordance with this invention, is obvious, the wires to be connected being introduced into the opening 5 of the connector body, and the clamping screw 8 being screwed against one of the wires to force said wires together in clamping relation and to force one of the wires into close contact with the tapered end 6*a* of the connector body.

This application is a division of an application filed in my name on March 22, 1937, Serial No. 132,205, which has matured into Patent 2,179,753, November 14, 1939.

I claim:

1. The method of forming a body portion of a connector from a body of ductile metal, which consists in introducing into a cavity formed in die means, a rod or bar of metal which is of greater length than the depth of said cavity, cutting off the body of metal within said cavity from the portion of the rod or bar of metal extended beyond the cavity by cutting means which serves as a closure for said cavity, extruding said body of metal through the instrumentality of punch means moving transversely of said body of metal so as to cause the metal to completely fill said cavity and produce an opening in said body portion which is closed by a thin web of material and provide the body portion with a solid boss portion, causing said punch means to be subjected to additional movement against said thin web of material which disengages the thin web of material from said body portion, and drilling and tapping an opening in the boss portion of the body portion.

2. The method of forming a body portion of a connector from a body of ductile metal, which consists in introducing into a cavity formed in die means, a rod or bar of metal which is of greater length than the depth of said cavity, cutting off the body of metal within said cavity from the portion of the rod or bar of metal extended beyond the cavity by cutting means which serves as a closure for said cavity, extruding said body of metal through the instrumentality of a pair of punch means moving in opposite directions transversely of said body of metal so as to cause the metal to completely fill said cavity and produce oppositely extending opening portions in said body portion which are separated by a thin web of material and provide the body portion with a solid boss portion, causing one of said punch means to be subjected to quick movement against said thin web of material which disengages the thin web of material from said body portion, and drilling and tapping an opening in the boss portion of the body portion.

FREDERICK W. MEBOLD.