Jan. 12, 1971 TAKASHI WATANABE 3,555,497

ELECTRICAL CONTACT MEMBER

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FIG. 1 FIG. 2 FIG. 3 FIG. 4

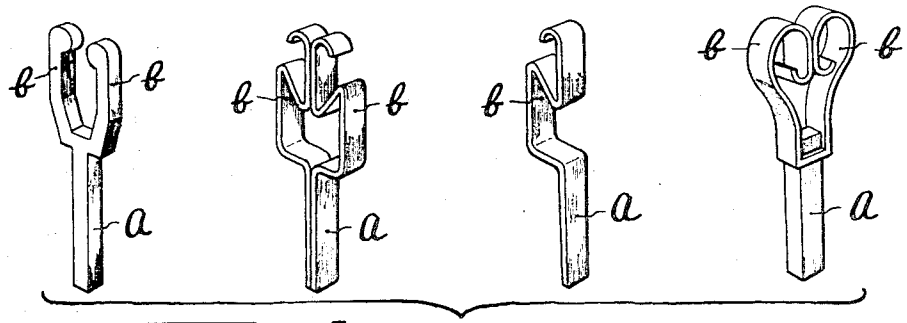

FIG. 5 PRIOR ART

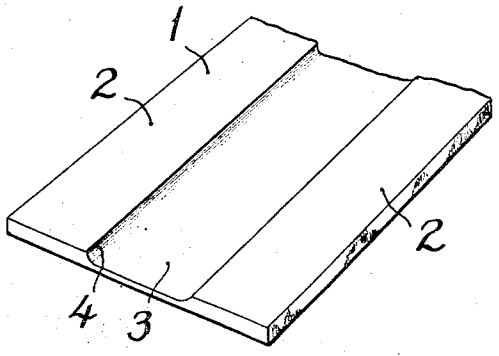

FIG. 7

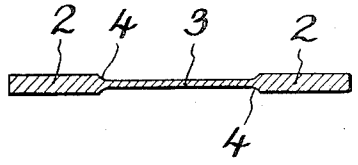

FIG. 8

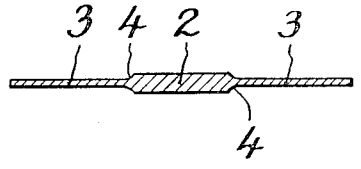

FIG. 6

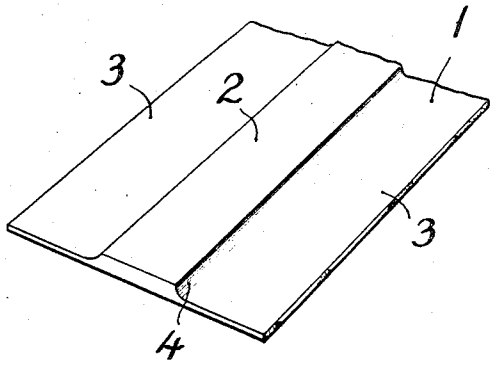

FIG. 9

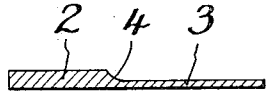

FIG. 10

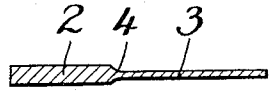

FIG. 26 FIG. 27 FIG. 28

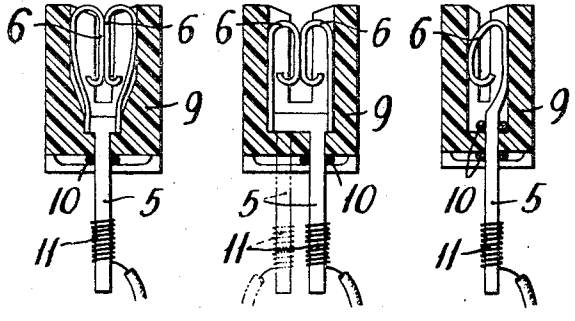

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FIG. 11 FIG. 12 FIG. 13 FIG. 14 FIG. 15 FIG. 16

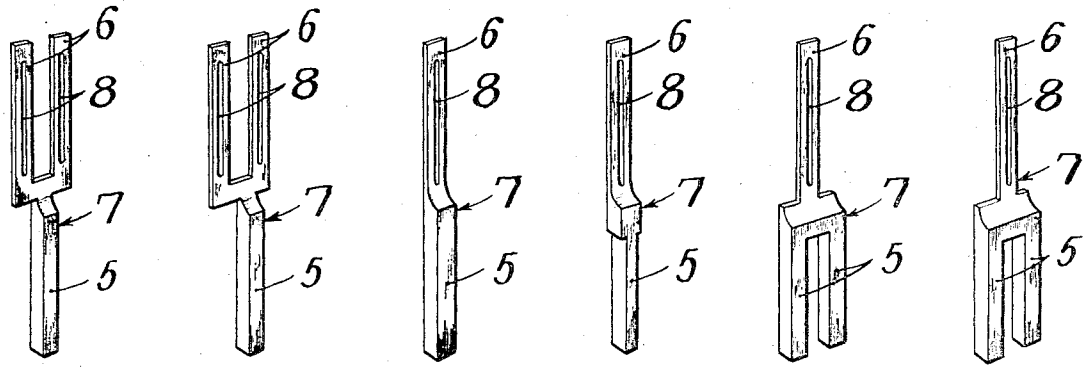


FIG. 17 FIG. 18

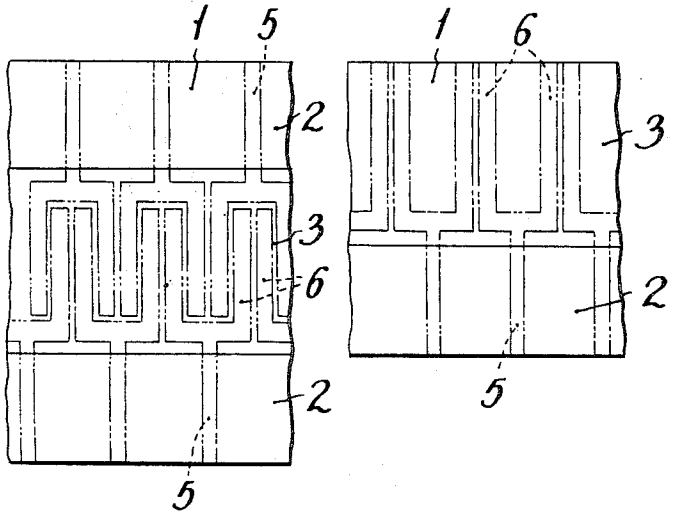


FIG. 19 FIG. 20

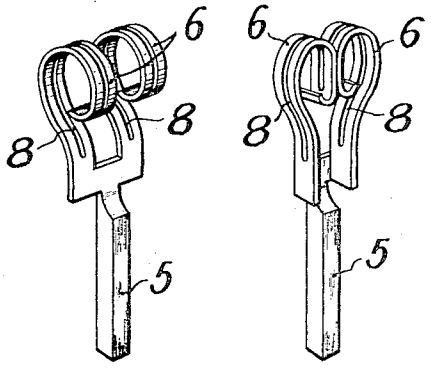


FIG. 21 FIG. 22

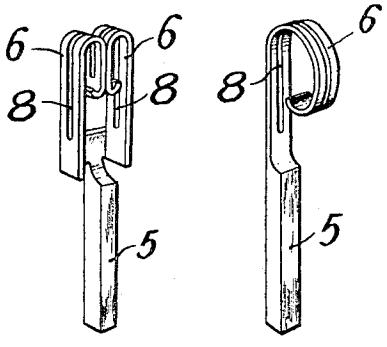
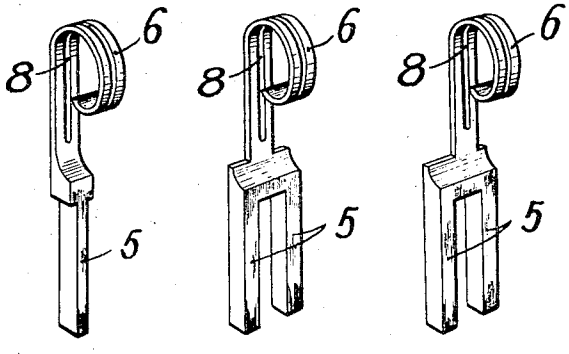


FIG. 23 FIG. 24 FIG. 25



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3,555,497

ELECTRICAL CONTACT MEMBER

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Claims priority, application Japan, Sept. 2, 1967, 42/56,270
Int. Cl. H01r 13/12
U.S. Cl. 339—258 1 Claim

ABSTRACT OF THE DISCLOSURE

An electrical contact member which is punched from a rolled sheet having a thick longitudinal section and an adjacent thin longitudinal section, the thick section forming a terminal portion on which a lead wire can be wrapped while the thin section forms a contact portion. The contact portion is bent to form a loop, and in the event that a pair of opposed contact portions are to be formed, they in turn are bent relative to the terminal portion such that their loops face one another.

BRIEF SUMMARY OF THE INVENTION

This invention relates to electrical contact members for multi-connectors for electrical musical instruments and the like, and more particularly to an electrical contact member which comprises a wrapping terminal portion and a resilient contact portion punched integrally from a blank of raw material.

According to this invention, a rolled plate of a high-strength resilient metallic material having a longitudinal thick wall portion and an adjacent longitudinal thin wall portion is subjected to a punching operation to produce a blank having a terminal portion, on which a lead wire can be wrapped, corresponding to the thick wall portion, and an integral contact portion corresponding to the thin wall potion, the contact portion then being subjected to a bending operaion.

It is generally required for an electrical contact member of the wrapping terminal type that the contact portion thereof be resilient enough to always maintain proper contact pressure while at the same time the wrapping terminal portion must have a mechanical strength to withstand a mechanical wrapping operation. For this purpose, it is considered necessary that the wrapping terminal be about 1 mm. in both width and thickness. A mechanical wrapping process is reliable in connection and is good in electrical conductivity, whereas a soldering process is deficient in that the operations lacks reliability and requires skill. Hence the contact members are especially suitable for undergoing a mechanical wrapping process.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 to 4 are perspective views showing known embodiments of electrical contact members,

FIGS. 5 and 6 are perspective views of rolled plates from which electrical contact members according to this invention are punched,

FIGS. 7 to 10 are sectional views showing other forms of rolled plates according to the invention,

FIGS. 11 to 16 are perspective views of partially processed members punched from the rolled plates,

FIGS. 17 and 18 are plan views showing in dotted outline the layout of the members punched from the rolled plates,

FIG. 19 is a perspective view of the member of FIG. 11 after completion of a first bending operation,

FIG. 20 is a perspective view of the member of FIG. 19 after being subjected to a second bending operation,

FIGS. 21 to 25 are perspective views of other forms of contact members obtained by bending the members of FIGS. 12 to 16, respectively, and

FIGS. 26 to 28 are side elevation views, partly in sec- showing the contact members as assembled for use.

DETAILED DESCRIPTION

Electrical contact members commonly used hitherto have a construction as shown in FIG. 1, in which a wrapping terminal *a* (on which a lead wire is to be wound) and a pair of opposite contact pieces *b* are punched or cut from a raw material blank at a thickness of about 1 mm. As shown in FIG. 3, a strip punched from a thin plate at a thickness of about 0.2 to 0.3 mm. is subjected to a bending operation and as shown in FIG. 2, two of the thus bent strips are soldered together at their terminal portions *a*. Alternatively, as shown in FIG. 4, a contact member *b* and a rapping terminal *a* are separately produced and then secured together.

The contact member of FIG. 1 is deficient in that when a printed plate or the like is inserted between the pair of contact pieces *b*, there may be caused bad contact and damage to the contact surfaces because the adjustment of the contact pressure against the printed plate is not sufficient, due to the rigidity of the contact pieces. The contact member of FIG. 2 is better in respect of the adjustment of this contact pressure, but the wrapping terminal *a* is not sufficient in strength to withstand a wire wrapping operation because the terminal *a* only comprises two sheets of very thin plates secured to one another. The contact member of FIG. 3, which is adapted for one side contact, is insufficient in strength for a wrapping operation. The contact member of FIG. 4, in which the contact piece *b* and the wrapping terminal *a* are separately prepared and then fixed together, is troublesome in manufacture and is not sufficient in electrical conductivity.

This invention eliminates these deficiencies and provides an electric contact member in which the contact portion and the wrapping terminal portion are integrally formed and the contact portion is then subjected to a bending operation, so that the contact portion is given excellent contact characteristics, whereas the wrapping terminal portion is strong enough to withstand a mechanical wrapping operation.

The contact member of the invention is formed from a high-strength resilient metallic material which is excellent in electric conductivity, such as a copper-beryllium alloy or the like. This metal is rolled to produce a shaped plate **1** having a longitudinal thick wall portion **2** of about 1 mm. thickness and a longitudinal thin wall portion **3** of about 0.2 to 0.3 thickness.

The arrangement of these thick and thin wall portions **2** and **3** is optional and may be made, for example, in the form as shown in FIG. 5, in which thin wall portion **3** is at the center of plate **1** while thick wall portion **2** has one side surface raised in relation to said thin wall portion **3**, whereas its opposite surface is flush with the thin wall portion **3**. Alternatively, as shown in FIG. 6, thick wall portion **2** is located at the center of plate **1** and a thin wall portion **3** is formed on each side of the thick wall portion **2**. As shown in FIGS. 7 and 8, the thick wall portions **2** are raised at both side surfaces in relation to thin wall portion **3**, whereas as shown in FIG. 9, one surface of thin wall portion **3** is flush with portion **2** and the other surface of thick wall portion **2** is raised above portion **3**. As shown in FIG. 10, thick wall portion **2** is raised at both its side surfaces in relation to thin wall portion **3**. There is formed a fillet **4** at the juncture between the thick wall portion **2** and the thin wall portion **3**.

Rolled plate **1** is subjected to a punching operation at

right angles to its longitudinal direction to form any desired shapes, depending on the intended products, such that a wrapping terminal **5** is formed from the thick wall portion **2** and a contact piece **6** is formed from the thin wall portion **3**, whereby there may be obtained a punched-out piece **7**. This punched-out piece may be, for instance, in the form as shown in FIG. 11 in which there are provided two contact pieces **6** for each single wrapping terminal **5**. As shown in FIG. 12, the wrapping terminal **5** is offset from the middle of the contact pieces **6** so as to be suitable for a zig-zag arrangement when a large number theerof are used as a multi-connector. As shown in FIG. 13, a single contact piece **6** is provided for a single wrapping terminal **5**. As shown in FIG. 14, the wrapping terminal **5** is made somewhat slender at its base portion, while as shown in FIG. 15 two wrapping terminals **5** are provided for a single contact piece **6**. As shown in FIG. 16, the single contact piece **6** is offset to one side from the middle of two wrapping terminals **5** so as to be adaptable for a zig-zag arrangement when a large number thereof are utilized. Any desired form can be chosen, depending on the place of application and the conditions of use thereof. These forms are designed to be punched at the highest possible efficiency from the rolled plate **1**, as shown in FIGS. 17 and 18.

The punched-out piece **7**, as shown in FIG. 11, is then subjected to a first bending operation wherein its contact pieces **6** are bent downwardly, as shown in FIG. 19, and thereafter the bent portions are subjected to a second bending operation wherein the two contact pieces **6** are bent inwards at their base portions nearly at right angles as shown in FIG. 20, so that they are opposed to one another and form therebetween a gap for receiving a printed plate or the like. In almost the same manner, the product as shown in FIG. 21 may be obtained from the punched-out piece **7** shown in FIG. 12. The punched-out pieces **7** as shown in FIGS. 13 to 16, which have a single contact pieces **6**, can form the products as shown in FIGS. 22 to 25 by only a single bending operation.

The contact piece **6** may be formed with a slit along its longitudinal extent, whereby the contact thereof with a printed plate or the like can become more reliable.

The product of the invention can be used, for example, as a multi-connector. In this case, a plurality of contact members are mounted in an insulating casing **9**, as shown in each of FIGS. 26 to 28, and their wrapping terminals **5** are arranged to project outwardly from a wall of the casing and are fixed at **10** by clamps, or the like, and a lead wire **11** is wrapped thereon.

Thus, according to this invention, a raw material shaped strip of rolled material of high strength resilient material

metal having a longitudinal thick wall portion and an adjacent longitudinal wall portion is subjected to a punching operation to subdivide blanks in which a wrapping terminal portion is formed from the thick wall portion and at the same time a contact portion is formed from the thin wall portion. The contact portion is then subjected to at least one bending operation to confer the desired shape thereto.

Accordingly, there is obtained a contact member having a contact portion with substantial resiliency and a wrapping terminal portion of substantial strength suitable for resisting a mechanical wrapping operation wherein the contact portion and wrapping portion are integral with one another. Moreover, the manufacture of the electrical contact member comprising such integral portions can be effected economically and at high efficiency.

What is claimed is:

1. An electrical contact member comprising a first thick portion and a second thin portion with spaced upstanding legs and a transverse stem connecting said thick portion to said legs; said stem, legs, and thick portion being integrally connected and constituted from a one-piece plate of metallic material which is electrically conductive and resilient, said thin portion initially being offset from the thick portion to form a common planar surface with said thick portion, said thick portion being laterally positioned intermediate the legs of the thin portion and extending in an opposite direction thereto, said legs being bent relative to said stem upwardly from said coplanar surface at an angle of 90° to face one another, said legs each having a width substantially equal to the thickness of said thick portion to be coextensive with said thick portion, as measured in the direction of the thickness thereof, when bent; said legs including respective bent portions curved towards one another in facing adjacent relation, said legs each having a longitudinal slit therein and cooperatively constituting a contact portion while said thick portion constitutes a terminal portion on which a lead wire can be wrapped.

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