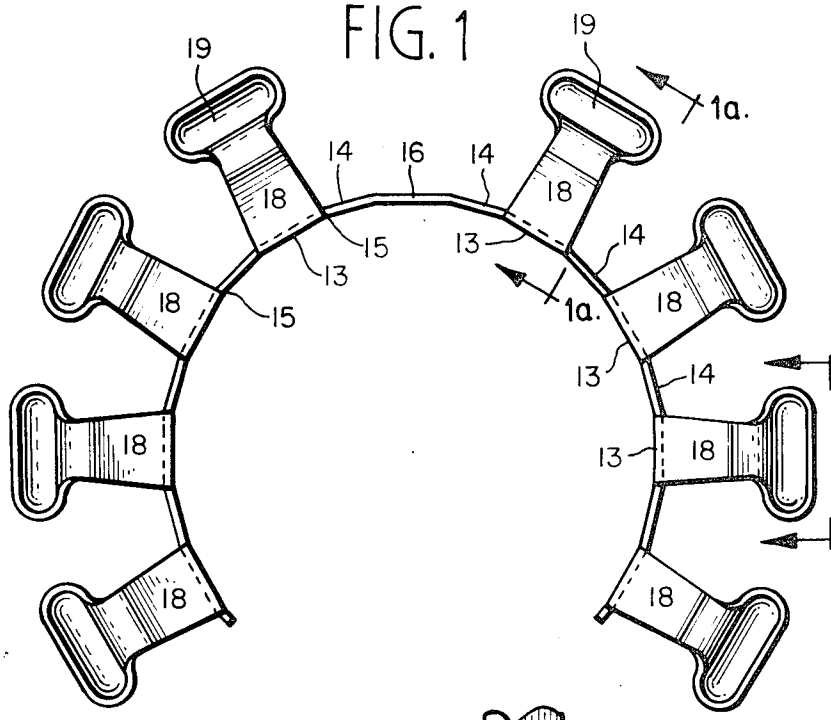
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METHOD OF MANUFACTURING ROTARY SWITCH ROTOR CONTACT MEMBERS

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FIG. 1



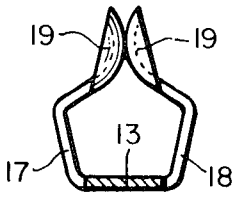




FIG. 1a

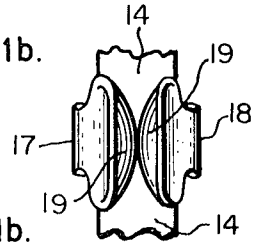



FIG. 1b

FIG. 2

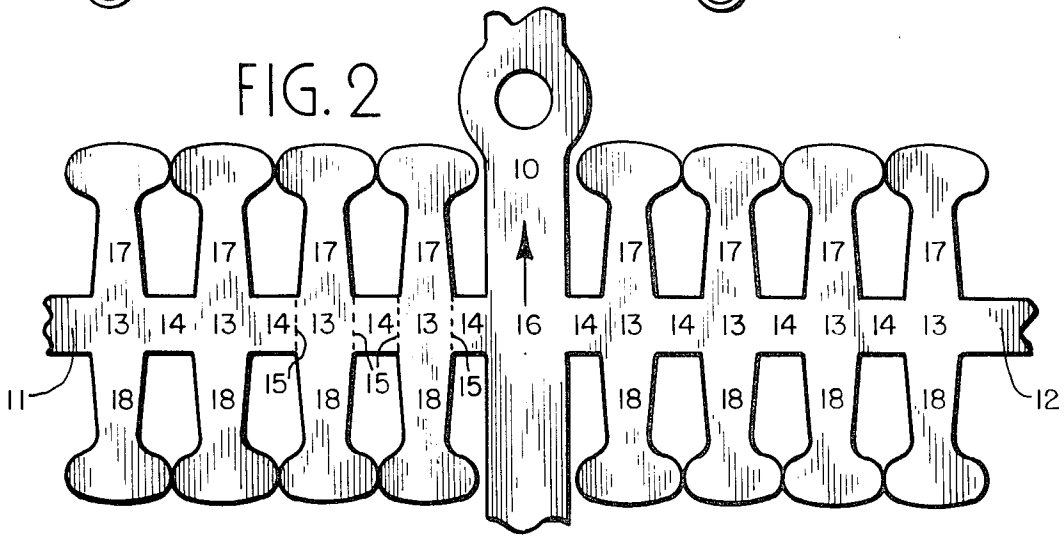



FIG. 2a

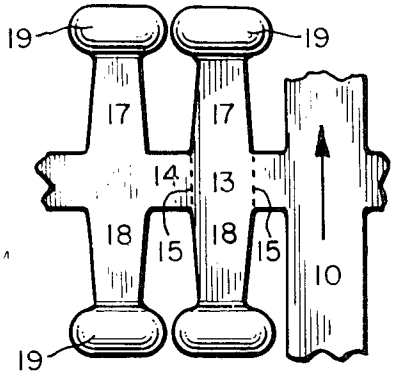
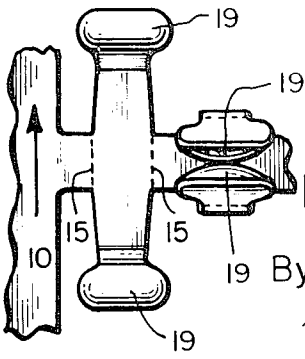



FIG. 2b




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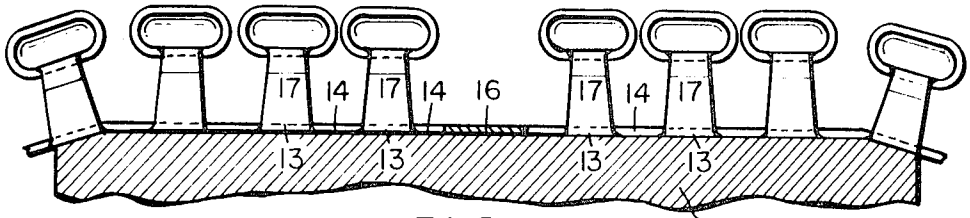



FIG. 3

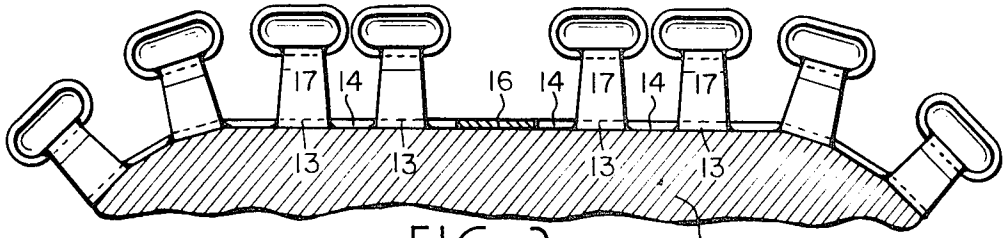



FIG. 3a

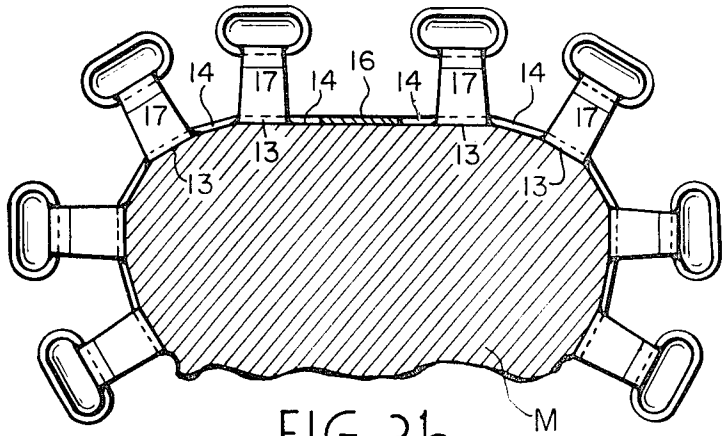



FIG. 3b

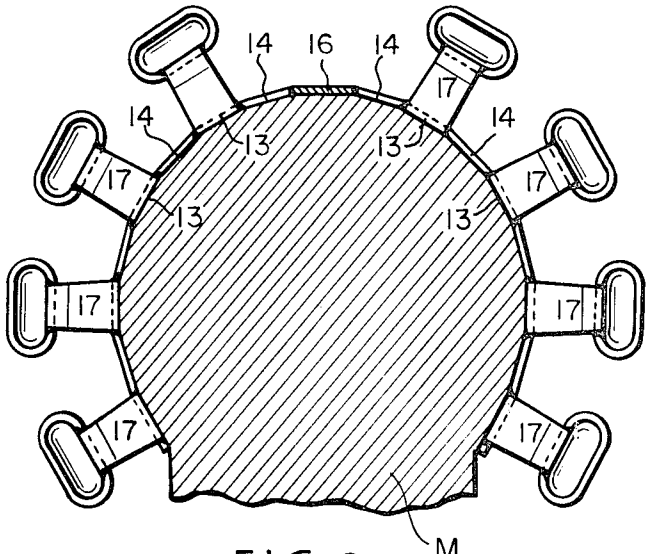



FIG. 3c

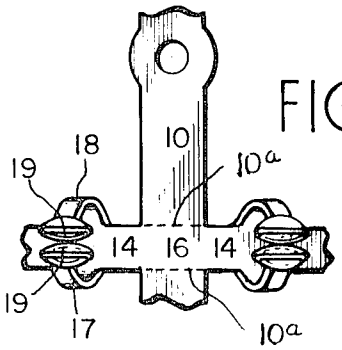



FIG. 4

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FIG. 5

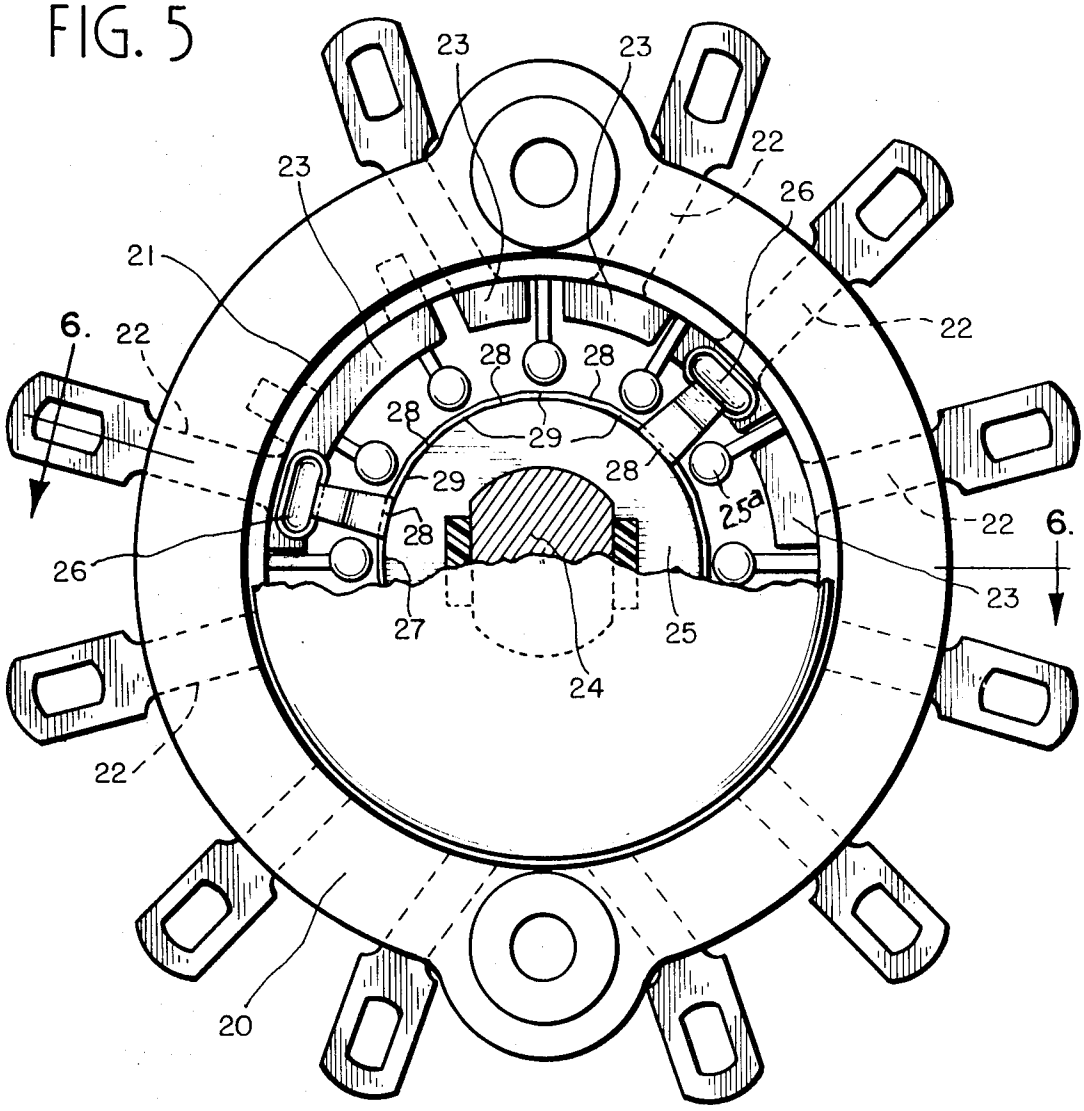
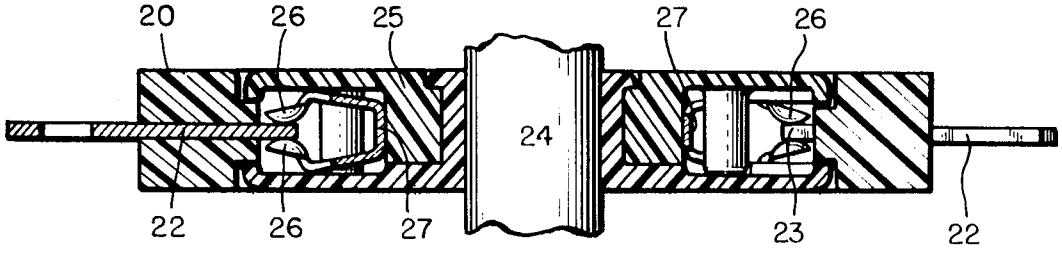



FIG. 6




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United States Patent Office 3,609,861 Patented Oct. 5, 1971



3,609,861

# METHOD OF MANUFACTURING ROTARY SWITCH ROTOR CONTACT MEMBERS

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Filed Oct. 21, 1969, Ser. No. 868,028
Int. Cl. H01r 9/00
U.S. Cl. 29—630 3 Claims

## ABSTRACT OF THE DISCLOSURE

The production of rotary switch rotor contact members wherein a strip of metal potentially divisible into a series of successive sections is fed intermittently, step by step, in one direction along a fixed line of travel to produce from each section a flat band and a flat trunk in relation to which said band defines a pair of branches extending in opposite directions at right angles to the line of travel of the strip and integral fingers extending in opposite directions from said branches in paired aligned relation lengthwise of said line of travel are bent into contact jaw forming relation and the branches are thereupon curved about the arc of a circle to thereby position said jaws in radially outward relation to the convex side of said branches in selected spaced apart relation circumferentially of the arc of curvature of said branches, and thereupon severing the leading section of the strip from the sections of the strip in trailing relation thereto.

This invention relates to the manufacture of rotary electric switches used extensively in television and radio receivers wherein a rotor contact member is selectively engageable with various stationary contacts arranged in a circle. More particularly, this invention concerns the method of making a rotor contact member having two or more pairs of contact jaws and an arcuate band integral with said jaws and from the convexly curved side of which band said pairs of contact jaws extend radially outwardly in alignment with a common plane containing the stationary contacts of the switch with which the rotor contact member is operatively associated.

A general object of this invention is to provide an improved method of making rotor contact members of the type indicated.

The production of a rotor contact member in accordance with the present invention contemplates the use of a strip of suitable metal composition which is potentially divisible into a series of successive sections and by feeding the strip intermittently, step by step, in one direction along a fixed line of travel each of said sections undergoes a series of operations whereby a rotor contact member is ultimately formed from each section prior to severance of each section from the next succeeding section of the strip. While undergoing said operations each section is initially stamped to form a blank having a flat band and a flat trunk in relation to which said band defines a pair of integral coplanar branches extending in opposite directions at right angles to the line of travel in which the strip is intermittently moved. As an incident to stamping each section to form said blank, each of said branches is formed with integral fingers which extend in opposite directions at right angles to the line of travel relation lengthwise of said line of travel of the strip. Such fingers are thereupon bent along parallel lines coinciding with the junction of said fingers with the branches of the band associated therewith so as to position said related pairs of fingers in face-to-face contact jaw forming relation. The branches are thereafter progressively curved to conform to the arc of a circle whereby said related pairs of fingers occupy radially outwardly extending positions in relation to the convexly curved side of said branches. Thereafter, each section of the strip thus defined by the arcuately bent branches, the fingers associated therewith and the area of the section defining the flat trunk joining said branches, is disengaged from the next succeeding section of the strip by cutting the strip along parallel severance lines in alignment with the bending lines at the junction of said fingers with the branches from which said fingers extend. The disengaged section thus provides a bank of contact jaws connected in uniformly spaced relation circumferentially of the arcuate band except for the unoccupied segment of the band which defines the trunk joining the branches of the band.



To meet various types of specific switching requirements as established by a predetermined pattern of stationary contacts of the switch to which it is to be applied, it is frequently necessary to provide a rotor contact member wherein the sequence of the contact jaws is broken by a vacant area of the band containing a continuity of two or more segments which have no contact jaws extending therefrom. Such a vacant area is produced in accordance with the method of this invention as an incident to the stamping operation which forms the fingers ultimately defining the desired contact jaws.

It is also an object of this invention to provide a rotor contact member which incorporates structural characteristics that not only simplify its production but also improves the quality of the switch to which the rotor contact member is operatively applied from the standpoint of stability and freedom from servicing problems.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, wherein:

FIG. 1 illustrates a rotor contact member formed by a method of production embodying the present invention.

FIG. 1*a* is a sectional view taken on lines 1*a*—1*a* of FIG. 1.

FIG. 1*b* is a fragmentary side view taken along line 1*b*—1*b* of FIG. 1.

FIG. 2 is a fragmentary plan view of the strip as it appears after undergoing initial stamping operations to form the flat blank from which the rotor contact member is ultimately produced in its final state.

FIG. 2*a* illustrates the strip after the blank undergoes a deforming step in which the ends of the contact jaw forming fingers are given a dome-like contour.

FIG. 2*b* illustrates the strip after the blank undergoes a further deforming step in which the related pairs of contact fingers are bent to define opposed jaws with the dome-like end portions of said fingers in face-to-face relation.

FIG. 3 and FIGS. 3*a*, 3*b*, and 3*c* illustrate a sequence of further deforming steps in which the branches of the band are progressively curved to conform to the arc of a circle to thereby position the related pairs of contact fingers in radially outwardly extending relation to the convexly curved side of said branches of the band.

FIG. 4 is a fragmentary view showing the formed blank in readiness for severance from the strip.

FIG. 5 is a plan view of a rotary switch having a rotor contact member made in accordance with the method of this invention but of modified form in relation to the rotor contact member shown in FIG. 1.

FIG. 6 is a section taken along line 6—6 of FIG. 5.

The production of a rotor contact member in accordance with the present invention contemplates the use of a strip of suitable metal composition such as laminated spring brass stock and which is potentially divisible into a series of successive sections and by intermittent feeding of said strip step by step in one direction along a fixed line of travel the strip is progressively acted upon to form

a structure as exemplified in FIGS. 1, 1*a* and 1*b* of the drawings. In undergoing such action each section of the strip is initially stamped to provide a blank having a flat trunk **10** and a flat band defined by a pair of integral coplanar branches **11** and **12** extending in opposite directions at right angles to the line of travel of the strip as indicated by the arrow shown on trunk **10** in FIG. 2 of the drawing. The area of each branch **11** and **12** includes a series of segments **13** of uniform dimension and a series of spacer zones **14** of uniform dimension to which said segments **13** are joined in alternating relation along meeting lines **15** extending parallel to said line of travel of the trunk **10**. Each segment **13** has a pair of fingers **17** and **18** extending therefrom in opposite directions so as to position said fingers **17** and **18** in paired relation lengthwise of the line of travel of the trunk **10**. Each finger **17** and the finger **18** in paired aligned relation therewith is thereupon subjected to a bending operation along a bending line coincident with the junction between said fingers and the segment of the band therebetween, and thus said finger **17** and the finger **18** associated therewith each define opposed contact jaws as shown in FIG. 2*b*. Prior to such bending action the end portion of each finger **17** and the finger **18** associated therewith is deformed to provide a domed contact surface **19** with the convex side of the domed surface facing inwardly of the area between the paired aligned fingers when the latter are in contact jaw forming position.

The branches **11** and **12** are subsequently progressively bowed with the aid of mandrels M as disclosed in FIGS. 3, 3*a*, 3*b* and 3*c* of the drawings so as to assume the curvature of the arc of a circle with the related pairs of fingers occupying radially outwardly extending positions in relation to the convexly curved side of said branches. Subsequent to such bending operations on the mandrels M to complete the curvature of the branches **11** and **12** of the band the area of the strip defining the trunk **10** between the branches **11** and **12** at the leading end of the strip is severed along parallel severance lines **10***a* (see FIG. 4) in alignment with the bending lines at the junction of the fingers **17** and **18** with the segment **13** of the branches from which the fingers extend. Upon such severance of the trunk **10** the leading section of the strip containing said severed trunk and the branches and fingers associated therewith is thereupon disengaged from the sections of the strip in trailing relation thereto and the disengaged section accordingly provides a bank of contact jaws connected in uniformly spaced apart relation circumferentially of the curved branches **11** and **12** of the band, as established by the spaced zones **14** except for the unoccupied segment **16** of the band defined by the area of the trunk **10** between the branches **11** and **12**.

While the bank of contact jaws thus shown in the contact member illustrated in FIG. 1 extends along a continuous arc of approximately 240 degrees with the jaws of each branch at spaced apart intervals of 30 degrees, it will be understood that the contact member might be extended to make a full circle or altered to form any desired arcuate dimension less than a full circle according to the specific circuitry pattern of the rotary switch with which the contact member is to be operatively assembled. Likewise the jaws of each branch of the contact member may be positioned at intervals either more or less than 30 degrees apart to meet varying circuitry conditions.

In a particular embodiment of a rotary switch assembly to which a rotor contact member according to the present invention is applicable, as shown in FIG. 5, reference numeral **20** designates a stator of molded insulating material. An opening **21** intersecting opposite faces of the stator provides a rotor unit receiving area and exposed end portions of conductor strips **22** embedded in the stator between opposite faces thereof define stator contacts **23** which occupy a common plane within the confines of the opening **21** while spaced apart circumferentially of the wall of said opening to establish a selected rotary switch circuit pattern. A rotor unit having a hub portion **25** is operable via a drive shaft **24** having driving connection with said hub portion **25** to turn the rotor unit within the opening **21** in the stator **20** about an axis centrally of the opening **21** and perpendicular to the plane occupied by the stator contacts **23**. Axially extending columns **25***a* formed integrally with the rotor unit and arranged in spaced apart relation circumferentially of the area between the rotor hub **25** and the wall of the stator opening **21**, and the axially extending surface of the rotor hub facing said columns define an annular clearway in which a contact member **27** is trapped while the jaws **26** are confined between column **25***a* flanking said jaws. Accordingly the jaws **26** of the contact member **27** are selectively engageable with the stator contacts **23** in response to rotation of the drive shaft **24**. It will be noted that the contact member **27** and the contact jaws **26** shown in the switch assembly in FIG. 5 differs from the contact member shown in FIG. 1 in that there is a vacant area separating the contact jaws **26** at the left hand end of contact member **27**, as shown in FIG. 5, from the contact jaws **26** next in clockwise direction therefrom. The vacant area thus provided in the contact member shown in FIG. 5 contains a continuity of three segments **28** having no contact jaws projecting therefrom and containing the spacer areas **29** with which said latter three segments **28** combine to form said vacant area. In accordance with the present invention, the omission of contact jaws forming fingers to provide such desired vacant area is most conveniently accomplished as an incident to the stamping operation which produces the blank with the fingers ultimately defining the desired contact jaws. However, severance of fingers to provide the desired vacant area may be performed at any stage of production prior to the bending operation in which the fingers are brought into paired contact jaw forming relation.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

What is claimed is:

**1.** The method of producing a one-piece rotor contact member having two or more pairs of opposed contact jaws and an arcuate band from the convexly curved side of which said pairs of contacts jaws form integral outwardly radial extensions in alignment with a common plane, said method including the provision of a strip of metal stock which is potentially divisible into a series of successive sections from each of which a rotor contact member is available and intermittently feeding said strip step by step in one direction along a fixed line of travel, subject each of said sections to a blanking operation to thereby form a flat band and a flat trunk in relation to which said band defines a pair of coplanar branches extending in opposite directions at right angles to said line of travel, said branches and the area of the trunk flanked by said branches providing a series of segments of uniform dimension and a series of spacer zones of uniform dimension to which said segments are joined in alternating relation along meeting lines extending parallel to said line of travel, said segments which extend throughout the area of said branches each having fingers extending in opposite directions therefrom in paired aligned relation lengthwise of said line of travel, thereafter bending said related pairs of fingers along parallel bending lines coincident with the junction of each of said related pairs of fingers with the segment associated therewith to thereby position said related pairs of fingers in face to face contact jaw forming relation, thereafter progressively bending said branches to conform to the arc of a circle whereby said related pairs of fingers occupy radially outwardly extending positions relative to the convexly curved side of said branches, thereafter severing said trunk along parallel lines of severance in alignment with said bending lines of said related pairs of fingers to thereby disengage the leading section containing said severed trunk and the branches and fin-

gers associated therewith from the sections of the strip in trailing relation thereto.

2. The method according to claim 1 wherein said blanking operation is effective to produce a vacancy in the sequence of contacts jaws so as to provide a continuity of two or more segments having no fingers extending therefrom and containing the spacer areas with which said latter two or more segments are joined.

3. The method according to claim 1 wherein the end portion of each finger and the finger in paired relation therewith is deformed to provide a domed contact surface with the convex side of the domed surface facing inwardly of the area between the paired aligned fingers when the latter are in contact jaw forming position.



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U.S. Cl. X.R.

29—418; 113—119