United States Patent [19]

Pfeifer

[11] **3,861,779**

[45] **Jan. 21, 1975**

[54] **POLARIZED ELECTRIC CONTACT BLADE**

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[73] Assignee: **Heyman Manufacturing Company,** Kenilworth, N.J.

[22] Filed: **Feb. 12, 1973**

[21] Appl. No.: **331,573**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 177,395, Sept. 2, 1971, abandoned.

[52] **U.S. Cl.**..... **339/184 M,** 339/276 SF, 113/119

[51] **Int. Cl.**..... **H01r 13/64**

[58] **Field of Search**..... 339/65, 66, 184, 195, 196, 339/275 FS, 278 T; 113/119; 29/630 A, 193.5

[56] **References Cited**

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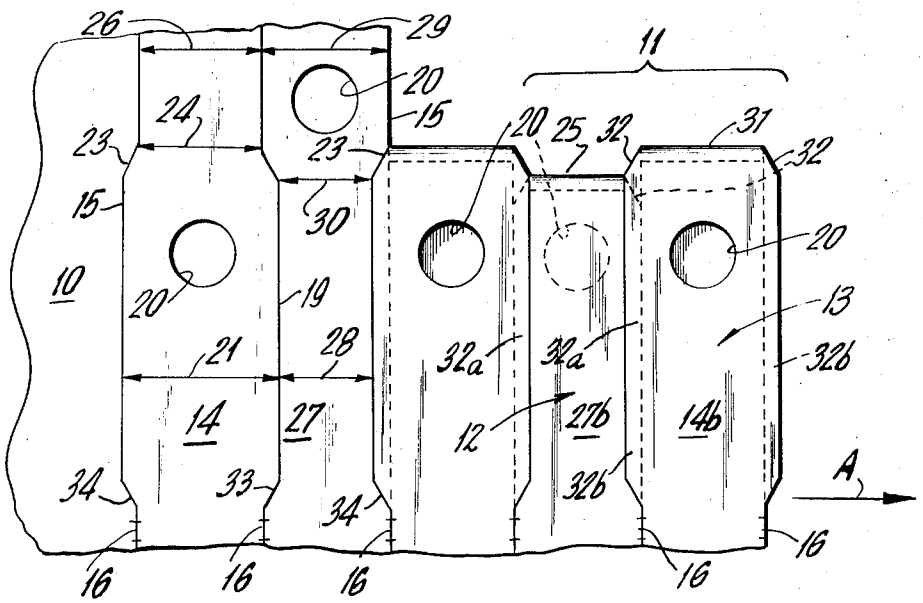
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Assistant Examiner—Lawrence J. Staab
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[57] **ABSTRACT**

Polarized electric contact blades are made of different widths having a different dimensional fold of metal for polarizing each blade.

13 Claims, 16 Drawing Figures



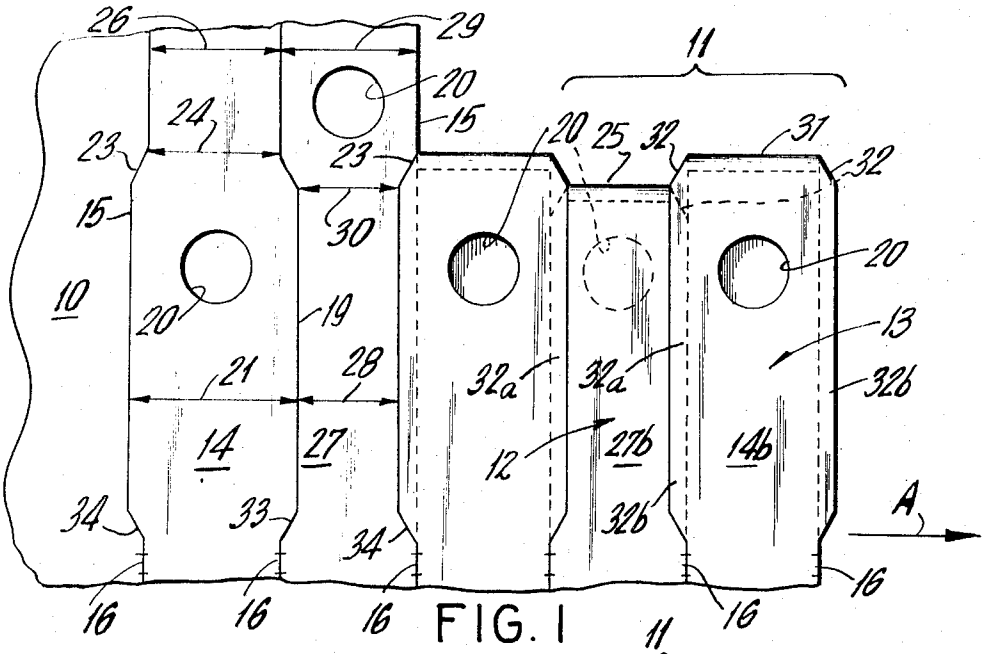


FIG. 1

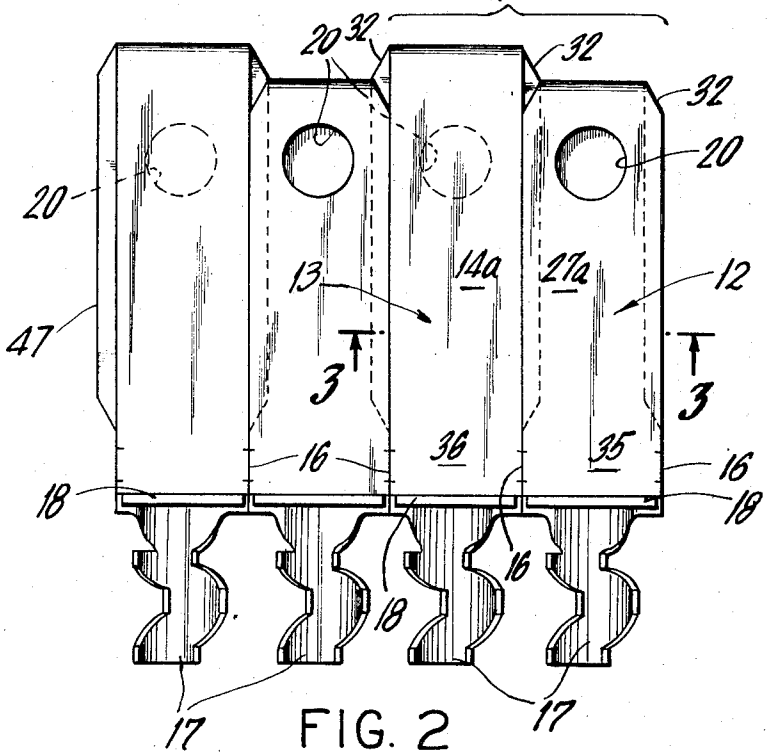


FIG. 2

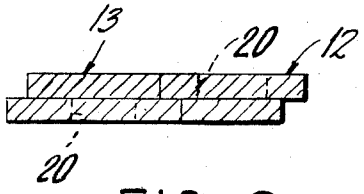


FIG. 3

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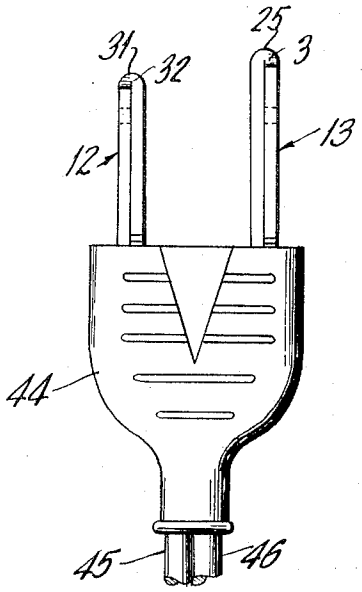


FIG. 4

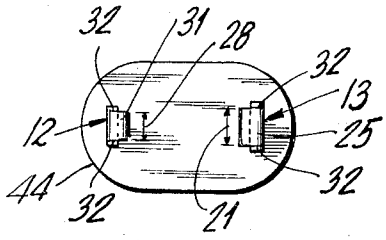


FIG. 5

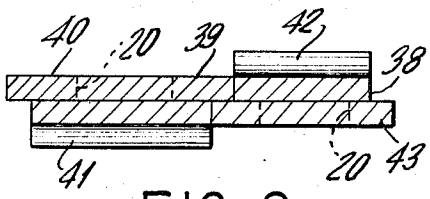


FIG. 8

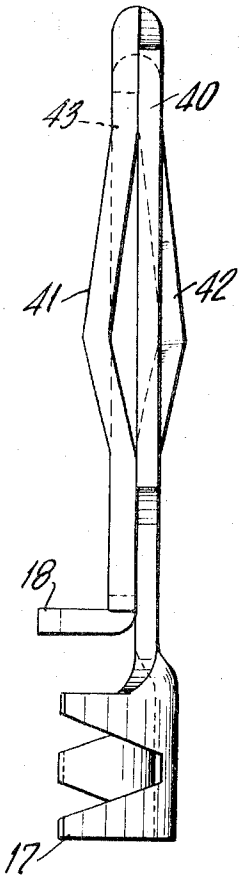


FIG. 6

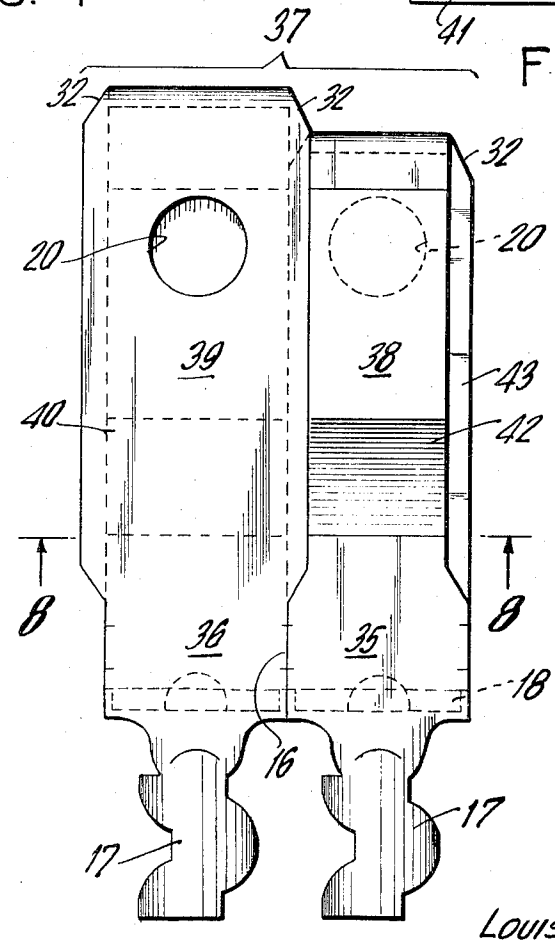


FIG. 7

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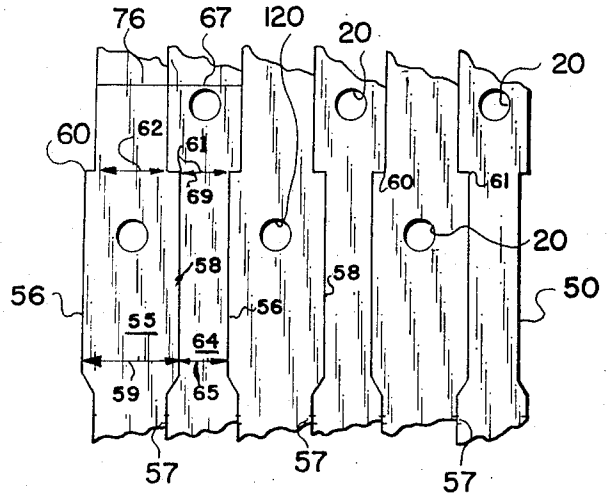

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FIG. 9

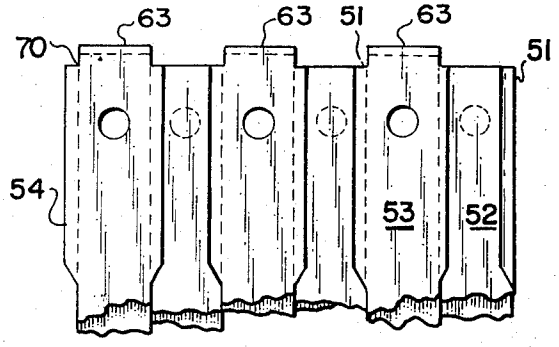

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FIG. 10

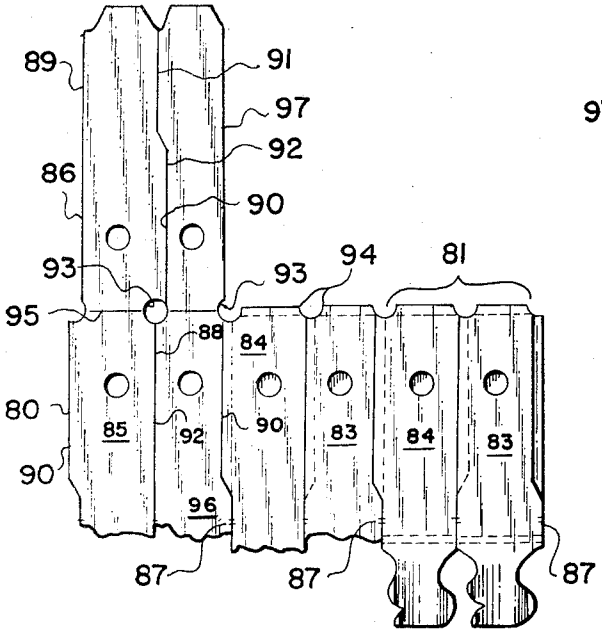


FIG.11

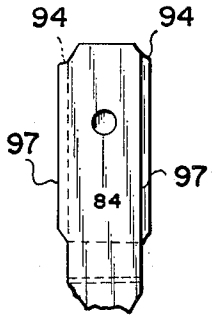
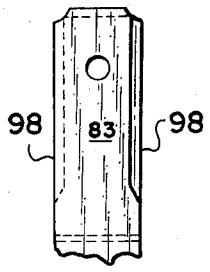


FIG.12

FIG.13



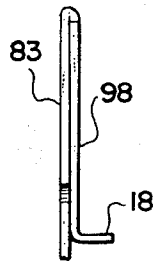


FIG.14

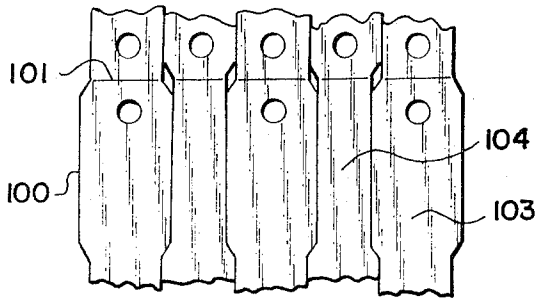


FIG.15

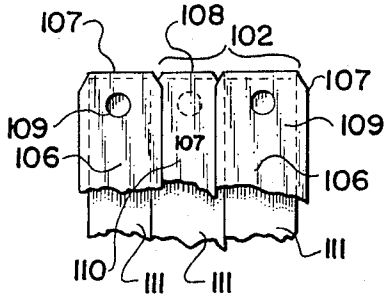


FIG.16

POLARIZED ELECTRIC CONTACT BLADE

This application is a continuation-in-part application of Serial no. 177,395 filed September 2, 1971 in Group 353 of the United States Patent Office, and now abandoned.

The present invention relates to polarized contact blades for electric plugs.

Even with the extensive use of A.C. current, there has been a continued need for electric contact blades that are polarized, or constructed so that each blade may fit into only one of the female socket contacts of an electric outlet.

It is a standard practice to manufacture electric outlets with one contact opening to receive a blade having a given width, and the other contact opening having a different width. Then if the blades of the inserted line cord plug are given the appropriate width dimension, the plug can be inserted into the outlet in only one way, with only one polarity.

Today, most standard electric sockets are polarized with two contact blade openings adapted to receive two different widths of contact blade, one width being the standard width clearing a blade of approximately one quarter of an inch and the second width clearing a blade of about five sixteenth of an inch.

The polarized electric socket openings thus adapted can receive a standard non-polarized electric plug cap assembly which has both blades of one quarter of an inch width without regard to polarity. If a polarized plug is used having one blade with a five sixteenth of an inch width, however, the larger dimension of the five sixteenth of an inch blade prevents its insertion in other than the desired polarity.

Prior devices to accommodate this arrangement have employed such varying width blades, but have been uneconomic of material and difficult to assembly in quantity as will later be described. Expedients such as coining one blade in a plug have been used in assembling a plug with two different blades to achieve polarization.

In modern blade manufacture it has been found economical to manufacture electric contact blades in progressive punch, cutting or stamping operations. By this expedient, little or no metal is wasted between blades and blades may be manufactured and assembled in strips and standard equipment designed for non-polarized plug blades without substantial change.

Heretofore, blades for polarized plugs could not easily be manufactured in strips and assembled in standard machines because of the variation in blade widths.

Progressive stamping of blades in long strips of metal in turn result in long strips of blades that are assemblable automatically by machine to a line cord and in properly detached pairs.

One form of polarized blade has been able to take advantage of side-by-side stamping of blades achieving polarity in blade sets by cutting each blade with the standard one quarter inch shank, but providing one blade with a five sixteenth inch tip and alternating with blades of three sixteenth tips. By this expedient, the same amount of metal is used as in the making of a standard blade and the blades are even adapted for automatic assembly.

The polarized effect is achieved by virtue of the fact that the five sixteenth tip cannot fit into the one quarter inch socket. The three sixteenth tip of the other blade does not affect its useability and further, the blades

have a one quarter inch shank to properly engage in a one-quarter inch socket.

While it would appear that the problems of economy and polarity have been solved, the above-mentioned blade has a particular shortcoming. The points and edges of the blades of the larger blade easily stick or jam while being inserted into a socket.

Attempted expedients of coining circular protrusions between such blades have only provided difficult wings on the wide blade to further complicate use.

Although rounded blade ends are easy to insert as are evenly tapered blade ends, the round end seems generally incompatible with the side-by-side stamped, folded polarized blade. Providing a diamond or triangular punch to the corner of the blade could be helpful in providing a taper.

Blades not round ended or tapered are not preferred, since they are more likely to hitch. Yet even such blades made in accordance with the present invention have advantages over the prior art in that the blade thickness of a normal blade is preserved in a blade that can be stamped side by side and also be polarized, with blades of substantially uniform width shanks.

According to the present invention, stamped, folded or cut-folded polarized blades are provided, stamped with a minimum of waste, polarized, yet such blade pairs consume no more metal stock than a stamping for a conventional blade.

Although such novel feature or features believed to be characteristic of the invention are pointed out in the claims, the invention and the manner in which it may be carried out may be further understood by reference to the description following and the accompanying drawings.

FIG. **1** is a detail of a metal strip showing folds of the blades of the present invention.

FIG. **2** is a plan view of a connected strip of blades according to FIG. **1.**

FIG. **3** is a section of FIG. **2** at lines **3—3.**

FIG. **4** is an elevation of a plug with a pair of blades of the present invention.

FIG. **5** is a plan view of FIG. **4.**

FIG. **6** is a side elevation of a variant set of blades of the present invention.

FIG. **7** is a plan view of FIG. **6.**

FIG. **8** is a section of FIG. **7** at lines **8—8.**

FIG. **9** is a detail of a metal strip cut for another embodiment of the present invention.

FIG. **10** is a plan view of a connected strip of blades according to FIG. **9.**

FIG. **11** is a detail of a metal strip cut for another embodiment of the present invention.

FIG. **12** is a partial front elevation of a wide blade made from the stamping strip of FIG. **11.**

FIG. **13** is a partial rear elevation of a narrow blade of FIG. **11.**

FIG. **14** is a side elevation of FIG. **13.**

FIG. **15** is a detail of a metal strip cut for another embodiment of the present invention.

FIG. **16** is a cut-away view of completed blades made from the stamping strip of FIG. **16.**

Referring now to the figures in greater detail, where like reference numbers denote like parts in the various figures.

The blades **12, 13** are designed for use in the standard United States electric plugs and sockets. The dimensions hereinafter described are for standard United

States use and use elsewhere where the dimensions are the same. It should be understood though, that the polarized relationship of the blade pairs **11** may be achieved with other dimensions also applying the teachings of the present invention.

In FIG. **1** the metal strip **10** as shown incidates cuts and folds in the fabricating of the polarized blade pairs **11.** Progressing in the direction of arrow A, the completed blades **12, 13** are shown to the right in FIG. **2.**

The preliminary steps in fabrication preferably start on the left where the blank **14** is cut into the strip **10.**

In order to form the shape of the blade pairs **11,** the metal strip **10** is given a cut **15.** Cut **15** leaves a small joint **16** to maintain the blades **12, 13** in strip form as shown in FIG. **2** for greater convenience in machine crimping, among other things.

The complete detail of the cut **15** is not shown since the balance of the cuts **15, 19** deal with selected styles of blade crimps **17** and blade lips **18,** all well known in the art and set forth in FIGS. **2, 6** and **7** in detail.

Cut **19** is a mirror image of cut **15** and leaves another joint **16.** For convenience and certain applications, blade location holes **20** may be punched or cut out of the strip **10** associated with the blades **12, 13.**

The cuts **15, 19** define a blade width distance **21** which in this instance, is five sixteenth of an inch. On blank **14** the cuts **15, 19** have tapering angles **22, 23** whose ends span the bend line **24** which ultimately becomes the tip **25** of the end of the blade **12.**

The taper angles **22, 23** are selected, preferred to provide tapered ends **32** to the blade tip **25** so that the blade **12** will have little difficulty in sliding into a socket.

The taper angles **22, 23** taper from the five sixteenth width to one quarter inch after which the width **26** spans the distance between the cuts **15, 19** and remains one quarter of an inch until the end of the blade section or the part that forms the slip **18.**

Blank **27** adjacent blank **14** is three sixteenth of an inch in its width **28,** blank **27** is adjacent blank **14**'s width **21** between a cut **19** and a cut **15.** The taper angles **22, 23** point inward on blank **27** and reduce to a three sixteenth of an inch width **28** from the upper portion of the blank **27** beyond the bend line **30,** which has a width **29** of one quarter inch.

The narrow end of the taper angles **22, 23** on the blank **27** spans the bending line **30** which forms the tip **31** of the blade **13.** The narrow end of the taper angles **22, 23** on the blank **14** spans the bending line **24** which forms the lip **25** of the blade **12.**

The upper portion of the blanks **14, 27** both have widths **26, 29** one quarter of an inch wide. Although the blank **14**'s bend line **24** is at a higher level than the blank **27**'s bend line **30,** bending of the blanks **14, 27** to form the blades **12, 13** forms a smooth blade set **11.** The one quarter inch blade sections fit in side by side in bent relationship, the blade **13** having a tapered corner **32** on a line with the bottom of the blade **12**'s tapered corners **32.** Each blade **12, 13** has a one quarter inch fold, blade **13** having a width **21** of five sixteenth of an inch on one face and blade **12** having a one quarter inch width **29** on one face folded over the three sixteenth inch width **28** fold.

As a practical matter, as can be seen in FIG. **2,** the blades **12, 13** are complete with crimp **17** and lip **18** and the lower portion of the blanks **14, 27** have tapers **33, 34** which widen the bases **35, 36** of the blades **12, 13** to a full one quarter width of both folds.

Referring to blade **12** as shown in FIG. **2,** the first blade fold **27***a* starts at the bend line **30** and extends a uniform width to the base **35.** The second longitudinal fold **27***b* can be seen in FIG. **1** or in phantom in FIG. **2.**

The taper **32** on the second fold **27***b* forms a linear indentation **32***a*, which extends longitudinally down the second blade fold **27***b* until near the base where tapers **33, 34** extended the second blade fold **27***b* to normal blade width.

The second blade **13** as shown in FIG. **2** has the first blade fold **14***a* start at the bend line **24** and extend a uniform width to the base **36.** The second longitudinal fold **14***b* can be seen in FIG. **1** or in phantom in FIG. **2.**

The taper **32** on the second fold **14***b* forms a linear protrusion **32***b* which extends longitudinally down the second blade fold **14***b* until near the base where tapers **33, 34** extend the second blade fold **14***b* to normal blade width.

In FIG. **3** is shown the cross-sectional relationship of blades **12, 13.**

In FIG. **7** a blade pair **37** is shown having substantially the same blade widths **21, 28** and tapered corners **32** as the blade pair **11.** The blades **38, 39** are bowed. Blade **39** has its five sixteenth section **40** flat while its one quarter inch section **41** has a blow in it to give the blade **39** a spring-like quality to better grasp the inside of a socket.

The blade **36** has its three sixteenth inch portion **42** bowed while the one quarter portion **43** lies flat. The bowed relationship of blades **38, 39** joined by the joint **16** can be seen in the section **2—2** of FIG. **7** as shown in FIG. **8.**

In fabricating the blades **12, 13,** a metal strip **10** of appropriate thickness is given cuts **15, 19.** It is advantageous to make the cuts **15, 19** one at a time in progressive movements of the strip **10** progressively bending the blanks **14, 27** at lines **24,** and line **30** until the blades **12, 13** are complete at the end of the direction of arrow A as shown in FIG. **1.**

The blades **12, 13** as shown in FIG. **2** are preferably constructed in the same manner as hereinbefore referred to with regard to FIG. **1,** but in this instance, the blades **12, 13** include the further steps well known in the art, those of stamping crimps **17** and lips **18.** The style of the crimp is of course an option as is the question whether or not to include lips, and then the shape the lip may take.

Other option features which may be cut during the forming of the blades **12, 13, 38, 39** are the location holes **20,** their number and alignment, all of which is well known in the art.

The blades **38, 39** are constructed by the same means as the blades **12, 13** with the exception of the bowing of blade sections **41, 42.** As shown in FIG. **7,** the blade pair **37** is a basic unit for use in a polarized plug **44.** The joined blades **12, 13** as shown in FIG. **2** represent a part of a strip **47** as distinguished from a basic unit blade pair **37,** which may be employed in machine crimping of line cords **45, 46,** accompanied or separate from the molding of polarized plugs **44** in an automated operation known in the art.

The blade sets **11, 37** in each instance include the five sixteenth blades **13, 39** of greater length than the

narrower one quarter inch blades **12, 38.** In polarized blade sets **11, 37** such as these, it is important that the longer blade **13, 39** be the wider blade **13, 39,** otherwise a narrower blade **12, 38** might first enter the wrong polarity electric socket by virtue of its greater length. In FIG. **4,** a plug **44** is shown with blades **12, 13** attached to line cords **45, 46.** It should be noted that the greater height of blade **13** does not affect its electrical characteristics.

In FIG. **5** the blades **12, 13** can be seen from above with their multiple width bent plies in the plug **44.** The width **21** of blade **13** selects only an available five sixteenth inch socket. The thicknesses of the plies of folded metal is selected to fit into a socket without undue looseness. The fact that the narrow portion of the blade **13** had a width **26** of one quarter inch does not affect blade **13**'s thickness. Thus, in thickness and width, the blade **13** is properly suited for a five sixteenth inch polarized socket.

The blade **12** is by the same token as blade **13,** suited for a one quarter inch socket and is unaffected by the three sixteenth inch width **28** of the fold of the blade **12.**

In FIGS. **9** and **10,** the metal strip **50,** as shown, indicates cuts and folds in fabricating blade pairs **51** progressing left to right as heretofore shown by arrow A in FIG. **1.** The completed blades **52, 53** are shown on the completed strip **54.**

The preliminary steps in fabrication preferably start on the left where the blank **55** is cut into the strip **50.**

In order to form the shape of the blade pairs **51,** the metal strip **50** is given a cut **56.** Cut **56** leaves a small joint **57** to maintain the blades **52, 53** in strip form as shown in FIG. **10** for greater convenience in machine crimping, among other things.

The complete detail of the cut **56** is not shown since the balance of the cuts **56** and the second cut **58** deals with selected styles of blade crimps **17** and blade lips **18,** all well known in the art and set forth in FIGS. **2, 6** and **7** in detail.

Cut **58** is a mirror image of cut **56** and leaves another joint **57.** For convenience and certain applications, blade location holes **20** may be punched or cut out of the strip **50** associated with the blades **52, 53.**

The cuts **56, 58** define a blade width distance **59** which in this instance, is five sixteenth of an inch. On blank **55** the cuts **56, 58** are right angles **60, 61** whose ends span the bend line **62** which ultimately becomes the tip **63** of the end of the blade **52.**

The right angles **60, 61** are selected as a selected alternate blade set **51** having the polarized blade **53** longer than the regular blade **52.**

The right angles **60, 61** extend from the five sixteenth width to one quarter inch after which the width **59** spans the distance between the cuts **56, 58** and remains one quarter of an inch until the end of the blade section or the part that forms the lip **18.**

Blank **64** adjacent blank **55** is three sixteenth of an inch in its width **65,** blank **64** is adjacent blank **55**'s width **59** between a cut **58** and a cut **56.** The right angles **60, 61** point inward on blank **64** and reduce to a three sixteenth of an inch width **65** from the upper portion of the blank **64** beyond the bend line **69,** which has a width **67** of one quarter inch.

The narrow end of the right angles **60, 61** on the blank **64** spans the bending line **62** which forms the tip **63** of the blade **53.** The narrow end of the right angles **60, 61** on the blank **55** spans the bending line **62** which forms the tip **68** of the blade **52.**

The upper portion of the blanks **55, 64** both have widths **71, 67** one quarter of an inch wide. Although the blank **55**'s bend lines **62** is at a higher level than the blank **65**'s bend line **69,** bending of the blanks **55, 64** to form the blades **52, 53** forms a smooth blade set **51.** The one quarter inch blade sections fit in side by side in bent relationship, the blade **53** having a cut-out corner **70** on a line with the bottom of the blade **64.** Each blade **52, 53** has a one quarter inch fold, blade **58** having a width **59** of five sixteenth of an inch on one face and blade **53** having a one quarter inch width **67** on one face folded over the three sixteenth inch width **65** fold.

As a practical matter, as in the case of the blades of FIG. **2,** the blades **52, 53** may be complete with crimp **17** and lip **18** and the lower portion of the blanks **14, 27** have tapers **33, 34** which widen the base **35, 36** of the blades **12, 13** to a full one quarter width of both folds.

In FIGS. **11 – 14,** a further embodiment of the present invention is set forth.

In FIG. **11** the metal strip **80,** as shown, indicates cuts and folds in the fabricating of the polarized blade pairs **81.** Progressing in the direction of arrow A, as shown in FIG. **1,** the completed blades **83, 84** are shown to the right in FIG. **11.**

The preliminary steps in fabrication preferably start on the left where the blank **85** is cut into the strip **80.**

In order to form the shape of the blade pairs **81,** the metal strip **80** is given a cut **86.** Cut **86** leaves a small joint **87** to maintain the blades **83, 84** in strip form as shown in FIG. **2** for greater convenience in machine crimping, among other things.

The complete detail of the cut **86** is not shown since the balance of the cuts **86, 88** deal with selected styles of blade crimps **17** and blade lips **18,** all well known in the art and set forth in FIGS. **2, 6** and **7** in detail.

Cut **88** has an upper straight edge **89** and on its lower portion, a straight protrusion **90** part of the distance of the cut. There is a second cut **91** which starts straight, then has an indentation **92** the shape of the protrusion **91** on one upper side. At the lower portion of the cut is a like straight edge **92.** The alternate repeats of the cuts **86, 88** ultimately allow the strip **80** to be formed into a strip of blades **83, 84** joined by joints **87.**

Blade edges may be formed by punching round holes **93** which round off the corners **94** of the blades **83, 84** when they have been folded.

The bend line **95** is uniform for both blades **83, 84,** bending the blank **96** or folding it from the bend line **95** forward, then straight edge **97** is folded under the protrusion **90** of the blank **85.** By bending the blank **85** forward, its protrusion **92** folds under the blank **96** and is inset with the protrusion **90** of cut **88,** thus forming polarized blades **83** having an inset lip **98** on either side and blades **84** having a protruding lip **99** on either side. The blades **83** are one quarter of an inch wide with a 1/32 inch inset **98** on each side and the blade **84** is one quarter inch wide with a lip **99** on either side extending outward.

In FIG. **15** the metal strip **100,** as shown, indicates cuts and bending line **101** in the fabricating of the polarized blade pairs **102.** The blanks **103, 104** have small diamonds **105** cut out straddling the bending line **101.** Blank **103** is formed into a blade **106** by folding forward from the bending line **101.** Blade **107** is formed

by bending the blank **104** forward at the bending line **101.**

As can be seen in FIG. **16,** the blade tips **107, 108** are tapered by the folding of the diamonds **105** and folding together alternate wide and narrow blade faces **109, 110** of five sixteenth of an inch and three sixteenth of an inch respectively, the back folds **111** are uniformly one quarter of an inch.

The terms and expressions which are employed are used as terms of description; it is recognized, though, that various modifications are possible.

What is claimed is:

1. A set of folded metal polarized blades for an electric plug comprising a narrow blade and a wide blade, each of said blades being defined by first and second longitudinal folds, folding from a bending line, the first fold of each of said blades being of the same given width, the second fold of the narrow blade having a width less than said given width, and the second fold of said wide blade having a width greater than said given width, each blade end having crimping means to join the blade to a line cord, joint means for maintaining said blades in a continuous strip with said first folds juxtaposed with each other on one side of said bending lines and with said second folds juxtaposed with each other on the opposite side of said bending lines.

2. The invention of claim **1** wherein said first longitudinal fold of said narrow blade tapers at its bending line to form a first blade tip and said second longitudinal fold of said wide blade tapers at its bending line to form a second blade tip.

3. The invention of claim **1** wherein said wide blade is longer than said narrow blade.

4. The invention of claim **1** wherein said crimping means are metal arms.

5. The invention of claim **1** in combination with an electric plug.

6. The invention of claim **1** wherein said wide blade is longer than said narrow blade by a distance about equal to the spacing between said narrow blade's bending line and said wide blade's bending line.

7. The invention of claim **1** wherein at least one of said longitudinal folds of at least one of said blades is bowed outward.

8. The invention of claim **7** wherein both said blades have at least one of said longitudinal folds bowed outward.

9. The invention of claim **1** wherein said first longitudinal fold of said narrow blade and said second longitudinal fold of said wide blade have aligned bending lines.

10. The invention of claim **9** wherein said first longitudinal fold of said narrow blade tapers at its bending line to form a first blade tip and second first longitudinal fold of said wide blade tapers at its bending line to form a second blade tip.

11. The invention of claim **1** wherein said joint means is on said first fold of said narrow and wide blades.

12. The invention of claim **1** wherein the longitudinal folds of said narrow and wide blades have concavities at their respective bending lines.

13. The invention of claim **3** wherein the longitudinal folds of said narrow and wide blades at their respective bendings lines defining tip portions, alternate tip portions of said blade being inset relative to adjacent tip portions.

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