United States Patent

Klumpp, Jr.

[15] **3,670,298**

[45] **June 13, 1972**

[54] ELECTRIC CONTACT BLADE CRIMP

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

[22] Filed: **Dec. 8, 1970**

[21] Appl. No.: **96,118**

[52] **U.S. Cl.** ..... **339/276 T**

[51] **Int. Cl.** **H01r 11/08**

[58] **Field of Search** 339/62, 63, 276

[56] **References Cited**

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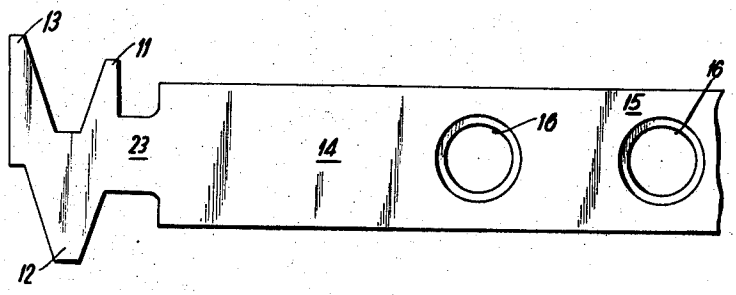
Primary Examiner—Joseph H. McGlynn

Attorney—Auslander and Thomas

[57] **ABSTRACT**

An electric plug blade has a crimp using the neck width for part of the crimp finger length improving the strength and reducing the resistance of the blade. Other gripping fingers may be offset from each other, extending the latitudinal distance between one fingertip and an opposite fingertip. The crimp works especially well with thin stock blades.

6 Claims, 11 Drawing Figures



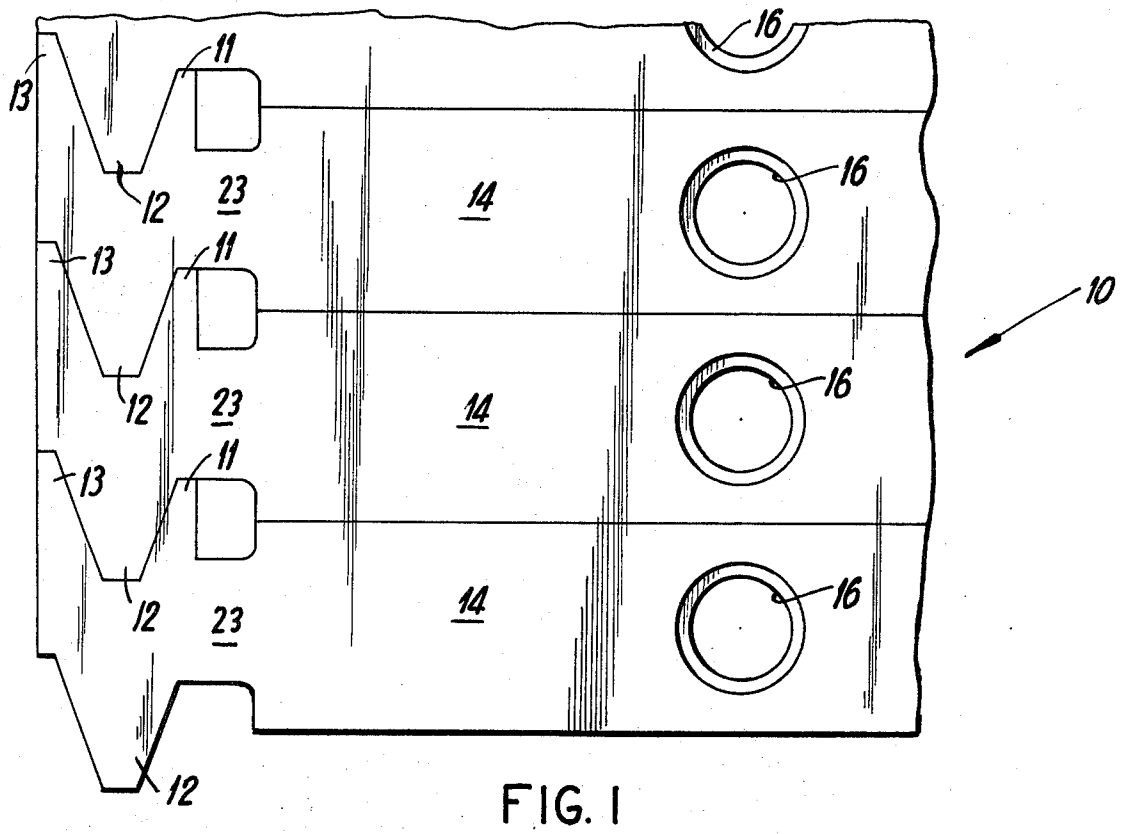


FIG. 1

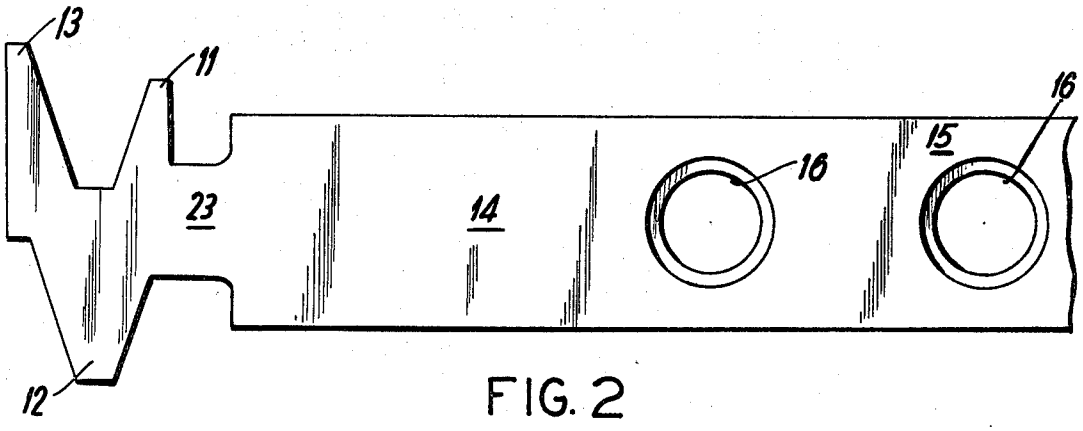


FIG. 2

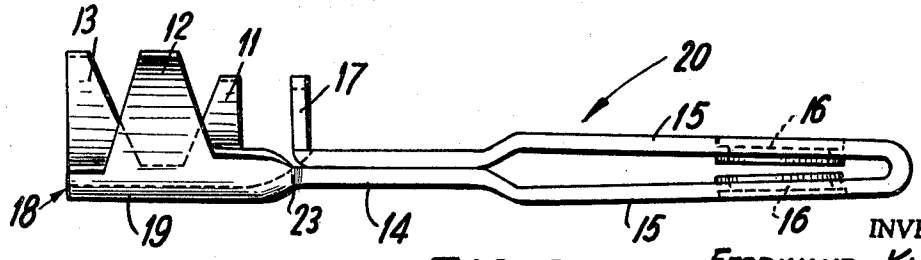


FIG. 3

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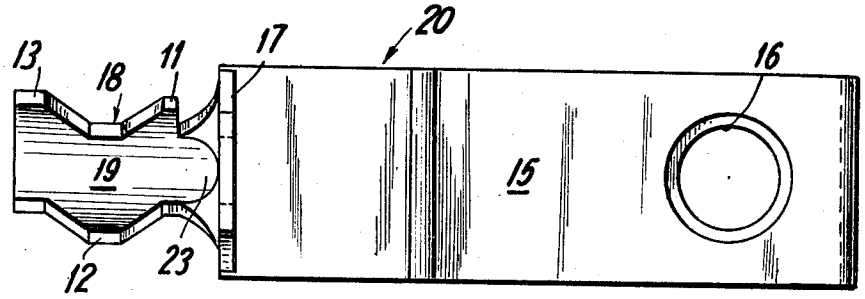


FIG. 4

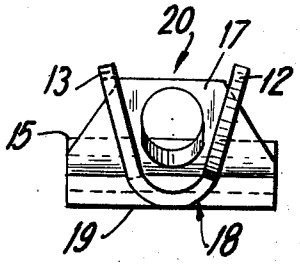


FIG. 5

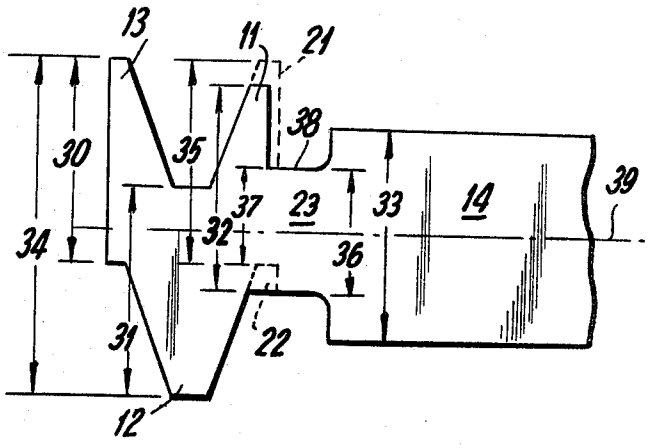


FIG. 6

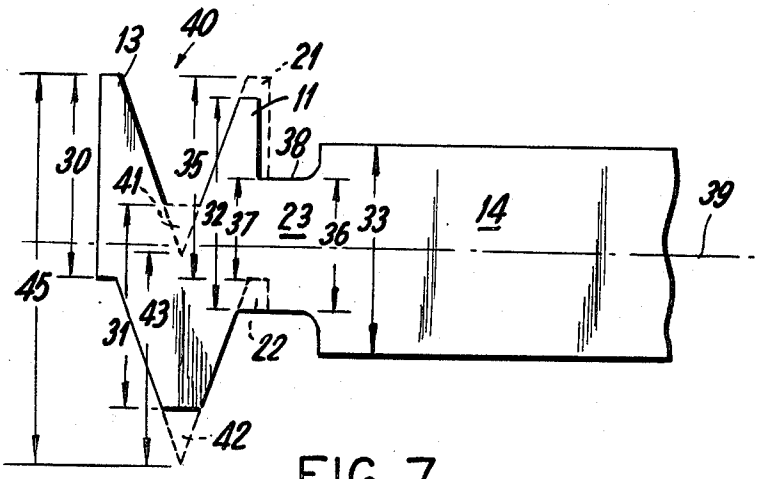


FIG. 7

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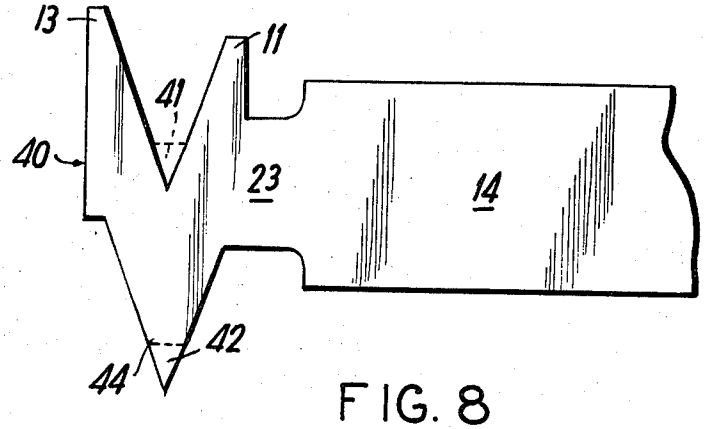


FIG. 8

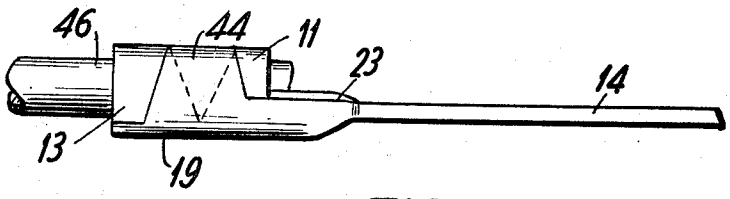


FIG. 9

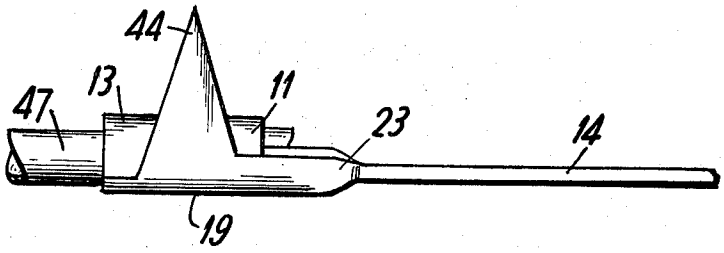


FIG. 10

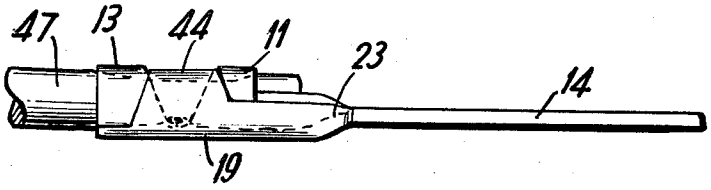


FIG. 11

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ELECTRIC CONTACT BLADE CRIMP

The present invention relates to an improved electric contact blade crimp which reduces the electrical resistance and heating at the neck, and the blade itself.

In the past the economic manufacture of electric contact blades has been performed in many instances by the progressive stamping of blades out of metal strips. The blades are stamped in a side by side configuration, providing a minimum of waste metal in stamping.

The crimps on such blades of the past have usually been limited to configurations having fingers offset from the basic width of the blade in alternating fashion, but in most instances the crimp fingers have been limited to the width of the blade itself.

In a stamping operation, the interfitting of successive blades would not allow for any finger width to be greater than the blade width because the extra finger width would have to come from the blade stock of the adjacent blade.

Actually, there have been exceptions to this axiom where it has been possible to introduce an intermediate swaging step to lengthen an already stamped finger after it has been lifted from their adjacent stamping position.

The swaging operation is a delicate one and requires extra steps which mean extra cost.

The overall breadth of the crimp of an unswaged blade crimp is determined by the distances between the various offset portions of the fingers. All the fingers are normally limited to a width no greater than that of the blade itself, but their offset may provide a longitudinal width from fingertip to fingertip of almost double the width of the blade. The wider the longitudinal width, the greater flexibility the crimp has for holding a wider selection of wires properly crimped under safe electrical conditions.

Other crimp expedients such as strain relief crimps, as set forth in U.S. Pat. No. 2,476,738 are complicated metal consuming and only palliative to the flexibility of what can be done with a primary crimp.

Economies in the use of contact blades have been effected by the use of thin stock, folded or bowed to provide Underwriter's Laboratory thickness dimension requirements. The thinner the stock, the greater than possibility of having to face current limitation on a line or wire in use, or heating problems with the blade caused by excess resistance.

According to the present invention, an improved crimp is provided with a large longitudinal width from finger tip to finger tip with improved electrical characteristics and blade strength.

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 partial plan view of a typical stamping strip configuration for blades of the present invention.

FIG. 2 is a plan view of an individual blade of FIG. 1 before folded into a completed blade.

FIG. 3 is a side elevation of a blade of the present invention.

FIG. 4 is a plan view of FIG. 3.

FIG. 5 is a left end view of FIG. 4.

FIG. 6 is a detail of a flat finger configuration of the present invention with the prior art superposed.

FIG. 7 is a detail of a variant flat finger configuration of the present invention with the crimp of FIG. 6 superposed.

FIG. 8 is a plan view of the variant crimp of FIG. 7.

FIG. 9 is one form of crimp of the fingers of FIG. 8.

FIG. 10 is a partially complete crimp of the finger of FIG. 8.

FIG. 11 is a completed crimp of FIG. 10, a variant of FIG. 9.

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

The stamping strip 10 as shown in FIG. 1 shows the interdigitations of the crimp fingers 11, 12, 13 as they are being cut out with a minimum of waste. The blade portion is shown unfolded. The completed blade 20 is folded over from the width

of the stamping strip 10, shown in greater particular detail in FIG. 2. The folded portion 15 of the blade 20 is folded over as shown in FIG. 3 to complete the blade 20, bowed to proper width and including indented openings 16 and a lip 17 and the crimp 18, fingers 11, 12, 13 ready to accept a wire.

The crimp base 19 is preferably on a plane with the blade 20 as can be seen in FIGS. 4 and 5.

In FIG. 6, the flat outline of the crimp 18 is shown with dotted portions 21, 22 which represent the prior art with regard to crimps.

The crimp 18 extends from the blade 20 through the neck 23 to the fingers 11, 12, 13 and the crimp base 19. A measure of the width of each finger 11, 12, 13 from its tip to the opposite edge shows that the width 30 of finger 13 is the same as the width 31 of finger 12 and the same as the width 32 of finger 11. The widths 30, 31, 32 are also the same as the width 33 which is the width of the blade.

The width 34 between the further extension of fingers 12, 13 is in excess of the width 33, even though the blade 20 is made from a single stamping strip 10. The width 34 is achieved by having the fingers 11, 12, 13 offset from each other.

The prior art configurations had a finger extending the width 35, extending from the inside of the dotted portion 22 to the extent of the dotted portion 21. The width 36 of the neck 23 of the present invention is thus wider than the neck width 37 of the prior art blade which extended from the inside edge of the dotted portion 22 to the further edge 38 of the neck 23; notwithstanding, the fact that the width 35 is the same as the other widths 30, 31, 32, 33.

The crimp 40 on the blade 20 of the FIG. 7 is cut from a stamping strip in progressive steps and includes the dotted portions 41, 42 which are portions of the crimp 18 of the blade in FIG. 6, further offset toward the centerline 39 of the blade 20. The width 43 from the innermost portion of the dotted area 41 to the outermost portion of the dotted portion 42 is still identical to the width 33 of the blade portion 14 and the other widths 30, 31, 32, 33, yet, by providing the dotted portion 41 as a V cut as shown in FIG. 8 with the portion 42 forming in integral finger 44, as shown in FIG. 8, the overall width 45 of the crimp 40 is even further extended over that of the width 34 in FIG. 1.

FIG. 9 is a crimp 40 of FIG. 8 engaged about a wire 46 having a circumferential gauge about equal to the inner circumference of the crimp 40.

FIGS. 10 and 11 show the crimp 40 as it grasps a solid wire 47 of a gauge of lesser diameter than the crimp 40. It could, of course, grasp a stranded wire.

The finger 44 in crimping can actually curl under the wire 47 and crimp it as a form of strain relief or or extra grasp.

The crimp 18 as applied to an ordinary blade made of thick stock, say over 0.020 inch provides a blade of greater strength than the prior art against fatigue because of the neck width 36 being greater than the prior art neck width 37. This changeover in the prior art is made without impairing the grasp of the finger 11 nor its width 32 which is equal to the prior art width 35.

The crimp 40 as applied to stock over 0.020 has the same advantage as the crimp 18 plus the flexibility of being able to apply a strain relief crimp or better grasp to a small gauge wire 46 and a potential of accepting a greater range of wire gauges overall, because of the increased width 45 between the ends of the fingers 13 and 44.

Blades 20 of the present invention have a further advantage, allowing greater flexibility and concommitant cost saving by enabling a good selection of wire gauges with stock well below 0.020.

In the thin stock area, great saving in metal costs may be effected and strong blades capable of meeting Underwriter's Laboratory's standards may be made.

The blade 20 as shown in FIGS. 3, 4 and 5, under .020, may be bowed as shown to conform to underwriters laboratories' prescribed widths. The neck 23 of the blade 20 of the present

invention is stronger, where strength counts in a thin stock blade. Further, a wider latitude of current may be used with blades **20** of the present invention. The greater width **36** of the neck **23** provides less electrical resistance than the crimps of the prior art and avoids the danger of heating or overheating.

The fact that the fingers **11, 12, 13, 44** of the crimps **18, 40** of the present invention cross the wires **46, 47** at about a right angle to the longitudinal axis of the wires **46, 47** provides a good grasp of the wire, avoids some of the delicate problems of crimping such as the loose strands free of the crimp where the fingers form a diagonal across the wire, or loose strands in an "E" crimp, or the sensitivity of adjusting the dies to get a good "E" crimp, parting stranded wire and curling between or properly grasping a single strand wire.

Comparison of comparible blades of the prior art with the blade **20** and crimp **18, 40** of the present invention would indicate that the normal power loss in a blade of the present invention may be as much as 26 percent less at the neck **23** than in a blade having a neck width **37** of the prior art with 18 gauge wire alone.

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

Having thus described certain forms of the invention in some detail, what is claimed is:

1. A folded blade formed by a progressive stamping operation having a low electrical resistance comprising a first folded blade portion and a second folded blade portion, a neck portion integral to one of said blade folds, said neck of substantially uniform width along its length, said neck edges extending from said blade parallel to the length of said blade, and crimp fingers extending from said neck; the first finger adjacent said neck having a width approximately equal to said blade width, said finger extending from one edge of the neck beyond one edge of said blade.

2. The invention of claim **1** having at least one offset finger adjacent said first finger, said offset finger having a width approximately equal to said blade width measured from the further edge of said finger to the tip of said finger.

3. The invention of claim **1** having at least two successive alternately offset fingers adjacent said first finger each said fingers having a width approximately equal to said blade width measured from the further edge of said finger to the tip of said finger.

4. The invention of claim **1** having at least two successive alternately offset fingers adjacent said first finger each said fingers having a width approximately equal to said blade width measured from the further edge of said finger to the tip of said finger and said blade having at least two successive alternately offset fingers adjacent said first fingers said finger being offset to a point near the centerline of said blade.

5. The invention of claim **1** having at least two successive alternately offset fingers adjacent said first finger said fingers being offset to a point near the centerline of said blade.

6. The invention of claim **5** crimped to a wire with one of said fingers crimped around and under said wire.

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