

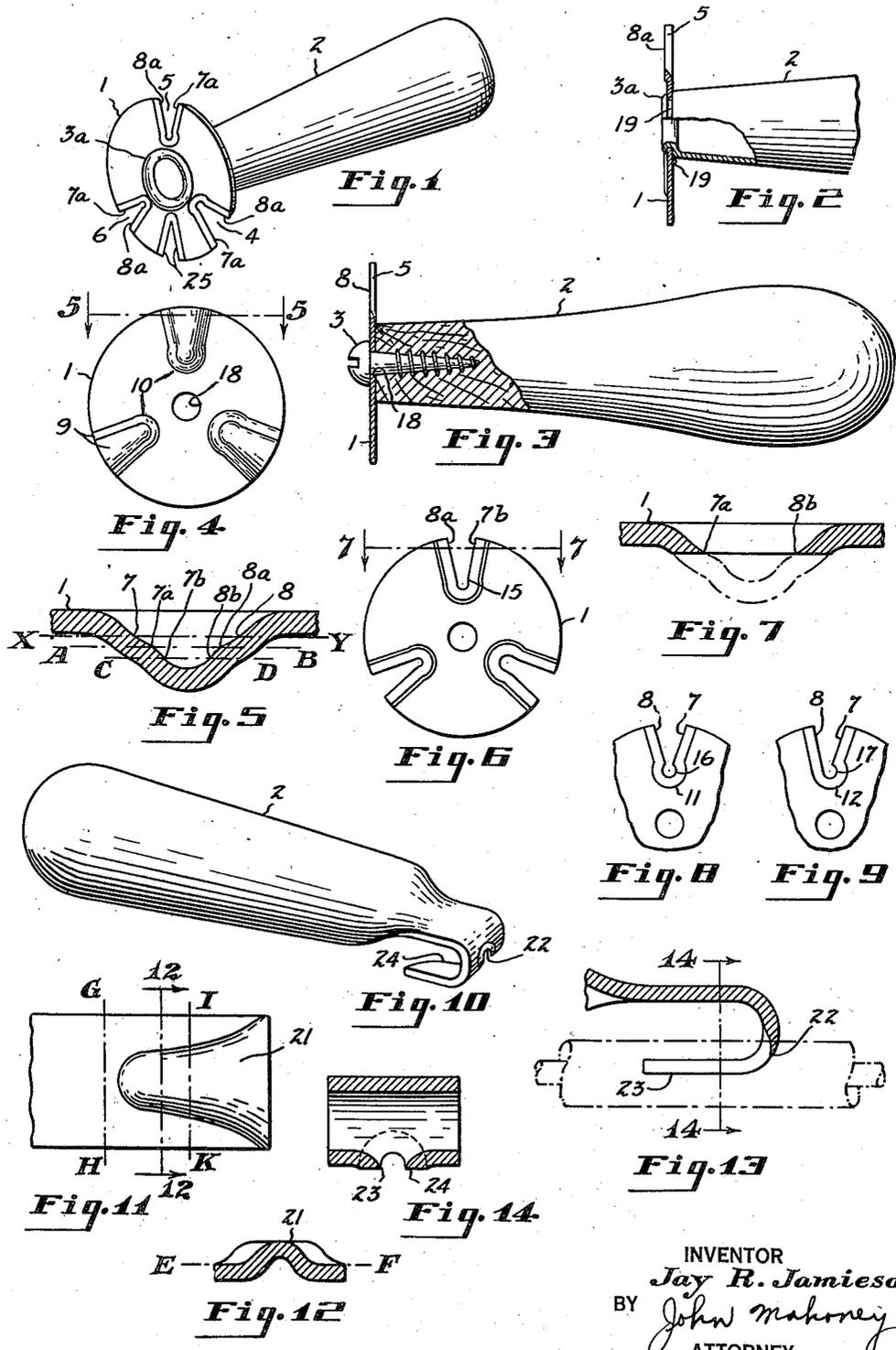
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METHOD OF PRODUCING THE CUTTING PORTION OF TOOLS

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## METHOD OF PRODUCING THE CUTTING PORTION OF TOOLS

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10 Claims. (Cl. 76—101)

My invention relates to tools and more particularly to tools for cutting and stripping insulation from wires and to an improved method of producing such tools.

In making electrical connections with conductive wires having insulated covers, it is desirable to provide a simple tool for readily removing portions of the insulation from the wire. Heretofore, in providing tools for such purposes, it has been the practice to provide either a somewhat complicated tool or a device which is adapted to be attached to tables, benches or the like. For simple operations, such tools or devices are not only cumbersome but are also expensive. In simple tools which have been devised for such purposes, the cutting edges of the tool is not only usually exposed but such tools are generally constructed in such a manner that it is difficult to strip the insulation from the wire after the cutting operation.

It is an object of the present invention to provide an improved tool for cutting and stripping insulation from wires that may be constructed by simple forming operations, is effective in service, and which is comparatively small in size so that it may be readily carried in the pocket or kit of the electrician or operator, and to an improved method of producing such tools.

Another object of my invention is to provide an improved tool having a cutting portion and a handle, the cutting portion being integrally or firmly united to the handle so that the tool may be held firmly in contact with the insulation during both the cutting and stripping operations.

A further object of my invention is to provide an improved tool that may be readily sharpened when it becomes dull.

Other objects and advantages of my invention will be apparent as the specification proceeds.

My invention will be better understood by reference to the accompanying drawing in which:

Fig. 1 is a perspective view of my improved tool;

Fig. 2 is a side elevational view of the tool shown in Fig. 1 with parts in section and with parts broken away to show how the cutting or stripping portion of the tool is attached to the handle;

Fig. 3 is a side elevational view with parts in section of a modification of my improved tool, showing the cutting edges in the same plane as one of the faces of the disk and the disk attached to a wooden handle;

Fig. 4 is a front view of a disk having a central

opening, the disk being embossed in preparation for subsequent operations;

Fig. 5 is a cross sectional view on the line 5—5 of Fig. 4;

Fig. 6 is front view of the completed disk;

Fig. 7 is a cross sectional view on the line 7—7 of Fig. 6, showing the contour of the cutting edges, the dotted lines indicating the portion of the embossment which has been removed;

Figs. 8 and 9 are detail views showing modifications of the cutting notches or slots formed in the disk;

Fig. 10 is a perspective view of a modified form of cutting and stripping tool adapted to be utilized in cutting and stripping insulation from wires having a comparatively large diameter;

Fig. 11 is a plan view of a portion of the blank from which the tool shown in Fig. 10 is formed, the blank being shown embossed and the dotted lines indicating the planes upon which the metal is bent in forming the tool;

Fig. 12 is a cross sectional view on the line 12—12 of Fig. 11;

Fig. 13 is a longitudinal sectional view of a portion of the tool shown in Fig. 10, parts of the tool being shown embedded in the insulation of the wire; and

Fig. 14 is a cross sectional view on the line 14—14 of Fig. 13.

Referring to the modifications shown in Figs. 1 to 7, inclusive of the drawing, my improved tool comprises a disk 1 which is firmly secured to a handle 2 by any suitable means, such as a screw 3, or when the handle is formed of metal, the end portion of the metal may be extended through a central opening in the disk and bent or flanged over the metal disk as shown at 3a in Figs. 1 and 2.

As illustrated the disk 1 has three cutting slots or notches 4, 5 and 6, each of which is adapted to receive an insulated wire of a different size, although obviously the disk may be provided with a smaller or larger number of such slots or notches. Each of the slots is provided with cutting edges 7a and 8a which are adapted to cut the insulation from the wire as it is forced into the slots.

According to my invention the cutting edges 7a and 8a are formed in a simple and economical manner. As indicated in Figs. 4 and 5 of the drawing, embossments are formed in the disk which extend from the outer periphery of the disk to a point a substantial distance from the center. The embossments may be formed in various shapes depending upon the shape of the slot.

which is to be subsequently formed and I do not desire to be limited in this respect. For instance, the embossments may be rectangular in shape. Preferably, however, the embossments extend from the outer periphery of the disk to a point a substantial distance from the center and the side edges of the embossments converge toward each other and are rounded at their inner portion into various shapes as illustrated in the drawing. As shown in Fig. 4, the outer edges 10 of the embossments are rounded in a substantially spherical shape, in Fig. 8 the outer edges of the embossments terminate in a substantially circular portion as indicated by the numeral 11, while in Fig. 9 one of the outer edges of the embossments extends substantially radially and the other edge is rounded outwardly as indicated by the numeral 12.

After the embossments are formed, the metal forming the embossments is laterally ground to remove a sufficient portion of the embossments to form slots or notches having sharp cutting edges which extend toward the opening in the slot. The lateral grinding of the rounded portion of the embossments also serves to form a rounded inner portion with cutting edges extending toward the slot. The embossments may be of the same size or of different sizes. When the embossments are of the same or of a standard size, slots having various sizes may be provided by grinding the embossments to various levels or if different size embossments are formed, slots of various sizes may be produced by grinding to the same level.

As illustrated in Fig. 5, the metal may be ground to a plane as indicated by the line X—Y to form cutting edges 7 and 8 in which the outer and inner portion of the metal of the cutting edge are at an acute angle to each other.

To enable the tool to be readily sharpened when it becomes dull, however, the embossments are usually ground to a plane spaced from the front face of the metal as indicated by the line A—B or C—D to form cutting edges 7a and 8a as shown in Fig. 1 or cutting edges 7b and 8b as shown in Fig. 5. Instead of grinding the metal to the plane designated by the lines X—Y and A—B, the upper portion may be cut or punched out upon a line having a contour substantially vertical with edges 7 and 8 or 7a and 8a, thereby removing the major portion of the embossment, and the remaining metal may be ground down to the desired level. For instance, the metal may be punched or cut out on a contour such as shown by the openings of the slots in Fig. 6 and the edges of the metal may then be ground laterally down to the shape shown in Fig. 7. It is not essential, however, that the embossments shall be formed prior to the cutting or piercing operation as slots may be first punched from the metal and the sides of the metal adjacent each slot may be formed or extruded outwardly to provide metal surfaces extending beyond the normal plane of the metal, such as shown in Fig. 14 which may then be ground to the desired level.

In the preferred form of my invention, however, a second embossment is formed within the first embossment, as shown in Figs. 4 and 5, both embossments being formed in one stamping operation, and the metal forming the second embossment is ground to a plane as indicated by the line C—D to form cutting edges 7b and 8b. In the latter case the angle formed between the inner and outer edges of the metal is not at such

an acute angle to each other as when the metal is ground to a plane along the lines X—Y or A—B and consequently the metal forming the cutting edges is not so apt to be broken during the cutting operation. When the metal is formed in such manner, the second embossment may be completely removed without any punching operation and the cutting edges are spaced outwardly from the face of the disk and are consequently in a position to be readily sharpened when they become dull, or after they have been sharpened several times, they may be ground down sufficiently to form a cutting edge for a wire of the next larger size.

After the embossments on the disks have been ground, the disk is in the form shown in Fig. 6 with the cutting edges converging radially inwardly and terminating in a rounded portion with cutting edges, or the rounded portion of the slot may be more pronounced as indicated by the numeral 16 in Fig. 8, or it may be slightly offset as indicated by the numeral 17 in Fig. 9. It will be particularly noted that the outer faces of the cutting edges are substantially flat and that the cutting edges form the boundaries of the slot. The cutting edges are therefore not directly exposed and substantially all danger of the operator cutting himself with the tool is eliminated.

According to my invention, the disk 6 is attached firmly to an appropriate handle 2, and while any suitable means may be provided for this purpose, as indicated in Figs. 1 and 2, when the handle is made of metal, the end of the handle attached to the disk is preferably bent inwardly to form a shoulder 19 and is then extended through the aperture and bent back or flanged over the disk. The shoulder and flanged portion thus formed preferably extend approximately to the inner portion of notches 15 and form a firm support for the disk.

When the handle is formed of wood as shown in Fig. 3, the disk may be attached to the handle by any convenient means, such as a screw 3, which extends through the aperture 18 and is embedded in the wood. If a plastic material is used, a threaded insert may be embodied in the plastic during the molding operation which protrudes beyond the end of the molded material to receive the disk and a nut for securing the disk in place. In attaching the handle in the manner specified, it will be noted that the central part of the disk fits snugly against the flat end of the handle and that substantially the entire area of the disk extending radially inwardly from the notches bears against the end of the handle. The handle therefore provides a strong rigid support for the disk.

In stripping insulation from wires, the insulated wire is inserted through the appropriate slot in accordance with the size of the wire and into the rounded portion at the end of the slot. As the insulated wire is forced inwardly, the edges 7a and 8a cut the insulation. To insure complete cutting of the insulation, the wire is held in one hand and the handle in the other, and after the wire has been inserted through the slot into the rounded portion, the handle is turned to make a complete cut and is then pulled to remove the insulation from the end of the wire. To insure proper cutting of the insulation and to provide a better grip on the insulation for stripping purposes, I have found it desirable to slightly round the inner portion of the slot and to provide cutting edges on the rounded

portion as indicated at 15 in Fig. 6, or if desired the inner portion of the slot may be substantially circular as shown at 16, or may be offset as shown at 17 in Fig. 9. In the modifications shown in Figs. 8 and 9, it will be understood that the rounded portions as well as the sides are provided with cutting edges.

A modified form of my invention is shown in Figs. 10 to 14 of the drawing and is designed for cutting insulation from wires of comparatively large diameter. As illustrated, the handle is formed integral with the cutting portion of the tool, the tool being preferably formed of an integral piece of metal. As indicated in Fig. 10 of the drawing, the metal from which the tool is formed is bent downwardly at both sides and at the rear to form the handle 2 and is then offset inwardly as shown in Fig. 11 to form a longitudinally extending end blank of less width than the handle portion which is embossed as shown at 21 and the embossment is ground to a plane as indicated by the line E—F to form cutting edges 22, 23, and 24. The metal is then bent on dotted lines G—H and I—K to form a U-shaped portion having a downwardly extending cutting portion with diverging side walls and a horizontally extending cutting portion with diverging side walls.

In cutting insulation with the tool shown in Figs. 10 to 14, inclusive, cutting edge 22 is forced downwardly through the top of the insulation and cutting edges 23 and 24 split the insulation along the sides and as the tool is pulled forwardly, the insulation is removed as it is slit.

In the form of tool shown in Figs. 1 to 7, inclusive, of the drawing, means may also be provided to cut both the insulation and the wire. For this purpose, one of the embossments on the disk may be formed with both outer edges extending radially inward and consequently when this embossment is ground laterally, V-shaped cutting edges 25 are formed. In forcing the insulated wire into a slot of this type, it will be apparent that the edges 25 will cut both the insulation and the wire. It will be noted that cutting edges 25 of this embossment are spaced outwardly from the plane of the metal and consequently they may be readily sharpened when they become dull.

What I claim is:

1. The method of preparing the cutting portion of an insulating cutting tool which comprises shaping a portion of a flat sheet of metal to form an embossment protruding outwardly from the normal plane of the metal and having a concave inner surface and converging side walls extending inwardly a substantial distance from the outer edge of the metal and then grinding away along substantially the entire length of the embossment and in a direction substantially perpendicular thereto a sufficient amount of metal constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and extending substantially the entire length of the embossment and with the narrow portion of the V-shaped slot spaced inwardly from the outer edge of the metal without disturbing the metal in the normal plane of the sheet.

2. The method of forming the cutting portion of an insulating cutting tool which comprises extruding from a flat sheet of metal a portion thereof in the form of an embossment having converging side walls extending inwardly from the edge of the metal and then grinding the metal along substantially the entire length of the em-

bossment and in a direction substantially perpendicular thereto to form a substantially V-shaped slot having cutting edges facing each other and with the narrow portion of the V-shaped slot spaced inwardly from the outer edge of the metal without disturbing the metal in the normal plane of the sheet.

3. The method of preparing a disk composed of flat sheet metal to form the cutting portion of a tool which comprises shaping a portion of the disk to form an embossment protruding outwardly from the normal plane of the metal and having a concave inner surface and converging side walls extending inwardly toward the center from the outer periphery of the disk and then grinding away throughout substantially the entire length of the embossment and substantially perpendicular thereto a sufficient amount of metal constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and of sufficient size to receive and cut the insulated portion of a wire as it is forced inwardly through the slot.

4. The method of preparing a disk composed of flat sheet metal to form the cutting portion of a tool which comprises shaping portions of the disk to form a plurality of spaced embossments of different sizes protruding outwardly from the normal plane of the metal and each of which has side walls converging inwardly toward the center of the disk from its outer periphery, and then grinding away along the entire length of each embossment and in a direction substantially perpendicular thereto a sufficient amount of metal from the central portion of each embossment to form V-shaped slots of different sizes, each of which has cutting edges facing each other of sufficient size to receive and cut the insulation from a wire.

5. The method of preparing a disk composed of flat sheet metal to form the cutting portion of a tool which comprises shaping the disk to form an embossment protruding outwardly from the normal plane of the metal having a concave inner surface and side walls tapering from the outer periphery of the disk toward the center and at least one of said side walls being rounded outwardly adjacent its inner portion and merged with the other side to form an enlarged arcuate-shaped portion spaced from the center of the disk and then grinding away along substantially the entire length of the embossment and in a direction substantially perpendicular thereto a sufficient amount of metal constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and of sufficient size to cut insulation from an insulated wire forced inwardly through the slot and to form an arcuate-shaped opening having cutting edges to receive the wire after it has been forced inwardly through the slot.

6. The method of preparing a disk composed of flat sheet metal to form the cutting portions of a tool which comprises shaping the disk to form an embossment protruding outwardly from the normal plane of the metal and having a concave inner surface and side walls tapering from the outer periphery of the disk toward the center of the disk and then grinding away along substantially the entire length of the embossment and in a direction substantially perpendicular thereto a sufficient amount of metal

constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and of sufficient size to cut insulation from an insulated wire forced inwardly through the slot but said grinding being insufficient to reduce any portion of said embossment to the normal plane of the metal in said sheet.

7. The method of preparing a disk composed of flat sheet metal to form the cutting portion of a tool which comprises shaping the disk to form an embossment protruding outwardly from the normal plane of the metal having a concave inner surface and side walls tapering from the outer periphery of the disk toward the center, at least one of which is rounded outwardly adjacent its inner portion and merged with the other side wall to form an enlarged arcuate-shaped portion spaced from the center of the disk, and then laterally grinding away along substantially the entire length of the embossment and in a direction substantially perpendicular thereto a sufficient amount of metal constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and of sufficient size to cut insulation from an insulated wire forced inwardly through the slot and to form an arcuate-shaped opening to receive the wire after it has been forced inwardly through the slot but the extent of said grinding being insufficient to reduce any portion of said embossment to the normal plane of the metal in said sheet.

8. The method of forming the cutting portion of a tool which comprises shaping a portion of the flat sheet of metal to form a first embossment protruding from the normal plane of the metal and having converging side walls extending inwardly a substantial distance from the outer edge of the metal and a second embossment protruding from the first embossment having a concave inner surface and converging side walls extending inwardly from the outer edge of the metal to substantially the same distance as the side walls of the first embossment and then laterally grinding away the metal constituting a

major portion of the second embossment to form a substantially V-shaped slot having cutting edges facing each other and extending substantially the entire length of the first embossment.

9. The method of preparing a disk composed of flat sheet metal to form the cutting portion of a tool which comprises shaping a portion of the disk to form a first embossment protruding outwardly from the normal plane of the metal having side walls tapering from the outer periphery of the disk, at least one of which is rounded outwardly adjacent its inner portion and is then merged with the other side wall to form an enlarged rounded portion spaced from the center of the disk and a second embossment protruding from the first embossment having a concave inner surface and converging walls of substantially the same shape as the side walls of the first embossment, and then laterally grinding away the metal constituting a major portion of the second embossment to form a substantially V-shaped slot having cutting edges facing each other and of sufficient size to cut insulation from an insulated wire forced inwardly through the slot and an arcuate-shaped opening having cutting edges to receive the wire after it has been forced inwardly through the slot.

10. The method of forming the cutting portion of an insulating cutting tool which comprises shaping a flat sheet of metal to form an embossment protruding outwardly from the normal plane of the metal and having a concave inner surface and side walls tapering from the outer edge of the metal which merge to form a rounded portion, grinding away along substantially the entire length of the embossment and in a direction substantially perpendicular thereto a sufficient amount of metal constituting the central portion of the embossment to form a substantially V-shaped slot having cutting edges facing each other and a cutting edge facing the slot, and then bending the metal beyond the embossment and substantially intermediate the length of the embossment to form a substantially V-shaped cutting portion and side cutting portions diverging away from each other.

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