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PLIERS

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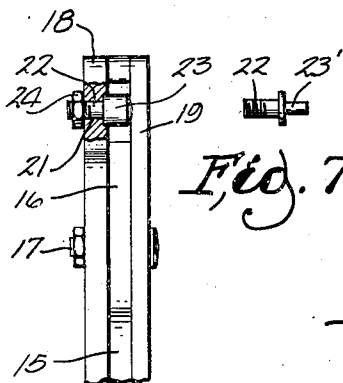
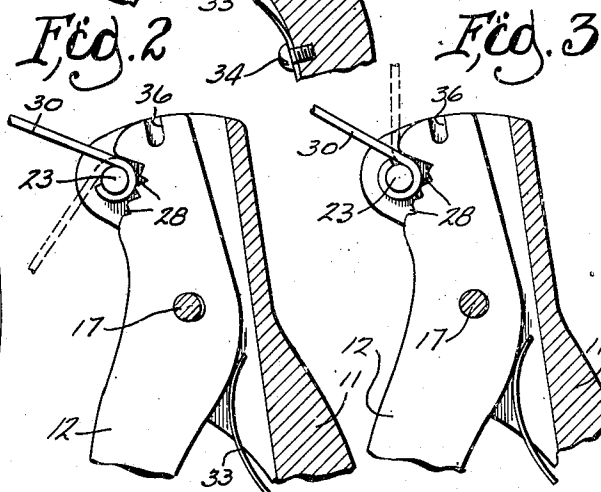
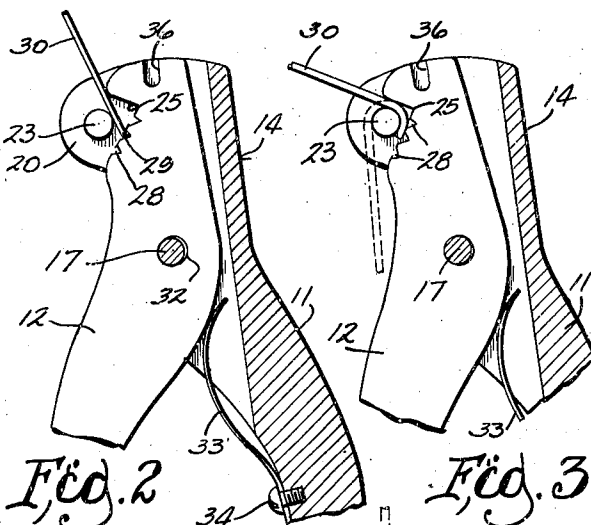
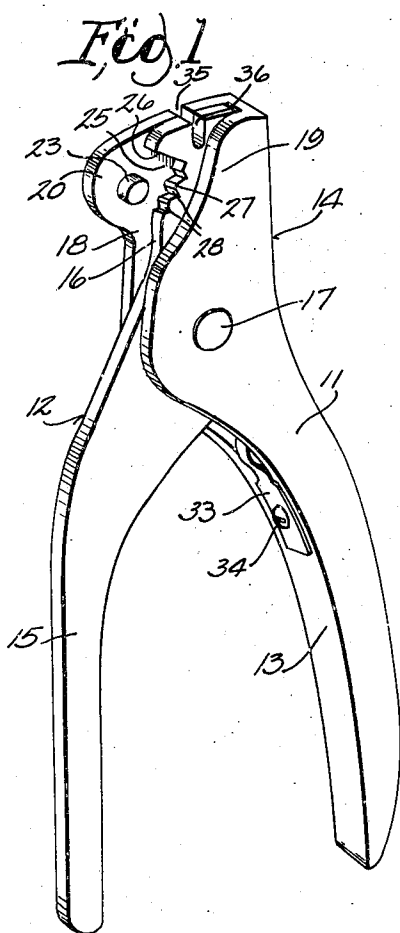


Fig. 8 Fig. 9 Fig. 10

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PLIERS

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This invention relates to a pliers, and more particularly to a pliers useful in bending wires.

It is an object of this invention to provide a hand-manipulated tool of the type conventionally known as a pliers, which finds particular utility in the bending of wire of any given diameter.

A more particular object is to provide a pliers useful in forming symmetrical curves, circles, coils and like shapes in wires.

Still another object is to provide a tool of the foregoing character which permits the employment of any one of various bending radii to facilitate the production of desired shapes.

The nature of these as well as other objects of the invention will become more apparent from a consideration of the following description and appended claims, together with the accompanying drawing, wherein:

Figure 1 is a view in perspective of a wire-bending pliers embodying the features of the present invention.

Figure 2 is a side elevational view, partially in section, of a portion of the pliers and illustrating the manner in which a wire to be bent is initially inserted between the jaws of the pliers.

Figure 3 is a view similar to Figure 2, illustrating, in solid line, how a wire is initially formed, and, in dotted outline, a further manual bending of the gripped wire.

Figure 4 is another view, similar to Figure 2, illustrating the manner in which the wire formed in Figure 3 is gripped and is further manually formed, as indicated in dotted outline, to provide a circular shape.

Figure 5 is still another view similar to Figure 2, illustrating the manner in which the wire formed in Figure 4 is gripped and manually bent, as indicated in dotted outline, to form a symmetrical shape having a circular eye at the end of the wire.

Figure 6 is a sectional view through a portion of the pliers, illustrating the manner of securing the mandrel in one of the plier jaws.

Figure 7 is a side elevational view of a mandrel having a smaller diameter than that illustrated in Figure 6.

Figures 8, 9 and 10 are perspective views of illustrative wire shapes of the type which may be formed by the pliers.

Referring more in detail to the drawing, wherein like parts bear like reference numerals in the several views:

The pliers of my invention comprises crossed lever members 11 and 12, lever member 11 hav-

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ing a handle 13 and a jaw generally indicated at 14, while lever member 12 is provided with a handle 15 and a jaw 16. A pivot pin 17 is disposed through the lever members at the crossing.

The upper portion of handle 13, and the jaw 14, on lever member 11, have the general shape of a channel open along a side margin of the lever member, this channeled portion having laterally disposed legs 18 and 19. Leg 18 carries an extension 20 provided with an opening 21 (Figure 6), which receives the stem 22 of an upstanding mandrel 23 disposed toward the leg 19. In the preferred embodiment of my invention, the mandrel 23 has a slight inward taper toward its free end. The mandrel stem 22 is threaded and is secured within the opening 21 by means of a nut 24.

The upper portion of handle 15, and the jaw 16, of lever member 12 are mounted between the legs 18 and 19 of the channeled portion of lever member 11. The side margin of jaw 16 adjacent mandrel 23 is relieved to provide a notch 25 having sides 26 and 27 which are preferably disposed substantially perpendicularly to one another, while the bottom of the notch, side 27, is provided with serrations, or teeth, 28 which are preferably flattened. In the preferred practice of my invention, the slope of the lower surface (that disposed nearest pivot pin 17) of each of the serrations 28, is somewhat greater than the slope of the upper surface thereof, as best illustrated in Figures 2 to 5. This shaping of the serrations 28 permits an end 29 of a wire 30 which is to be bent by the pliers to be set in a relatively perpendicular manner against the upper surface of a given serration, while the use of a more erect lower surface of a given serration adjacent, and next above, that against which the wire end 29 is set provides a sharp edge for biting into and gripping a wire portion adjacent end 29. Due to this gripping action the end 29 of the wire does not slip away from its original position within the notch 25 as the mandrel is pressed therein on closing the pliers, but is firmly engaged so that the adjacent portions of the wire may be formed about the mandrel in the desired manner.

The notch 25 is so disposed with respect to the mandrel 23 that as the handles 13 and 15 are pressed toward one another by the operator, the mandrel is received within a mid portion of the notch and travels in a direction toward the meeting point of walls 26 and 27. In other words, the center of mandrel 23 and the apex of notch 25, or meeting point of walls 26 and 27, should be substantially equidistant from the center of pivot

pin 17. To provide a degree of accommodation between the mandrel 23 and the walls 26 and 27 of the notch 25, the pivot pin 17, while closely fitting within its opening in lever member 11, is set within an oversized opening 32 in the lever member 12. This arrangement permits relative shifting, in limited degree, between the respective lever members as the pliers is closed, thereby effecting equidistant spacing of the mandrel 23 from the walls 26 and 27 even when the diameter of a wire portion falling between the mandrel and the wall 26 is slightly different than that falling between the mandrel and wall 27.

A leaf spring 33 is mounted on the inner surface of handle 13 by means of a screw 34. The free end of spring 33 engages the inner margin of an upper portion of handle 15 (Figure 2) and thereby maintains the pliers in a relatively open position when the handle members are not being pressed together by the hand.

When, for example, it is desired to form a circular eye in the end of the wire 30, an end 29 of the wire may be inserted behind the mandrel 23 and against one or the other of the serrations 28, as illustrated in Figure 2. On closing the pliers the wire is bent about the mandrel as the latter member presses the wire against the wall surfaces 26 and 27, the edge of the adjacent serration 28 engaging the wire just behind the wire end 29 to prevent slippage. Once the initial bend has been made in the wire, as indicated in Figure 3, the gripped wire may manually be further formed about the mandrel to the position indicated in dotted outline in that figure. The particularly formed wire may then be shifted about the mandrel on opening the pliers, and, on the renewed gripping thereof in the plier jaws between the mandrel 23 and the walls of notch 25, the wire may be further shaped as indicated in dotted outline in Figures 4 and 5. A variety of other bending operations and techniques will at once be apparent, and the shapes illustrated in Figures 8, 9 and 10 are but illustrative of the many shapes which may readily be formed from wires with the aid of the pliers described herein.

The pliers of my invention permits of an extended degree of variation in the bending radius by providing means for attaching mandrel members 23 of varying size. The mandrel illustrated in Figures 1 through 6 is one of a relatively large size, while the mandrel 23' shown in Figure 7 is of comparatively small diameter. The exchange of one mandrel for another is readily effected by removing the nut 24, taking out one mandrel, replacing it with another, and screwing the nut 24 in place about the neck of the newly emplaced mandrel member. Whatever the size of the mandrel selected, its mounting on the pliers is such that it progresses into the notch 25 as the pliers are closed and evenly engages a given wire between the walls 26 and 27 of the notch.

The pliers which forms the subject of the present invention may also be used as a wire cutting tool. To effect this purpose, a slot 35 is provided adjacent the end of the leg 18 on the lever member 11, while a slot 36 of substantially the same shape as slot 35 is provided at the end of the jaw 16 on lever member 12. When slots 35 and 36 are aligned and a wire is placed therein, cutting of the wire is effected by bringing the handles 13 and 15 toward one another.

I claim:

1. The combination of two relatively movable elements embodying jaws, one of said jaws having a recess, and the other of said jaws carrying an upstanding mandrel disposed to enter said re-

cess on movement of said element, wherein said mandrel is inwardly tapered, and wherein said recess has the shape of a notch having walls substantially perpendicular to one another, at least one of said walls being provided with serrations.

2. The combination of two relatively movable elements embodying jaws, one of said jaws having a recess, and the other of said jaws carrying an upstanding mandrel disposed to enter said recess on movement of said element, wherein said recess is provided with walls substantially perpendicular to one another, and wherein the center of the mandrel and the meeting point of said walls approach in the movement of said elements.

3. In combination, pliers comprising two movable crossed lever elements having a pivot pin disposed through the point where they cross, said lever elements embodying actuating handles on one side of the pivot pin and jaws on the other, one of said jaws being channel-shaped with laterally disposed legs one of which is wider than the other at a mid portion of the jaw, and the other jaw having a recess in a side margin thereof adjacent the free end of said legs, an upstanding mandrel carried on the wider leg of said first-mentioned jaw, said mandrel being disposed to enter a mid portion of said recess on bringing the handles toward one another, and to engage the walls of said recess on a complete closing of the pliers.

4. The combination of claim 3, wherein the recess is a V-shaped notch having a serrated side wall.

5. The combination of claim 3, wherein said mandrel is inwardly tapered and the recess has the shape of a notch having walls substantially perpendicular to one another, the center of said mandrel and the meeting point of said walls being substantially equally distant from the center of the pivot pin.

6. In combination, pliers comprising two lever elements having a pivot pin connecting them, said lever elements embodying actuating handles on one side of the pin and jaws on the other, the upper portion of the handle, and the jaw, on one of said lever members being channel-shaped with laterally directed legs, and the upper portion of the handle, and the jaw, in the other of said lever members being receivable in the respective channel-shaped portions of said first-mentioned lever member, an extension carried on an intermediate portion of one of said legs, an upstanding mandrel mounted on said extension, and a notch-like recess in a side margin of the received jaw adjacent said mandrel, said mandrel being disposed to enter a mid portion of said recess and to engage the side walls thereof on bringing the handles toward one another to close the pliers.

7. The combination of claim 6, wherein said mandrel is inwardly tapered and wherein the center of said mandrel and the apex of said recess are substantially equally distant from the center of the said pivot pin.

8. The combination of claim 6, wherein said pivot pin is fixed against lateral movement in one of said lever elements and is mounted within an oversized opening in the other of said lever elements.

9. In a pliers for forming an object, two pivotally joined and relatively movable lever members severally having jaw portions, one of the jaw portions defining a channel-shaped space receiving the other jaw portion and a mandrel mounted on one side of and extending over the

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channel space, the said other jaw portion being notched for coaction with the mandrel for forming the object upon closure of the jaws.

10. In a pliers for forming an object, two pivotally joined and relatively movable lever members severally having jaw portions, one of the jaw portions having a recess receiving the other jaw portion, and a mandrel mounted on the said one of the jaw portions, the said other jaw having a V-shaped notch with serrations in one side thereof for engaging an object to be formed, the axis of the mandrel and the apex of the notch approaching each other upon closure of the jaws for pressing the object between the mandrel and one side of the notch. 15

11. In a pliers for forming an object, two relatively movable lever members severally having jaw portions, a pin pivotally joining the members, and a mandrel mounted on one of the jaw portions, the other jaw having a V-shaped notch with the sides thereof at a right angle, one side of the notch having serrations with the serration side remote from the pivot pin at a lesser slope than the other serration side for engagement of an edge of the lesser sloped serration side with the object being formed, the mandrel and the notch coacting for forming the object upon closure of the jaws.

12. In a pliers for forming an object, two rela-

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tively movable lever members severally having jaw portions, a pin pivotally joining the members, and a mandrel mounted on one of the jaw portions, the other jaw having a V-shaped notch with the sides perpendicular to each other and with one side formed with serrations for engaging an object to be formed, the axis of the mandrel and the apex of the notch being equidistant from the axis of the pivot pin, the mandrel and one side of the notch coacting for forming the object upon movement of the mandrel toward the apex of the notch.

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