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**WIRE-BENDING PLIERS**

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5 Claims

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**ABSTRACT OF THE DISCLOSURE**

Wire bending pliers having stepped faces adapted to bend wire therebetween, said stepped faces of a pair of relatively movably spaced jaws being arranged in a generally Z-shaped disposition so as to bend a piece of wire therebetween into a Z-shape with one operation.

This invention relates to wire bending pliers, and more particularly, to wire bending pliers for use in bending a right angled stepped portion in the end of a wire which may be used as a throttle control, or the like, on conventional gas engines, such as used in connection with lawn mowers or other utility devices.

Mechanics who repair lawn mower or other similar engines find it necessary, in many instances, to replace the throttle, governor or other control wires and these wires must be cut to length and provided with a right angle stepped end portion to fit through holes in bell crank levers on carburetors or other structures. The wires are very difficult to bend accurately into a right angled stepped portion for such purposes and such control wires do not work properly unless accurately formed.

Accordingly, it is an object of the present invention to provide a very simple, efficient, and economical pair of wire bending pliers for use by various mechanics who find it necessary to form a right angle step in hard steel wire to be placed in connection with carburetors, bell cranks or other controls in connection with utility devices, such as lawn mower engines and other similar equipment.

Another object of the invention is to provide a novel pair of wire bending pliers having jaws particularly adapted and disposed to accommodate for spring back in hard resilient wire, such as piano wire, when forming right angle stepped portions in the wire.

Another object of the invention is to provide a novel pair of wire bending pliers having forming jaws adapted to engage and bend a right angle stepped portion in hard steel wire; said jaws being provided with wire bending die portions having angles substantially less than 90° and operated at acute angles relative to the pivotal axis of the handles and dies in order to over bend the wire to positions slightly beyond the ultimate 90° angles so that resilient spring back in the wire will accomplish an ultimate 90° bend and further, to provide the disposition of such die angles relative to the pivotal axis so that the wire may readily be placed in the and between the dies preliminary to forming and readily removed therefrom after forming of the wire.

Further objects and advantages of the invention may be apparent from the following specification, appended claims and accompanying drawings, in which:

FIG. 1 is a side elevational view of wire bending pliers, in accordance with the present invention;

FIG. 2 is an enlarged sectional view taken from the line 2-2 of FIG. 1;

FIG. 3 is an enlarged sectional view taken from the line 3-3 of FIG. 1;

FIG. 4 is a sectional view of the die portions of the jaws of the pliers shown in open position and showing a wire disposed between the die portions of the pliers and, also, showing by broken lines, a formed right angle step

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or Z-shape which the dies are adapted to make in the wire; and

FIG. 5 is a side elevational view of the wire after it has been formed.

As shown in FIG. 1 of the drawings, the wire bending pliers of the invention are provided with a pair of handles 10 and 12 pivoted together by means of a bolt 14. The handles 10 and 12 are provided with respective die jaw portions 16 and 18 having integral cutoff blade portions 20 and 22, respectively, as shown in FIGS. 1 and 2 of the drawings. The cutoff blade portions 20 and 22 are quite close to the bolt 14 and may be used to cut off the wire preliminary to the bending operation, as will be hereinafter described in detail.

As shown in FIGS. 2 and 4 of the drawings, the die jaw portions 16 and 18 are provided with wire engaging and guiding face portions 24 and 26, respectively. These face portions extend inwardly to joggling die surface portions 28 and 30, respectively, of the jaw portions 16 and 18 and these joggling die surfaces 28 and 30 are disposed at substantially less than 90° to the faces 24 and 26, respectively, as indicated by the arrow A in FIG. 4 of the drawings. The faces 24 and 26 are disposed at an acute angle to the axis B of the pivot bolt 14 so that the faces 24 and 26 may be separated in substantially parallel relation with each other to receive a wire 34 therebetween.

Adjacent the faces 28 and 30 are respective die faces 36 and 38 forming part of the joggle dies of the invention and these faces 36 and 38 are disposed at substantially less than 90° to the faces 28 and 30, as indicated by the arrow A, since the faces 36 and 38 are substantially parallel to the respective faces 24 and 26.

Thus the faces 24 and 26, and 28 and 30, and 36 and 38 occlude to form a generally Z-shaped wire engaging and joggling structure.

In operation, the cutoff blades 20 and 22, cut the wire to the proper length and it is inserted, as indicated at 34 between the parallel faces 24 and 26, when the jaws are pivoted into open position to separate the surfaces 24 and 26 in parallel relation to each other. When the handles 10 and 12 are forcefully pressed together, the dies move toward a closed position, as shown in FIG. 2, but the wire 34 is engaged between the faces 28 and 30 and the faces 36 and 38, respectively, to form a substantially Z-shaped right angled stepped or joggled portion 40 therein, as shown in FIGS. 4 and 5 of the drawings.

The angles between the faces 28 and 36 and 30 and 38 being substantially less than 90° permits the wire, such as piano wire or other tough wire to be bent slightly beyond the 90° angle which corresponds to the amount of spring back in the wire which will occur when the dies are released so that the wire ultimately will be provided with a right angle step or joggle portion, as indicated in FIG. 5 of the drawings. This angle is important, since the portion 42 of the wire, as shown in FIG. 5, may be extended through a hole in a carburetor bell crank or the like, and it is therefore necessary that this portion 42 be at right angles to the longitudinal axis of the wire 34.

It will be obvious to those skilled in the art that various modifications of the present invention may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim:

1. In wire bending pliers the combination of: a pair of handles; a bolt pivoting said handles together; a pair of die jaws integral with said handles and adapted to be pivoted apart and together by pivotal action of said handles; said die jaws having angularly stepped faces adapted to occlude in a substantially Z-shaped structure and to engage opposite sides of a wire; said stepped faces comprising first, second and third pairs of faces, one face of each pair being carried by one of said jaws, two of said

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pairs being spaced apart and substantially parallel to each other, said third pair of faces being disposed at an angle slightly less than 90° to said first and second pairs of faces and adapted to engage opposite sides of a wire for forming said wire slightly beyond 90° to provide a right angle generally Z-shaped step portion therein, when spring back of the wire takes place subsequent to the bending thereof between the die faces.

2. The invention, as defined in claim 1, wherein: said die jaws are provided with adjacent faces which are parallel to each other and located at an angle to the axis of said bolt, such that said parallel faces will be separated to admit a wire therebetween, when said handles are pivoted about the axis of said bolt.

3. The invention, as defined in claim 1, wherein: said die faces of each die jaw mesh with each other, when closed, each die jaw having two parallel faces and one face disposed at substantially less than 90° to both parallel faces.

4. The invention, as defined in claim 1, wherein: said jaw die portions are each provided with a pair of parallel faces stepped apart and interconnected by another die face disposed at less than 90° to each of the parallel faces; the parallel faces of each of said jaws disposed parallel to the other parallel faces, when the jaws are closed and whereby all of said parallel faces move apart in parallel relation to each other, when said handles are actuated to pivot said jaw portions apart, whereby wire may be inserted between said jaw portions to permit forming of a right angle step portion in the wire, when said jaw portions are forced together.

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5. The invention, as defined in claim 1, wherein: each of said jaw die portions is provided with a pair of parallel face portions stepped apart by a second die face which is disposed at substantially less than 90° to the stepped apart parallel portions and whereby the stepped apart parallel portions of one die mesh with the stepped apart parallel portions of the other die and whereby said second die faces of adjacent die jaws are parallel with each other; said second faces being disposed at substantially less than 90° with respect to their stepped parallel faces.

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