F. IRWIN.

Wire Cutting and Bending Die.

No. 217,007. Patented July 1, 1879.

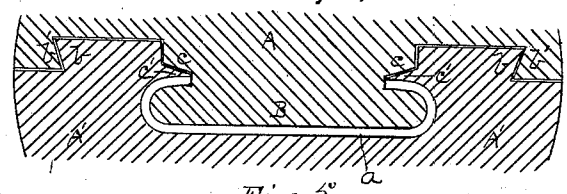


Fig. 5.

Fig. 1.

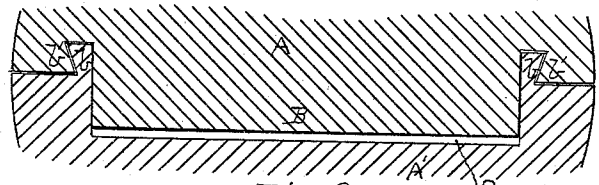


Fig. 2.

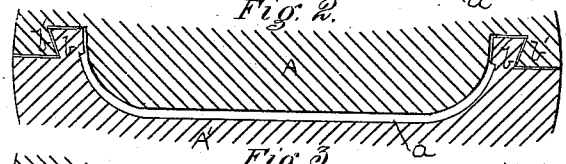


Fig. 3.

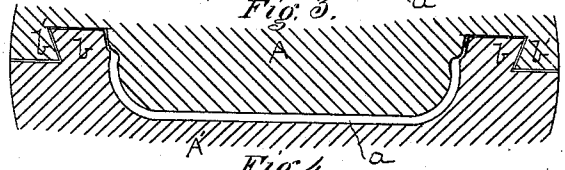


Fig. 4.

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UNITED STATES PATENT OFFICE.

FREDERICK IRWIN, OF LEET TOWNSHIP, ALLEGHENY COUNTY, PA.

IMPROVEMENT IN WIRE CUTTING AND BENDING DIES.

Specification forming part of Letters Patent No. **217,007**, dated July 1, 1879; application filed April 16, 1879.

To all whom it may concern:

Be it known that I, FREDERICK IRWIN, of Leet township, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Wire Cutting and Bending Dies; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a perspective view of my improved wire cutting and bending device, the two parts of the bending-dies or former being separated and so placed as to show the interior faces; and Figs. 2, 3, 4, and 5 are transverse sectional views of the bending-dies or former, the two parts being in position with relation to each other, such figures being drawn to an enlarged scale and taken on the lines *w w*, *x x*, *y y*, and *z z*, respectively.

My invention relates to dies, or dies and former, for cutting and bending wire; and consists in the arrangement of shaping or bending surfaces separated by a space equal to the thickness of the wire operated on, such space gradually merging from a straight or nearly straight form into a form in cross-section corresponding to the shape desired to be given to the wire, and also a combined cutting-die and plunger adapted to sever a continuous line of wire into uniform lengths, and successively force such lengths bodily or sidewise into the space between the bending-surfaces of the former or bending-dies, and upon such operation each length of wire will force its predecessor forward or downward, step by step, through such space until they are discharged therefrom.

I have shown in the drawings my improvement as adapted to bending wire hooks designed for use in securing the tops of fruit-jars to the body, such a wire hook being shown at W, Fig. 1; but by varying the form of the device, as hereinafter explained, the same method of operation may be employed for bending or cutting and bending a wide range or variety of wire articles.

The device, when employed for cutting and bending wire hooks for fruit-jars, is constructed as follows: The bending-die or former is made in two parts, A and A′. These two parts may be secured together, face to face, in any convenient way. I have shown dovetail tongues *b* on the part A′, one on each side of the inner face, and extending from top to bottom, and corresponding grooves, *b′*, made in the part A, into which the tongues *b* may be slipped by an endwise motion of the parts when placed face to face; and in order to prevent endwise displacement of the parts when once properly adjusted, a key, *d*, may be passed into a hole or key-seat, *d′*, made in both parts A and A′. The adjacent or inner faces of the parts A A′, between the grooves *b′* and tongues *b*, respectively, are cut away and shaped so as to form a continuous space or cavity, *a*, extending entirely through the former from top to bottom. This cavity or space *a* has, in general terms, a width equal to the length of the wire to be bent, and also a thickness or a distance from side wall to side wall equal to the thickness of such wire, while the form or shape of the cavity in cross-section gradually progresses from a straight line, as in Fig. 2, to a form corresponding to the wire W, Fig. 1, and in so doing successive shapes are assumed, some of which are represented in Figs. 3, 4, and 5, which are taken in the lines *x x*, *y y*, and *z z*, Fig. 1, respectively.

This cavity *a* is formed by shaping the inner walls or faces of the parts A A′ as follows: On the part A, between the grooves *b′*, is made a raised mandrel, B, against or around which the several wires *s* are bent as they are forced downward. This mandrel has a straight face across its upper end along the line *w w*; but from such line downward the face angles are rounded and the straight part of the face gradually narrowed down to a point, by preference, a little below the line *y y*, while from such point downward the width of the straight face of B is made nearly or quite uniform, and equal to the straight part of the inner edge of the hook W. As this rounding and contracting of the face angles is carried downward, the round is carried backward over the edges of B until it reaches the back or rear angles of such edges at or about the line *x x*, and from such line downward the edges of B are

cut away along with the rounding described, and the width of the body of B correspondingly reduced.

From a point at or near the line *y y* downward the rounding of the edges is extended back over the rear angles, thus cutting them away also, and gradually forming a re-entrant extension of cavity *a* back of the face of B.

The form of the cavity *a*, at or near the section where this re-entrant or return part of the cavity begins, is represented by Fig. 4, while in Fig. 5 the same cavity is shown at a point lower down or in the line *z z*.

A recess, B′, is made in the face of the part A′, adapted to receive the mandrel B and form the other wall of the cavity *a*. In conformity to the shape of mandrel B, this cavity B′ is made widest at the top and gradually contracted in width toward the bottom.

The tongues *b* are, by preference, increased in width downward, their inner edges conforming in general outline to the edges of B. The rear or back angles of B′ are filled, and the sides curved so as to form the counterpart of the face angles and edges of B, and lips *c′ c′*, which gradually increase in width downward from or near the line *y y*, project from the inner base angles of the tongues *b* inward over the recess B′. The flat outer faces of these lips are adapted and intended to fit onto or against the corresponding faces of the ledges *c* in the part A, and they extend inward into the re-entrant part of the cavity *a* back of the mandrel B, while their inner faces are shaped to form one of the walls of the re-entrant part of such cavity.

The relation and position of the mandrel B when in place within the recess B′ are not unlike that of a core in a casting-mold. While I prefer to so shape the boundary edges of the cavity *a* that the width of the cavity or its length in cross-section shall nearly equal the length of the wire, yet this is not essential, since the bending of the wire begins almost immediately upon its entry within the cavity, and after such bending begins there is little or no danger that any of the wires can work endwise in the cavity during their passage through it. I have shown at *s* in Fig. 1 wires arranged at intervals along the face of B. In operation the entire length of this cavity is filled with a succession of such wires arranged across the cavity, and the cavity having a distance between its walls equal to the thickness of such wires, they cannot wedge past each other, and so choke the cavity, but are forced downward, step by step, as additional wires are forced in at the top, and, passing through, are discharged, one by one, at the bottom, as at W, having their ends gradually bent during such passage into the hook form shown. The succession of wires thus forms in effect a plunger, or rather each wire communicates to the wires below it the motion received from the plunger P through the intervening wires. This plunger P forms, in connection with the die P′, the cutting as well as the feeding device.

The die P′ is secured in any suitable way to the top of one of the parts A of the former, so as to cover the upper end of cavity *a*, and a slot, *a′*, is made through P′ from top to bottom, and registering with the opening or mouth of *a*. The length and width of this slot *a′* are equal to the corresponding dimensions of cavity *a* at *w w*.

A hole, *o*, is made from one end of P′, opening in a horizontal line into slot *a′*. The wire is fed in through this hole and passed along until its end abuts against the opposite edge of *a′*. The hole thus forms a guide, and the opposite edge of the slot forms a stop or measure to direct and regulate the feed of the wire, so as to secure uniform lengths.

The edge *p* of plunger P is fitted to the form of the slot *a′*, and is moved up and down within or into and out of such slot.

Any suitable or desired reciprocating mechanism may be employed for giving the requisite stroke to the plunger P, and under ordinary circumstances a stroke of, say, three-eighths of an inch will be sufficient, or at least a stroke which will raise the lower edge or working-face of *p* above the line of feed *o*, and carry it down to, or preferably a little below, the lower limit of such feed, so that when the plunger is elevated wire can be fed in through hole *o*, and upon depressing such plunger that part of the wire which extends across the slot *a′* will be severed and forced downward bodily or sidewise below the line of feed, and in so doing each and all of the wires below and in the cavity *a* will be forced downward to an equal extent, and will be ultimately discharged at the bottom, having been progressively bent by their passage through *a* into a form corresponding to such cavity at its discharge.

By extending the re-entrant parts of cavity *a*, so as to meet or unite, or, if preferred, to lap or pass each other in rear of mandrel B, and also properly shaping such mandrel, rings or elliptical links may be bent out of suitable wire; or, by properly shaping the cavity *a*, many other forms may be bent substantially in the manner described and by the same method of operation.

While I prefer to make slit *a′* and the receiving end of cavity *a* straight, as shown and described, yet I do not limit my invention to such form, as these parts may, especially when light wire is used, be curved more or less, the face *p* of the plunger being also curved in like manner, and still perform the work described and in substantially the same manner. Also, if preferred, the plunger may be arranged to work directly into or within the receiving end of cavity *a*, and in such case this end of the cavity is nothing more or less than an equivalent of the slot *a′*, and these and similar modifications I consider as coming within my invention.

I claim herein as my invention—

1. The method of bending lengths or sections of wire, which consists in forcing suc-

cessive lengths of wire sidewise against each other into and through a bending-cavity, substantially as set forth.

2. The combination of plunger P, cutting-die P′, and bending-die or former A A′, the same being constructed and arranged substantially as described.

3. A wire-bending die or former having an inclosed mandrel extending through the same, such mandrel gradually merging by a continuous surface from a straight face at the receiving end to a form in cross-section at the delivery end corresponding to the desired form of the article, and the side wall of the former adjacent to the working-face of the mandrel being continuous from end to end of the mandrel, and separated therefrom by a uniform space, substantially as set forth.

4. The bending-die or former A A′, having a cavity, *a*, extending through the same, such cavity gradually merging from a straight or nearly straight form at the receiving end to a form in cross-section at the discharging end corresponding to the desired bent form in the article, in combination with suitable mechanism for successively forcing uniform lengths of wire sidewise into the receiving end of the cavity, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FREDERICK IRWIN.

Witnesses:
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