

L. D. DANFORTH.

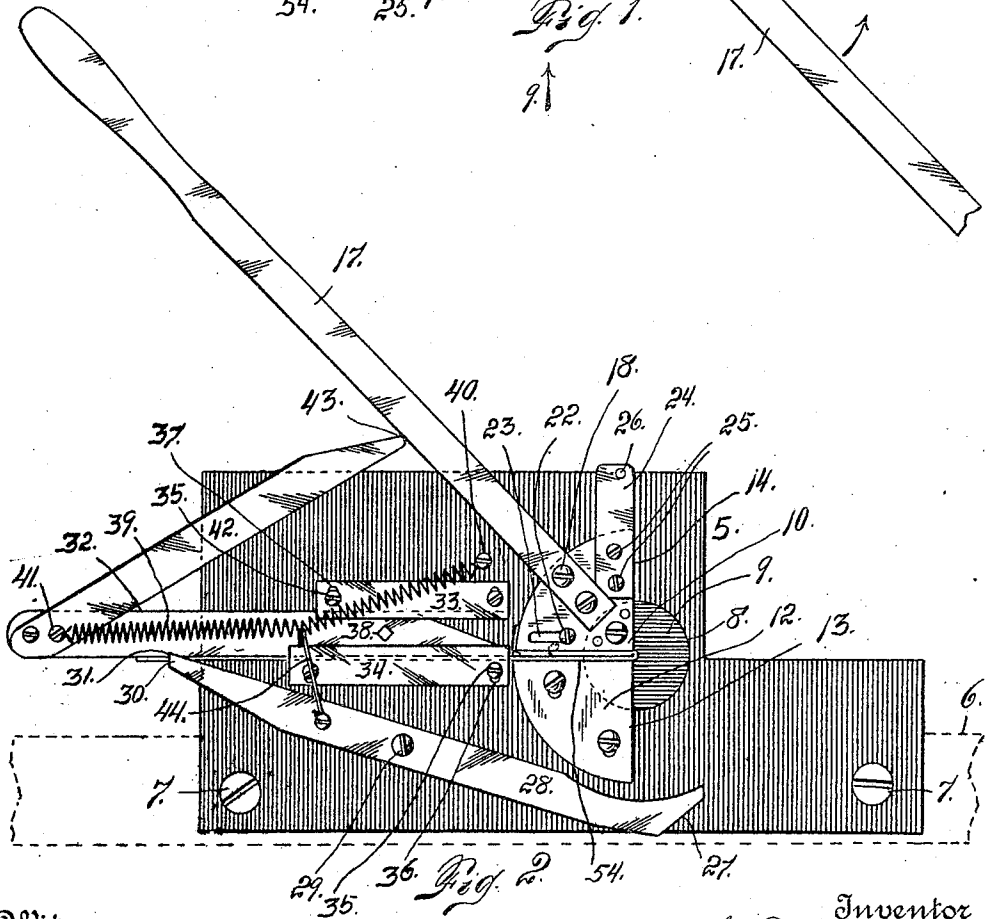
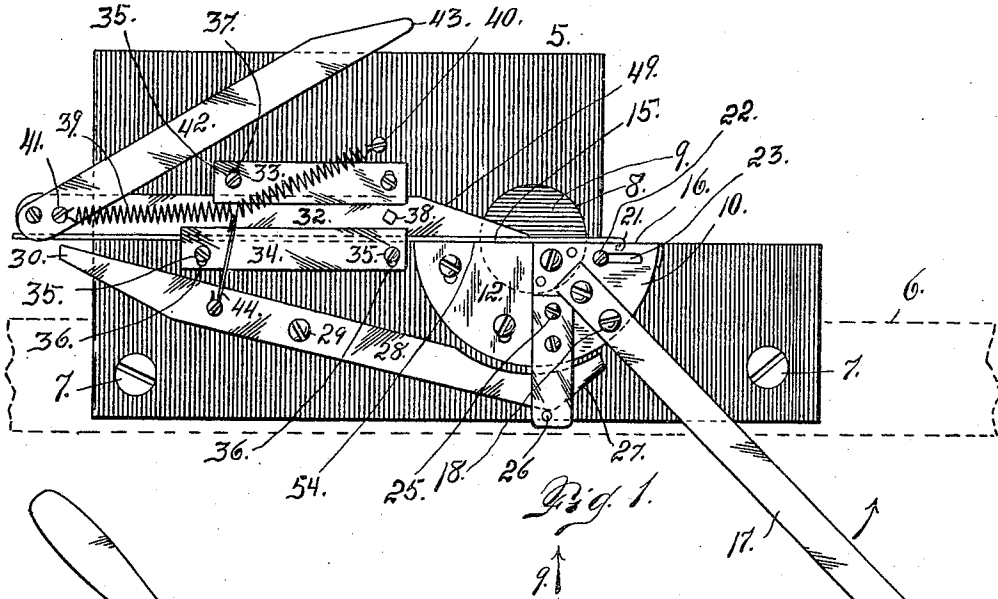
WIRE BENDER.

APPLICATION FILED MAR. 7, 1908.

942,440.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 1.



Witnesses
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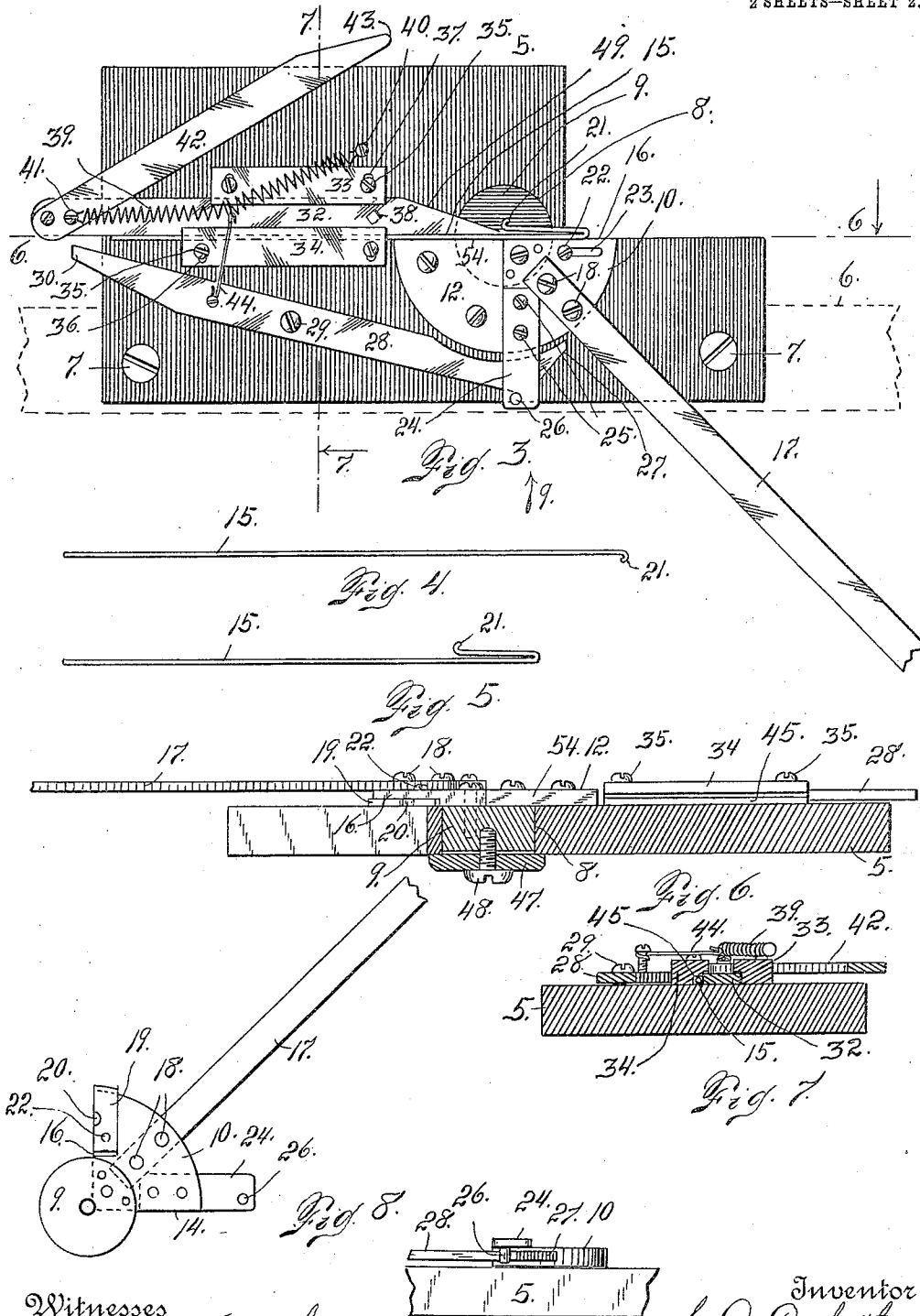
WIRE BENDER.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE

LOUIS D. DANFORTH, OF DENVER, COLORADO.

WIRE-BENDER.

942,440.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed March 7, 1908. Serial No. 419,618.

To all whom it may concern:

Be it known that I, LOUIS D. DANFORTH, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Wire-Benders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a device more especially adapted for bending wire though it may be employed if desired for bending metal bands or metal parts or bars of any desired description assuming of course that the device is made of sufficient strength to accomplish the purpose.

In this specification the construction will be considered as a bender for comparatively small wires such as may be employed or are employed in the manufacture of pencil holders, though it must be understood as above indicated that its use is not by any means limited thereto.

In my improved construction I employ a stationary plate to which is made fast an abutment and upon which is also mounted a slidable abutment which coöperates with the stationary abutment. Pivottally mounted upon this plate is an operating member which acts on the wire to force it against the slidable abutment which is caused to recede automatically or move away from the bent portion of the wire, thus allowing the doubled or bent portion of the wire to come in contact with the stationary abutment against which it is forced by the operating device. The operating device preferably consists of a plate having the shape of a quarter of a circle which is also the preferred shape of the stationary abutment. Normally the operating plate and the stationary abutment are in contact with each other forming a half circle, as the construction is shown in the drawing. The shape, however, of the stationary abutment is immaterial so long as it presents an abutting face to the slidable abutment and the operating plate. The wire to be bent is held between the slidable abutment and the stationary abutment and protrudes beyond the same to engagement with the operating

plate which is constructed to bend the wire at the point where it leaves the two abutments. As the operating plate is moved to perform the bending function, the protruding portion of the wire is bent, this bent member being finally brought into engagement with an inclined face with which the disappearing abutment is provided. However, as the pressure on the operating device is continued, the slidable abutment is caused to recede or move away from the adjacent face of the stationary abutment, thus allowing the operating plate to force the bent member of the wire against the body of the wire whereby the bent member is caused to engage the body portion. In case it is not desired to bend the wire to this degree, the slidable abutment may be made stationary and in this event the bevel of its face will determine the shape of the hook to be formed by bending the wire. The construction is provided with a pawl which engages the disappearing abutment and automatically locks it at its rearward limit of movement, until the operating plate is returned to its normal position when a device carried by said plate, acts on the pawl to release the slidable abutment allowing the latter to return to its normal position. This forward movement of the slidable abutment acts on the bent portion of the wire to draw the latter forwardly whereby its removal from the device is facilitated.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is an elevation of my improved device, the parts being shown in position before the bending operation commences. In this view the wire to be bent is in position. Fig. 2 is a similar view showing the device with its parts in the position which they occupy after the bending function has been performed. Fig. 3 is a similar view showing the parts in their normal position, after the slidable abutment has been released and returned to its normal position carrying the bent extremity of the wire forwardly to facilitate its removal as heretofore explained. Fig. 4 is a detail view showing a piece of wire such as my improved instrument is adapted to bend. Fig. 5 is a detail view illustrating the wire after the wire bending operation is complete.

Fig. 6 is a section taken on the line 6—6 Fig. 3. Fig. 7 is a section taken on the line 7—7 Fig. 3. Fig. 8 is an underneath detail view of the operating plate showing the disk bearing with which it is connected. Fig. 9 is a fragmentary elevation of the structure looking in the direction of arrow 9 in Figs. 1 and 3.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a stationary plate upon which the wire bending mechanism hereinafter described is mounted. It is assumed that this plate occupies a vertical position, being secured to a stationary member 6, by means of screws 7.

The supporting plate 5 is provided with a circular opening 8 in which is mounted a disk 9 which fits closely in said opening and turns freely therein. The front face of this disk is flush with the corresponding face of the plate 5 and to it is secured an operating member 10 which as shown in the drawing has the shape of a quarter of a circle. The right angled corner of this plate occupies a position in close proximity to the center of the disk bearing. Secured to the plate 5 is a stationary abutment 12 having two faces which intersect at right angles close to the center of the disk 9. The face 13 of this abutment, is adapted to engage a face 14 of the operating member when the latter is in the position shown in Figs. 1 and 3; while the face 54 of this abutment, is engaged by the wire 15, when the latter is in position in the device for bending purposes. This face 54 coöperates with the face 16 of the operating member, when the parts are in the position shown in Fig. 2, to perform the bending function.

To the movable member 10 is attached an operating arm 17 by means of screws 18. To the under surface of the operating member is attached a small plate 19 having a recess 20 adapted to receive the slightly bent end 21 of the wire preparatory to the performance of the bending function when this wire is used for the special purpose intended by applicant, namely for pencil holder purposes. The small plate 19 is adjustable on the operating member since it is held in place by a screw 22 passing through a slot 23 formed in the operating member. By loosening this screw, the plate may be adjusted to bring the recess 21 into any desired position. By the adjustment of the plate the length of the protruding extremity of the wire beyond the abutment may be regulated within reasonable limits. To the upper surface of the operating member 10 is also attached a plate 24 by means of screws 25. This plate protrudes beyond the operating member and is provided with a depending pin 26, adapted to engage the face 27 of a pawl 28 pivoted to the plate 5 as

shown at 29. The extremity 30 of this pawl opposite the face 27, engages a recess 31 formed in the movable abutment 32 whereby the latter is locked at its rearward limit of movement or in the position shown in Fig. 2. This movable abutment is slidably mounted upon the plate and as shown in the drawing moves between two guides 33 and 34. These guides are secured to the plate 5 by means of screws 35. The screws 35 of the guide 34 are passed through openings 36 elongated to permit adjustment of the guide, whereby the device is adapted for use with wires of different size. The plate 33 is also provided with similar elongated openings 37 through which the screws 35 pass for a similar purpose. The movable abutment 32 is provided with a set bolt or screw 38 which may be used to tighten the abutment upon the plate 5 when it is not desired that it shall move. Its forward extremity is also beveled as shown at 49 forming an inclined face against which the bent portion of the wire is forced. If this abutment is stationary this bevel will determine the angle of the bend given to the wire, while if it is movable, it allows the abutment to recede without interfering with the bending operation which continues during the receding movement.

The movable abutment when released from engagement with the pawl 28, is returned to its normal or forward position by the recoil of a coil spring 39, one extremity of which is connected with the plate 5 as shown at 40, while the other extremity is attached to the abutment by a screw 41 which also serves to rigidly attach to the said abutment, an arm 42 which projects upwardly from the rear extremity of the abutment, its free extremity 43 being adapted to be engaged by the operating arm 17 during the performance of the wire bending function. It is this contact of the arm 17 with the arm 42, which causes the movable abutment to recede during the completion of the extreme wire bending act.

In order to hold the pawl 28 in operative engagement with the movable abutment, whereby the pawl is caused to engage the recess 31 of the abutment, the spring 39 is connected with the pawl in the rear of its pivot by a hook 44.

The guides 33 and 34 between which the movable abutment operates, are recessed on opposite sides of the abutment and adjacent the plate 5, to receive the edges of the abutment. The upper portions of the guides therefore overlap the abutment and hold it in place. The guide 34 is further recessed as shown at 45, to receive the wire 15 to be bent. This recess receives the body portion of the wire, and within it the wire is held securely in place during the bending operation.

As shown in the drawing (see Fig. 6),

the disk 9 is prevented from leaving the plate 5 by means of a plate 47 connected with the disk by a screw 48. This plate projects beyond the periphery of the disk and engages the adjacent portion of the plate 5 thus preventing the removal of the disk from the operating face of the plate, before the stationary abutment 12 has been put in place. With the abutment 12 in place it will be understood that as the latter overlaps the disk bearing, the said bearing is prevented from escaping from the face of the disk even if the plate 47 were not employed.

From the foregoing description the use and operation of my improved device will be readily understood. Assuming that the parts are in the position shown in Fig. 1, and that the wire 15 is also in the position shown in that figure with its extremity 21 in engagement with the recess 20 of the operating plate, the operator will grasp the handle or arm 17 of the operating member, and move the said arm in the direction indicated by the arrow in Fig. 1. As soon as the operating member begins to move, the portion of the wire which protrudes beyond the abutments 12 and 32, begins to bend at a point approximately coinciding with the center of the disk bearing 9. This bent portion of the wire continues to move under the influence of the bending member 10 and is finally brought into engagement with the beveled face 49 of the movable abutment. As soon as this occurs, the arm 17 is brought into engagement with the extremity 43 of the arm 42 and as the movement of the arm 17 is continued, the movable abutment is moved rearwardly to the position shown in Figs. 2 and 3. In this event the rear extremity of the pawl 28 engages the recess 31 of the abutment and locks the latter in its rearward position. When the abutment is in the last named position, the bent portion of the wire is forced against its adjacent body portion and the bending operation is complete. The operating member is then returned to its normal position by reversing the travel of the handle 17 and as it nears its normal position, the pin 26, engages the extremity 27 of the operating pawl and actuates the latter sufficiently to disengage its rear extremity 30 from the abutment allowing the latter under the influence of its spring 39, to return to its normal position. During its forward travel, the extremity of the abutment engages the hook 21 on the bent extremity of the wire, and carries the latter forwardly to the position shown in Fig. 3 whereby the bent end of the wire may be grasped by the operator to facilitate the removal of the wire from the device.

It must be understood that wherever the term "wire" is employed in this specifica-

tion, it must be considered sufficiently comprehensive to include a metal part of any kind, since the invention is not limited to the bending of what is ordinarily termed "wire".

Having thus described my invention, what I claim is:

1. A metal bender comprising a support, an operating member pivotally mounted thereon and having an exterior angle and an abutment provided with an exterior angle around which the angle of the operating member is adapted to travel, and means for holding the wire in contact with one of the angle faces of the abutment, while the operating device is in motion, comprising a member mounted to slide longitudinally of the wire and in contact therewith, and means connected with the slidable member and actuated from the operating member for automatically imparting to the sliding member movement in a rearward direction as the operating member approaches its limit of movement.

2. A device of the class described comprising a support, an operating member pivotally mounted thereon having an exterior angle, an abutment fast on the support and around which the angle of the operating member is adapted to travel, a second abutment having a beveled face whose pointed extremity terminates adjacent the exterior angle of the first abutment, the wire to be bent occupying a position between the two abutments, the second abutment being mounted to slide longitudinally of the wire and in contact therewith, and an operative connection between the two abutments, whereby the second abutment is actuated during the latter part of the stroke of the first abutment.

3. A wire bender comprising a support, an abutment fixedly connected therewith and having an exterior angle, an operating member pivotally mounted on the support, its axis being adjacent the angle of the abutment, the operating member also having an exterior angle coinciding as to position with its axis whereby when the said device is in motion it travels around the exterior angle of the abutment, the wire to be bent being in engagement with one of the angle faces of the abutment and protruding beyond the same to engagement with one of the faces of the operating member, a second abutment cooperating to hold the wire in operative relation with the first named abutment, the second abutment being mounted to slide longitudinally of the wire, and a connection between the two abutments, where by the second abutment is actuated in a rearward direction as the first abutment approaches its limit of movement, substantially as described.

4. A device of the class described comprising an operating member pivotally

mounted thereon and having an exterior angle located adjacent its axis or center of motion, an abutment fixedly connected with the support and also having an exterior angle located adjacent the corresponding angle of the operating member, a second abutment mounted on the support to slide longitudinally of the wire and having a part occupying a position adjacent one of the angle faces of the fixed abutment, the wire to be bent occupying a position between the two abutments and normally protruding beyond the same to engage one of the angle faces of the operating device, the movable abutment having a beveled face terminating in a pointed extremity and normally occupying a position adjacent the center of motion of the operating device.

5. The combination with a support, of an abutment fixedly connected with the support and having an exterior angle, an operating member also having an exterior angle located adjacent the corresponding angle of the abutment, the center of motion of the operating member being adjacent the exterior angles of the abutment and said device, a second abutment slidably mounted on the support and having a part occupying a position adjacent one of the angle faces of the fixed abutment, the wire to be bent occupying a position between the two abutments and protruding beyond the same to engagement with the operating member, the movable abutment having a beveled face terminating in a pointed extremity located adjacent the center of motion of the operating member and adjacent the exterior angles of the fixed abutment and the said member, the operating member being provided with an arm, and the movable abutment also having a part rigidly connected therewith and adapted to be engaged by the arm of the operating member during the travel of the latter, whereby the movable abutment is caused to recede during the wire bending operation, to allow the operating member to force the bent portion of the wire against the body of the latter, the said body portion being in engagement with the fixed abutment.

6. The combination with a support, of an operating member pivotally mounted thereon and having an exterior angle located adjacent its center of motion, an abutment fixedly connected with the support and also having an exterior angle located adjacent the corresponding angle of the operating member, a second abutment slidably mounted on the support and having a part normally occupying a position adjacent one of the angle faces of the fixed abutment, the movable abutment cooperating with the stationary abutment to hold the wire in place during the bending operation, means connected with the movable abutment and acted on by the operating member whereby the

movable abutment is caused to recede during the completion of the wire bending operation, means for automatically locking the movable abutment at its rearward limit of movement, and means connected with the operating member for releasing the locking means when the operating member is returned to its normal position, substantially as described.

7. An operating device comprising a support, an operating member pivotally mounted thereon and having an exterior angle located adjacent its center of motion, an abutment fixedly connected with the support and having an exterior angle located adjacent the exterior angle of the operating member and around which the said angle of the operating member is adapted to travel during the wire bending operation, a second abutment slidably mounted on the support and normally spring-held at its forward limit of movement, the said abutment cooperating with the fixed abutment to hold the wire in place during the wire bending act, the movable abutment having an arm rigidly connected therewith, the operating device also having an actuated arm, the arm of the movable abutment occupying a position in the path of the arm of the operating member whereby the movable abutment is caused to recede during the completion of the wire bending act, a pawl for automatically engaging the movable abutment and locking it at its rearward limit of movement, the operating member having a part adapted to engage the extremity of the pawl remote from its engaging extremity, whereby the pawl is actuated to release the movable abutment, allowing the latter to return under the influence of its spring to its forward or normal position, substantially as described.

8. The combination with a support, of an operating member pivotally mounted thereon and having an exterior angle located adjacent its center of motion, the said device having a recessed plate adjustably mounted on its under surface and adapted to receive a small hook formed on the extremity of the wire to be bent, an abutment fixedly attached to the support and having an exterior angle around which the corresponding angle of the operating member is adapted to travel, and means for holding the wire in place in engagement with one of the angle faces of the abutment during the wire-bending operation, substantially as described.

9. The combination with a support, of an operating device pivotally mounted thereon and having an exterior angle adjacent its center of motion, and an abutment adjustably attached to the support and having an exterior angle around which the corresponding angle of the operating member is adapted to travel, and a second abutment mounted to slide longitudinally upon the support and spring-held at its forward limit of move-

ment cooperating with the first named abutment to hold the wire in place during the wire-bending operation, substantially as described.

5 10. The combination with a support, of an operating member pivotally mounted on the support and having an exterior angle located adjacent its center of motion, an abutment fixedly connected with the support and having an exterior angle located adjacent the corresponding angle of the operating member and around which the angle of the operating member is adapted to travel, a second abutment mounted on the support to slide longitudinally of the wire to be bent and in contact therewith and cooperating with the first named abutment to hold the wire in place during the wire-bending operation, and guides adjustably mounted on the support and between which the second abutment is adapted to travel during the completion of the wire-bending act, substantially as described.

11. A device of the class described comprising a support, an operating member pivotally mounted on the support and having faces intersecting to form an exterior right angle located adjacent its center of motion, and an abutment fixedly mounted on the support and having faces intersecting to form an exterior angle located adjacent the corresponding exterior angle of the operating member and around which the corresponding angle of the operating member is adapted to travel during the bending operation, means for holding the wire in place in contact with one of the faces of the said abutment and protruding beyond the same to engagement with a face of the operating member, said means comprising a member mounted to slide longitudinally on the wire to be bent and in contact therewith, and a

connection between the slidable member and the operating member, whereby the slidable member is actuated from the operating member, while the latter is performing the bending function.

12. A metal bender comprising a support, an operating member pivotally mounted thereon and having an exterior angle, an abutment provided with an exterior angle around which the angle of the operating member adapted to travel, and a second abutment cooperating with the first named abutment, the metal to be bent occupying a position between the two abutments, the second abutment being mounted to slide longitudinally of the wire to be bent and in contact therewith, and means for automatically actuating the second abutment as the operating member approaches the first named abutment, substantially as described.

13. A metal bender comprising a stationary abutment, a rotary member for performing the bending function, a movable abutment slidably mounted and cooperating with the stationary abutment to hold the metal part in place, the movable abutment being normally spring-held at its forward limit of movement, and movable longitudinally of the material to be bent and in contact therewith, and a connection between the rotary bending member and the movable abutment, whereby the latter is automatically moved away from the stationary abutment during the bending movement of the rotary member.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS D. DANFORTH.

Witnesses:

A. J. O'BRIEN,
DENA NELSON.