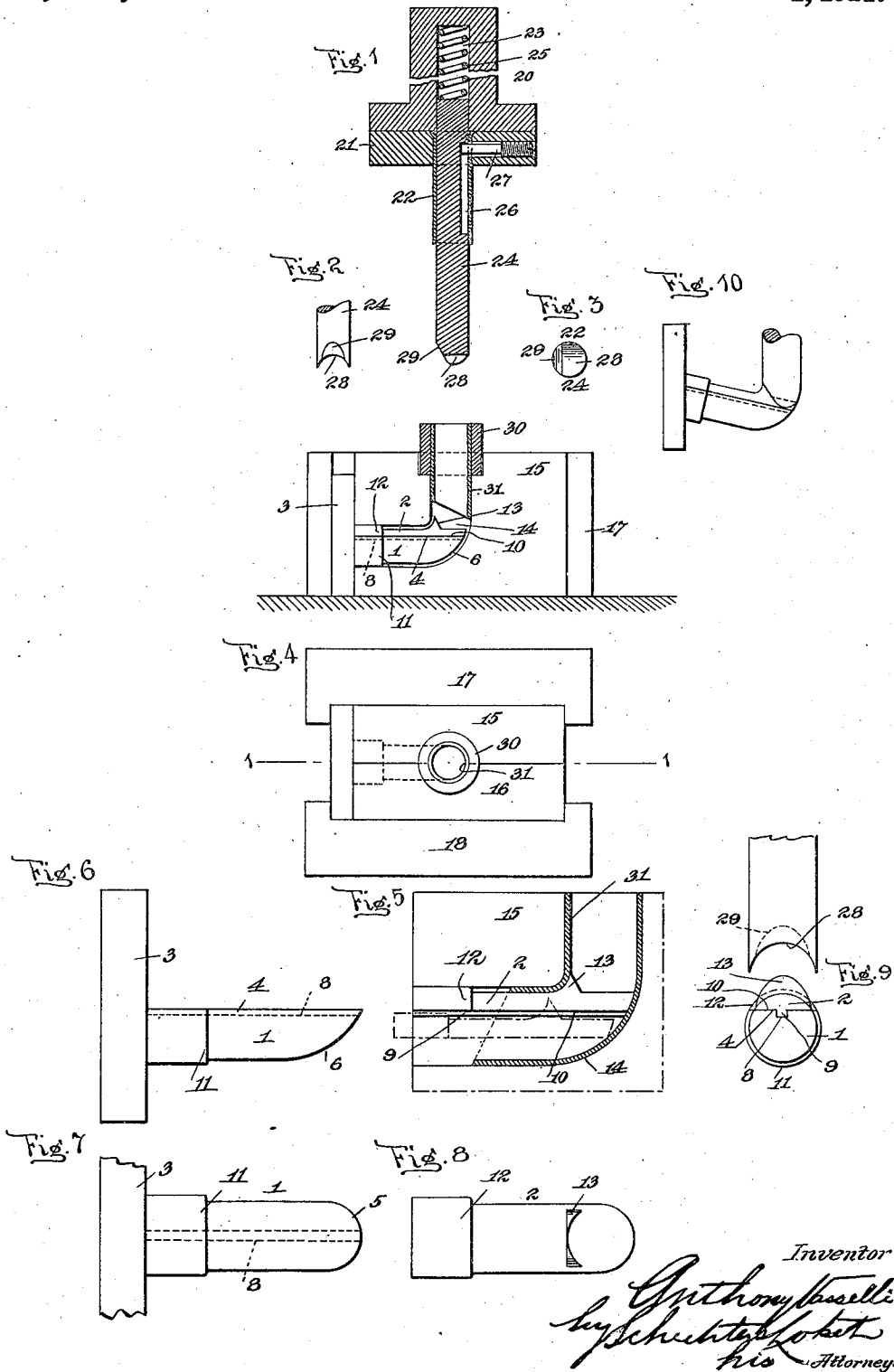


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TUBE BENDING APPARATUS.
APPLICATION FILED MAY 5, 1919.

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UNITED STATES PATENT OFFICE.

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TUBE-BENDING APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ANTHONY VASELLI, a citizen of the United States, and a resident of the city of Newark, county of Essex, and State of New Jersey, have invented a certain new and useful Tube-Bending Apparatus, of which the following is a specification.

My invention relates to devices for bending tubes whereby a smooth bend or elbow may be made. The invention is particularly applicable to the bending of the thin tubes forming parts of the tone-arms of talking machines, but it is obvious that tubing of any kind or description may be operated upon.

The invention resides particularly in the device as used in making right-angle, or acute angle, bends, but it is to be understood that obtuse angle bends may also be made without departing from the spirit or scope of my invention.

The objects of the invention are to provide a simple and cheap device for the bending of tubes, which may be operated by means of the simplest of machinery, and by means of which the operations may be accomplished by the employment of cheap and unskilled labor.

A further object of the invention is the provision of means of the character herein described, which are simple in operation and construction, thoroughly reliable and efficient in its purpose and operation, and inexpensive and economical to manufacture.

With these and other objects in view to be more fully set forth hereinafter, the invention consists in the novel construction, combination of elements, and arrangement of parts which will be exemplified in the operation and construction hereinafter described in the specification and illustrated in the accompanying drawings considered together or separately.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which for the purpose of illustrating the invention, is shown in the accompanying drawings.

The invention will be first described in connection with the accompanying drawings, illustrating one embodiment of the invention, wherein similar reference characters are used to designate corresponding parts throughout the several views, and

then more specifically defined and indicated in the appended claims.

In the drawings,—

Figure 1 is a longitudinal section partly in elevation of a device embodying my invention, the section being taken on the line 1—1 of Fig. 4;

Fig. 2 is a detail side view of the reciprocating core member;

Fig. 3 is a detail bottom plan view of the same;

Fig. 4 is a plan view of the anvil element of the device;

Fig. 5 is an enlarged sectional view showing a step in the process;

Fig. 6 is a side elevation of the foundation portion of the stationary core member;

Fig. 7 is a bottom plan view of the same;

Fig. 8 is a top plan view of the auxiliary portion of the stationary core member;

Fig. 9 is a detail end elevation of the stationary core member and a side elevation of the reciprocating core member; and

Fig. 10 is a detail side elevation of a modification.

In carrying out my invention I employ a fixed core member consisting of two parts 1 and 2. The part 1 is a cylindrical structure which projects from a plate 3. The part 1 has a flat face 4 which extends from the plate to the extremity of the part. The free end of the part 1 is rounded as at 5, with a radius equal to that of the bore of the tube to be bent. The end of the part 1 opposite the flat face 4 is rounded as at 6 on a radius equal to the curve of the outside of the elbow to be formed.

The flat face 4 of the part 1 is provided with a groove 8 with which engages a projection 9 on the flat face 10 of the part 2 of the member. The surface of the part 2 opposite the flat face 10 is cylindrical and when the two parts are placed together with their flat faces 4 and 10 in engagement with the projection 9 in the groove 8 a cylindrical structure is produced.

Adjoining the plate 3 the part 1 is enlarged to form a shoulder 11, and one end of the part 2 has a similar shoulder 12. The combined shoulders 11 and 12 form a cylindrical plug of a diameter equal to the outside of the tube to be bent.

Near the opposite end of the part 2 and projecting from the cylindrical face thereof is a radial lip 13. One side of the lip 13 is

joined at the body of the part 2 by a curved surface, the curvature of which is equal to that of the inside arc of the elbow to be formed.

5 The fixed core member is inserted in a die opening 14 formed of opposed grooves in the two sides 15 and 16 of a separable die member. The sides 15 and 16 are set up as shown in Fig. 4, the core part 2 of the
10 member is inserted in the opening with the projection 9 engaging the groove 8. The shoulders 11 and 12 will center the fixed member in the die opening with the projecting part of the member spaced from the
15 wall of the die opening a distance equal to the thickness of the tube to be bent.

The sides 15 and 16 together with the plate 3 are now clamped between vise members 17 and 18 on the table of a punch press
20 or similar device. The reciprocating head 20 of the punch press carries on its under side a plate 21 perforated at its center and carrying tubular punch 22 in line with a cylindrical recess 23 in the head. The punch
25 22 is of the same size as the tube to be bent.

Carried within the bore of the punch 22 is a die plunger 24. The upper end of the plunger extends within the recess 23 and is cushioned against a heavy spring 25. The
30 plunger is provided with a longitudinal slot 26 cooperating with a pin or screw 27 carried by the plate 21. The engagement of the pin with the slot will prevent rotation of the plunger, but will permit longitudinal
35 movement thereof relatively to the head 20.

The lower face of the plunger is curved as at 28 to fit over the cylindrical side of the fixed core member, and one side of the end is recessed as at 29 to receive the lip 13 of the
40 part 2 of the fixed core.

If desired an auxiliary die member 30 may be provided. This member may consist of a tubular section having a bore the same size as the outside of the tube to be
45 bent and may be seated in a recess formed in the members 15 and 16.

The operation is as follows:—

The part 2 of the fixed core member is placed in the position in the die members 15
50 or 16, as shown in Fig. 5. The die members are then joined as in Fig. 4. The part 1 of the fixed core piece is then inserted in the die opening 14, with its flat face engaging the flat face of the part 2 and the pro-
55 jection 9 engaging the groove 8 and the plate 3 abutting against the ends of the members 15 and 16.

The die is now clamped to the table of the punch press with the face leg of the die
60 opening in axial alinement with the plunger 24. A section 31 of tubing is placed in the die opening as shown in Fig. 1. The lower extremity of the section 31 is preferably beveled as shown, although this is not neces-
65 sary.

The head 20 is brought down and the plunger will enter the section 31 in the die until the lower extremity thereof contacts with the part 2. The core of the bend is
70 now complete.

The continued downward movement of the head will engage the punch 22 with the tube section 31, the spring 25 will be com-
75 pressed, and the punch will force the section 31 around the bend in the die and the core 1, 2, 24. The head will now be raised with-
drawing the punch and the plunger from the die.

The die will be released from the vise and the members 15 and 16 separated, and the elbow 31 with the fixed core in position within it will be released. The part 1 will be withdrawn in a straight line. The part
80 2 will be lowered until the lip 13 is clear of the horizontal bore when the part 2 is with-
drawn.

With slight modifications as shown in Fig. 10 an acute angle bend may be made in the same manner.

In accordance with the provisions of the
90 Patent Statutes, I have described the principle of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire
95 it understood that my invention is not confined to the particular form of apparatus herein shown and described, the same being merely illustrative, and that the invention can be carried out in other ways without
100 departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which objects of my in-
105 vention are attained, and the new results accomplished, as herein set forth, as it is obvious that the particular embodiment herein shown and described is only one of many that can be employed to attain these
110 objects and accomplish these results.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. A device of the character described, comprising a die member having an open-
115 ing therethrough, said opening having an elbow bend therein, a core member adapted to be inserted through one end of the opening, said core member having a portion extending around said elbow, a second core
120 member engaging and supporting the first mentioned core member, means for forcing a tube into the die opening and between the walls of said opening and the core members, said core members being capable of with-
125 drawal from the tube without distortion of the core members.

2. A device of the character described, comprising a die member having an opening therein, said opening having an elbow bend
130

therein, a two part rigid core member adapted to be moved into the die, there being a portion of said core member extending around the bend in the die opening, one of
 5 said core parts being capable of withdrawal from the die opening in a straight line whereby the other core part may be released from the elbow by movement in one direction and withdrawn from the opening with-
 10 out distorting said member.

3. A device of the character described, comprising a die member having an elbow opening extending therethrough, a two part core member adapted to be inserted in one
 15 end of the opening, there being a projection on one of the core parts, said projection extending around the elbow and preventing withdrawal of the core as a whole, said core members being capable of separation longi-
 20 tudinally whereby said core may be withdrawn from the opening.

4. A device of the character described, comprising a member having an angular opening therein, a two part core member
 25 adapted to be inserted in the opening, there being a projection on one of the parts, said projection preventing withdrawal of the core as a whole, said parts being separable thereby permitting withdrawal of the core,
 30 and a core member cooperating with the first mentioned core member to form a rigid core within the opening and spaced from the wall thereof.

5. A device of the character described, comprising a member having an angular opening therein, a two part core member adapted to be inserted in the opening, there being a projection on one of the parts, said
 35 projection preventing withdrawal of the core as a whole, said parts being separable thereby permitting withdrawal of the core, and a core member cooperating with the first mentioned core member to form a rigid
 40 core throughout the opening and spaced from the wall thereof.

6. A device of the character described, comprising a member having an angular

opening therein, a two part core member adapted to be inserted in the opening, there being a projection on one of the parts, said
 50 projection preventing withdrawal of the core as a whole, said parts being separable thereby permitting withdrawal of the core, and a reciprocating core member cooperating with the first mentioned core member
 55 to form a rigid core throughout the opening and spaced from the wall thereof.

7. A device of the character described, comprising a member having an angular opening therein, a two part core member
 60 adapted to be inserted in the opening, there being a projection on one of the parts, said projection preventing withdrawal of the core as a whole, said parts being separable thereby permitting withdrawal of the core,
 65 and a reciprocating core member cooperating with the first mentioned core member to form a rigid core throughout the opening and spaced from the wall thereof, said reciprocating core member embracing the
 70 first mentioned core member.

8. A device of the character described, comprising a member having an angular opening therein, a two part core member adapted to be inserted in the opening, there
 75 being a projection on one of the parts, said projection preventing withdrawal of the core as a whole, said parts being separable thereby permitting withdrawal of the core, and a reciprocating core member cooperating
 80 with the first mentioned core member to form a rigid core throughout the opening and spaced from the wall thereof, said reciprocating core member embracing the first mentioned core member and coacting
 85 with the projection on the first mentioned core member.

This specification signed and witnessed this 18th day of April, 1919.

ANTHONY VASSELLI.

Witnesses:

JOHN L. LOTSCH,
 M. JONES.