Nov. 30, 1948. G. C. H. PERKINS 2,455,138

PIVOTED BENDER WITH REVERSIBLE CLAMP AND FORMER

Filed Aug. 16, 1946

2 Sheets-Sheet 1

Fig. 1

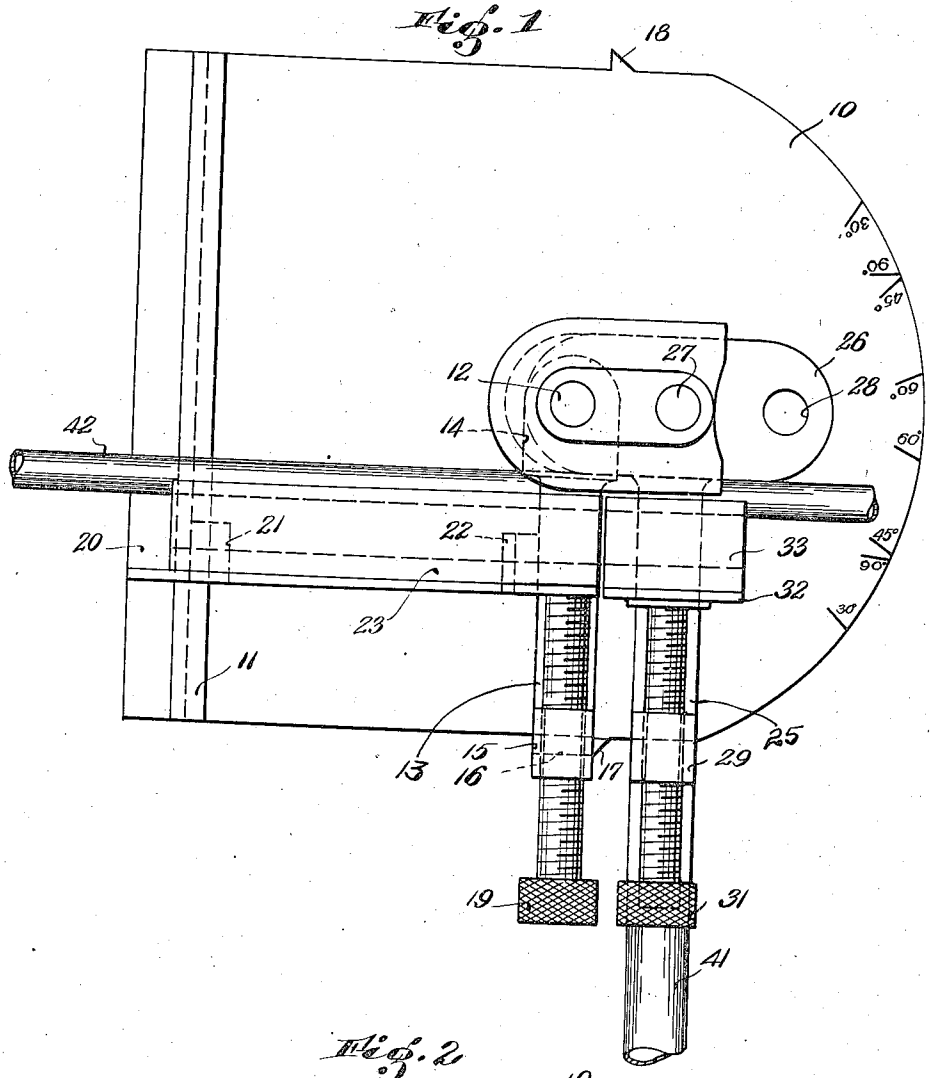
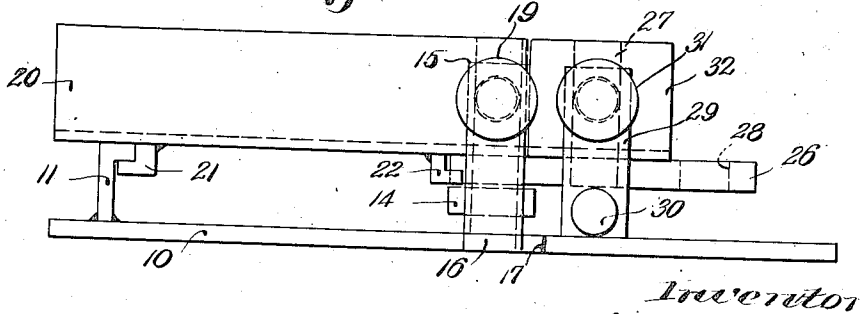


Fig. 2



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2 Sheets-Sheet 2

Fig. 3

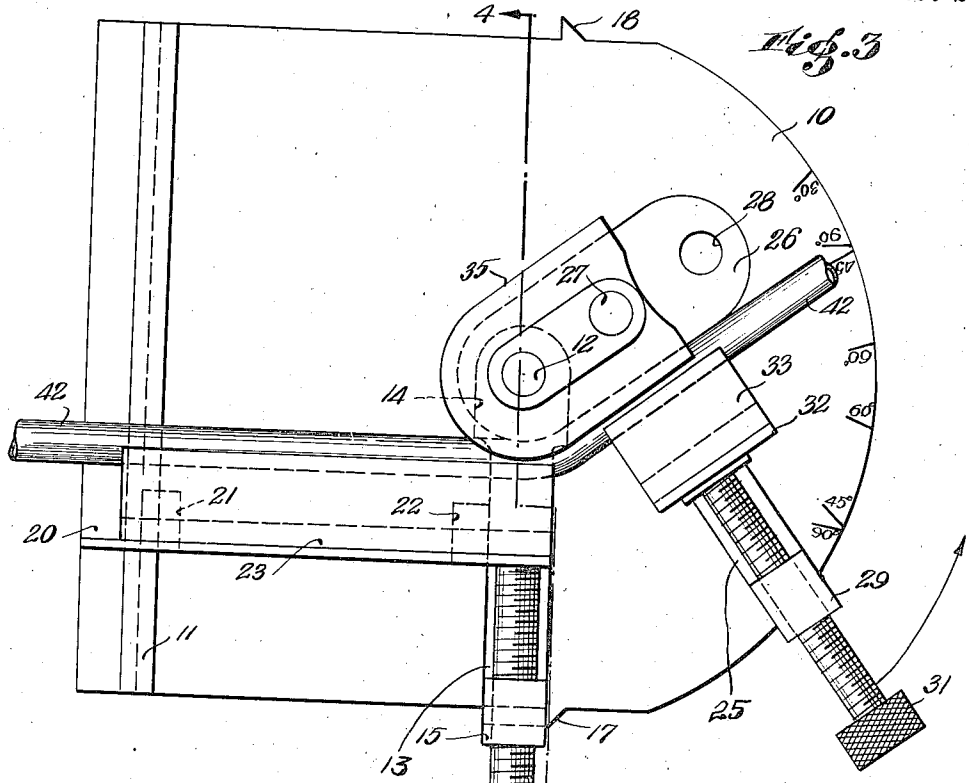


Fig. 4

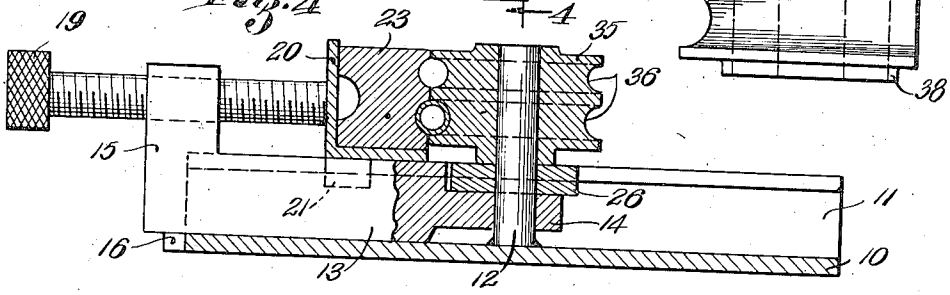


Fig. 5

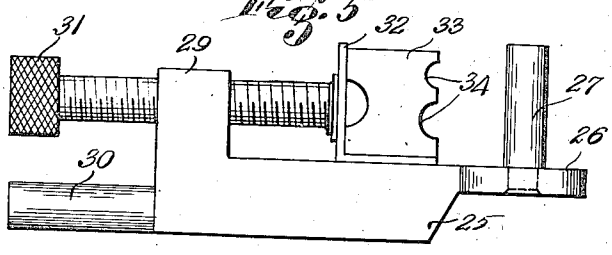
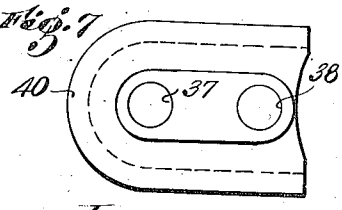


Fig. 6

Fig. 7



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PIVOTED BENDER WITH REVERSIBLE CLAMP AND FORMER

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6 Claims. (Cl. 153—40)

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This invention consists in an improved machine for bending pipes, tubes or rods, and has the general advantages of simplicity and ruggedness in structure combined with low cost of manufacture and a wide range of capacity.

Tube bending machines now available are either so elaborate and costly in their organization that they are not available for small jobs, or else they are so light and unreliable that they have a short effective life and are a constant annoyance to the user on account of bent pivot or retaining pins which make it difficult to position or replace the bending die. The bending machine of my invention may be constructed at moderate cost and is so organized that difficulties heretofore encountered in the use of inexpensive bending machines are obviated and certain other important advantages secured.

As herein shown, the preferred embodiment of my improved bending machine comprises a stationary base plate carrying an upstanding pivot pin, a stationary clamping member held at its inner end by said pivot pin, and a movable clamping member having a head perforated to receive said pivot pin and itself carrying an upstanding retaining pin, together with the bending die block perforated to receive both the pivot pin and the said retaining pin. The stationary clamping member is associated with an elongated carriage supporting a four-sided holding bar recessed to accommodate tubes of three different diameters and cooperates with interchangeable die bending blocks recessed to correspond with the operative face of the holding bar. This construction permits convenient interchange of die bending blocks and holding bars so that the machine may be easily adapted for a wide range of sizes.

Preferably and as herein shown, my machine is so organized that the bending operation may be reversibly carried out, that is to say, the movable clamping member may be swung either clockwise or counter-clockwise thus adapting the machine for forming either right and left-hand bends as may be required by the particular work in hand.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment hereof, selected for purposes of illustration and shown in the accompanying drawings in which:

Fig. 1 is a plan view of the machine showing a tube clamped preparatory to bending,

Fig. 2 is a corresponding view in elevation,

Fig. 3 is a plan view of the machine showing the movable clamp swung to impart approximately a 40° bend to the tube,

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Fig. 4 is a view in cross section on the line 4—4 of Fig. 3,

Fig. 5 is a view in elevation of the movable clamping member,

Fig. 6 is a view in elevation of a die bending block of alternative construction, and

Fig. 7 is a plan view of the die block shown in Fig. 6.

In its preferred and illustrated form the machine of my invention comprises a stationary base plate or table 10 to which are rigidly secured an upstanding flanged guide 11 and the main pivot pin 12. One edge of the base plate 10 is straight and the flanged guide 11 is located a short distance within this straight edge. The other edge of the base plate is curved on a radius struck from the axis of the pivot pin 12.

The parts of the machine which are stationary in the bending operation include a clamping member comprising a bar 13 of rectangular section having at its inner end a flat eye 14 offset upwardly above the lower face of the bar and perforated to receive the pivot pin 12. As shown in Fig. 2, the bar 13 is provided at its outer end with an upstanding ear 15 and with a downwardly projecting stop 16 which is arranged to engage either a stationary stop 17 on one edge of the base plate 10, or a stationary stop 18 on the other edge of the plate depending upon whether the machine is organized for forming a left-hand bend, as shown in Fig. 3, or a right-hand bend in a manner to be presently explained.

The ear 15 is drilled and threaded to receive a clamping screw 19 which bears at its inner end against a long angular carriage 20. As shown in Fig. 2, the carriage is provided with a pair of flanged tongues 21 and 22 which project downwardly from its lower face. As shown in Fig. 2, the tongue 21 engages the flanged guide 11 and the tongue 22 is inoperative, but if the position of the carriage is reversed in organizing the machine for forming a right-hand bend, the flanged tongue 22 becomes operative. In the carriage 20 is removably placed a long holding bar 23 and this may be grooved or recessed in its four faces to accommodate tubes of different diameters; for example, as shown in Fig. 4 its inner face has two small recesses of different diameters in one of which the tube 42 is held and its outer face has a single recess which would accommodate a tube of larger diameter.

The swinging clamp shown by itself in Fig. 5 includes a bar 25 having at its inner end a flat head 26 so located that the flat eye 14 of the stationary clamp will fit beneath it. The head 26

is extended transversely as shown in Figs. 1 and 3 and is provided centrally with an upstanding retaining pin 27. Both ends of the head are perforated to receive the pivot pin 12. One of these perforations 28 is shown in Fig 3, and the other is filled by the pivot pin 12. At its outer end the bar has an upstanding ear 29 and a cylindrical handle 30 by which the clamp may be swung about the axis of the pivot pin 12 either directly or with the assistance of a length of pipe which may be slipped over the handle 30. The upstanding ear 29 is drilled and threaded to receive a clamping screw 31 and this is connected at its inner end to a short carriage 32 corresponding in outline to the long carriage 20. In the carriage 32 is placed a short holding bar 33 which is provided with recesses corresponding to those of the long holding bar 23.

A die bending block or former 35 is removably held by the stationary pivot pin 12 and the movable retaining pin 27 and for this purpose is provided with parallel vertical holes spaced to accommodate these pins. As shown in Fig. 4, the edge faces of the die 35 are recessed to correspond to the recesses of the long holding bar 23 and the short holding bar 33, having recesses 36. The inner end of the die block is semicircular and concentric with the pivot pin 12, while its side edges extend as parallel tangents to its curved end.

The operation of the machine will be apparent from the foregoing description but may be summarized as follows. Having equipped the machine with a long holding bar 23, a short holding bar 33, and a bending die 35 suitably recessed to fit the tube or rod which it is desired to bend, the clamping screws 19 and 31 are both retracted and the movable clamping member is moved into parallelism with the stationary clamping member as shown in Figs. 1 and 2. A tube 42 is then inserted lengthwise between the holding bars and the die block, as suggested in Fig. 1. The clamping screw 31 is then set up sufficiently to clamp the tube firmly against the straight wall of the bending die and the clamping screw 19 set up sufficiently to hold the tube frictionally but permit it to travel inwardly in the bending operation. The movable clamp is then swung about the axis of the pivot pin 12, as suggested in Fig. 3, to an index mark on the curved edge of the base plate 10 corresponding to the angle of bend required. In the bending operation the tube is bent about the circular contour of the bending die 35. When the desired bend has been formed, both clamping screws may be released and the bent tube removed from the machine.

In Fig. 6 is shown a bending die 40 which is interchangeable with the bending die 35 and differs from it only in that its peripheral wall is provided with a single recess or groove of large diameter as compared to the recesses or grooves 36 of the bending die 35. The die 40, like the die 35, is provided with a hole 37 to receive the pivot pin 12 and a hole 38 to receive the retaining pin 27.

When it is desired to organize the machine for forming a right-hand bend, both the movable and stationary clamping members are lifted off the pivot pin 12 and replaced in similar but reversed positions on the other side of the base plate 10. The carriage 20 is also removed from the position shown in Fig. 1, turned end for end, and replaced in reversed position on the other side of the pivot pin 12.

The holding bars 23 and 33 are herein shown as having a single recess in one face and two recesses in the opposite face, thus adapting the machine for operating on three sizes of tubes. It will be apparent that these bars may have additional recesses of different sizes in their other two faces and thus adapt the machine for operation on tubes of various sizes.

The construction of the machine is such that the upright pins 12 and 27 have a floating relationship with their associated parts since the holes in which they are recessed are formed with substantial clearance. This feature is desirable as it greatly facilitates the removal and interchange of the bending dies. In bending machines as heretofore constructed a slight distortion of the holding pins has caused much difficulty in removing the dies. This difficulty is overcome in the present machine by the floating connection of the pins and the fact that the bending die itself is used as the bearing housing.

Having thus disclosed my invention and described in detail an illustrative embodiment thereof, I claim as new and desire to secure by Letters Patent:

1. A tube bending machine comprising a base plate having a semi-circular edge and an upstanding pivot pin located at the center of its edge curvature, a projecting stop at each end of said semi-circular edge, a stationary clamping member perforated to fit the pivot pin and to be engaged with one or the other of said stops accordingly as the machine is organized for right hand or left hand bending, and a movable clamping member having transversely spaced holes in its inner end either of which may be fitted on said pivot pin.

2. A tube bending machine comprising a base plate having an upstanding pivot pin, a bending die mounted to swing on said pivot, tube guiding means leading to the die, means for connecting the said tube guiding means to the said base on either side of the said pivot pin for the purpose of right or left hand bending, and a swinging clamping member having a T-shaped head provided with an upstanding retaining pin for the bending die and being perforated to receive the said pivot pin at either end of the T-shaped head.

3. A tube bending machine comprising a base plate having a fixed upstanding pivot pin, a stationary clamping member perforated at its inner end to receive the pivot pin, means for securing the said stationary clamping member to the said base plate in either of two positions 180° apart with respect to the axis of said pivot pin, a movable clamping member having transversely spaced holes in its inner end either of which may be fitted on said pivot pin and having an upstanding retaining pin, and a bending die having transversely spaced holes receiving the pivot pin and the retaining pin of the movable clamping member.

4. A tube bending machine comprising a base plate carrying an upstanding pivot pin and a flanged guide, a stationary clamping member held at its inner end by said pivot pin, separate means for securing the said stationary clamping member to the said base plate in a position parallel to the said flanged guide at either side of the said pivot pin, an elongated carriage supported at its outer end on the said guide and at its inner end supported on the said stationary clamping member, an elongated recessed holding bar mounted in said carriage, a moveable clamping member having a head with transversely

spaced holes either of which may be fitted on the said pivot pin and having an upstanding retaining pin, a bending die block perforated to receive both the pivot pin and the said retaining pin whether the movable clamping members is fitted to the pivot pin by one or the other of its transversely spaced holes.

5. A tube bending machine comprising a base plate, a pivot pin located centrally in the base plate, a stationary clamping member perforated at one end to fit the pivot pin, means at the other end of the stationary clamping member for securing it to the base plate in either of two positions 180° apart with respect to the axis of said pivot pin, a movable clamping member having transversely spaced holes in its inner end either of which may be fitted on the said pivot pin, a straight line flange connected to the said base plate and disposed in parallel relation to the stationary clamping member, a carriage disposed at right angles between the flange and stationary clamping member, so constructed and arranged as to slide on the flange when actuated towards or away from the said pivot pin by the clamping member, alternate means for securing the carriage to the flange and stationary

clamping member depending on which side of the pivot pin the stationary clamping member may be located.

6. A tube bending machine as described in claim 5, in which the said movable clamping member has a T-shaped head and perforations at either end of the T-shaped head, a pin located centrally on the T-shaped head and equidistant from the said perforations, and a bending die perforated in two places so as to receive both the pivot pin and the pin on the T-shaped head.

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