

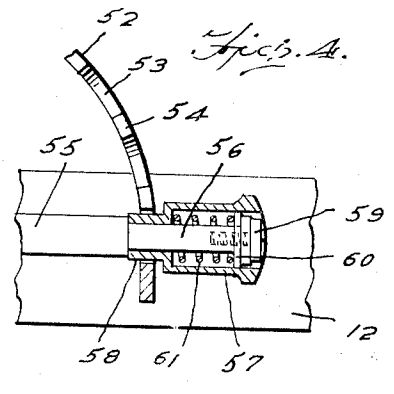
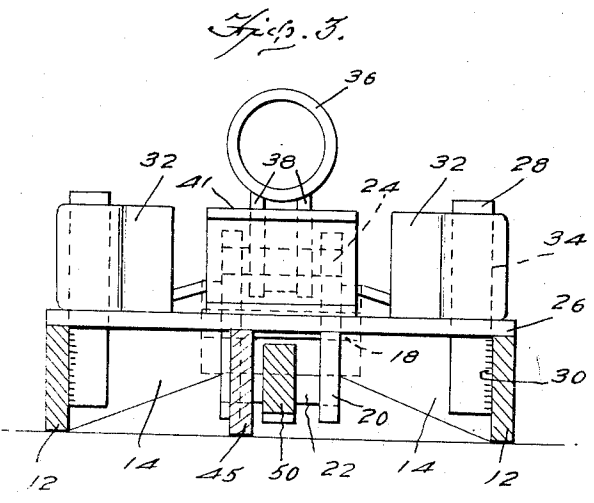
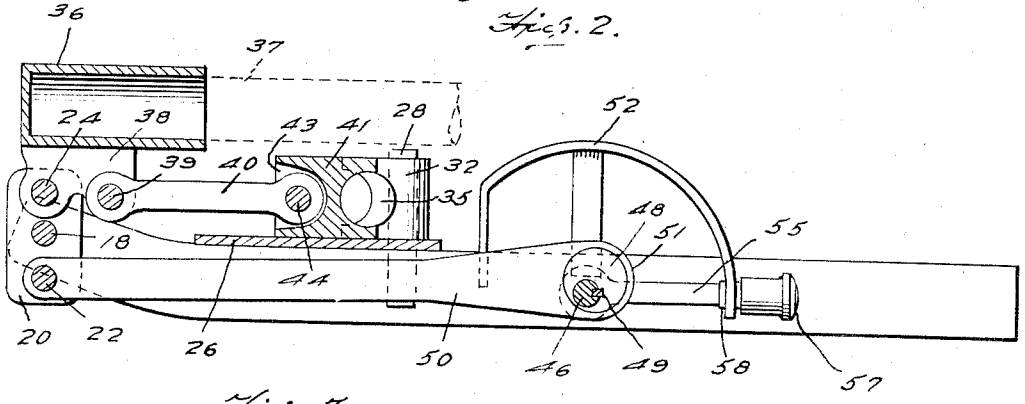
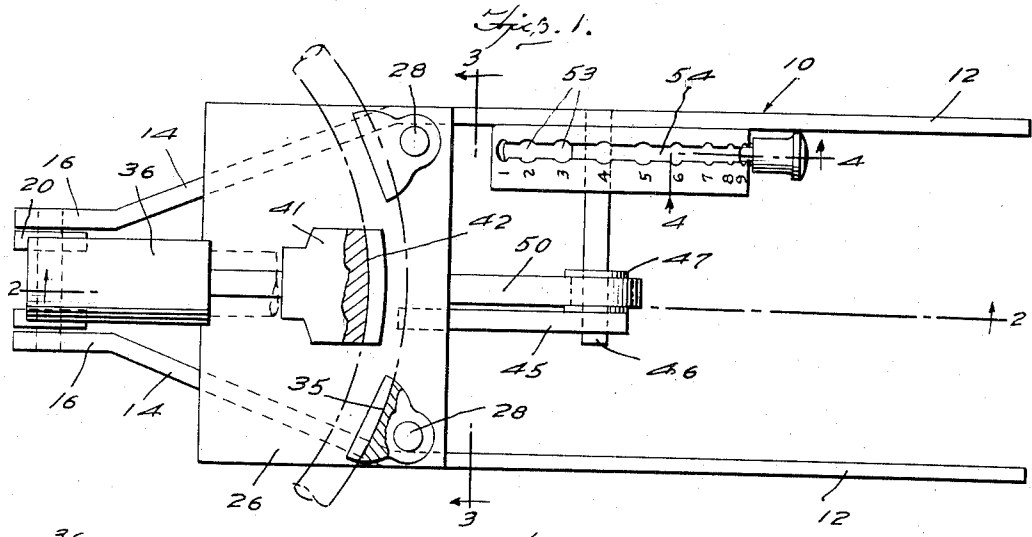
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PIPE BENDING MACHINE

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**PIPE BENDING MACHINE**

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4 Claims. (Cl. 153—48)

This invention relates generally to force applying tools and it is directed particularly to improvements in tools or machines for bending tubular or bar material.

A principal object of the present invention is to provide a bending tool designed particularly for the bending or curving of pipes, more especially steel pipes or tubes, wherein a novel means is provided whereby predetermined settings of the dies may be easily and quickly made for bending the tube to a desired curvature.

Another object of the invention is to provide in a tool or machine of the above described character, a die adjusting or setting means which is designed in such a manner that resettings may be easily and quickly made to produce exactly the same bend in a pipe or tube as may have been previously made, although the setting of the dies may have been subsequently changed or altered.

Still another object of the invention is to provide in a tool or machine of the character stated, an eccentric operated means for adjusting the position of a pressure die with respect to a pair of holding dies and wherein, also, a novel means is provided for setting and locking the position of the eccentric so that the adjustment of the pressure die cannot change accidentally.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described since obvious modifications will occur to a person skilled in the art.

In the drawing:

Figure 1 is a view in top plan of a tool or machine constructed in accordance with the present invention.

Figure 2 is a longitudinal section taken substantially on the line 2—2 of Figure 1.

Figure 3 is a transverse section taken substantially on the line 3—3 of Figure 1.

Figure 4 is a sectional view on an enlarged scale taken substantially on the line 4—4 of Figure 1.

Referring now more particularly to the drawing it will be seen that the machine comprises a base structure which is generally designated 10, and while it may be of any desired form, it is here shown as comprising two spaced parallel side beams 12 which have convergently arranged forward end portions 14 which terminate in the short spaced parallel terminal portions 16.

The forward end terminal portions 16 of the base 10 are connected by a shaft or axle 18 which has mounted thereon a pair of spaced elongate rock plates 20 as shown, the shaft passing through the plates at the transverse center thereof.

Connecting the two rock plates 20, below the shaft 18, is a link pin 22, while the upper ends of the plates 20 are connected by a corresponding pin 24.

Upon the forward end of the base 10 and rearwardly of the rock plates 20, the beams 12 have disposed there-

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across and secured upon the top edges thereof the plate 26 which forms a platform for the purpose about to be described.

At opposite sides of the platform 26 there are positioned the upright pivot posts 28 which, at their lower ends, are welded to the inner sides of the adjacent beams 12 as shown in Figure 3, where the weld is designated 30, while the posts extend upwardly through the platform 26 to a substantial height thereabove as is also illustrated.

Positioned upon the platform 26 are two movable holding dies 32, each of which has a suitable passage 34 formed vertically therethrough to receive the pivot post 28. As illustrated, each of these dies has a curved channel 35 across the working face in which the tube or pipe P, shown in broken lines in Figure 1, is positioned and the holding dies swing about their respective posts 28 upon the surface of the platform 26 and automatically adjust themselves to the proper position as a pipe, disposed across their faces, is bent to the desired curvature.

The numeral 36 designates an elongate handle socket which is designed to receive a suitable handle bar, shown in dotted outline and designated 37.

Secured to and extending longitudinally of the outer side of the socket 36, are two spaced parallel flanges 38 which, at the ends adjacent to the bottom of the socket 36, are suitably apertured to receive the shaft 24 whereby the socket can be turned on the shaft 24 as will be readily apparent.

At the forward ends of the flanges 38 they have extending across between them the pivot pin 39 and this pin passes through one end of a thrust link 40, which rocks on the pin and extends forwardly over the platform 26.

Supported upon the top of the platform 26 for sliding movement in a path passing centrally between the holding dies 32, is a pressure die 41 which has formed across the working face the convex channel 42 which engages a pipe between the holding dies, as will be readily apparent.

The back of the die 41 has a socket 43 into which the forward end of the link 40 extends and this end of the link is pivotally coupled to the power die 41 by the pivot pin 44 as clearly shown in Figure 2.

Secured to the underside of the platform 26 and extending rearwardly between the frame beams 12, is the rigid arm 45 which, at its rear end is provided with a suitable bearing opening to receive an end of an eccentric shaft 46, the opposite end of the shaft being mounted for rotation in a side beam 12, as illustrated in Figure 1.

Adjacent to the side of the arm 45 which is nearest to the side beam in which the outer end of the shaft 46 is mounted, the shaft carries two spaced collars 47 and between these collars the shaft has mounted thereon the eccentric 48 which is secured by a key 49 to the shaft, as shown in Figure 2.

The numeral 50 designates the eccentric link, which has its forward end provided with a suitable aperture to receive the shaft or axle 22, while at its rear end it is formed to provide the eccentric strap 51 which encircles the eccentric 48.

Secured to the frame side beam 12 in which the outer end of the shaft 46 is mounted, and rising above the beam is an arcuate frame 52 of substantial width, which has its two ends welded to the inner side of the adjacent beam 12 and which is supported intermediate its ends by a vertical bar 52 which is welded at its lower end to the adjacent beam 12 and rises within the frame to be secured to the underside thereof as shown in Figure 2.

This arcuate frame is provided with a longitudinal series of circular openings 53 which are interconnected by the slots 54, the width of which is, as clearly shown in Figure 1, materially less than the diameters of the openings 53.

The shaft 46 passes through the radial center of the

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arcuate frame 52 and carries the adjusting arm 55 which, at its outer end is of reduced diameter to form the terminal stem 56. This terminal stem is of a diameter slightly less than the width of the slots 54 so that when the arm is swung around the axis of the shaft 46, the stem will move from one opening 53 to the next.

The reduced end portion of the arm, that is the stem 56, extends into a cylindrical head or knob 57 which, at its inner end is formed integral with a collar 58 in which the stem 56 snugly positions. The outer end of the knob 57 is open and the end of the stem 56 has secured thereon, by a screw 59, a washer 60. Surrounding the stem and compressed between the washer 60 and the bottom of the hollow knob 57 is the coil spring 61 which constantly urges movement of the knob 57 inwardly on the stem.

The collar 58 at the inner end of the knob 57 is of a diameter to fit into any one of the holes or openings 53 and when in one of the holes it locks the arm 55 against turning movement.

In the operation of the present tube bending tool, the amount of bend or curvature given to the tube will be determined by the setting of the eccentric 48 by which the plates 20 are rocked so as to shift the position of the pivot shaft 24 either forwardly or backwardly to thereby govern the extent of movement of the pressure die 41. However, in order to provide a clearance for the placing of a pipe length on the plate or platform 26, relatively to the dies 32, the die 41 is drawn in the forward direction by swinging the handle bar 37 and the socket 36 upwardly, following which, the handle bar and the socket are lowered to move the die 41 against the pipe.

When it is desired to turn the eccentric 48, the knob 57 is pulled outwardly against the tension of the spring 61 so as to remove the collar 58 from the hole 53 in which it may be engaged. When the collar 58 is thus shifted the stem 56 can pass from the hole into the next hole or into any one of the holes by being moved through the connecting slots 54 as will be readily apparent. This turning of the shaft 46 turns the eccentric 48 so that the link 50 will be moved in the forward direction and rock the plates 20 clockwise to shift the handle bar socket and also shift the pressure die in the directions as previously stated. As will be readily apparent, if the arm 55 is swung from the position in which it is shown in Figures 1 and 2 to one of the other openings 53, the eccentric will be turned so as to force the link 50 forwardly and cause the plates 20 to likewise force the pressure die 41 rearward to a greater extent. Thus the degree of curvature or bend given to the tube will be increased and, when the arm 55 is swung over to the limit of its movement toward the front of the machine, the pressure die 41 will be shifted to a position where, upon the forward and downward swinging of the handle bar 37 and socket 36, to the position in which it is shown in Figures 1 and 2, the maximum amount of bend will be given to a pipe or tube which has been laid across the platform 26 in front of the holding dies 32 and behind the pressure die 41.

From the foregoing it will be seen that there is provided by the present invention a machine by which the adjustment of the pressure die can be changed easily and quickly and when the change has been made the operating eccentric will be locked in place so that the accidental shifting of the pressure die from the selected set position will not take place. Also it will be seen that if the knob 57 is set in one position for bending a number of tubes or pipes and is then shifted to another position for bending other pipes, it can be easily brought back

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to the original position to accurately bend more pipes to the same curvature as those first formed and thus all possibility of making an error is avoided.

I claim:

1. In a tube bending machine, a base, two transversely spaced holding dies pivotally mounted on said base; a pivot shaft mounted transversely on the base in spaced relation to said dies, an elongate rock member mounted in upright position on said shaft to rock in a vertical plane passing between said dies, a pressure die supported for reciprocatory movement on said base in said plane for coaction with the holding dies, a socket to receive a rearwardly extending handle bar, a pivot between said member and the top end of said rock member, a link coupling pivoted to and between said rock member and the pressure die in rearwardly offset relation with respect to the last named pivot, a second link having one end pivotally coupled to said rock member below the pivot shaft, an eccentric rotatably supported on the base, an eccentric strap carried by said second link at its other end and encircling the eccentric, an arm operatively coupled with the eccentric for turning the latter, and means for locking said arm in any one of a number of set positions.

2. The invention according to claim 1, with a shaft rotatably supported by the base and extending transversely thereof, said eccentric being carried by the last named shaft, said arm being secured at one end to the last shaft to extend perpendicularly thereto and to turn therewith on the axis of the shaft, an arcuate guide frame concentric with the last shaft, and said locking means being releasably coupled between the arm and the frame.

3. The invention according to claim 2, wherein said frame is formed of a relatively wide band of material positioned with the width paralleling the axis of the last named shaft, said frame having a longitudinally spaced series of circular openings connected together by slots, said arm having an outer end portion of a diameter to pass through the slots from one opening to the next upon the turning of the arm with the last named shaft, and means carried on the said outer end portion of the arm for selective engagement in said circular openings, said last means being movable out of the openings to permit the said outer end portion to pass through the slots.

4. The invention according to claim 2, wherein said frame is formed of a relatively wide band of material positioned with the width paralleling the axis of the last named shaft, said frame having a longitudinally spaced series of circular openings connected together by slots, said arm having an outer end portion of a diameter to pass through the slots from one opening to the next upon the turning of the arm with the last named shaft, and a securing means for said arm comprising a knob slidably supported on said outer end portion and having a collar encircling said end portion and adapted for selective engagement in said circular openings, the collar being of a diameter greater than the width of the slots, said knob and collar being slidable outwardly to disengage the collar from an opening sufficiently to permit said end portion of the arm to pass through the slots, and spring means urging movement of the knob and collar inward to arm securing position.

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