ABSTRACT
A portable bender having an elongated base plate with a shoulder at one end and an extendable unit at the other end, with a wheel device connected to the free end of the extendable unit and linked to the shoulder. An opening is formed at one end of the base plate to receive a bar or the like between the shoulder and the wheel device and upon extension of the extendable unit the wheel device is moved arcuately upwardly over the opening and the shoulder thereby bending the bar.

9 Claims, 8 Drawing Figures
PORTABLE BENDING APPARATUS

BACKGROUND OF THE INVENTION

A search of the prior art showed, for example, U.S. Pat. No. 2,958,361 wherein strip metal is held on a form section portion of a frame by a pair of clamp assemblies, with one end being free to flex with the clamp thereon, and with a piston and cylinder secured to the frame and to the free end of the metal. Operation of the cylinder bends the strip about an ear or the form section.

U.S. Pat. No. 3,017,917 discloses a massive and complicated tube bending machine using a stationary clamp die and a rotating bending form; while U.S. Pat. No. 3,531,963 discloses a tube bending apparatus which is adjustable suspended from an overhead boom.

U.S. Pat. No. 3,545,247 discloses another large, stationary bending machine which has a swingable die structure mounted on a radius arm.

Nothing in the prior art discloses a portable unit which can be placed quickly anywhere on the item being bent, operated to bend the item the desired degree, and then quickly released.

SUMMARY OF THE INVENTION

A portable bar bending apparatus comprising a base plate means having an opening formed in one end thereof, shoulder means mounted at one end of the base plate means, extendable means pivotally mounted at one end to the other end of the base plate means, wheel means connected to the other end of the extendable means such that the opening is disposed between the shoulder means and the wheel means when the extendable means is retracted, and linkage means pivotally connected at each end to the shoulder means and to the wheel means and operable upon extension of the extendable means to bend a bar inserted in said opening over said shoulder means.

It is an object of this invention to provide a new and novel bar bending apparatus.

It is another object of this invention to provide a bar bending apparatus which can readily be carried or otherwise transported by an iron worker.

Still another object of this invention is to provide a portable bar bender which can bend a straight bar, and then straighten out the bend.

Another object of this invention is the provision of a portable bar bender which can be placed anywhere on the time being bent, and will attach itself in that position whether or not the item is loose or fixed.

Yet another object of this invention is the provision of a portable bar bender which will enable the iron workers to bend or straighten reinforcing steel, for example, constantly throughout the work day without becoming physically exhausted and at a faster rate than can be achieved manually with pipes and/or hickey bars.

These objects, and other features and advantages of this invention will become readily apparent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a preferred embodiment of this invention; FIG. 2 is another perspective view showing the portable bar bender ready to receive the upper, straight portion of a bar prior to bending same; FIG. 3 is an enlarged plan view of the bender; FIG. 4 is a side, elevational view thereof prior to the bending operation; FIG. 5 is a view comparable to FIG. 4, and wherein the apparatus has functioned to bend a bar; FIG. 6 is a vertical, sectional view as seen along the line 6—6 in FIG. 4; FIG. 7 is a vertical, sectional view as seen along the line 7—7 in FIG. 5; and FIG. 8 is a vertical, sectional view as seen along the line 8—8 in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the portable steel bar bender of this invention is illustrated generally at 10 in FIG. 1 and is operable to bend a normally straight steel reinforcing bar 11 (FIG. 2) or the like at a predetermined degree, as best illustrated in FIG. 5, and is further operable to bend the bent bar 11 such as is shown in FIG. 5, back into a straight bar.

The bender 10 comprises generally, base plate means 12, shoulder means 13 at the front end of the bender 10, extendable means 14 intermediate the ends of the bender, wheel means 16 at the free end of the extendable means 14, as described more in detail hereinafter, and linkage means 17 pivotally connected between the wheel means 16 and the shoulder means 13 and operable upon extension of the extendable means 14 to move the wheel means 16 (FIG. 5) accurately upwardly and over an opening 22 (FIG. 2) within which a bar 11 has been placed, so as to bend the bar 11 to a predetermined angle depending upon the extension of the extendable means 14.

More specifically, the base plate means 12 includes an elongated rectangular base plate 18 which has an axial channel 19 (FIGS. 1 and 4) formed therein, and within which nests the extendable means 14, as shown hereinafter. A pair of vertical slots 20 are formed in the sides of the base plate 18 near the rear end thereof, and the rear of the channel 19 is filled with a plate 21, as best shown in FIG. 1.

The base plate means 12 includes further an opening 22 (FIGS. 1 and 3) which is formed near the front of the plate 18 and in one side thereof laterally to the center of the plate. This opening 22 is lined by a U-shaped insert 23, and which insert 23 can be of varied sizes to accommodate different sized bars 11. A groove 24 (FIGS. 4 and 8) is formed axially in the front of the plate for a purpose hereinafter described.

The shoulder means 13 includes a pair of blocks 26 and 27 (FIGS. 1 and 3) which are welded in parallel relation to the front, top surface of the base plate 18. One block 27 has a corner 28 cut off to accommodate unloading of a bent bar, as best illustrated in FIG. 5.

The shoulder means 13 includes further a circular disk 29 mounted intermediate the blocks 26 and 27 and retained in place by a pin 31 (FIGS. 3 and 8) which is inserted through the blocks and the disk 29. The diameter of the disk is such that it requires the groove 24 (FIG. 8). A trio of openings 32, 33, and 34 (FIG. 8) are formed in the blocks 26 and 27 and also in the disk 29, respectively, for receiving a tapered dowel 36 having a ring 37 at one end, and adapted to be locked within the
openings by a pin 38 (FIG. 3) at the other end. The dowel 36 is tapered to accommodate easy insertion and withdrawal through the openings 32–34 inclusive.

The extendable means 14 includes a double-acting, hydraulic piston and cylinder 41 of conventional form which is fluid connected at opposite ends by fluid lines 42 and 43 to a source of fluid supply under pressure, and also to a reservoir. The rear of the piston and cylinder unit 41 is connected by an end block 44 (FIG. 2) and by a pair of laterally extended bars 46 which form a fulcrum to the slot 20, the bars 46 being retained therein by a pair of T-plates 47 (FIGS. 3 and 4), and which plates 47 are secured by fasteners 48 to the sides of the base plate 18.

The extendable means includes further a U-shaped yoke 49 (FIGS. 1 and 3) connected at the outer end of the piston 51 of the unit 41, and which yoke has a pair of transversely aligned openings 52 (only one showing in FIG. 4) formed therein to receive a pin 53.

The wheel means 16 includes a wheel 54, as best illustrated in FIGS. 1, 3, and 4, and which wheel 54 has a diameter such that it extends beyond the normal horizontal and vertical dimensions of the yoke 49, as best shown in FIG. 4. Particularly, the leading or front portion of the wheel 54 extends toward the front of the base plate 18 and beyond the front surface of the yoke 49.

In operation of the portable steel bar bender 10, the bender can either be hand carried by an iron worker, or placed upon any wheeled cart or the like and moved to a desired location close to one or more steel reinforcing bars 11 or the like. In this regard, it is to be noted that the bender could be adapted for use by electricians, pipe fitters, and general industry. The bender 10 is, of course, fluid connected remotely to a source of fluid under pressure.

To place the bender into use; with the dowel 36 partially withdrawn, as best shown in FIG. 2, a link 57 can be flipped up such that the bender 10 can now be slid onto the bar 11 at a desired elevation thereon. The link 57 is then lowered into place parallel with the other link 56 whereupon the dowel 36 is reinserted completely through the links and is locked therein by the pin 38. This arrangement is shown in FIGS. 3 and 4.

A fluid reservoir handle (not shown) or an electric control (also not shown) can be operated to actuate the piston and cylinder unit 41 such as to extend the piston 51 from the position of FIG. 4 toward the position of FIG. 5, the piston 51 being extended a distance determined by the operator. As the piston 51 is extended, the bar 11 is engaged by the wheel 54 (FIG. 4), the links 56 and 57 pivoting about the dowel 36 and carrying the wheel 54 arcuately upwardly and over the opening 22 until the wheel 54 engages the bar 11 and begins to force it toward the shoulder disk 29. Continued extending or expanding movement of the piston 51 thus physically wraps the bar 11 about the stationary shoulder disk 29 until the desired angle of bend is obtained.

At this point, action of the piston and cylinder unit 41 is reversed so as to return the parts to their position of FIG. 4, whereupon the flip link 57 is again raised, as shown in FIG. 2, and the bender 10 removed from the bent bar 11. Cutting off or beveling the corner 28 of one of the blocks 27 accommodates this removal of the bender 10 from the bar 11.

Should it be desirable to straighten the bent bar 11 from its bent position of FIG. 5 to the straight position of FIG. 4, the bender 10 is merely reinserted upon the bar 11 at the appropriate height thereon whereupon the operation is repeated, but this time with the wheel 54 forcing the bent portion of the bar 11 back upwardly toward and to a straight position. The bender 10 would thus be swung 180° about the bar 11 of FIG. 5.

As mentioned hereinbefore, to accommodate bars 11 of different cross-sectional diameter, the opening 22 and the insert 23 can be changed, along with a change of the diameter of the wheel 54 and the length of the links 56 and 57 in proportion therewith.

The bender 10 can be operated without the pin 31 (FIGS. 3 and 8) such that the shoulder disk 29 is permitted to rotate. This operation of the bender 10 is satisfactory, but it has been found that holding the shoulder disk 29 stationary provides a more effective operation of the bender 10.

Additionally, the provision of a safety stop structure secured to one or both of the blocks 26 and/or 27 near the front of the base plate 18 may be advisable in order to limit forward movement of the yoke 49 beyond a certain extension of the piston 51.

It can thus be seen from the aforementioned description, that all of the objects and features of this invention can be and are obtained.

1 claim:
1. A portable bar bending apparatus comprising:
a. a portable base plate means having an opening formed in one end thereof;
shoulder means mounted at one end of said base plate means;
extendable means pivotally mounted at one end to the other end of said base plate means;
wheel means connected to the other end of said extendable means, said wheel means being movable by said extendable means, said opening disposed between said shoulder means and said wheel means when said extendable means is at its shortest length; and
linkage means pivotally connected at one end to said shoulder means and at the other end to said wheel means and operable upon extension of said extendable means to guide the movement of said wheel means by said extendable means accurately upwardly and over said opening, and over said shoulder means.
2. A portable bar bending apparatus as defined in claim 1, and wherein said base plate means includes an elongated base plate having an opening formed centrally at one end thereof and open to one side thereof.
3. A portable bar bending apparatus as defined in claim 1, and wherein said shoulder means includes at least a pair of parallel blocks having formed therein openings aligned transversely of said base plate means, a circular disk having an opening centrally formed therein, and further a dowel member removably insert-
able through said blocks and said disk to support said disk between said blocks.

4. A portable bar bending apparatus as defined in claim 1, and wherein said extendable means includes a double-acting piston and cylinder unit.

5. A portable bar bending apparatus as defined in claim 1 wherein said extendable means includes a yoke and said wheel means including a wheel pinned within said yoke.

6. A portable bar bending apparatus as defined in claim 1, and wherein said linkage means includes a pair of parallel links movable axially of said extendable means.

7. A portable bar bending apparatus as defined in claim 3 wherein said extendable means includes a yoke and said wheel means includes a wheel pinned within said yoke.

8. A portable bar bending apparatus as defined in claim 7, and wherein said linkage means includes a pair of parallel links movable axially of said extendable means, said links permanently pivotally connected within said yoke and with said wheel therebetween at one end, and releasably connected adjacent said blocks and by said dowel member at the other end, one of said links being independently movable upwardly upon removal of said dowel to permit insertion of a bar into said opening formed in said portable base plate.

9. A portable bar bending apparatus as defined in claim 2 wherein said base plate means includes an insert member, said insert member being removably placed within said opening in said elongated base plate to adapt said opening to bars having a plurality of cross-sections.

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