PORTABLE ROD OR TRUE BENDER

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ABSTRACT

A portable rod bending machine for vise mounted operation with capacity for producing closely spaced multiple bends in heavy rod stock having a rod clamping section with a fixed jaw, a movable jaw, and a quick acting cam lock. A force application member provides a rotatable bending die to reduce friction against the rod stock. Positional and angle indexing members provide accurate reproduction of bends. Two auxiliary brace members provide additional leverage for the heavy rod stock. A high ratio of bending torque to total weight is achieved by the invention.

8 Claims, 2 Drawing Figures
PORTABLE ROD OR TRUE BENDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

In general, the present invention is related to rod bending machines, and in particular it is concerned with portable rod bending machines for bending heavy rod stock.

More particularly, the invention is concerned with a portable rod bending machine with a capacity for producing closely spaced multiple bends in heavy rod stock, having a quick acting rod clamping device for rapid operation, and angle indexing members for accurate reproduction of bends.

2. Description of Prior Art

Heretofore, portable rod benders could not easily produce closely spaced multiple bends in heavy rod stock up to one half inches in diameter. The heretofore rod benders had slow acting rod clamping devices which prevented rapid production rates. Another problem that existed with the conventional rod benders was the difficulty of producing accurate bends with a predetermined characteristic due to the springiness of the metal rod and slight structural deformations within the rod bender itself.

The present invention overcomes these problems by utilizing relatively small but highly leveraged jaws for holding the rod stock in order to permit closely spaced bends and at the same time minimizing the weight and size of the rod bender for portability; the structure of a quick acting cam lock for gripping the rod stock; the implementation of positional and angle indexing devices for accurate bending characteristics; and the structure of the force application member to counteract the springiness characteristic of the metal rod.

SUMMARY OF THE INVENTION

The purpose of the present invention is to provide a portable rod bender for vise mounted operation with a capacity for producing closely spaced multiple bends in heavy rod stock and providing accurate bending characteristics therein.

The operational sequence of rod bending is as follows: the rod bender is securely clamped in a supporting vise, the positional and angle indexing members are set for the desired bend characteristics, the proper bending die is inserted in the die holder, then the rod stock is clamped between the holding jaws of the rod bender by means of a fast acting cam lock, and the handle of the force application member is manually turned through the preset angular sector to complete the operation.

Consequently, an object of the invention is to provide a portable rod bender with a capacity for producing closely spaced multiple bends in relatively heavy bar stock.

Another object of the invention is to provide a rod bender having a relatively small size and weight with respect to its heavy duty performance.

Another object of the invention is to provide positional and angle indexing devices for accurate reproduction of bends.

Another object of the invention is to provide a rod bender which counteracts the springiness of metal rods in order to produce accurate bend characteristics.

Another object of the invention is to provide means for rapid clamping of the rod stock in the rod bender for high production rates.

Another object of the invention is to provide auxiliary brace members to increase bending leverage for relatively heavy rod stock.

Still another object of the invention is to provide structural elements to prevent distortions in the rod bender and maintain the accuracy of the bend characteristics in the rod stock.

Other objects and many additional advantages will be more readily understood by those skilled in the art after a detailed consideration of the following specification taken with the accompanying drawings.

DESCRIPTION OF THE DRAWING

FIG. 1 is a top plane view of the rod bender; and FIG. 2 is a longitudinal cross sectional view taken substantially along lines 2—2 in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2 of the drawing the various structural elements of a rod bending machine 10 are seen mounted on a base section 11. Rod stock 12 to be bent into the desired shape, is held in a rod clamping section 13 comprised of a fixed jaw 14, an opposing movable jaw 15 and a locking member 16. The locking member 16 itself is comprised of a frame 17 and a cylindrical cam 18 rotatably mounted on the frame so that the cam 18 will advance the movable jaw 15 toward the fixed jaw 14 and lock the rod stock 12 therebetween when the cam 18 is rotated by external means such as a wrench 20 engaging a movable hex projection 19 connected to the cam 18.

In order to position the rod stock 12 precisely in the rod bender 10, a positional indexing member 21 is incorporated into the structure of the rod bender 10. This positional indexing member 21 is comprised of a guide member 22, mounted to the movable jaw 15, an indexing stop member 24 slidably mounted on the guide member 22, and a fastening device 25, such as a bolt, for fastening the indexing stop member 24 at a selected position.

The bend angle of the rod stock 12 is preselected by an angle indexing member 26. This angle indexing member 26 is comprised of a bar stop 27 slidably mounted on the frame 17 and a fastening device 28 such as a bolt so that the position of the bar stop 27 defines the bend angle of the rod stock 12. In order to obtain the required bend contour of the rod stock 12 a contour die 29 is bolt mounted to the movable jaw 15.

This contour die 29 is comprised of a block of highly tempered steel having at least one angular edge 31 for bending solid rod stock and at least one rounded edge 32 for bending hollow rod stock. In operation, the contour die 29 is selectively positioned for the desired bend contour by means of fastening bolts 33.

The bending torque required for the rod stock is accomplished by a force application member comprised of a die holder 34 pivotally mounted at one end to a fulcrum 35 located on the fixed jaw 14, a handle 36 mounted on the other end of the die holder 34, and a cylindrical bending die 42 rotatably mounted on the die holder 34 so that friction between the die and rod stock is substantially reduced. The die may have a shape...
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other than cylindrical and it may be rotatably or fixed in position depending upon the material of the rod stock, its size, and the bending characteristics required.

In order to produce accurate bends, in metal rod stock having a springy characteristic, the rod bender is structured to permit an incremental displacement of the rod stock at the point of force application after the prescribed bend angle has been completed, provided the bend angle is less than 90°. In this manner the springiness characteristic of the rod is compensated.

For bending heavy rod stock additional leverage is provided by two auxiliary brace members. A first auxiliary brace member is comprised of a leverage bar 37 slidably mounted on the fixed jaw member 14 so that the point of leverage on the clamped section of the rod stock may be adjusted by means of a fastening device 38 such as a bolt.

A second auxiliary brace member is comprised of an extension bar 44 rotatably mounted on the die holder 34 by means of a fastening device 46 such as a bolt. The contacting end 45 of the extension bar is rounded in order to reduce friction during bending.

A longitudinal projecting member 48, mounted on the bottom surface of the base section 11, is utilized for both mounting the rod bending machine 10 in a vise and providing additional structural rigidity along its longitudinal axis.

A transversal mounted structural reinforcement member 50, also mounted on the bottom surface of the base section 11 provides structural rigidity along the transverse axis of the rod bending machine.

On important advantage of this rod bending machine is the high bending torque to total weight ratio which permits bending heavy rods without affecting the portability feature of the machine. Another advantage of the machine is that closely spaced multiple bends in heavy rod stock can be accomplished by relatively small clamping jaws. Still another advantage of the machine is the high bending accuracy attained by utilizing indexing members, high structural rigidity and compensation for the springiness characteristic of certain metal rods.

While one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts, which will now appear to those skilled in the art may be made without departing from the scope of the invention.

What is claimed is:

1. A portable rod bending machine for vise mounted operation, comprising:
   a base section;
   a rod clamping section mounted on top surface of said base section, said rod clamping section having a fixed jaw member, an opposing movable jaw member and a locking member;
   a detachable contour die member bolt mounted to said movable jaw member;
   a force application member mounted on top surface of said base section;
   a positional indexing member connected to said mov-

able jaw member for positioning a rod stock;
   an angle indexing member mounted on said locking member;
   a first auxiliary brace member mounted on said fixed jaw member;
   a second auxiliary brace member mounted on said force application member;
   a transversely mounted structural reinforcement member on bottom surface of said base section to prevent structural distortion thereof; and,
   a longitudinally mounted projection member on the bottom surface of said base section for mounting said rod bending machine in said vise and thereby providing additional structural rigidity.

2. The structure of claim 1 wherein said locking member comprises:
   a frame mounted on top surface of said base section; and,
   a cylindrical cam eccentrically mounted on said frame wherein the axis of rotation of said cam is perpendicular with respect to surface of said base section so that said cam will move said movable jaw toward said fixed jaw and lock the rod stock thereinbetween when said cam is rotated by external means.

3. The structure of claim 1 wherein said force application member comprises:
   a die holder rotatably mounted at one end to said fixed jaw member;
   handle means mounted to other end of said die holder; and,
   a cylindrical bending die rotatably mounted on said die holder so that friction between the die and rod stock is substantially reduced.

4. The structure of claim 1 wherein said positional indexing member comprises:
   a guide member mounted to said movable jaw member;
   an indexing stop member slidably mounted on said guide member; and,
   means for fastening said indexing stop member to said guide member at a selected position.

5. The structure of claim 1 wherein said angle indexing member comprises a bar stop slidably mounted on said locking member so that position of bar stop defines the bend angle of the rod stock.

6. The structure of claim 1 wherein said first auxiliary brace member comprises a leverage bar slidably mounted on said fixed jaw member so that point of leverage on clamped section of rod stock may be adjusted.

7. The structure of claim 1 wherein said second auxiliary brace member comprises an extension bar pivotally mounted on said die holder so that leverage to the movable section of the rod stock is increased.

8. The structure of claim 1 wherein said detachable contour die member is comprised of a block of tempered steel having at least one angular edge for bending solid rods and at least one rounded edge for bending hollow rods.

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