April 15, 1930. J. R. KERLIN 1,754,470

BENDING MACHINE

Original Filed Dec. 16, 1918

Fig. 1.

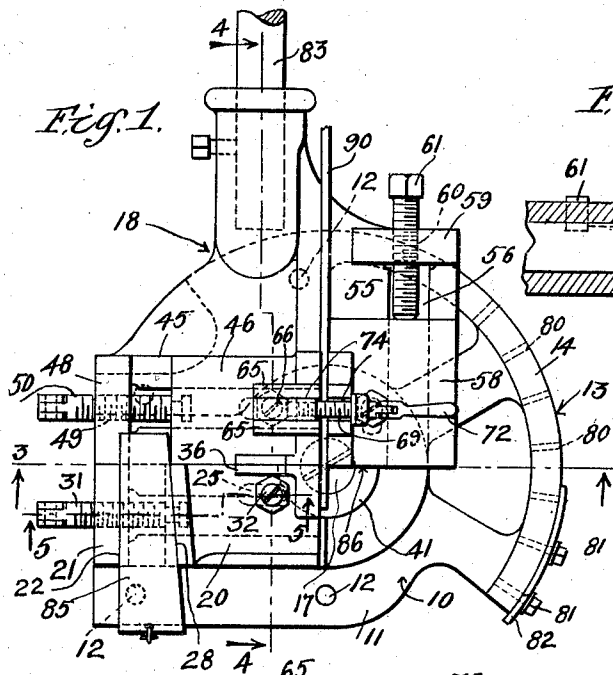


Fig. 4.

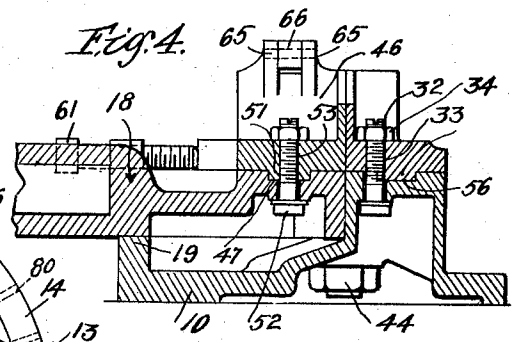


Fig. 5.

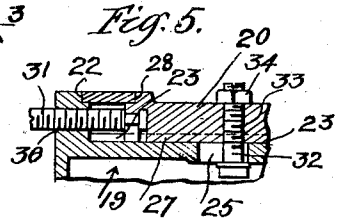


Fig. 2

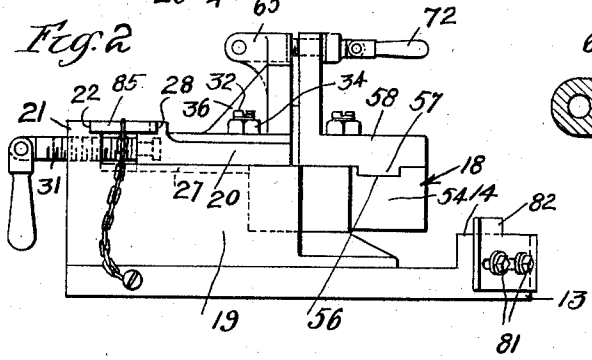


Fig. 6.

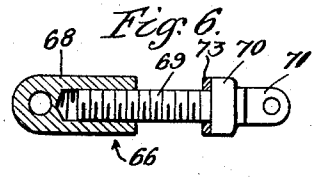


Fig. 7

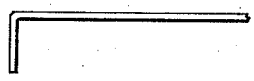


Fig. 3.

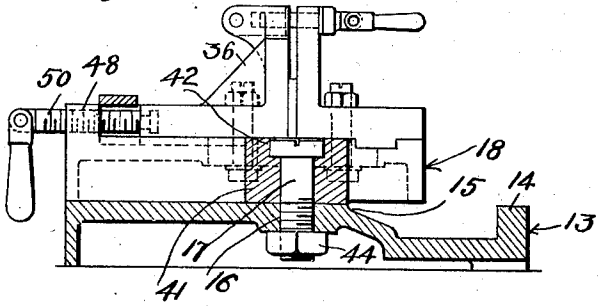
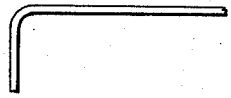


Fig. 8.



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UNITED STATES PATENT OFFICE

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BENDING MACHINE

Refiled for abandoned application Serial No. 267,054, filed December 16, 1918. This application filed June 18, 1924. Serial No. 720,875.

This application is refiled for applicant's abandoned application entitled "Bending machine" Serial No. 267,054 filed in the Patent Office December 16, 1918.

My invention resides more particularly in a mechanism adapted for use in bending metallic bars, pipes, and other objects into predetermined angles or curves.

An important object of my invention is to provide a bending machine in which all the clamping and bending jaws are adjustable.

A further object is to provide a simple means for relieving the strain on the jaw adjusting mechanism during a bending operation.

A still further object is to provide an easily operated locking means for rigidly securing the upper ends of the clamping jaws together during the operation of the machine.

A final object of my invention is to provide a simple and inexpensive mechanism that is easy of manipulation, and one in which the strains consequent to the bending operation are efficiently provided for.

I accomplish the above objects by means of the machine herein described and illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of the machine with a piece of material adjusted between the clamping jaws preparatory to bending into shape.

Fig. 2 is a side elevation.

Fig. 3 is a cross section taken on line 3—3 of Fig. 1.

Fig. 4 is a longitudinal cross section taken on line 4—4 of Fig. 1.

Fig. 5 is a detail cross sectional view illustrating one of the jaw adjusting mechanism, taken on line 5—5 of Fig. 1.

Fig. 6 is an enlarged detail sectional view of the locking mechanism of the clamping jaws.

Fig. 7 illustrates a plan view of an iron bar after being bent at an acute angle by my machine.

Fig. 8 illustrates a plan view of an iron bar in which the bend has been made in a curved form by my machine.

The improved bending apparatus forming the subject matter of the present invention comprises a casing or base 10 which is substantially hollow in configuration, and preferably formed of cast iron or steel. The base is provided around its edges or flanges 11 with a plurality of bolt holes 12 to receive bolts or other securing means, for rigidly maintaining the base against movement when secured to a suitable framework or foundation (not shown). One edge of base 10 is curved as at 13, and an upstanding track 14 is formed thereon. Track 14 is preferably of arcuate form and extends along the curved edge 13, as clearly shown in Fig. 1 of the drawing. At the central point of track 14 is a circular raised portion 15 of the same height as track 14, and is provided with a centrally disposed threaded bore 16, through which passes the lower end of a screw threaded king bolt 17, adapted to pivotally secure the movable bending member 18 in position on the base 10 of the machine, as will be more particularly described hereinafter.

The base 10 is also provided with a raised portion 19, rectangular in configuration, upon which is adjustably mounted an abutment or brace jaw 20. Raised portion 19 is provided on its outer upper end with an upstanding wall 21 formed integrally therewith, and provided on its inner longitudinal edge with a groove 22, the upper face of portion 19 is also provided with a longitudinally extending guide groove 23, the said groove having a slot 25 therethrough near the inner end thereof. Mounted on the upper face of raised portion 19 is the adjustable abutment jaw 20, the under face of said jaw being provided with a longitudinally extending tongue 27 adapted to engage the guide groove 23 formed in the upper face of the raised portion 19. The outer upper face of abutment jaw 20 is provided with a groove 28, inclined with respect to the outer transverse edge of the abutment jaw. Wall 21 is provided at its center with a screw threaded aperture 30 in which is mounted an adjusting screw 31, the free end of said adjusting screw swivelly engaging the movable abutment jaw 20.

It will be observed from the foregoing that by rotating screw 31, jaw 20 would be moved

longitudinally along the upper face of the raised portion 19 into the desired position. In order to rigidly maintain jaw 20 in its adjusted position, and also to prevent an upward or lateral movement of the same during a bending operation, I provide an adjusting bolt 32, said bolt passing upwardly from the under face of portion 19 through slot 25 and threaded aperture 33 formed in one of the corners of jaw 20 and secured in position by a lock-nut 34, the end of said bolt being provided with a screw driver slot so that an adjustment may be quickly made. The face of jaw 20 is provided with a web 36 to insure its stability when pressure is brought against the same.

Bending member 18 is provided on one of its edges with a semi-circular boss or projection 41 formed integrally therewith, and having a counter sunk bore 42 for the reception of the pivotal or king bolt 17, the end of said bolt engaging the threaded bore 16 formed in the circular raised portion 15, a lock-nut 44 securing the king bolt against movement when the bending member 18 is adjusted. The head of bolt 17 is slotted for adjustment purposes.

Formed integrally with the bending member 18, and lying parallel with one of its edges, is an upstanding block or base 45, similar in configuration to the portion 19 formed on base 10. This base 45 forms a support for a clamping jaw 46, and is grooved on its upper face as at 47, and provided on its outer upper edge with an upstanding lug 48, having a centrally disposed threaded bore 49, for the reception of a jaw adjusting screw 50. Screw 50 swivelly engages the outer transverse edge of jaw 46, and on a rotation thereof the jaw can be adjusted to the desired position. The underface of jaw 46 is provided with a tongue 51, that engages the groove 47 formed on base 45 to guide the same during its movement, and at the same time prevent any lateral movement thereof. The floor of the groove 47 is slotted longitudinally for the passage therethrough of a headed bolt 52, the threaded end of said bolt engaging a threaded aperture 53 formed on the inner end of the jaw 46. In adjusting jaw 46 the handle of the adjusting screw 50 is rotated so as to bring the jaw 46 into the proper or desired position.

Mounted along the edge 54 of the bending member 18 is a raised portion 55, similar in configuration to the raised portion 45, and is provided on its upper face with a guide groove 56 adapted to engage a tongue 57 formed on the under face of an adjustable clamping jaw 58. The outer upper end of raised portion 55 is provided with an upstanding lug 59 which is provided with a centrally disposed threaded aperture 60 for the reception of a threaded adjusting bolt 61.

The upper end of jaw 46 is provided with a pair of lugs 65 spaced apart for the reception of a jaw locking device 66 which is pivoted therebetween. This locking device preferably consists of a threaded socket 68 which is pivotally mounted between lugs 65 as clearly shown in Figs. 1 and 2 of the drawing. Engaging threaded socket 68 of the jaw locking device, is a threaded bolt 69 provided on one end thereof with a head 70, having an apertured lug 71 extending therefrom, an operating handle 72 being attached thereto. To prevent the handle from becoming unduly hot during a bending operation (when the material being bent is in a highly heated condition) a washer 73 is mounted on bolt 69 lying against the inner annular face of head 70, serving thereby to prevent an unbroken flow of heat from the heated material to the operating handle.

The upper end of clamps 46 and 58 are provided with semi-circular recesses 74 for the reception of the socket 68 and bolt 69 of the locking device. The radius of recess 74 in the upper end of clamp 58 is greater than the diameter of bolt 69, thereby permitting of an adjustment of the clamping jaw 58 by means of the adjusting bolt 61. By employing a locking means for the two clamping jaws 46 and 58 all danger of the upper portions of the jaws spreading apart during a bending operation is avoided.

The outer face of track 14 is preferably provided with a plurality of apertures 80, as clearly shown in dotted lines of Fig. 1 of the drawing. These apertures are threaded and are spaced apart an equal distance from each other and are adapted to receive the threaded ends of adjusting bolts 81, these bolts rigidly maintaining an adjustable stop 82 in position against the outer face of the circular track 14. By means of the adjustable stop the movement of the operating lever 83 attached to bending member 18 can be determined, and the exact angle can be formed in the material that is being bent.

By mounting the clamping jaws and the bending jaw in an adjustable manner on the bending member 18 and the base 10 respectively, I am enabled to effect an extremely fine adjustment of said jaws so that the material which is being bent may be bent at any desired angle accurately. By adjustably mounting one of the clamping jaws 58 I am enabled to redress the surface or material bending wall 86 of the jaw if the same should become pitted or roughened from constant bending operations. When the jaw is in such a condition it may be removed and the surface 86 planed off smoothly and then the jaw can be adjusted by means of the adjusting bolt 61 so that it is in absolute alinement with the inner face of clamping jaw 46.

As bending jaw 20 receives the greatest strain during a bending operation that would seriously affect the said jaw adjusting mecha-

nism I have provided a wedge 85 which is adapted to seat in the grooves 22 and 28, said wedge relieving all strain upon the screw threads of the adjusting bolt 31, and also all strain that might be imposed on the adjusting bolt 32 which adjustably secures the jaw in position on the base 10.

In a bending operation the bar 90 which is to be bent is first placed between the clamping jaws 46 and 58 and the locking mechanism is then swung into position to rigidly maintain the upper portions of jaws 46 and 58 against spreading. The adjusting gauge 82 is then moved into position on the outer face of the circular track 14 and the handle 83 is then operated to move the bending member 18 and complete the bending operation. When it is desired to bend the bar 90 into a curved angle as shown in Fig. 8 of the drawings, jaw 20 is moved rearwardly and away from the center of base 10, or to get a more perfect arc at the bend, the jaw 58 may be also adjusted away from the center of rotation, to the same extent as that of jaw 20.

From the above description it will be noted that I have produced a bending machine on which an extremely fine adjustment may be made of all the jaws, so that the bending of metallic bars, pipes, etc., may be accurately accomplished.

What I claim is:

1. In a metal bending machine, a base member provided with an abutment, a bending member pivotally mounted on said base member, a pair of clamping jaws slidably mounted on said bending member for independent adjustment thereon, the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member, the work face of said abutment being in substantial alignment with the opposed work faces of said clamping jaws before the bending operation, and means for adjusting said abutment out of such alignment.

2. In a metal bending machine, a base member provided with an abutment, a bending member pivotally mounted on a said base member, a pair of clamping jaws mounted on said bending member, the work face of said abutment being in substantial alignment with the work faces of said clamping jaws before the bending operation, means for adjusting said clamping jaws angularly with respect to each other, the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member, and means for adjusting said abutment out of alignment with the work faces of said clamping jaws.

3. In a metal bending machine, a base member provided with an abutment, a bending member pivotally mounted on said base member, a pair of clamping jaws slidably mounted on said bending member for independent adjustment thereon, the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member, means for adjusting one of said clamping jaws relative to the other, and means for adjusting said abutment substantially in the plane of said bending member, both of said adjusting means being operable from the same side of the machine when the bending member is in its operative position prior to the bending operation.

4. In a metal bending machine, a base member provided with an adjustable abutment jaw, a bending member pivotally mounted on said base member, a pair of clamping jaws adjustably mounted on said bending member, and means for relieving the strain on the adjusting mechanism of the abutment jaw during a bending operation.

5. In a metal bending machine, a base member provided with an adjustable abutment jaw, a bending member pivotally mounted to swing on said base member, a pair of clamping jaws mounted on said bending member, means to adjust each of said clamping jaws, and means for relieving the strain on the adjusting mechanism of the abutment jaw during a bending operation.

6. In a metal bending machine, in combination with a base, an abutment jaw affixed thereto, means to adjust said jaw, a movable member pivotally secured to said base, a pair of clamping jaws affixed thereto, and means for relieving the strain on the abutment jaw adjusting mechanism during a bending operation.

7. In a metal bending machine, in combination with a base, an adjustable abutment jaw secured to said base, mechanism for adjusting said jaw, a wedge shaped member adapted to engage said jaw and to relieve the strain on the jaw adjusting mechanism during a bending operation, a movable member pivotally secured to said base, a pair of clamping jaws mounted on said base, means to adjust each of said clamping jaws independently of the other, and a locking means for the upper end of said clamping jaws.

8. In a metal bending machine, a base member provided with an adjustable abutment and a bending member pivotally mounted on said base member provided with a pair of independently adjustable clamping jaws, the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member.

9. In a metal bending machine, a base member provided with an adjustable abutment, a bending member pivotally mounted on said base member provided with a pair of independently adjustable clamping jaws,

the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member, and means for locking said abutment and clamping jaws in adjusted position.

10. In a metal bending machine, a base member provided with an adjustable abutment and a bending member pivotally mounted on said base member provided with a pair of clamping members adjustable angularly with respect to each other, the work face of one of said clamping jaws being adapted at all times to slide in a radial direction with respect to the center of rotation of said bending member.

In witness that I claim the foregoing I have hereunto subscribed my name this 11th day of June, 1924.

JAS. R. KERLIN.