A. M. MEYERS.

BENDING MACHINE.

APPLICATION FILED NOV. 25, 1918.

1,338,946.

Patented May 4, 1920.

5 SHEETS—SHEET 1.

Fig. I.

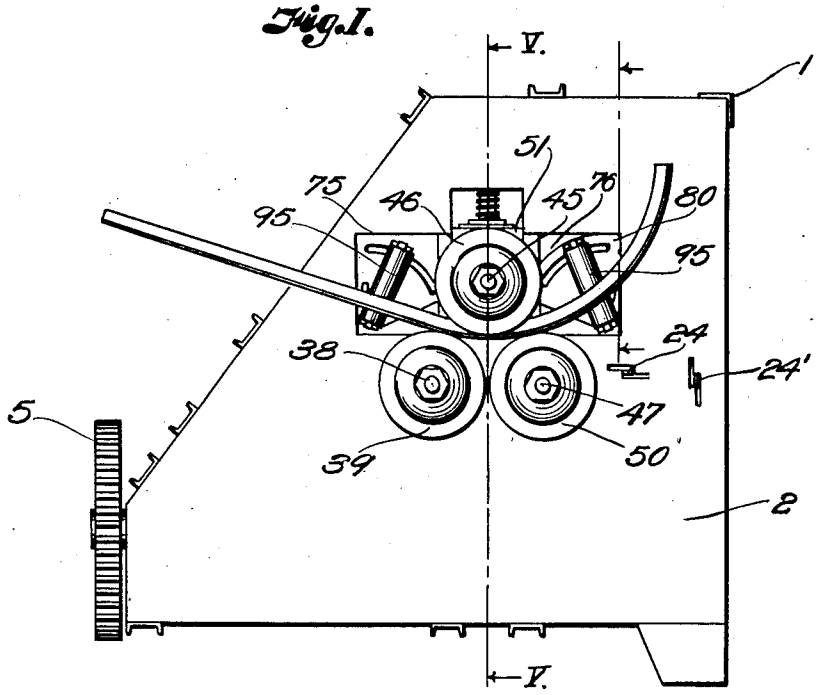
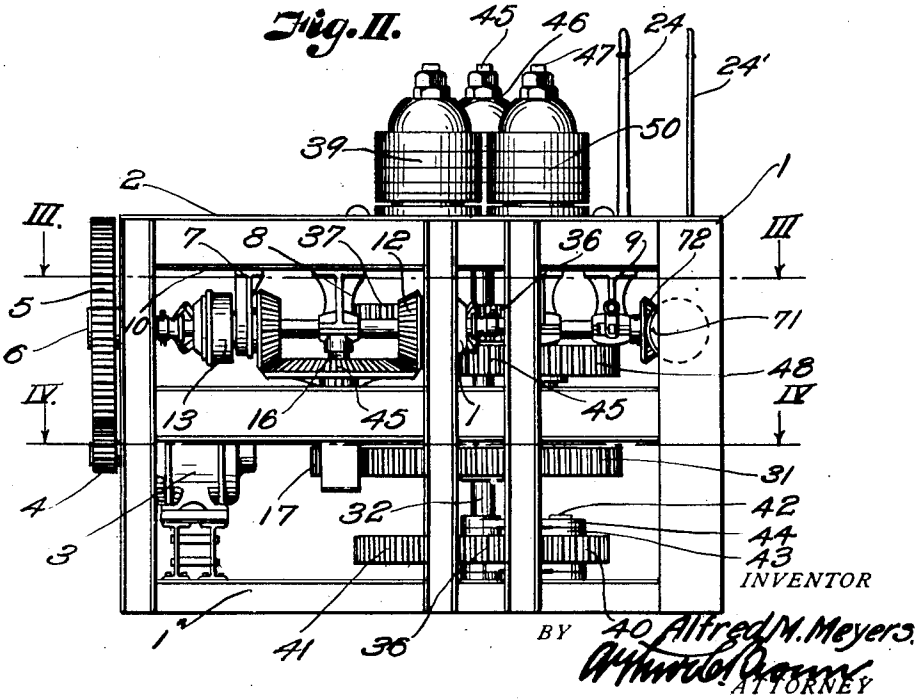


Fig. II.



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5 SHEETS—SHEET 2.

Fig. III.

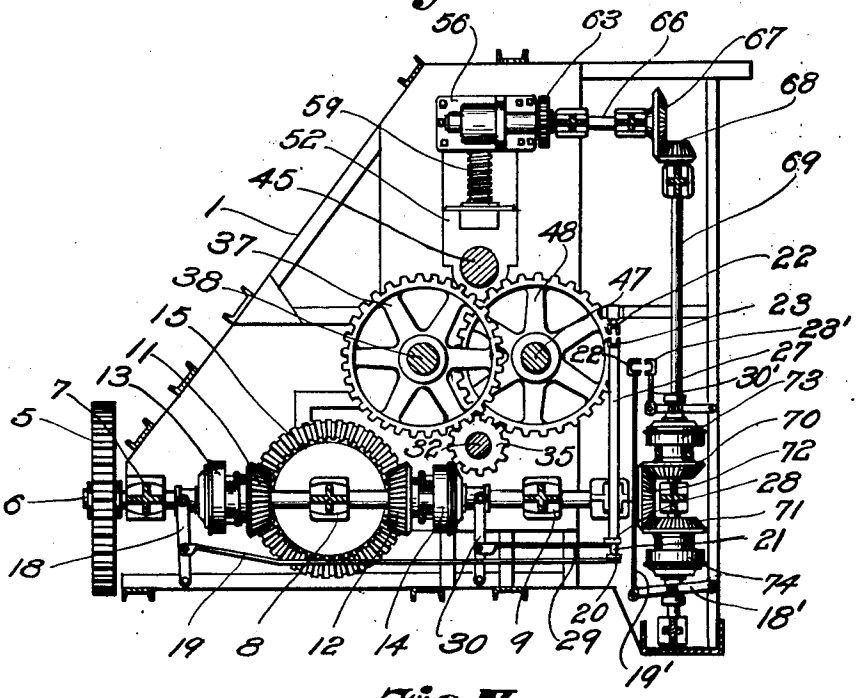
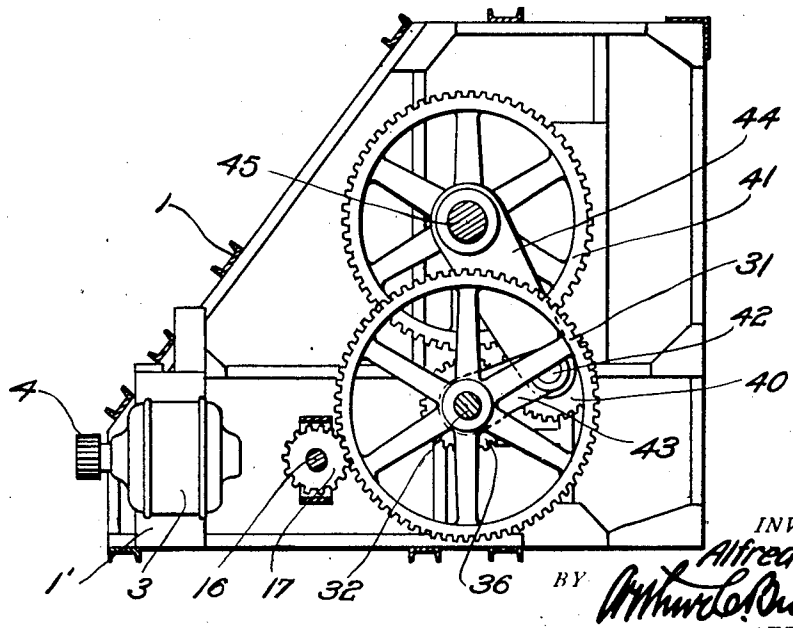


Fig. IV.



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5 SHEETS—SHEET 3.

Fig. V.

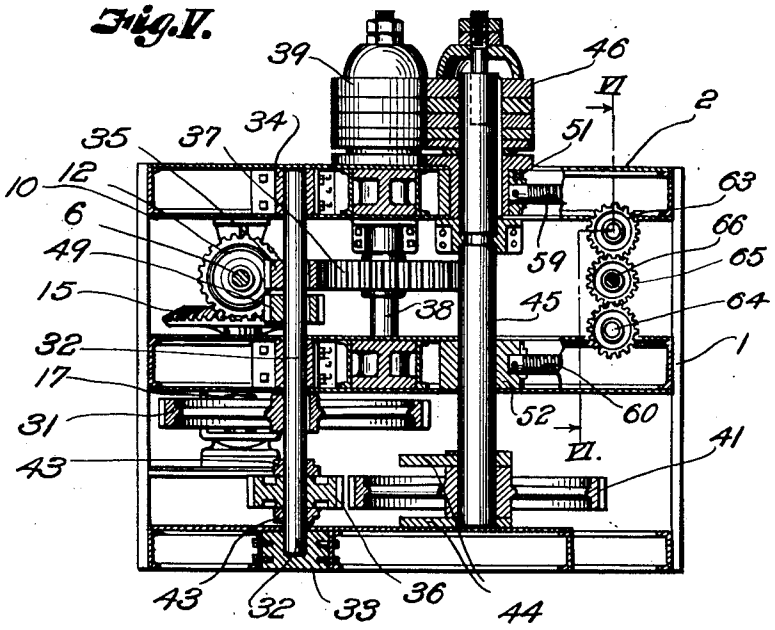
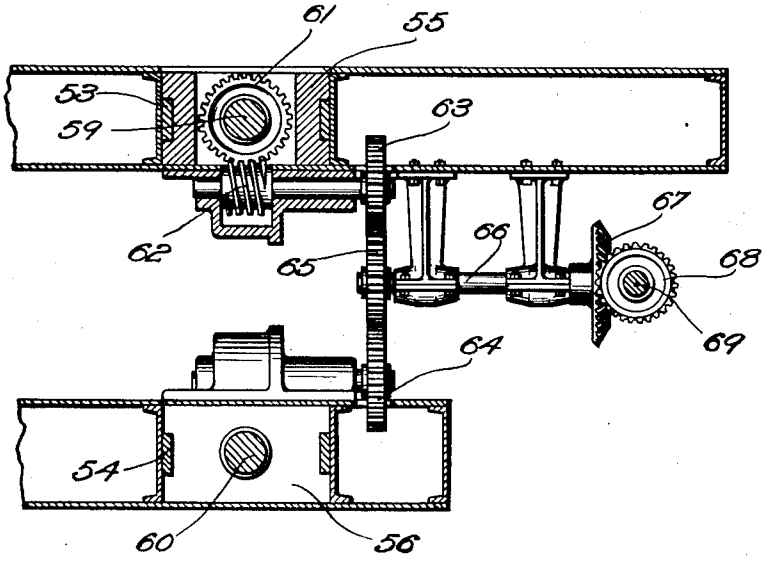


Fig. VI.



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5 SHEETS—SHEET 4.

Fig. VII.

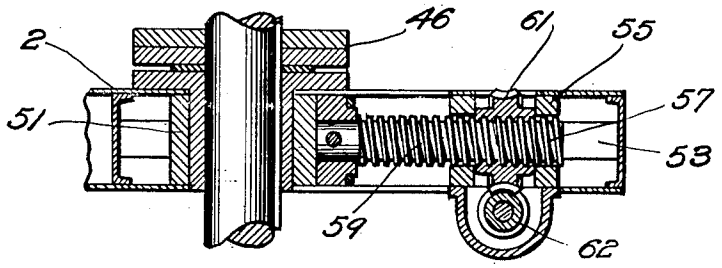


Fig. VIII.

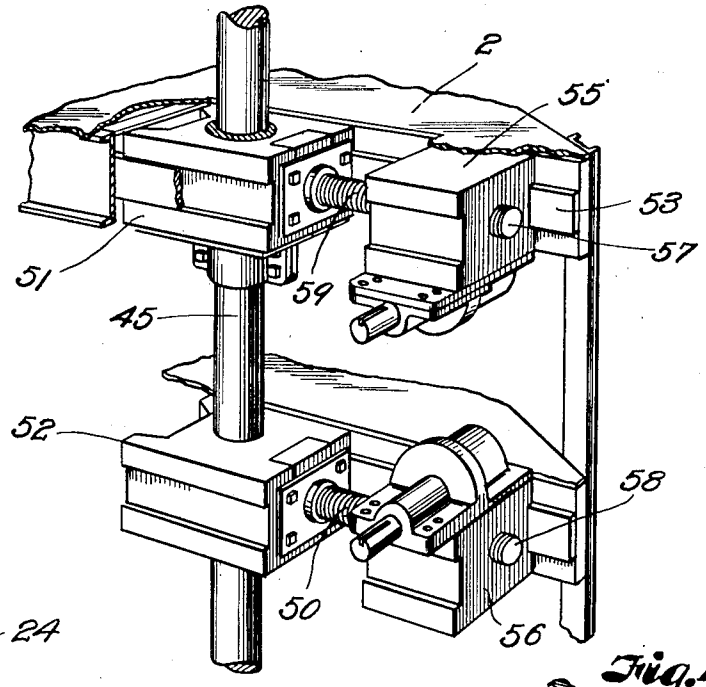


Fig. IX.

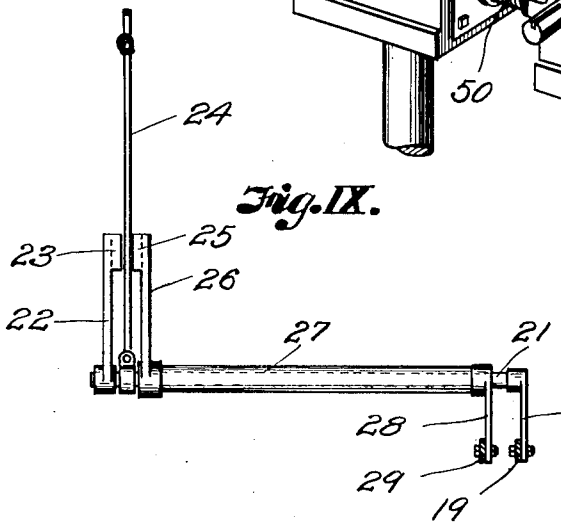
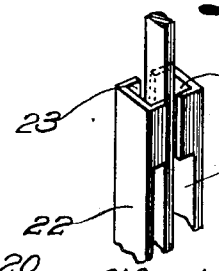


Fig. X.



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5 SHEETS—SHEET 5.

Fig. XI

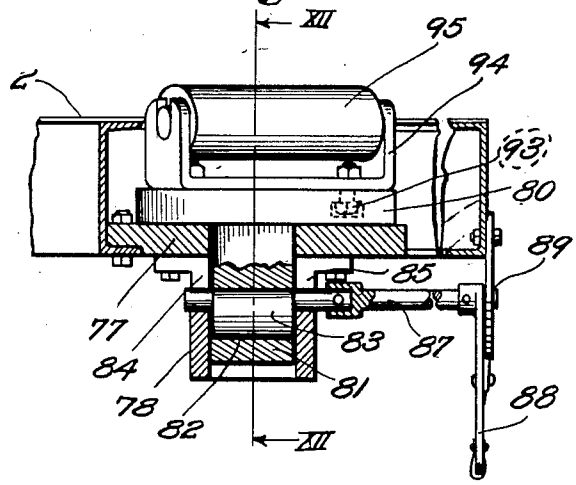


Fig. XII.

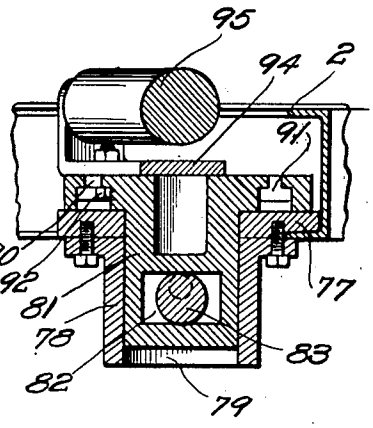


Fig. XIII.

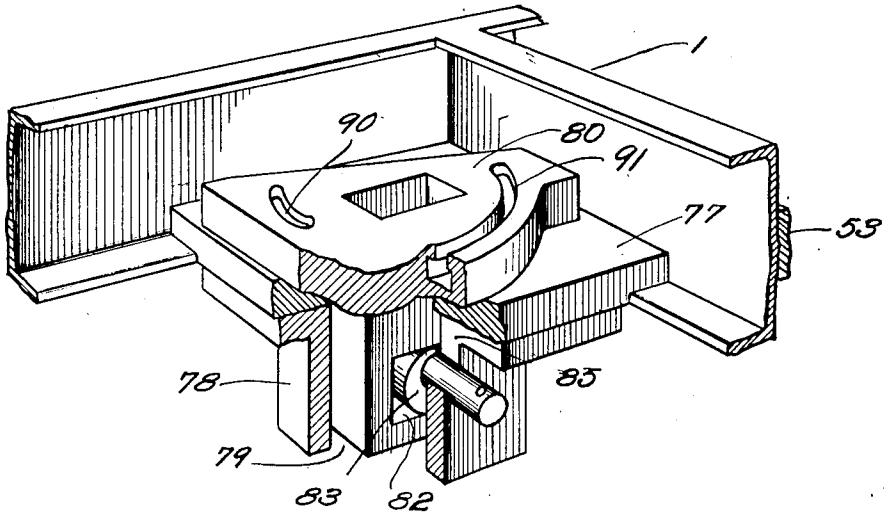
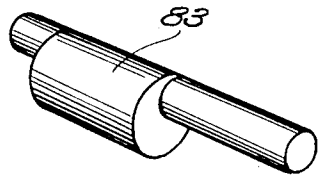


Fig. XIV.



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UNITED STATES PATENT OFFICE.

ALFRED M. MEYERS, OF MERRIAM, KANSAS, ASSIGNOR TO THE KANSAS CITY STRUCTURAL STEEL COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

BENDING-MACHINE.

1,338,946. Specification of Letters Patent. Patented May 4, 1920.

Application filed November 25, 1918. Serial No. 264,090.

To all whom it may concern:

Be it known that I, ALFRED M. MEYERS, a citizen of the United States, residing at Merriam, in the county of Johnson and State of Kansas, have invented certain new and useful Improvements in Bending-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to a machine for bending bars, commercial shapes and the like.

The machine is particularly adapted for use in bending angle bars to marine shapes as, for example, to conform to the desired shape for the ribs of ships, the bilge braces, shapes to be used on rudders or indeed, any curved form.

In the drawings—

Figure I is a top plan view of a bending machine constructed in accordance with my invention.

Fig. II is an end view of the same.

Fig. III is a sectional view on the line III—III of Fig. II.

Fig. IV is a sectional view on the line IV—IV of Fig. II.

Fig. V is a sectional view on the line V—V of Fig. I.

Fig. VI is an enlarged sectional view on the line VI—VI of Fig. V.

Fig. VII is a sectional view through the bearing box for the shiftable vertical roller.

Fig. VIII is a detailed perspective view of the bearing boxes for the shaft on the shiftable vertical roller.

Fig. IX is a detailed view of the clutch operating mechanism.

Fig. X is a detailed view of the selective slot bars for the shifting mechanism.

Fig. XI is a sectional view through one of the vertical adjustable base rollers.

Fig. XII is a sectional view on the line XII—XII of Fig. XI.

Fig. XIII is an enlarged detailed view of one of the base roller supports and

Fig. XIV is a detailed perspective view of one of the shifting cams.

Referring now to the drawings by numerals of reference:

1 designates a frame which may be appropriately constructed and braced to support the mechanism and the platform 2. Suitably supported on the base 1′ is a driving member which may consist of a motor 3, on which is a pinion 4 in mesh with a gear 5 which drives the counter-shaft 6, mounted in bearings 7, 8 and 9 on plate 10. 11 and 12 are beveled pinions loose on the shaft 6 but adapted to be clutched thereto by the independently operating clutches 13 and 14. These pinions are constantly in mesh with the beveled gear 15 on the vertical shaft 16 and on which is a pinion 17 transmitting power to the vertical bending rollers, as will be presently explained.

The clutch 13 splined on the shaft 6 is adapted to be moved into and out of clutching engagement with the pinion 11 through the medium of the link lever 18, actuated by rod 19 on the crank 20 of the rock shaft 21 (see Figs. III and IX). The rock shaft 21 is provided with an upstanding arm 22 having a selective slot 23 adapted to receive the pivoted lever 24 loose on the rock shaft 21 and adapted to engage the selective slot 25 on the up-standing arm 26 of the rock shaft 27 sleeved on 21. Rock shaft 27 has a depending crank 28 connected to an actuating rod 29 engaging the pivoted lever 30 which operates the clutch 14 for pinion 12. Therefore, if power is supplied through the motor 3, the pinion 4 and gear 5, the counter-shaft 6 will be rotated idly unless the lever 24 is actuated to throw one of the clutches 13 or 14 into engagement with one of the gears 11 or 12 so that power will be communicated to the beveled gear 15. It is understood that the direction of rotation of the beveled gear 15 will be determined by the particular pinion thrown into mesh therewith; when the gear 15 is rotated, power will be communicated through its shaft 16 to the pinion 17 and as pinion 17 is in mesh with the spur gear 31 fixed on shaft 32, said shaft will be rotated. The shaft 32 is in fixed bearings 33 and 34 and said shaft carries pinions 35 and 36. The pinion 35 meshes with a gear 37 on shaft 38 which carries the bending roller 39 consisting of a plurality of rings and which extends above the platform 2. The pinion 36 meshes with an intermediate gear 40 which in turn, drives the gear 41. The

bearing for the pinion 40 consists of a pivot or trunnion 42 which connects the links 43 and 44 on shafts of the gears 36 and 41 respectively, (see Figs. II and IV). The gear 41 is fixed on shaft 45 which carries the bending roller 46 adjacent to the roller 39. 47 is a vertical shaft in fixed bearing in the frame which carries a gear 48 meshing with the pinion 49 on shaft 32 and rotated in the same direction as the gear 37 so that the roller 50 will rotate in the same direction as the roller 39.

Thus, it will be seen that when the bar or angle, as the case may be, is fed between the roller 46 and the rollers 39 and 50, the device being bent will partake the desired curvature depending on the pressure exerted by the roller 46. The shaft on which the roller 46 is mounted is laterally adjustable toward and away from the rollers 39 and 50 so that the degree of curvature on the bar may be determined. By referring to Figs. VI, VII, and VIII it will be observed that the shaft 45 is mounted in sliding bearings 51 and 52 spaced apart and mounted on the guides 53 and 54 respectively, (see Figs. VI and VIII) in line with but fixed with respect thereto, and spaced from the sliding bearings 51 and 52 are boxes 55 and 56 in which are the threaded ends 57 and 58 of the screws 59 and 60. These screws are fixed to the sliding bearings 51 and 52 and have threaded engagement with the worm gears 61, which are adapted to rotate in the boxes 55 and 56 but which have no endwise movement. These gears 61 are driven by the worms 62 so that when the gears 61 are rotated a longitudinal movement will be imparted to the screws to shift the shaft 45 laterally. The worms 62 are driven by the gears 63 and 64 through the medium of an intermediate pinion 65 which receives its motion from the shaft 66 to which it is fixed; said shaft 66 carries a beveled gear 67 meshing with the beveled gear 68 on the shaft 69, (see Fig. III). The shaft 69 carries at its end opposite to 68 a pair of spaced beveled gears 70 and 71 in mesh with the beveled gear 72 on the shaft 6. These gears 70 and 71 are normally loosely mounted on the shaft 69 but are adapted to be clutched thereto by the clutches 73 and 74 respectively, which clutches may be any preferred form. When gear 70 is clutched to shaft 69 the worms will be driven in one direction and when gear 71 is clutched to shaft 69 the worms will be driven in an opposite direction so as to cause the roller 46 to move toward and away from the rollers 39 and 50. In this way any desired curvature can be imparted to the bar or angle.

The base rollers and the method of mounting the same are best shown in Figs. I, XI to XIV, both inclusive.

In the platform 2 are the recesses 75 and 76 provided with the floor plates 77 carrying the slotted guides 78 to a central opening 79; upon the floor plates 77 are vertical adjustable blocks 80 having depending shanks 81 with transverse rectangular openings 82 to receive a cam 83, the shaft of which is journaled in the slots 84 and 85 as shown in Fig. XI. One end of the shaft of the cam 83 is connected to an extension shaft 87 carrying an operating lever 88 with an ordinary pawl and ratchet mechanism 89, so that the shaft can be turned and held in any desired adjustment to effect the necessary vertical adjustment of the block 80. The block 80 is provided with segmental slots 90 and 91 to receive the headed projections 92 and 93 on the yoke 94 which carries the base roller 95. For the purpose of illustration I have shown only one roller and its set of appertenances, it being obvious that the construction of both rollers and their operating mechanisms are the same.

From the foregoing it will be apparent that these rollers may be conveniently adjusted vertically to accommodate them to various conditions. It will also be apparent that the work may be conveniently fed between the vertical rollers and any desired curvature within certain limts may be imparted to the bar, angle, channel, I-beam, or other commercial shapes and that any desired pressure may be exerted by the roller 46.

What I claim and desire to secure by Letters-Patent is:

1. A bending machine comprising a base, vertically disposed bending rollers carried by the base, a supporting roller, a mounting for the supporting roller comprising a block, a depending shank on said block, angular in cross-section and having a transverse rectangular opening, guiding means for the said shank, a rock shaft, a cam on the rock shaft and within the rectangular opening, and means for effecting rotative adjustment of said rock shaft.

2. A bending machine comprising a base, vertically disposed bending rollers carried by the base, a supporting roller, a mounting for the supporting roller comprising a block having inner and outer segmental slots, the outer segmental slot being of relatively greater length than the inner slot, a roller carrying a yoke swingingly mounted in the slots in the block but mounted for fixed adjustment, and means for vertically adjusting said block.

3. A bending machine comprising vertical bending rollers one of the bending rollers being adjustable inwardly and outwardly, a supporting frame provided with recesses at opposite sides of the adjustable bending roller, floor plates secured in the said recesses and having depending guiding means, blocks arranged in the said recesses and pro-

vided with shanks operating in the said guiding means and cams journaled in the guiding means and arranged to adjust the shanks and the blocks upwardly and downwardly, and supporting rollers carried by the blocks.

4. A bending machine comprising vertical bending rollers one of the bending rollers being adjustable, a supporting frame having recesses at opposite sides of the adjustable bending roller, floor plates arranged in the said recesses and provided with slotted guides, blocks arranged on the floor plates and provided with shanks operating in the said guides, cams journaled in the slots of the guides and arranged to raise and lower the shanks and the blocks, and supporting rollers mounted on the said blocks.

5. A bending machine comprising vertical bending rollers, a supporting frame, plates carried by the supporting frame and having depending guides angular in cross-section, blocks arranged on the plates and having angular shanks slidable in the guides and provided with openings, cam shafts journaled in the said guides and having cams operating in the openings of the shanks and supporting rollers mounted on the said blocks.

6. A bending machine comprising a supporting frame, vertical bending rollers mounted on the frame, adjustable blocks located at opposite sides of one of the bending rollers and having inner and outer arcuate slots of unequal length, adjustable yokes mounted on the blocks supporting rollers arranged in the yokes and fastening devices carried by the yokes and operating in the segmental slots the outer segmental slots being of relatively greater length than the inner segmental slots to permit a greater adjustment of the outer ends of the supporting rollers.

In testimony whereof I affix my signature.

ALFRED M. MEYERS.