Dec. 3, 1957 J. A. COOK ET AL 2,815,062

MACHINE TO SIMULTANEOUSLY EFFECT A PLURALITY OF BENDS IN A ROD

Filed March 9, 1956 3 Sheets-Sheet 1

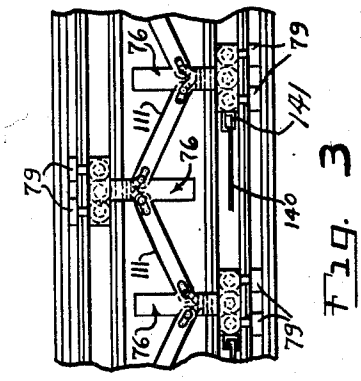


Fig. 3

Fig. 1

Fig. 2

INVENTOR.
JOHN A. COOK
JOHN A. COOK JR.

BY Jennings & Carter

ATTORNEYS

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Filed March 9, 1956 3 Sheets-Sheet 2

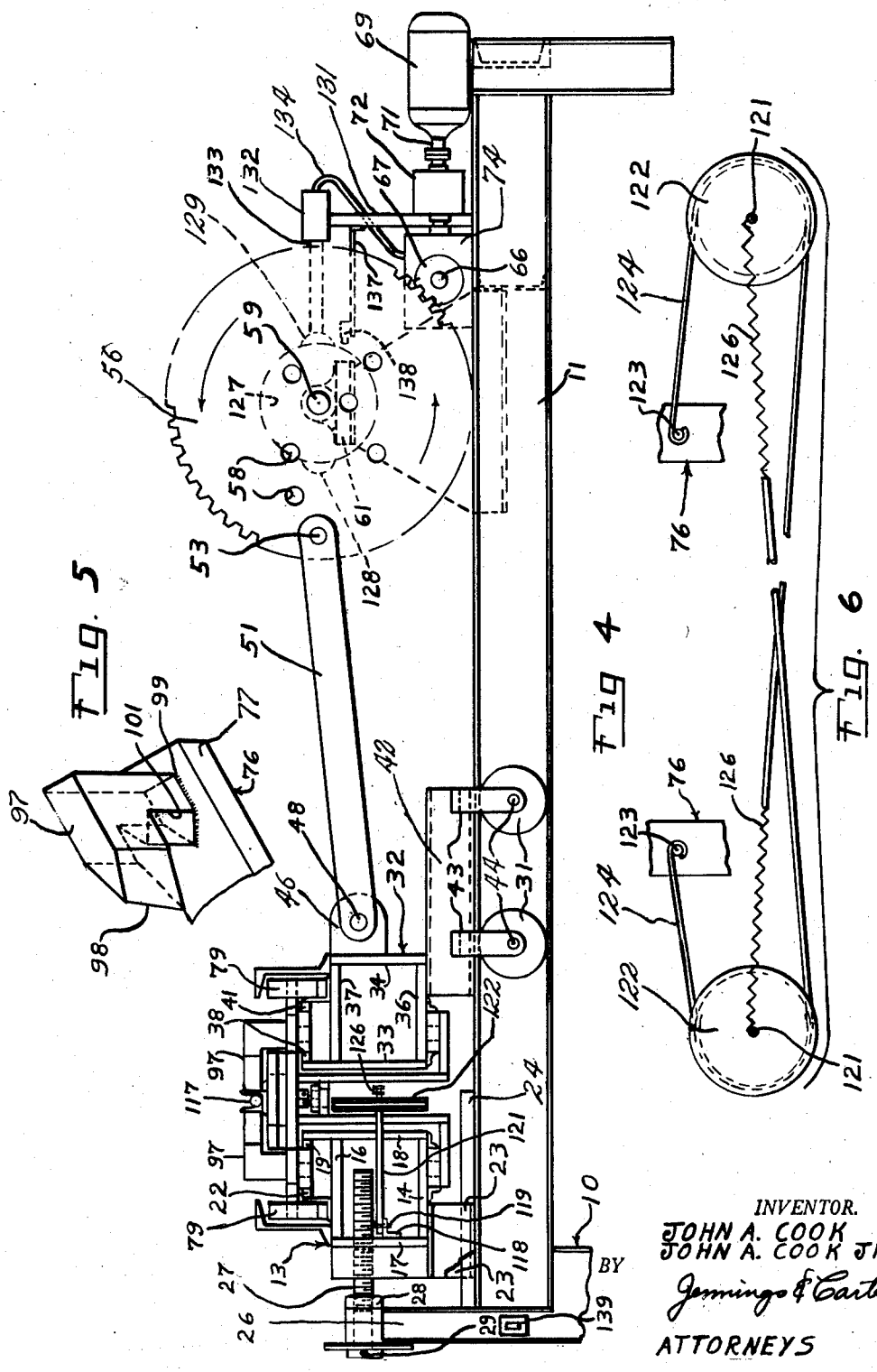


FIG. 5

FIG. 4

FIG. 6

INVENTOR.
JOHN A. COOK
JOHN A. COOK JR.
BY
Jennings & Carter
ATTORNEYS

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Filed March 9, 1956 3 Sheets-Sheet 3

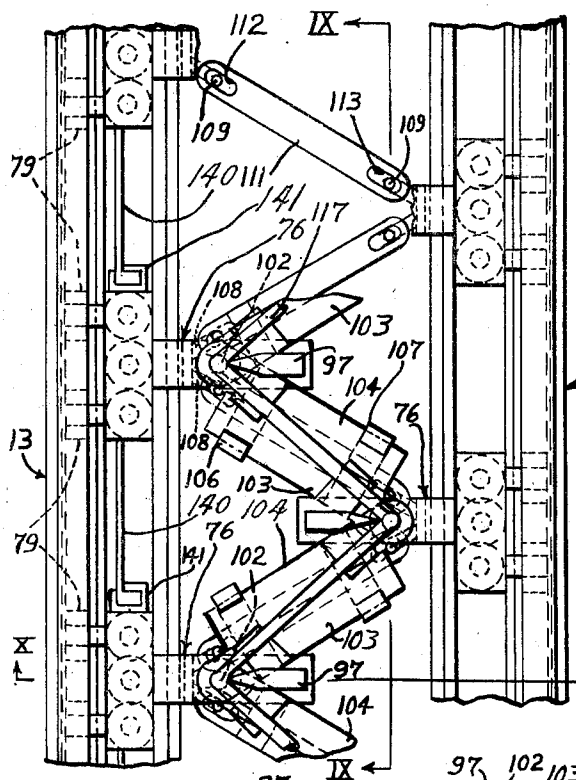


Fig. 8

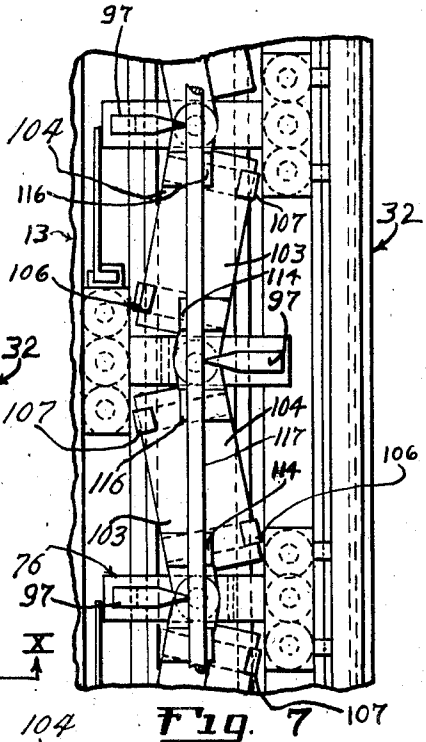


Fig. 7

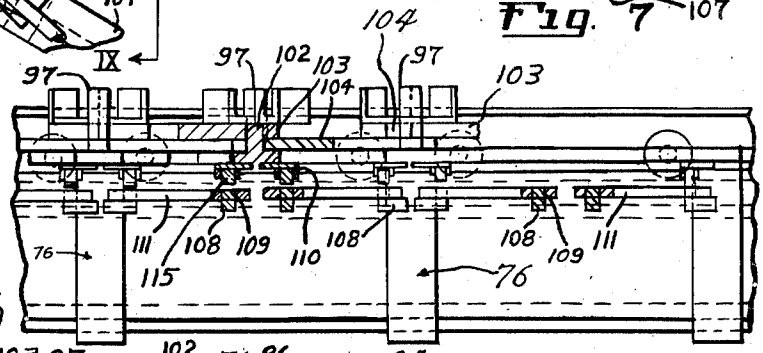


Fig. 9

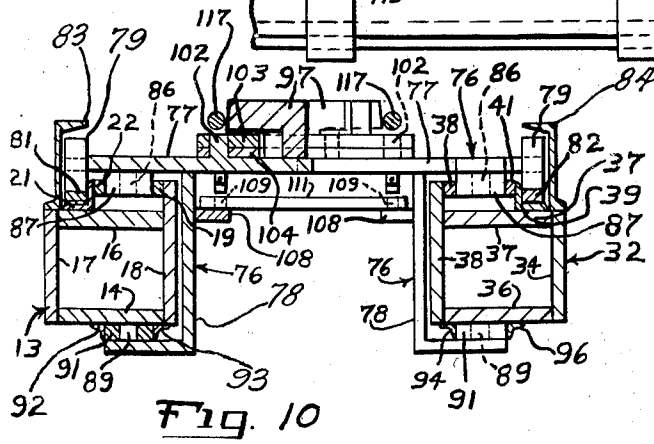


Fig. 10

INVENTOR.
JOHN A. COOK
JOHN A. COOK JR.

BY Jennings & Carter

ATTORNEYS

United States Patent Office

2,815,062

Patented Dec. 3, 1957

2,815,062

MACHINE TO SIMULTANEOUSLY EFFECT A PLURALITY OF BENDS IN A ROD

John A. Cook and John A. Cook, Jr., Fairfield, Ala.

Application March 9, 1956, Serial No. 570,608

16 Claims. (Cl. 153—20)

This invention relates to rod bending apparatus and has for an object the provision of means for simultaneously effecting a plurality of bends in a rod.

Another object of our invention is to provide a rod bending machine which shall be adapted to bend a straight bar into a series of angular shapes accurately spaced longitudinally of the finished bar, whereby the bar may be welded or otherwise connected between two or more members to form a truss or brace for a bar joist, or the like.

Another object of our invention is to provide a rod bending machine of the character designated which shall be adapted for bending a rod into zig-zag shape with alternate bends disposed in the same planes.

A further object of our invention is to provide a rod bending machine of the character designated which may be accurately and quickly adjusted to regulate the depth of and the length between bends of the finished rod, thus providing a single machine which is adapted for use in bending rods of different dimensions.

A still further object of our invention is to provide a rod bending machine of the character designated which shall be simple of construction, economical of manufacture and which may be operated with a minimum of labor to bend the rods in a minimum of time.

Heretofore in the art to which our invention relates difficulties have been encountered in applying a plurality of bends to a rod simultaneously due to the fact that the cross sectional area of the rod is easily varied by stretching or deforming as the bend is effected.

Briefly, our improved apparatus comprises substantially parallel, longitudinally extending guide members, one of which is adapted for lateral reciprocation relative to the other. Alternately spaced anvil support units are mounted for longitudinal movement along the guide members whereby the units on one guide member are spaced longitudinally between the adjacent units on the other guide member. Upstanding work engaging anvils are mounted on the support units. Pivotally connected to the support units are arms which extend outwardly of the support units with the free ends of the arms of adjacent alternately spaced units extending alongside each other. Spacer bars pivotally connect adjacent alternately spaced support units whereby the effective length of the arms is determined. Other work engaging anvils are mounted on the arms in position to lie on the opposite side of the rod to be bent from the first mentioned anvils whereby upon outward movement of the movable guide member the rod is bent.

Apparatus embodying features of our invention is illustrated in the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view, partly broken away, and showing the rod partly bent, the Z-shaped guard members being omitted for the sake of clarity;

Fig. 2 is an enlarged perspective view of the arms carrying the upstanding anvils, removed from the remainder of the apparatus;

Fig. 3 is a fragmental plan view showing the spacer bars which connect alternately spaced anvil support units, the arm members being removed for the sake of clarity;

Fig. 4 is an enlarged end elevational view, partly broken away, showing the means for reciprocating the movable guide member;

Fig. 5 is an enlarged fragmental perspective view showing an upstanding anvil and the manner in which it is mounted on its support member;

Fig. 6 is a diagrammatic view showing resilient means for urging the support units toward extended position;

Fig. 7 is an enlarged fragmental plan view showing the apparatus in position for receiving a straight rod;

Fig. 8 is an enlarged fragmental plan view showing the apparatus in the position assumed after the rod has been bent;

Fig. 9 is a sectional view taken generally along the line IX—IX of Fig. 8, the rod being omitted for the sake of clarity; and,

Fig. 10 is a sectional view taken generally along the line X—X of Fig. 8.

Referring now to the drawings for a better understanding of our invention, we show a stationary frame **10** having transverse rails **11** and **12** mounted thereon. Mounted on the rails **11** and **12** is a substantially stationary, elongated guide member indicated generally at **13**. As shown in Figs. 4 and 10, the guide member **13** may be substantially square as viewed in cross section and comprise bottom and top walls **14** and **16**, respectively, and side walls **17** and **18**. The inner side wall **18** extends above the top wall **16**, as shown.

Mounted on the inner side wall **18** above the top wall **16** is a guide rail **19**. Mounted on the top wall **16** adjacent the side wall **17** is a longitudinally extending angle member **21** having a longitudinally extending guide rail **22** mounted on the inner surface thereof, as shown. The guide member **13** is supported by a pair of spaced apart channel members **23** having outturned flanges. The lowermost outturned flanges of the channel **23** are in sliding engagement with the upper surface of the rails **11** and **12**, thereby supporting the guide member **13**, from the transverse rails. Secured to the upper surface of the transverse rails **11** and **12** between the channel members **23** is an elongated guide member **24** which limits transverse movement of the channels **23** relative to the rails **11** and **12**.

Extending upwardly from the frame **10** outwardly of the guide member **13** is a support member **26** having a suitable opening therethrough for slidably receiving an actuating rod **27**. The inner end of the actuating rod **27** is threaded externally and passes through a threaded opening in the side wall **17** of the guide member **13**, as shown in Fig. 4. To limit axial movement of the actuating rod **27** relative to the support member **26**, a nut **28** is mounted on the threaded end of the actuating rod adjacent the support member **26**. The actuating rod **27** is rotated by any suitable means, such as by inserting a suitable tool in an opening **29** provided adjacent the outer end of the actuating rod. It will thus be seen that upon rotation of the actuating rod **27** the guide member **13** moves laterally relative to its longitudinal axis.

Mounted for movement along the lower flanges of the transverse rails **11** and **12** are rollers **31** for supporting a second guide member indicated generally at **32**. The second guide member **32** is provided with side walls **33** and **34** and bottom and top walls **36** and **37**, respectively. The innermost side wall **33** extends upwardly above the top wall **37** and has mounted adjacent the upper end thereof and above the top wall **37** a longitudinally extending guide rail **38**. Mounted on the top wall **37** adjacent the side wall **34** is an angle member **39** having a guide rail **41** mounted on the inner surface thereof, as shown. As shown in Fig. 4, the guide member **32** is mounted on

suitable channel members 42 having depending brackets 43 attached thereto. The rollers 31 are mounted for rotation on suitable pins 44 secured to the lower ends of the brackets 43.

Mounted on the side wall 34 of the guide member 32 and projecting outwardly thereof over the transverse rails 11 and 12 are brackets 46 and 47, respectively. Pivotally connected to the brackets 46 and 47 by means of pins 48 and 49 are actuating arms 51 and 52. The other ends of the actuating arms 51 and 52 are connected eccentrically to drive members by means of pivot pins 53 and 54. The drive members may be in the form of gear wheels 56 and 57 having a plurality of openings 58 therethrough for receiving the pivot pins 53 and 54, whereby the stroke of the actuating arms 51 and 52 may be varied. That is, the openings 58 are positioned at different distances from the center of the gear wheels, as shown in Fig. 4. The gear wheels 56 and 57 are keyed to a shaft 59 which is mounted for rotation in suitable bearings 61 and 62 which are in turn supported by the transverse rails 11 and 12. Mounted for rotation in bearings 63 and 64 on the transverse rails 11 and 12 is a shaft 66 which extends substantially parallel to the shaft 59. Mounted on the shaft 66 and in mesh with the gear wheels 56 and 57 are pinions 67 and 68. The shaft 66 is rotated by means of a motor 69 which is operatively connected to the shaft 66 by a shaft 71, a reduction gear box 72, a shaft 73 and a transmission 74. It will thus be seen that upon rotation of the gear wheels 56 and 57, the guide member 32 is reciprocated relative to the guide member 13.

Mounted for longitudinal movement along the guide members 13 and 32 are alternately and equally spaced anvil support units indicated generally at 76. That is to say, the anvil support units on the guide member 13 are spaced longitudinally between the adjacent anvil support units on the guide member 32. In like manner, each anvil support unit 76 on the guide member 32 is spaced longitudinally between the adjacent anvil support units on the guide member 13. In view of the fact that the construction and operation of the anvil support units 76 are all substantially identical in construction, a description of one will suffice for all anvil support units.

Each anvil support unit 76 comprises a horizontal bracket 77 having a depending, substantially L-shaped, member 78 secured to the under surface thereof. The horizontal brackets 77 are substantially T-shaped, as viewed in plan. Mounted for rotation at the outer ends of the brackets 77 are rollers 79 which engage the outer surface of the angle members 21 and 39. Mounted on the lower leg of the angle members 21 and 39 are rail members 81 and 82, respectively, upon which the rollers 79 ride. Mounted on the guide members 13 and 32 outwardly of the angle members 21 and 39 are Z-shaped guard members 83 and 84, respectively. Mounted on the undersurface of the horizontal brackets 77 is a depending shaft 86 having a horizontal roller 87 mounted thereon. As shown in Fig. 10, the rollers 87 ride between the guide rails 19—22 and 38—41, as the case may be. Mounted on the upper surface of the lower leg of the L-shaped member 78 is a vertical pin 89 which supports a horizontal roller 91. Angle shaped guide rails 92 and 93 are mounted on the bottom wall 14 of the guide member 13 and guide rails 94 and 96 are mounted on the bottom wall 36 of the guide member 32 in position to engage opposite sides of the horizontal roller 91, thus aiding to support and maintain alignment of the bracket 77 relative to the guide members 13 or 32, as the case may be.

Mounted adjacent the inner end of the horizontal bracket 77 is an upstanding work engaging anvil 97 having a slightly downwardly sloping work contact surface 98 adjacent the outer side thereof. The work engaging anvil 97 may be secured to the bracket 77 by any suitable means, such as by welding at 99. The lower portion of the work engaging anvil 97 is cut away adjacent the outer end thereof as at 101, as clearly shown in Fig. 5.

Mounted on the bracket 77 directly in front of and below the work contact surface 98 is an upstanding pin 102. Arms 103 and 104 are pivotally connected adjacent one of their ends to the upstanding pin 102 with the free ends of the arms of adjacent alternately spaced units extending alongside each other. As shown in Fig. 2, secured to the undersurface of the arm 103 and projecting beneath the arm 104 and then extending upwardly to overlap a portion of the arm 104 is a guide member 106. In like manner, secured to the undersurface of the arm 104 and overlapping the free end of the arm 103 is a guide member 107. The guide members 106 and 107 permit free sliding movement of the arms 103 and 104 relative to each other and prevent lateral movement of the arms relative to each other.

Secured to the L-shaped member 78 and projecting inwardly thereof are brackets 108 having an upstanding pin 109 mounted thereon. Spacer bars 111, having elongated openings 112 and 113 in opposite ends thereof for receiving the upstanding pins 109, pivotally connect adjacent alternately spaced support units 76 whereby the effective length of the arms 103 and 104 is determined. To lock the spacer bars 111 in place on the pins 109, I mount brackets 110 beneath the horizontal brackets 77 directly over the pins 109. Pivotally connected to the brackets 110 are depending latch members 115 which, when moved to down position limit upward movement of the spacer bars 111 relative to the pins 109.

Mounted on the arms 103 and 104 adjacent the pivot ends thereof are upstanding work engaging anvils 114 and 116. As shown in Figs. 1, 7 and 8, the anvils 114 and 116 are positioned adjacent opposite sides of the arms 103 and 104 from their respective work engaging anvil 97, whereby the rod to be bent, indicated at 117, may be inserted between the upstanding anvil 97 and the anvils 114 and 116.

As shown in Figs. 4 and 6, mounted at opposite ends of the side wall 17 of the guide member 13 are angle brackets 118. Pivotally connected to each bracket 118 by means of a pin 119 is one end of a shaft 121 having a pulley 122 mounted for rotation at the free end thereof. Connected to the anvil support units 76 adjacent each end of the guide member 13, by means of a pin 123, is a cable 124. The cable 124 passes around the adjacent pulley 122 and is connected to the shaft 121 of the pulley 122 at the other end of the guide member 13 by means of a resilient member, such as a spring 126. The springs 126 thus assist the spacer bars 111 in urging the anvil support units toward extended position upon inward movement of the guide member 32.

Keyed to the shaft 59 is a cam wheel 127 having diametrically opposed cam surfaces 128 and 129 thereon. Mounted on the transverse rail 11, as shown in Figs. 1 and 4, is a substantially L-shaped bracket 131 having a hydraulic master cylinder 132 mounted adjacent the top thereof. The master cylinder 132 has an actuating rod 133 projecting outwardly thereof toward the shaft 59 in position to be engaged by the cam surfaces 128 and 129 as the cam wheel 127 is rotated. The master cylinder 132 is thus actuated as the guide member 32 is moved to its maximum inward and outward positions relative to the guide member 13. A hydraulic line 134 connects the master cylinder 132 with a brake unit 136 which surrounds the shaft 66, as shown in Fig. 1.

Mounted on the L-shaped bracket 131 beneath the master cylinder 132 is an inwardly extending support bracket 137 having a switch element 138 mounted adjacent the free end thereof. The switch element 138 is positioned to be actuated by the cam surfaces 128 and 129, whereby the circuit to the motor 69 is interrupted just prior to the actuation of the master cylinder 132 by the cam surfaces. Accordingly, the motor 69 is deenergized prior to the application of the brake unit 136.

To limit inward movement of the anvil support units **76** relative to each other, spacer members **140** are mounted on the support units in position to contact an adjacent support unit. Preferably, the spacer members **140** are supported by brackets **141** mounted on the anvil support units. The brackets **141** are provided with suitable slots for receiving the spacer members, as shown, whereby different length spacer members may be employed when it is necessary to vary inward movement of the support units **76** relative to each other. While we show the spacer member **140** as being mounted only on the units **76** along the guide member **13**, it will be apparent that they may be mounted on the anvil support units along guide member **32** or along both guide members.

From the foregoing description, the operation of our improved apparatus will be readily understood. With the apparatus in the position shown in Figs. 4 and 7, the guide member **32** is at its maximum inward position relative to the guide member **13**. In this position, the rod **117** to be bent is positioned between the work engaging anvils **97** and their associated work engaging anvils **114** and **116**. The motor **69** is then actuated by means of a suitable switch **139**, which may be mounted on the frame **10** at a convenient location. See Fig. 4. As the gear wheels **56** and **57** rotate in a counterclockwise direction, the arms **51** and **52** move the guide member **32** laterally away from the guide member **13** whereby the anvil support units **76**, carried by the guide member **32**, are moved outwardly of the anvil support units **76** carried by the guide member **13**, as shown in Fig. 1. Upon outward movement of the guide member **32**, the anvil support units **76** move longitudinally along the guide members **13** and **32** toward collapsed position. That is, the anvil support units **76** move toward the longitudinal center portion of the apparatus whereby the rod **117** is bent to the position shown in Fig. 8. As the guide member **32** approaches its outermost position, the switch **138** is actuated by the cam surface **128**, deenergizing the motor **69**. As the guide member **32** reaches its maximum outermost position, the actuating rod **133** of the master cylinder is actuated by the cam surface **128** thereby applying the brake unit **136**. The bent rod **117** is then removed from the apparatus. The downwardly sloping work contact surface **98** facilitates removal of the rod from the apparatus. The switch **139** is then again actuated to energize the motor **69** whereupon the arms **51** and **52** move the guide member **32** inward toward the guide member **13** until the switch **138** is actuated by the cam surface **129** to deenergize the motor **69**. The cam surface **129** then actuates the master cylinder **132** to apply the brake unit **136** when the guide member **32** reaches its maximum inward position. As the guide member **32** is moved toward the guide member **13**, the spacer bars **111** move the anvil support units **76** longitudinally along their respective guide members to their proper extended position. The tension applied by the resilient members **126** permit smooth movement of the anvil support units **76** toward extended position. With the anvil support unit **76** in extended position, as shown in Fig. 7, another rod **117** is then positioned within the apparatus and the operation is repeated.

To vary the length between the bends applied to the rod **117**, different length spacer bars **111** are employed. They are easily removed and new ones installed by pivoting each latch member **115** whereby it lies in a plane parallel to its spacer bar **111**. When different length spacer bars are installed, the stroke of the arms **51** and **52** and the position of the guide member **13** must also be adjusted. The stroke of the arms **51** and **52** is varied by positioning the pins **53** and **54** in the proper opening **58**. To adjust the position of the guide member **13**, the actuating rod **27** is rotated. The position of the guide member **13** is thus adjusted to suit the adjustment of the stroke of the arms **51** and **52**.

From the foregoing, it will be seen that we have devised improved apparatus for effecting a plurality of bends in a rod. By providing longitudinally movable anvil support units together with parallel arms which carry upstanding work engaging anvils and spacer bars determining the effective length of the parallel arms and the exact length between bends, the rod is accurately bent to the desired shape without stretching or deforming the rod. Furthermore, by providing means for interrupting the source of power prior to the application of the brake unit, the apparatus is stopped in the exact positions for receiving and removing the rod **117**.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. A rod bending machine comprising a first longitudinally extending guide member, a second longitudinally extending guide member mounted for lateral reciprocation relative to the first guide member, alternately spaced anvil support units mounted for longitudinal movement along the guide members whereby said units on one guide member are spaced longitudinally between the adjacent units on the other guide member, upstanding work engaging anvils mounted on said support units, arms pivotally connected to said support units and extending outwardly thereof with the free ends of the arms of adjacent alternately spaced units extending alongside each other, guide members holding said arms of adjacent alternately spaced units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent alternately spaced support units whereby the effective length of said arms is determined, other work engaging anvils mounted on said arms and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, and means reciprocating said second guide member.

2. A rod bending machine as defined in claim 1 in which the first mentioned work engaging anvil is provided with a downwardly sloping work contact surface.

3. A rod bending machine as defined in claim 1 in which means is mounted on the anvil support units limiting inward longitudinal movement of said support units relative to each other along the guide members.

4. A rod bending machine as defined in claim 3 in which the means limiting inward movement of the anvil support units comprises spacer members mounted on said anvil support units in position to contact an adjacent support unit.

5. A rod bending machine as defined in claim 1 in which the arms are pivotally connected to each anvil support unit by a vertical pin positioned in front of and beneath the first mentioned work engaging anvil, and the spacer bars are pivotally connected to each anvil support unit by vertical pins positioned at opposite sides of and beneath said vertical pin.

6. A rod bending machine as defined in claim 1 in which the means for reciprocating the second guide member comprises at least one actuating arm pivotally connected at one end to said second guide member, a rotary drive member, and means pivotally connecting the other end of said actuating arm eccentrically to said drive member.

7. A rod bending machine comprising a supporting frame, a first longitudinally extending guide member at one side of said frame, a second longitudinally extending guide member mounted for lateral reciprocation relative to the first guide member, longitudinally spaced anvil support units mounted for longitudinal movement along said first guide member, other longitudinally spaced anvil support units mounted for longitudinal movement along said second guide member and disposed between the first mentioned support units, upstanding work engaging anvils mounted on said support units, arms piv-

otally connected to said support units and extending outwardly thereof with the free ends of the arms of adjacent support units extending parallel to and in sliding engagement with each other, guide members holding said arms of adjacent support units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent support units whereby the effective length of said arms is determined, other work engaging anvils mounted on said arms adjacent the pivot ends thereof and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, and means reciprocating said second guide member.

8. A rod bending machine as defined in claim 7 in which guide members are mounted on each of said arms in position to engage the adjacent arm in sliding contact therewith, whereby lateral movement of adjacent arms relative to each other is limited.

9. A rod bending machine comprising a supporting frame, a first longitudinally extending guide member at one side of said frame, a second longitudinally extending guide member mounted for lateral reciprocation relative to the first guide member, longitudinally spaced anvil support units mounted for longitudinal movement along said first guide member, other longitudinally spaced anvil support units mounted for longitudinal movement along said second guide member and disposed between the first mentioned support units, upstanding work engaging anvils mounted adjacent the inner ends of said support units with the work contact surfaces thereof positioned outwardly of said anvils, arms pivotally connected at one of their ends to said support units outwardly of said anvils with the other ends of said arms extending substantially parallel to and in sliding contact with the arms of adjacent support units, guide members holding said arms of adjacent support units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent support units whereby the effective length of said arms is determined, other upstanding work engaging anvils mounted on said arms adjacent the pivot ends thereof and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, and means reciprocating said second guide member.

10. A rod bending machine comprising a supporting frame, a longitudinally extending stationary guide member at one side of said frame, a longitudinally extending movable guide member mounted on said frame and extending substantially parallel to the stationary guide member, means reciprocating the movable guide member laterally relative to the stationary guide member, alternately spaced anvil support units mounted for longitudinal movement along said stationary and movable guide members, upstanding work engaging anvils on said anvil support units, arms pivotally connected at one of their ends to said anvil support units with the other ends of the arms of adjacent anvil support units in sliding contact with each other, guide members holding said arms of adjacent anvil support units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent alternately spaced support units whereby the effective length of said arms is determined, other upstanding work engaging anvils mounted on said arms adjacent the pivot ends thereof and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, means reciprocating said movable guide member, means urging the support units toward extended position upon inward movement of said movable guide member, and means for varying the lateral position of said stationary guide member and the distance which said movable guide member is reciprocated whereby the depth of the bend is varied.

11. A rod bending machine as defined in claim 10 in which the means for varying the lateral position of the stationary guide member comprises stationary support members outwardly of the stationary guide member, actuating rods mounted for rotation in said support members and having externally threaded inner ends, means limiting axial movement of said rods relative to their support members, there being threaded openings in the stationary guide member for receiving the threaded ends of said actuating rods, and means for rotating said rods whereby the lateral position of the stationary guide member is varied.

12. A rod bending machine comprising a first longitudinally extending guide member, a second longitudinally extending guide member mounted for lateral movement relative to the first guide member, alternately spaced anvil support units mounted for longitudinal movement along the guide members whereby said units on one guide member are spaced longitudinally between the adjacent units on the other guide member, upstanding work engaging anvils mounted on said support units, arms pivotally connected to said support units and extending outwardly thereof with the free ends of the arms of adjacent alternately spaced units extending alongside each other, guide members holding said arms of adjacent alternately spaced units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent alternately spaced support units whereby the effective length of said arms is determined, other work engaging anvils mounted on said arms adjacent the pivot ends thereof and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, power means moving said second guide member toward and away from said first guide member, means interrupting the power means as said second guide member approaches its maximum inward and outward positions, brake means restraining movement of said second guide member after it reaches its maximum inward and outward positions, and means assisting the spacer bars to urge said support units toward extended position upon inward movement of said second guide member.

13. A rod bending machine as defined in claim 12 in which assisting means urging the support units toward extended position comprises resilient means connecting the anvil support units adjacent the ends of the machines to a stationary part of the machine.

14. A rod bending machine comprising a first longitudinally extending guide member, a second longitudinally extending guide member mounted for lateral movement relative to the first guide member, alternately spaced anvil support units mounted along the guide members whereby said units on one guide member are spaced longitudinally between the adjacent units on the other guide member, rollers mounted on said units and supporting said units for longitudinal movement along the guide members, upstanding work engaging anvils mounted on said support units, arms pivotally connected to said support units and extending outwardly thereof with the free ends of the arms of adjacent alternately spaced units extending alongside each other, guide members holding said arms of adjacent alternately spaced units in parallel sliding relationship to each other, spacer bars pivotally connecting adjacent alternately spaced support units whereby the effective length of said arms is determined, other work engaging anvils mounted on said arms adjacent the pivot ends thereof and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, and means moving said second guide member toward and away from said first guide member.

15. A rod bending machine as defined in claim 14 in which other rollers are mounted for rotation on each support unit in planes at right angles to the first mentioned rollers and in position to engage the adjacent guide member thereby limiting lateral movement between each support unit and its associated guide member.

16. A rod bending machine comprising a first elongated guide member, a second elongated guide member extending substantially parallel to the first guide member and adapted for lateral reciprocation relative thereto, alternately spaced anvil support units mounted for longitudinal movement along the guide members whereby the

units on one guide member are spaced longitudinally between the adjacent units on the other guide member, upstanding work engaging anvils mounted on said support units, arms pivotally connected to said support units and extending outwardly thereof with the free ends of the arms of adjacent alternately spaced units extending alongside each other, guide members holding said arms of adjacent alternately spaced units in parallel sliding relationship to each other, pivot pins mounted on said support units, spacer bars having elongated longitudinally extending openings adjacent the ends thereof for receiving the pivot pins whereby adjacent alternately spaced support units are connected and the effective length of said arms is determined, other work engaging anvils

mounted on said arms and disposed to lie on the opposite side of the rod to be bent from the first mentioned anvils, means reciprocating said second guide member, and means urging the support units toward extended position upon inward movement of said second guide member.

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