

Aug. 21, 1923.

1,465,733

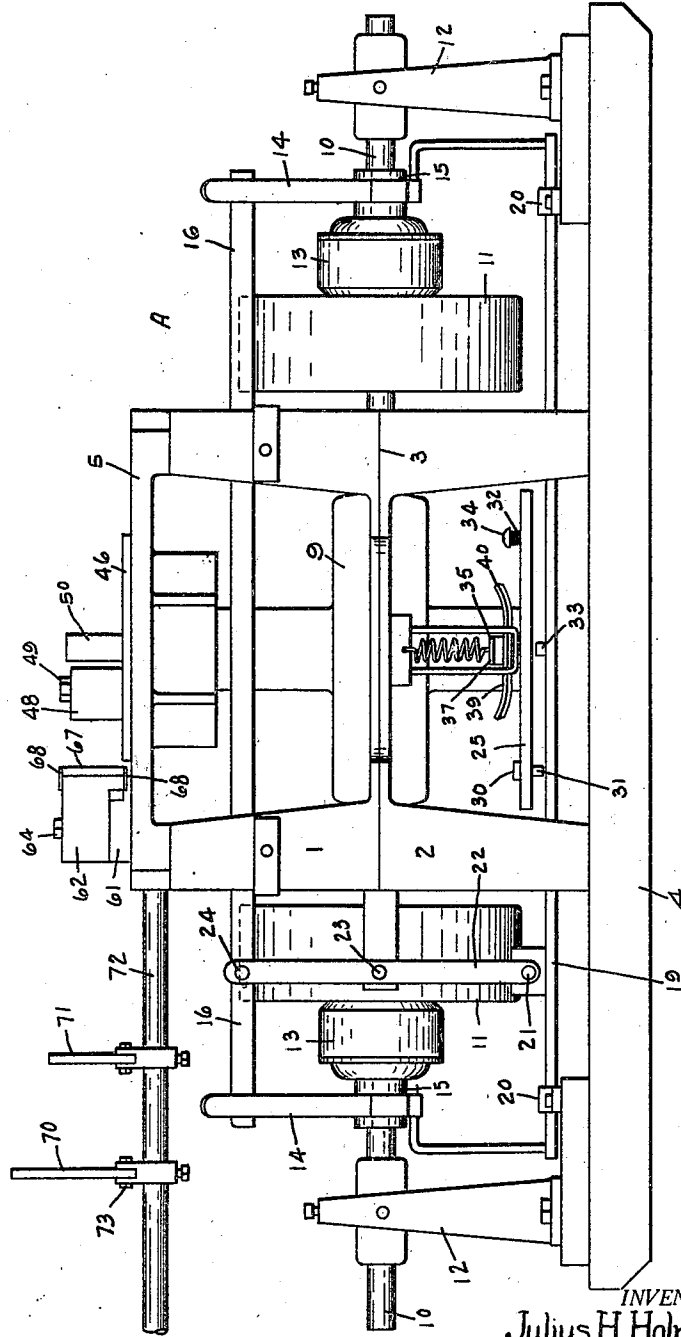
J. H. HOLMGREEN

BENDING MACHINE

Filed Aug. 4, 1919

4 Sheets-Sheet 1

FIG. 1



INVENTOR.
Julius H. Holmgreen.

BY
Bradford Morris & Pines
ATTORNEYS.

Aug. 21, 1923.

J. H. HOLMGREEN

BENDING MACHINE

Filed Aug. 4, 1919

1,465,733

4 Sheets-Sheet 2

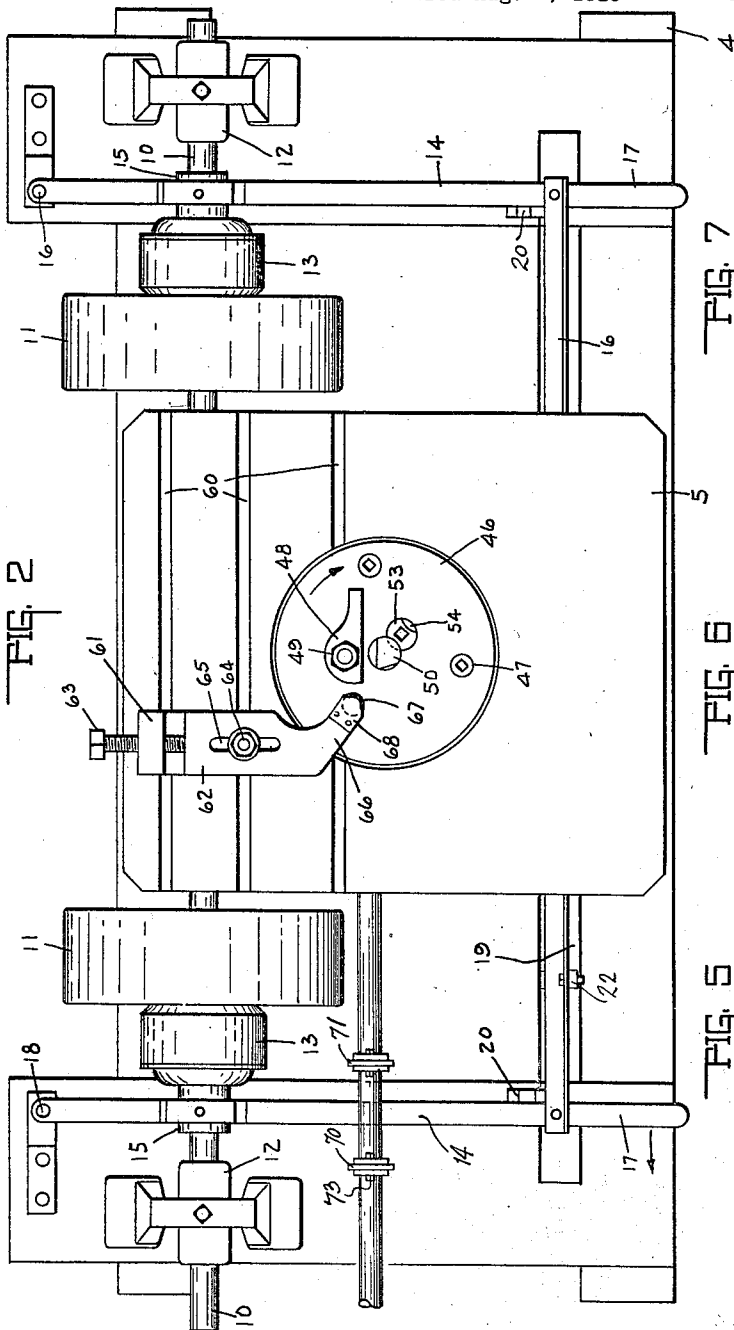


FIG. 2

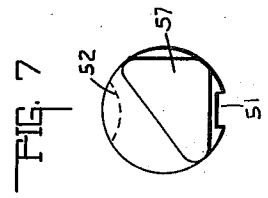


FIG. 7

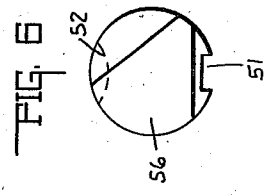


FIG. 6

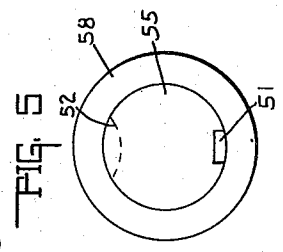


FIG. 5

INVENTOR.
Julius H. Holmgreen

BY

Burdett, Morrill & Pieman
ATTORNEYS.

Aug. 21, 1923.

1,465,733

J. H. HOLMGREEN

BENDING MACHINE

Filed Aug. 4, 1919

4 Sheets-Sheet 3

FIG. 10

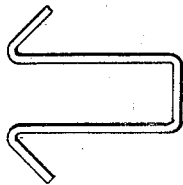


FIG. 11

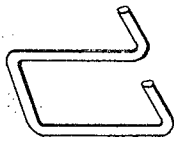


FIG. 12



FIG. 13

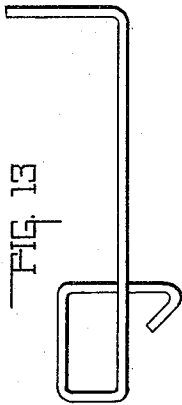
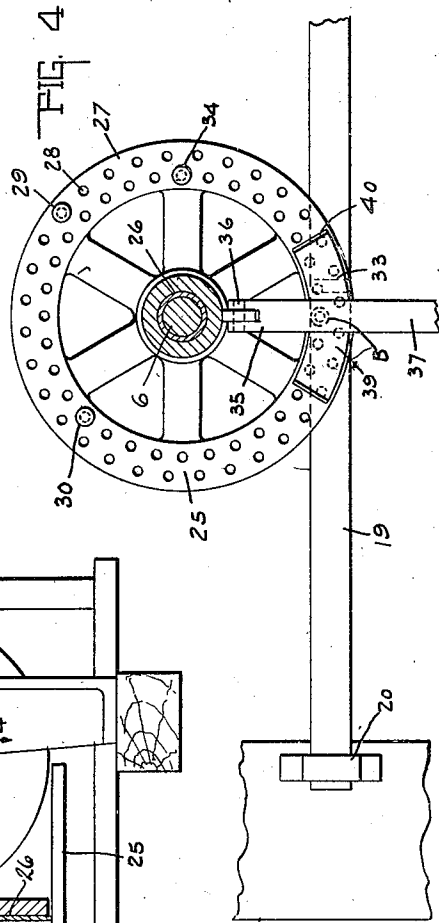
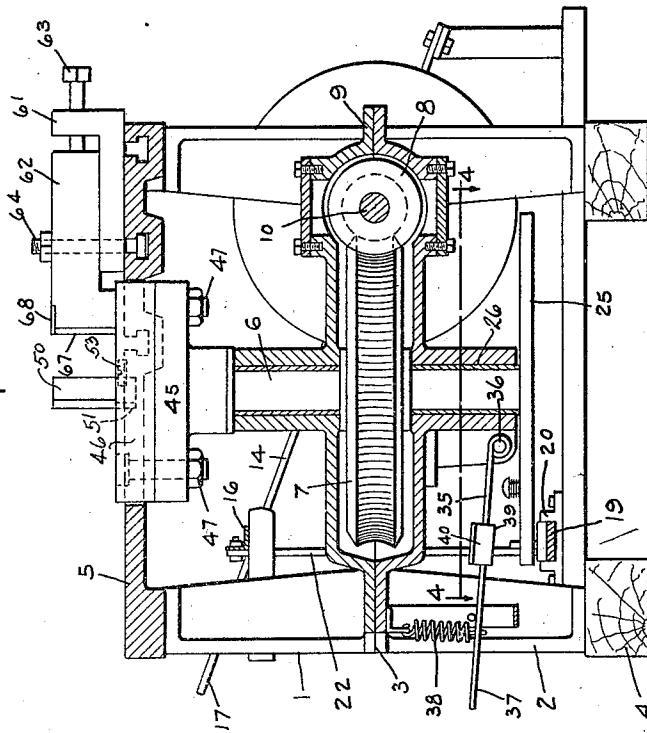


FIG. 3



INVENTOR.

Julius H. Holmgreen

BY

Bradford Morrill & Sherman

ATTORNEYS.

Aug. 21, 1923.

J. H. HOLMGREEN

1,465,733

BENDING MACHINE

Filed Aug. 4, 1919

4 Sheets-Sheet 4

FIG. 8

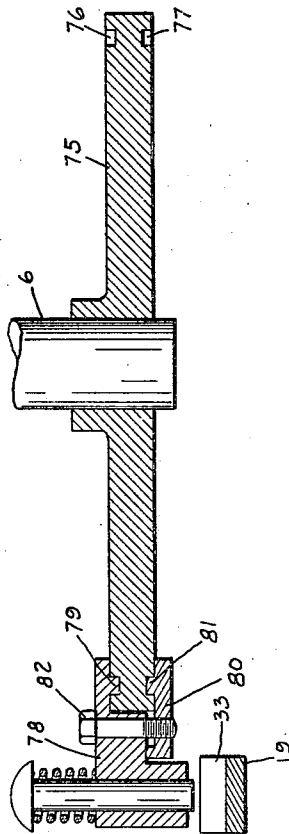
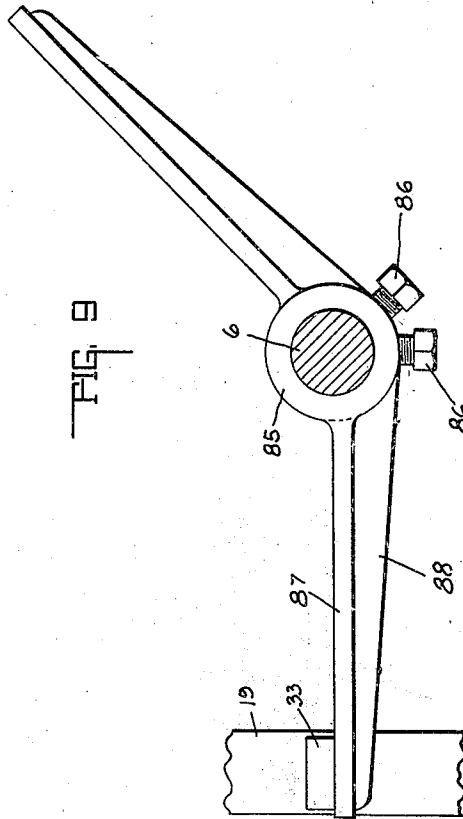


FIG. 9



INVENTOR.

Julius H. Holmgreen

BY

Bedford Morrill Brennan
ATTORNEYS,

UNITED STATES PATENT OFFICE.

JULIUS H. HOLMGREEN, OF SAN ANTONIO, TEXAS.

BENDING MACHINE.

Application filed August 4, 1919. Serial No. 315,154.

To all whom it may concern:

Be it known that I, JULIUS H. HOLMGREEN, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Bending Machines, of which the following is a specification.

This invention relates to bending machines, more especially those adapted to bend rods, bars, wires and similar materials into a variety of forms suitable for structural purposes, such as reinforcements for concrete structures. Machines of this kind previously used were hand operated and the degree of bending was usually gaged only by the eye with perhaps the aid of a chalk mark on the machine. As a result the different pieces, supposedly of the same shape, were not bent to the same angle thus introducing inaccuracies in the set-up reinforcing structure. Only a limited number of bends could be made, the accuracy of which largely depended on the skill of the operator in stopping the machine when the bar was bent around to a chalk mark on the work table. By this invention I obviate all the disadvantages of prior machines and it is among the objects of my invention to produce a machine which is semi-automatic in its operation, bends pieces to accurate shapes, is comparatively simple, easily operated and very rapid in bending various materials.

In carrying the objects of my invention into effect I provide an index means or stop member preferably on the shaft of the machine and in the specific embodiment described, in the form of a disk having holes therein which I call an index plate. By means of this member I am enabled to stop the machine after a predetermined angle has been formed on the material being bent. I am able to bend not only sharp angles but U's, V's and S's, closed and open loops, combinations of these, reverse curves and the various other shapes into which rods, bars, etc., are capable of being bent.

Specifically, my machine comprises a frame and a shaft preferably vertically mounted therein, a turn table fixed to the upper end of the shaft and means for holding and bending the material. Any suitable driving means may be employed but preferably I use a worm wheel and worm, my index plate being preferably attached to the

lower end of the shaft below the worm wheel.

Referring to the accompanying drawings forming a part thereof, in which is illustrated a specific embodiment of my invention, and in which similar reference characters denote similar parts,

Figure 1, illustrates a front view of my machine,

Figure 2, a plan view thereof, some parts being omitted,

Figure 3, a vertical section, some parts being in elevation and some omitted,

Figure 4, a section on line 4-4 of Figure 3,

Figures 5, 6 and 7 show modifications of the bending pin,

Figure 8, a modified form of index plate,

Figure 9, different index means, and

Figures 10, 11, 12 and 13 various bends which are made by my machine.

The machine A comprises a frame work consisting of upper and lower sections 1 and 2, respectively, preferably of the same shape in order that the same mold may be used in casting them, which are connected at line 3 by bolts. The machine rests on a base 4 and carries at its upper end a work table 5. A shaft 6 preferably vertical is fixed in said frame and has secured to it a worm wheel 7 which meshes with a worm 8 within the casing 9, the worm being fixed to shaft 10 extending longitudinally on both sides of the frame and carrying driving pulleys (or gears) 11 and having its ends journaled to the base 4 at 12.

Clutches 13 and shift bars 14 having collars 15 engaging the clutches are provided. A shift bar 16 is fixed near the ends 17 of bars 14 so that when one clutch is thrown in the other is thrown out. A shifting bar 19 is slidably attached to the frame 4 by bars 20 and has a pivot 21 thereon to which is attached bar 22 journaled in the frame of the machine at 23 and pivotally attached to bar 16 at 24 in order that a shifting of bar 19 may cause a corresponding shifting of bar 16 and the clutches.

Fixed to the shaft and preferably to the lower end thereof is an index plate 25 whose hub 26 engages the shaft 6, and having in its peripheral portion 27 a series of holes 28 which are adapted to engage stop pins 29 and 30. The lower ends 31 of the stop pins are adapted to engage a projection 33

formed on bar 19 and some of these pins have retracting springs 32 thereon to normally hold the end 31 so as to avoid contact with the stop 33.

5 Pivoted to the frame at 36 is a lever 35 the end 37 of which is adapted to be pressed down by the foot, and retracting spring 38 normally holds the pedal 37 in retracted position. A plate 39 having upwardly
10 curved ends 40 is attached to an intermediate portion and is adapted to engage one of the retracted pins to press the same downwardly.

To the upper end of shaft 6 is fixed a
15 turn table 45 which may extend to the surface of the work table 5, but preferably has bolted to it a plate 46 by means of counter-sunk bolts 47. Upon the turn table is fixed a cramping member 48 held in place by bolt
20 49. Bending pin 50 which may be of any suitable shape is inserted into a corresponding hole in the center of plate 46 and carries a keyway and key 51 adapted to key the pin 50 against rotatory motion relative to
25 plate 46. The pin also has a notch 52 cut in the same which is adapted to engage a circular disk 53 pivoted in the plate 46, the said disk having a cut out portion 54 of the same size and shape as 52 in order to
30 provide a means for allowing pin 50 to slip down into its hole after which disk 53 is rotated so as to lock the pin against vertical movement. Various shapes and sizes of
35 bending pins may be used, such as are illustrated at 55, 56 and 57. When it is desired to form bends of large radius, collars 58 of various sizes may be slipped over pin 55 to provide a bearing surface for the material
40 to be bent to the desired curvature.

On the work table are formed a series of
45 grooves 60 preferably T-shaped which are adapted to engage bolts for holding an adjustable stop member to the work table. The stop member consists preferably of a
50 member 61 which may be adjustably secured in said slots and carries a movable frame 62 held in alignment and in position by bolts 63 and 64, the bolt 64 operating in a slot 65 for
55 adjustment purposes. On the end 66 of the stop is journaled a roller 67 preferably in a hole drilled in the end of the member 66 into which the roller is inserted. Plates 68 prevent roller 67 from moving vertically upward or downward.

The operation of the machine is as follows:

The cramping member 48, bending pin
60 50 and stop member 61 are fixed in the positions shown so that a rod or other material to be bent may be placed between them. The index plate 25 carries a permanent stop B, and, for example, another stop 29 at an angle of 135 degrees to the first stop. The
65 lever 17 is pushed over, let us say to the left, as shown by the arrow, in order to

engage one of the clutches 13 with driving pulley 11 and causing the turn table to be rotated in the direction shown by the arrow. The stop member 29 which moves with the
70 index plate 25 will engage projection 33 on bar 19 after the shaft has revolved 135 degrees thus cutting off the driving means by throwing out the clutch 13, the motion being transmitted through bars, 19, 22, 16
75 and 14.

Meanwhile the cramping member 48 has engaged the end of the rod to be bent and has bent it around pin 50, the free end of the rod being in engagement with roller 67
80 which holds it in alignment. When cramping member 48 engages the end of the rod being bent it causes a creeping motion of the rod so that the rod moves slowly forward so as to allow of free bending without any binding or undue strain on the machine.
85

I preferably provide a series of gage members 70, 71, etc., adjustably mounted upon a bar 72 fixed to the frame of the
90 machine. When a rod to be bent is placed on the table, gage member as 70, which is normally in a raised position, is thrown over about its pin 73 to allow the gage 70 to lie in a horizontal position and engage
95 the end of the rod being bent.

After the first bend of 135 degrees, for
100 example, has been made and it is desired to make another bend on the same rod, let us say at an angle of 90 degrees, a retracting pin 34 set at an angle of 90 degrees to the permanent stop member is placed on the
105 index plate. The first bend having been made, the rod is removed and the machine is reversed by throwing bar 17 to the right, engaging the other clutch with the driving pulley, reversing the machine until the permanent stop member B engages projection
110 33 stopping the machine at the original point.

The rod being bent is again inserted between
115 the stop members with its end abutting the next gage member 71, which has been thrown down into a horizontal position. The member 17 is again thrown to the left to start the machine and the pedal
120 37 depressed so that it engages the head of the retracting pin 34 pressing it downwardly as it approaches projection 33 causing it to shift bar 19 again cutting out the driving means and stopping the machine when the desired angle of 90 degrees has
125 been formed.

It will be seen that by this arrangement I
130 may form two bends of different angles on a bar without resetting the machine. I can form more than two bends of different character without resetting my machine by providing a plurality of retracting pins of different lengths operated by either a plurality
135 of spring retracted pedals or by a single

pedal which is adapted to assume a plurality of vertical positions. I can also form bends at varying distances from the ends of a rod as in Figures 10, 11 and 13 by using two or more stops 70, 71, as above explained.

Although I have above described and prefer to use an index means comprising a circular plate having holes in its periphery, other forms may be used as shown in Figures 8 and 9. To the vertical shaft is fixed a plate 75 (Fig. 8) having aligned grooves 76 and 77 in its upper and lower surfaces respectively. A holding plate 78 having a projection 79 corresponding to groove 76 is placed on the plate and a complementary plate 80 having a projection 81 corresponding to 77 fits into the lower groove and into plate 78. A screw 82 holds 78 and 80 in fixed, adjusted position. A stop pin, which may be of the retracting type is inserted into the end of plate 78. When it is desired to adjust the angle of bend, screw 82 is loosened, plates 78 and 80 are shifted to the desired position and clamped in place by tightening the screw.

The form shown in Figure 9 comprises a collar 85 adapted to be adjustably fixed to the shaft by set screw 86. An arm 87 having a strengthening rib 88 extends radially, the end of the arm serving as a stop pin to engage projection 83 on the shifting bar. When a plurality of stops are wanted, additional collars having radial arms are fixed to the shaft.

In Figures 10, 11, 12 and 13 I have illustrated a few of the common forms into which rods may be bent by my machine it being understood that my machine is capable of bending almost any shape including closed circles, angles of various sizes and various radii. Pins 50, 55, 56 and 57 show a few of the shapes which I may use in order to produce various types of bends.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. A bending machine comprising a work table, a turntable, co-acting means on the work table and turntable adapted to bend material upon rotation thereof, a shaft carrying said turntable, said shaft also carrying an index plate, means for driving said shaft in opposite directions comprising a pair of clutches, a pair of clutch levers, a link connecting said clutch levers and having a projection thereon, and means on the index plate adapted to engage said projection and disengage the driving clutch.

2. In bending machines a turn table, a work bending means thereon comprising a central depression, a keyway in the wall thereof, locking means comprising a disk in said turn table extending into said depression, a cut out portion in said disk corresponding in size and shape to its extended

portion, a stud having a longitudinal keyway and a transverse slot adapted to slide into said depression and be locked therein by the rotation of said disk.

3. In a bending machine, a turntable, a stationary table, an abutment carried by the stationary table for engaging objects to be bent and adjustable either longitudinally or transversely thereof, a cramping member on the turntable in line with the abutment, and a bending pin spaced from the cramping member.

4. In a bending machine, a turntable, a stationary table, an abutment carried by the second table for engaging objects to be bent, a cramping member on the turntable in line with the abutment, a bending pin spaced from the cramping member, and a gage for rods and the like comprising a support extending from the stationary table substantially in alignment with the abutment and the cramping member, and spaced devices thereon against which the work may rest.

5. In a bending machine, a turntable, a stationary table, an abutment carried by the second table for engaging objects to be bent, a cramping member on the turntable in line with the abutment, a bending pin spaced from the cramping member, and a gage for rods and the like comprising a support extending from the stationary table substantially in alignment with the abutment and the cramping member and devices supported thereby and adapted to swing into and out of line with the object to be bent, thereby acting as abutments for the end of such object farthest from the operator.

6. In a bending machine, a work table, a supporting member bodily adjustable in a direction transversely of its length in grooves on the work table and having an arm thereon adjustable longitudinally of the supporting member, said arm carrying a loosely held roller at its forward end, a turntable, a cramping member and a bending pin held on the turn table, the bending pin having a keyway engaging a key on the turn table, a rotary disk on the turntable having a portion cut away and being adapted to engage a notch in the bending pin thus locking it to the turn-table.

7. In a bending machine a turn-table having spaced devices thereon for engaging an object to bend the same, a stationary abutment in alignment with one of said devices at their starting position and a gage member adapted to engage the end of a rod lying between said devices, and swingable into and out of such engaging position.

8. In a bending machine, a turntable, a stationary table, an abutment carried by the second table for engaging objects to be bent, a cramping member on the turntable in line with the abutment, a bending pin spaced from the cramping member, and a

gage for rods and the like comprising a support extending from the stationary table substantially in alignment with the abutment and the cramping member, and spaced members pivoted to said support and adapted selectively to engage the end of the work.

9. In a bending machine, a turn table, a separate bending pin thereon, means independent of the bending pin and rotatably mounted at one side thereof to lock the same against longitudinal movement, substantially as set forth.

10. In a bending machine, a turn table, a separate bending pin thereon, means independent of the bending pin and rotatably mounted at one side thereof to lock the same against withdrawal from the table and means to prevent rotation of the pin relative to the table, substantially as set forth.

11. In a bending machine a turn table having means thereon to engage an object to be bent, a shaft carrying the table, a worm wheel on the shaft, a worm and its shaft for driving the table, and means for driving the table through predetermined angular distances including clutches and levers for controlling them, a cross-bar connected to the levers, a parallel cross-bar connected to the first cross-bar and a plate rotating with the turntable and carrying adjustable means to engage the latter cross-bar and disengage the clutch.

12. In bending machines a turn-table, a shaft fixed thereto, means for driving said shaft, means for cutting off said driving means and a circular index plate having holes in a face thereof on said shaft and means on said plate normally inactive but adapted to be actuated by the operator while the shaft is moving to stop the rotation of said turn-table and shaft at a predetermined point.

13. In a bending machine, a turn-table, a stationary table, co-operating means on the tables to engage objects to be bent, a shaft on which the turn-table is fixed, means for driving the shaft, and means for stopping the turntable at a predetermined time comprising a plate attached to the shaft and having a plurality of apertures, a pin adapted to be placed in any one of the apertures, means holding said pin normally inactive and means co-acting with the pin to stop the machine.

14. In a bending machine, a turn-table, a stationary table, co-operating means on the tables to engage objects to be bent, a shaft on which the turn-table is fixed, means for driving the shaft, and means for stopping

the turntable at a predetermined time comprising a plate attached to the shaft and having a plurality of apertures, a pin adapted to be placed in any one of the apertures, another pin adapted to be inserted in said apertures and normally held in inactive position, and means co-acting with either pin to stop the machine.

15. In a bending machine, a turn-table, reversible driving means therefor, a plate concentric with the table and carrying a fixed member adapted to engage an element of the driving means to check rotation in one direction uniformly at the same position of the table, an adjustable stop for checking rotation in the other direction automatically at a predetermined position, a second adjustable stop normally out of engaging position, and means adapted to move it into engaging position.

16. In a bending machine, a turn-table, a stationary table, co-operating means on the tables to engage objects to be bent, a shaft on which the turn-table is fixed, means for driving the shaft, and means for stopping the turn-table at a predetermined time comprising a plate attached to the shaft and having a plurality of apertures, a pin adapted to be placed in one of the apertures, another pin adapted to be inserted in said apertures and normally held in inactive position, a treadle whereby the latter pin may be forced into active position, and means co-acting with either pin to stop the machine.

17. In a bending machine a turntable having means thereon to engage an object to be bent, a shaft carrying the table, a worm wheel on the shaft, a worm and its shaft for driving the table, and means for driving the table through predetermined angular distances including clutches, a cross-bar connected to the lever, a parallel cross-bar connected to the first cross-bar and a plate rotating with the turn-table and carrying adjustable means to engage the latter cross-bar and disengage the clutch, and supplementary engaging means on the plate normally out of engaging position and means whereby they may be moved into operative position at the will of the operator.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana, this 29th day of July, A. D. nineteen hundred and nineteen.

JULIUS H. HOLMGREEN. [L. S.]

Witnesses:

H. C. BIERMAN,
M. L. SHULER.