Aug. 31, 1926. 1,598,513

A. S. TERHAAR

ROD BENDING APPARATUS

Filed Feb. 19, 1924

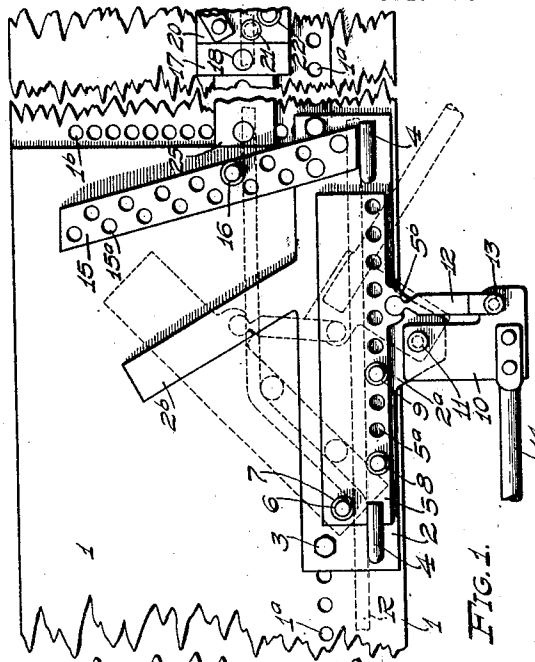


FIG. 1.

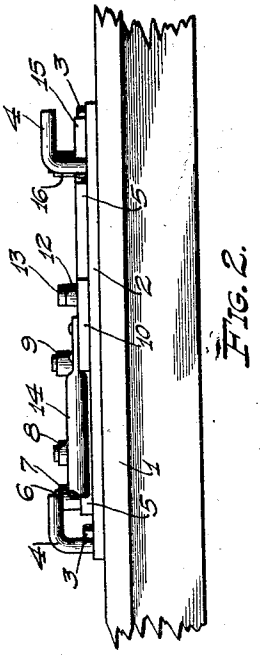
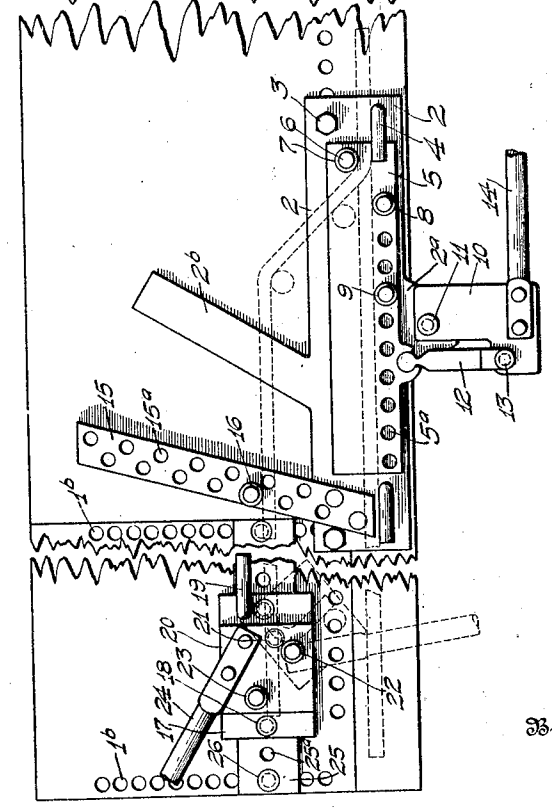


FIG. 2.



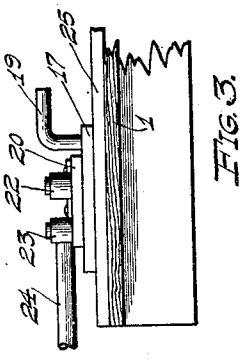


FIG. 3.

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UNITED STATES PATENT OFFICE.

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ROD-BENDING APPARATUS.

Application filed February 19, 1924. Serial No. 693,814.

My invention relates to a rod bending apparatus, which is particularly adapted for bending reinforcing steel for reinforced concrete, and the objects of my invention are: First, to provide an apparatus of this class by which a double bend may be made at the same time in steel or other rods for making offsets therein such as are used for reinforcing concrete beams and columns; second, to provide an apparatus of this class for making right angle bends or hooks at the ends of bent reinforcing steel rods with one setting of the apparatus; third, to provide an apparatus of this class in which the several bends therein are made by substantially rolling the steel into the bent shapes, thus reducing to a minimum the strain on the fibres of the steel; fourth, to provide an apparatus of this class for bending rods which may be quickly and easily set and adjusted to bend offsets in rods at different depths and also to bent offsets in the rods at different distances from each other, as well as for making right angle bends or hook portions at the ends of rods of different lengths; fifth, to provide novel means for setting or adjusting the apparatus for making offset bends of different depths; sixth, to provide novel lever means for making bends in steel rods; seventh, to provide a novelly constructed rod bending apparatus, and eighth, to provide such an apparatus which is very simple and economical of construction, durable, efficient, adapted to bend steel rods of different lengths and diameters or cross-sections, and an apparatus of this class which will not readily deteriorate or get out of order.

With these and other objects in view, as will appear hereinafter my invention consists of certain novel features of construction, combination and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:—

Figure 1 is a fragmentary plan view of my bending apparatus with the different bending units supported on a bending table, showing the same fragmentarily as well as certain of the units and parts thereof, and showing by dotted lines certain shifted positions of certain members of the units, and also showing by dotted lines the rods before and after bending; Fig. 2 is a side elevational view of one of the offset bending units, supported on a fragmentary portion of the bending table, and Fig. 3 is a side elevational view of the bending unit for making the right angle bend or hook portions at the ends of rods.

Like characters of reference refer to similar parts and portions throughout the several views of the drawings.

The table 1, supporting plates 2, bolts 3, handle members 4, bending plates 5, pivot bolts 6, rollers 7, 8 and 9, lever plates 10, bolts 11, connecting links 12, bolts 13, operating levers 14, stop supporting arms 15, rollers 16, supporting plates 17, bolts 18, handle members 19, bending plates 20, pivot bolts 21, rollers 22 and 23, operating levers 24, plates 25, and the bolts 26, constitute the principal parts and portions of my rod bending apparatus.

The supporting plates 2 for supporting the mechanism for making offset bends in the rods are positioned on the top of the bending table 1 of any suitable construction, and are secured thereto by means of pins or bolts 3. The table 1 is provided with a plurality of spaced holes 1^a in its top near the front edge thereof into which the bolts 3 are adapted to be inserted for supporting the plates 2, of which there are two in number, from and relatively to each other depending upon the distance required between the offset bends in the rods. Said plates 2 are provided at each end with handle members 4 for handling the same and shifting the plates about on the table 1. Said handle members 4 also serve as stops or positioning members at the ends of said plates for the rods adapted to be bent, as shown by dotted lines of the rods indicated by "R" in Fig. 1, the axes of said handle members being fixed relatively to the plates 2. On each of the plates 2 is pivotally mounted a pivot or bending plate 5 at its one end by means of a pivot bolt 6 on which is mounted a roller 7, which serves as a stop or positioning member for the other side of the rod adapted to be bent, and which also serves as a fulcrum or pivot about which one bend of the rod is made. On the opposite side of the rod R from the roller 7 and also longi-

tudinally spaced therefrom is a roller 8, which is fixed and revolubly mounted on the plate 5. It will be here noted that the handle member 4, the roller 8, and the intermediately positioned roller 7 serve as the three bearing or fulcrum points for making the one bend in the rod. In the plate 5 are also provided a plurality of spaced apart holes 5^a, in line with the rollers 8, in which is adapted to be positioned the removable roller 9, serving as another fulcrum member or means, the distance of the same from the rollers 7 and 8 depending upon the depth of the offset required in the rod.

Each of the plates 2 is provided with an outwardly and forwardly extending portion 2^a upon which is pivotally mounted a lever plate 10 by means of a bolt 11, said lever plate being pivotally connected at an offset portion therein with the bending plate 5 by means of a link 12, which link is pivotally connected at its one end with the plate 10 by means of a bolt 13 and with the plate 5 by means of a joint formed by a cylindrical portion at the opposite end of the link 12 and a corresponding recess 5^b in the plate 5, thus providing a pivotal connection between the link 12 and the plate 5 which will not interfere with the shifting of the rod as indicated by dotted lines in Fig. 1 of the drawings. An operating lever 14 is secured to the outer end of the plate 10 for rotating the same and the plate 5. Each supporting plate 2 is provided with a backwardly extending angular bearing arm 2^b for supporting the plate 5 when the same is shifted backwardly.

At the opposite ends of the plates 2 from the pivotal mountings of the plates 5 are provided backwardly extending depth stop supporting arms 15, which are preferably positioned at an angle relatively to the plates 2 so as to conform to a certain extent with the curve made by the plates 5. The upper faces of said arms are also made flush with the upper faces of the bending plates 5. In the arms 15 are provided a plurality of spaced holes 15^a in which are adapted to be positioned the removable stops in the form of rollers 16, the particular hole selected depending upon the depth of the offset portion in the rod.

Between the units for making the offset bends in the rods and the ends of the table 1 are positioned the supporting plates 17 for supporting the mechanism for making the right angle bends or hooks at the ends of the reinforcing rods. Said plates are adapted to be secured to long bearing plates 25 by means of bolts 18, said plates 25 being provided with a plurality of spaced holes 25^a through which the bolts 26 extend for variously securing the plates 17 thereto relatively to the offset bending units. The table 1 is also provided with evenly spaced holes 1^b from front to rear at the ends of the plates 25 for securing said plates 25 to the table 1 in different positions by means of bolts 26, said positions depending upon the depth of the offset portions in the rods. The plates 17 are provided with handle members 19 for shifting the plates about on the table. On the plates 17 are pivotally mounted the bending plates 20 by means of countersunk bolts 21. On the plates 20 are mounted two spaced apart rollers 22 and 23, the same being positioned on opposite sides of the rod after the same is provided with an offset bend. The rollers 22 are positioned substantially close to the pivot bolts 21 and are also positioned outwardly therefrom and also spaced from the roller 23 so as to provide more than sufficient clearance for the rod, thus providing a means for effectively rolling the hook portions at the ends of the rod without distorting the same laterally. Each of the plates 20 is also provided with an operating lever 24 for rotating the same about their pivotal axes.

It is obvious from this construction, as illustrated in the drawings and disclosed in the foregoing specification, that there is provided a rod bending apparatus, which is particularly adapted for bending reinforcing steel for reinforced concrete, as aimed at and set forth in the objects of the invention; and though I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of my invention the construction, combination and arrangement substantially as set forth in the appended claims.

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

1. In a bending apparatus, a supporting member, a pair of spaced apart axially-fixed rod positioning members, a bending member shiftably mounted on said supporting member, a rod-bending fulcrum means adapted to be variously positioned on said bending member for engaging and bending a rod, and a stop means adapted to be variously positioned relatively to said supporting member for limiting the bending of said rod.

2. In a rod bending apparatus, a supporting means, a rod positioning member mounted thereon, a bending member pivotally mounted at its one end on said supporting means and provided at its pivotal axis with a fulcrum means spaced from said rod positioning member and positioned in opposed and offset relation relatively to said rod positioning member, the space between said fulcrum means and said rod positioning member being adapted to receive a rod

adapted to be bent, said bending member extending, and the end of the rod adapted to be bent being adapted to extend in substantially the same direction from said rod positioning member, a fulcrum member mounted on and adapted to be variously positioned on said bending member toward the free end thereof from its pivotal axis, and a stop member positioned beyond said fulcrum member from the pivotal axis of said bending member adapted to be variously fixed by said supporting means and adapted to limit the offset position of said rod near its end.

3. In a rod bending apparatus, a supporting member, a bending member pivotally mounted thereon, the portion at the pivotal axis of said bending member forming a bending fulcrum for the rod adapted to be bent, an axially-fixed stop member mounted on said supporting member and in opposed relation to the pivotal axis of said bending member and spaced therefrom, a fulcrum member adapted to be variously positioned on said bending member, another stop member adapted to be variously positioned relatively to and backwardly from the front side of said supporting member, and means for rotating said bending member.

4. In a rod bending apparatus, a supporting member, a bending member pivotally mounted thereon, the portion at the pivotal axis of said bending member forming a bending fulcrum for the rod adapted to be bent, a stop member mounted on said supporting member and in opposed relation to the pivotal axis of said bending member and spaced therefrom, a fulcrum member adapted to be variously positioned on said bending member, a fixed fulcrum means mounted on said bending member and spaced from its pivotal axis substantially in line with the stop member mounted on said supporting member, another stop member adapted to be variously positioned relatively to and backwardly from the front side of said supporting member, and means for rotating said bending member.

5. In a rod bending apparatus, a supporting plate, a bending plate pivotally mounted on said supporting plate, a roller mounted at the pivotal axis of said bending plate, a pair of stop members mounted on said supporting plate at the opposite ends thereof, a roller revolubly mounted on said bending plate adapted to be variously positioned thereon, substantially in line with said stop members, and another roller adapted to be variously positioned relatively to and backwardly from the front side of said supporting plate.

6. In a rod bending apparatus, a supporting plate, a bending plate pivotally mounted on said supporting plate, a roller mounted at the pivotal axis of said bending plate, a pair of stop members mounted on said supporting plate at the opposite ends thereof, a pair of rollers revolubly mounted on said bending plate substantially in line with said stop members, one of said rollers being adapted to be variously spaced from the other, and another roller adapted to be variously positioned relatively to and backwardly from the front side of said supporting plate.

7. In a rod bending apparatus, a table, a pair of supporting members adapted to be variously positioned relatively to each other and secured on said table, stops mounted on said supporting members at their adjacent ends, bending members pivotally mounted on said supporting members, their pivotal mountings forming fulcrums about which rods are adapted to be bent, fulcrum members mounted on said bending members and adapted to be variously positioned thereon, substantially in line with the stops on said supporting members, and other stops in connection with said supporting members adapted to be variously positioned relatively thereto and backwardly from the front side thereof.

8. In a rod bending apparatus, a table, a pair of supporting members adapted to be variously positioned relatively to each other and secured on said table, stops mounted on said supporting members at their adjacent ends, bending members pivotally mounted on said supporting members, their pivotal mountings forming fulcrums about which rods are adapted to be bent, fulcrum members mounted on said bending members and adapted to be variously positioned thereon, substantially in line with the stops on said supporting members, other stops in connection with said supporting members adapted to be variously positioned relatively thereto and backwardly from the front side thereof, other supporting members adapted to be variously positioned near the ends of said table, and hook forming plates, provided with spaced apart rollers on each, pivotally mounted on said last mentioned supporting members, said spaced apart rollers being normally adapted to be positioned in alinement with said other stops and fulcrum members when the latter are shifted to their extreme bending positions.

9. In a rod bending apparatus, a supporting member, stop means mounted thereon, a bending member pivotally mounted on said supporting member, the portion at the pivotal axis of said bending member forming a fulcrum about which rods are adapted to be bent, a fulcrum means mounted on said bending member and spaced from its pivotal axis and in alinement with said stop means, and a pair of lever members pivotally connected together at their one ends and pivotally connected at their opposite ends

respectively to said supporting and bending members, the last mentioned ends of said lever members being positioned contiguous to each other when said bending member is in a receded position and substantially in alinement with each other and their pivotal connection when said bending member is shifted to its extreme position about its pivotal axis.

In testimony whereof, I have hereunto set my hand at San Diego, California this 13th day of February, 1924.

ALOYSIUS S. TERHAAR.