E. L. BROWN, JR.

ROD BENDING APPARATUS.

APPLICATION FILED OCT. 31, 1912.

1,066,247.

Patented July 1, 1913.

2 SHEETS—SHEET 1.

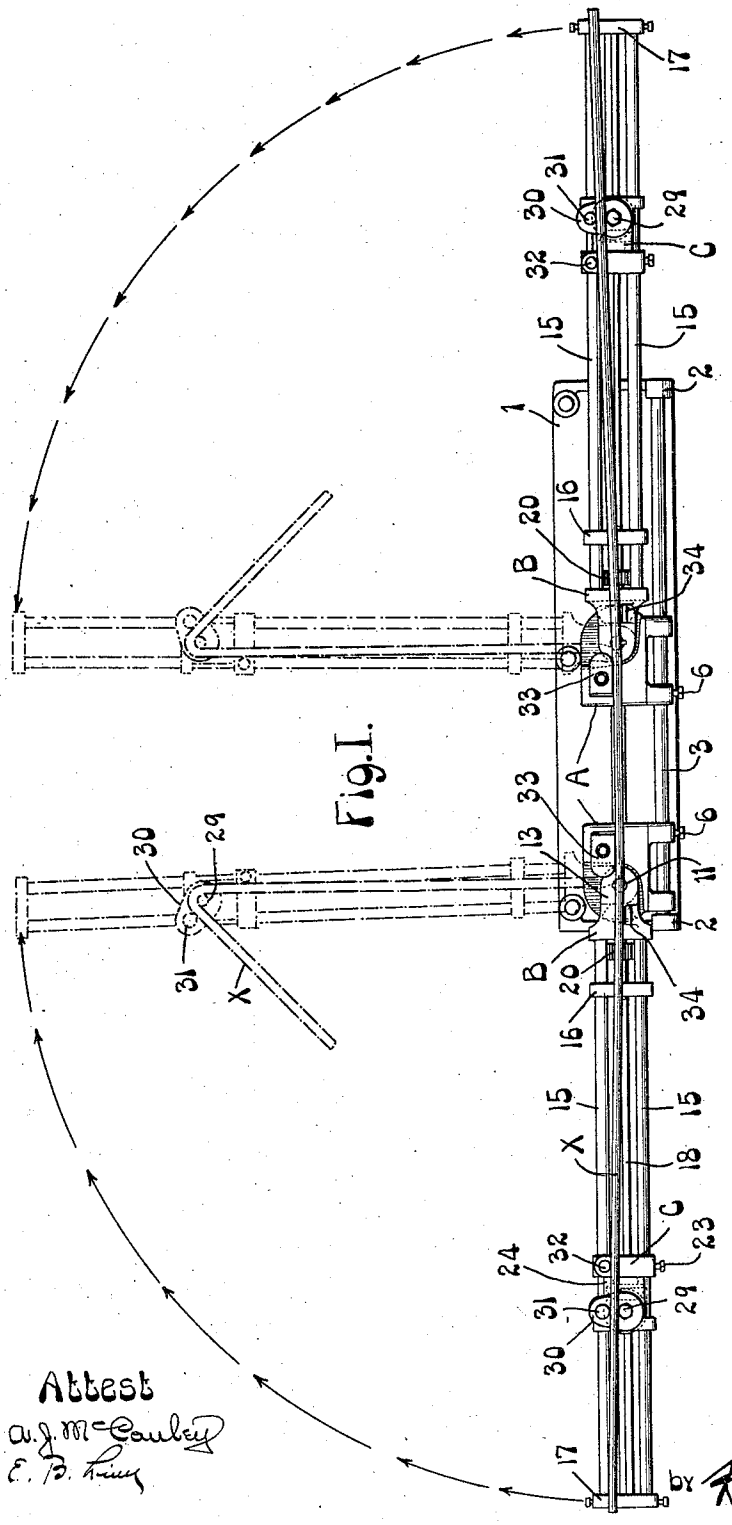

Fig. I.

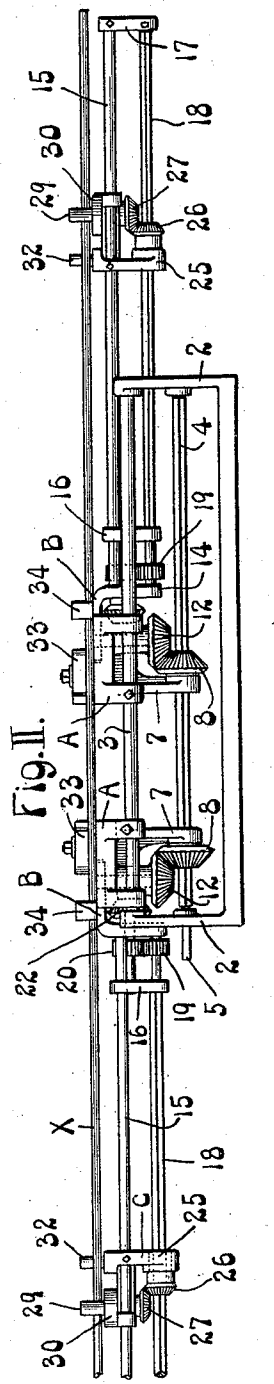

Fig. II.

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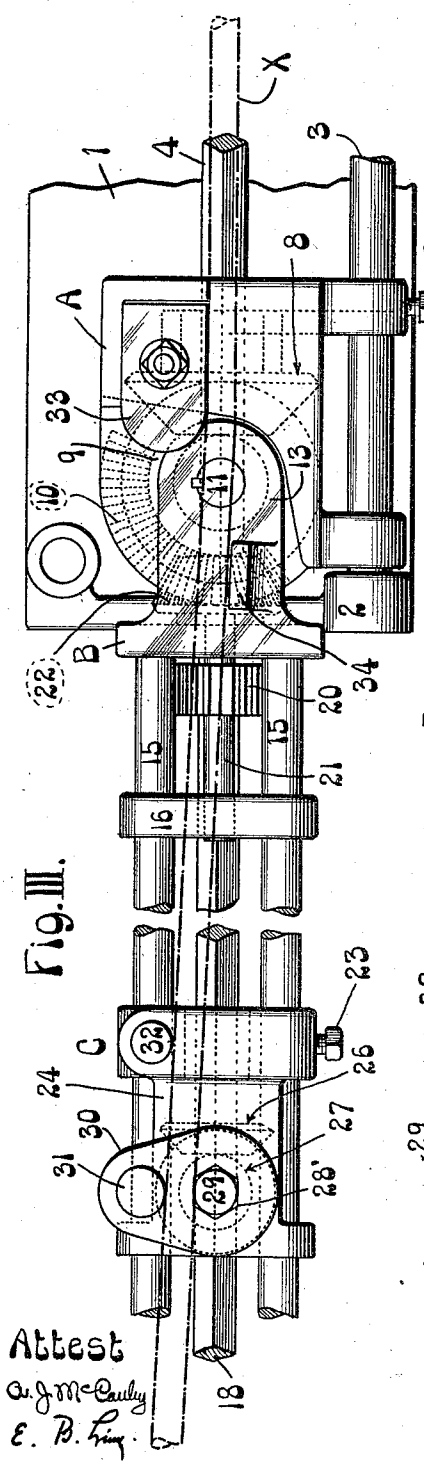

Fig. III.

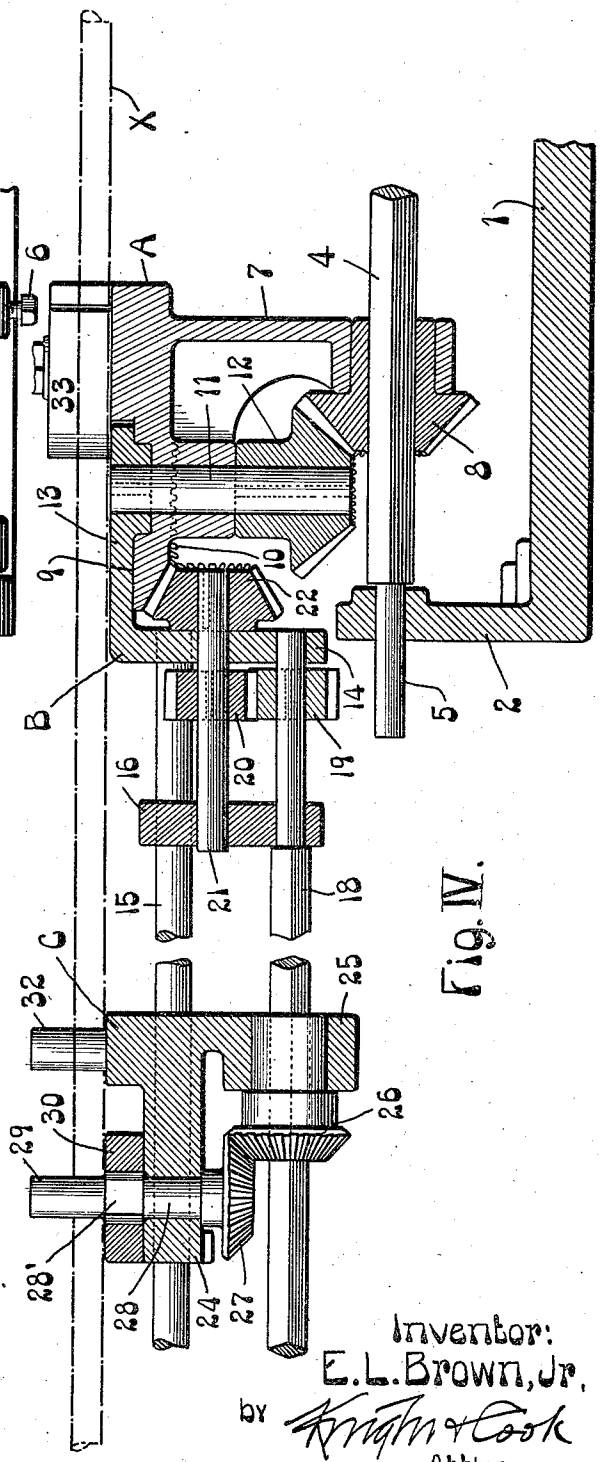

Fig. IV.

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UNITED STATES PATENT OFFICE.

EUGENE L. BROWN, JR., OF ST. LOUIS, MISSOURI.

ROD-BENDING APPARATUS.

1,066,247. Specification of Letters Patent. Patented July 1, 1913.

Application filed October 31, 1912. Serial No. 728,807.

To all whom it may concern:

Be it known that I, EUGENE L. BROWN, Jr., a citizen of the United States of America, and a resident of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Rod-Bending Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an apparatus for bending rods, or other objects of like nature, that require to be bent into particular shapes before they are used for specific purposes.

The principal object of my invention is to provide an apparatus of this kind by which rods used in the reinforcement of concrete structures may be shaped according to requirements.

Figure I is a top or plan view of my bending apparatus, with the movable elements shown in both full lines and dotted lines to indicate their positions previous to and subsequent to rod bending operations. Fig. II is a front elevation of the apparatus. Fig. III is an enlarged top or plan view of portions of my apparatus, including one of the pivot heads and the rod bending members swingingly connected to said head. Fig. IV is a vertical longitudinal section through the parts shown in Fig. III.

In the drawings: 1 designates the base of my apparatus, which is provided with end uprights 2.

3 is a horizontal rod extending longitudinally of the base 1, and mounted at its ends in the uprights 2.

4 is a main drive shaft, preferably non-circular in shape, which is rotatably mounted in the uprights 2, and to which power may be supplied in any suitable manner. The shaft may, as illustrated, be provided with an extension 5, to which a pulley may be secured.

A designates pivot heads supported by the horizontal rod 3, and preferably slidably arranged thereon, in order that the heads may be adjusted to space them from each other according to desire or requirement in the use of the apparatus. To provide for the pivot heads being maintained in fixed positions, I place in each of them a set screw 6 that serves to hold the head from movement longitudinally of the supporting rod 3 by impingement against said rod. Each pivot head is provided with a member 7 through which the main drive shaft 4 extends, and rotatably mounted in said member is a beveled gear wheel 8. Each pivot head is provided with a seat 9 that receives a bending head, which will be more particularly hereinafter referred to. In the pivot head A is a vertical bore that receives a pivot shaft 11, which extends beneath the part of the head containing the bore, and has fixed to it a beveled gear wheel 12, in mesh with the beveled gear wheel 8. The portion of each pivot head surrounding the vertical bore therein and the pivot shaft 11 is provided at its bottom with gear teeth 10, preferably arranged in the form of a segment, as seen most clearly in dotted lines Fig. III.

B designates inner bending heads, having horizontal wings 13 loosely positioned on the seats 9 of the pivot heads, and fixed to the pivot shafts 11. Each inner bending head also includes a vertical wing 14 that extends downwardly at an angle to the horizontal wing 13, as seen most clearly in Fig. IV.

15 are carrier bars arranged parallel with each other, these bars being secured at their inner ends to the vertical wing of the inner bending head B with which the bars are associated. There are preferably two of the carrier bars attached to each inner bending head, and the bars in each pair are connected by inner stays 16 and outer stays 17 suitably secured thereto, so that they may serve to maintain the rods in their proper correlative positions.

18 designates secondary drive shafts journaled in part in the vertical wings of the inner bending heads B, and in part in the stays 16 and 17. These auxiliary shafts are, like the main drive shaft 4, preferably non-circular in cross section. Each of said shafts has fixed to it at its inner end a spur wheel 19 that meshes with a spur wheel 20, fixed to a stub shaft 21 journaled in part in the adjacent vertical wing of the inner bending head B, and in part in the adjacent inner stay 16. Each stub shaft also has fixed to it at the side of the vertical wing of the inner bending head in which the stub shaft is mounted a beveled gear wheel 22, which is in mesh with the stationary gear teeth 10 on the corresponding pivot head A.

In the use of my apparatus, the operation

of the parts thus far described is as follows: When the main drive shaft 4 is operated, it acts to impart rotation to the beveled gear wheels 8 mounted thereon, and these gear wheels serve to drive the gear wheels 12 in mesh therewith, whereby partial rotation is imparted to the pivot shaft 11, and the inner bending heads B fixed to said pivot shafts are moved in an arc of a circle, carrying with them the carrier bars 15, the auxiliary drive shafts 18, the stub shafts 21, and the other elements supported by said inner bending heads. During such movements of the inner bending heads, the beveled gear wheels 22 travel in mesh with the stationary gear teeth 10 on the pivot heads A and, as a consequence, said wheels 22 are rotated, thereby causing rotation of the stub shafts 21, the spur wheels 20 and 19, and the auxiliary drive shafts 18. The object of rotating these last mentioned parts will hereinafter appear.

C designates outer bending heads mounted on the carrier bars 15, and preferably adjustable thereon, in order that they may be shifted toward or away from the inner bending heads B. To prevent displacement of the outer bending heads from their adjusted positions, each outer bending head is preferably supplied with a set screw 23 adapted to be placed in impingement against one of the carrier bars 15. Each bending head C includes a horizontal member 24 through which the carrier bars 15 extend, and also a vertical leg 25 through which an auxiliary drive shaft 18 extends; and the leg of each head constitutes a bearing for a beveled gear wheel 26, fitted to the auxiliary shaft extending through said leg. The beveled gear wheels 26 mesh with the beveled gear wheels 27 that are fixed to vertical shafts 28 extending through bores in the horizontal members 24 of the outer bending heads C, said shafts being extended above said horizontal members. The portions 28′ of the shafts 28 above the bending heads are preferably polygonal in shape, as seen in Figs. III and IV, and above said portions are abutments 29 formed integral with the shafts.

30 designates bending arms fitted to the upper ends 28′ of the shafts 28 and adapted to be rotated by said shafts. These bending arms are provided with studs 31, offset from the axes of the bending arms. On each outer bending head C is an abutment 32 that is so located as to provide for the stud on the bending arm 30 being in alinement therewith longitudinally of the carrier bars 15, when the bending arms are in their normal positions, as seen in Figs. I and III.

On the pivot heads A of my apparatus are abutments 33, which are located backwardly and inwardly relative to the axes of the inner bending heads B, and against which a rod, such as that shown at "X" may be bent when the swinging elements of the apparatus are moved from the positions seen in full lines to the positions seen in dotted lines, Fig. I. On the inner bending heads B are abutments 34 that press against the rod when it is being bent by the movement of the parts just referred to, these last mentioned abutments being of service to prevent the rod from becoming bowed while the rod is being bent at its portions that contact with the abutments 33.

From the description just given, it will be understood that when the swinging elements are moved from the full line to dotted line positions, Fig. I, I produce such bends as to render the rod "X" of U-shape, it being understood that the rod is, previous to the bending operation, longitudinally positioned so as to lie upon the pivot heads A adjacent to the abutments 33, and also upon the inner bending heads B and the outer bending heads C adjacent to the abutments 32 on the latter and the studs 31 on the bending arms 30, which are primarily substantially in alinement with the last mentioned abutments. During the movement of the bending heads B and C and the swinging elements associated therewith, the auxiliary shafts 18 are operated, as previously explained, and act to drive the beveled gear wheels 26 and 27 and the shafts 28 in the outer bending heads; and, in consequence, the bending arms 30 are partially rotated. As a result of the partial rotation of said bending arms, the studs 31 carried thereby are forcibly pressed against the rod and act to bend the rod around the abutments 29, whereby the end portions of the rod "X" are bent at angles to the arms of the rod previously bent into U-shape, it being obvious that the degree of such bending operation will be commensurate with the degree of movement of the bending arms 30. When the bending arms are in operation to produce the bends referred to, the abutments 32 act to prevent bowing of the arms of the rod, due to their positions relative to the bending points, as will be readily apparent.

I claim:—

1. In a rod bending apparatus, a pair of pivotally mounted bending sections, rod receiving abutments adjacent to the pivots of said sections, rod bending members carried by said pivotally mounted bending sections, rotatable shafts carried by said pivotally mounted sections, and means for rotating said shafts to operate said rod bending members.

2. In a rod bending apparatus, a pair of pivotally mounted bending sections, rod receiving abutments adjacent to the pivots of said pivotally mounted bending sections, rod bending members in the form of cranks carried by said pivotally mounted sections,

rotatable shafts carried by said pivotally mounted sections and geared to said cranks, and means for causing said shafts to rotate while the pivotally mounted bending sections are being rocked on their pivots.

3. In a rod bending apparatus, a pivotally mounted bending section, a rotatable rod bending member carried by said pivotally mounted bending section, an abutment carried by said pivotally mounted bending section, said rotatable rod bending member being operable to bend a rod around said abutment, a power shaft, and means carried by said pivotally mounted rod bending section for causing said rotatable rod bending member to partake of the movement of said power shaft.

4. In a rod bending apparatus, a pivotally mounted bending section, a rod bending member in the form of a crank carried by said pivotally mounted section, a rotatable shaft carried by said pivotally mounted section and geared to said crank, and means for causing said shaft to rotate while the pivotally mounted bending section is rocked on its pivot.

EUGENE L. BROWN, JR.

In the presence of—
A. J. MCCAULEY,
E. B. LINN.