

(No Model.)

2 Sheets—Sheet 1.

G. D. BURTON & E. E. ANGELL.
ELECTRIC METAL BENDING APPARATUS.

No. 475,194.

Patented May 17, 1892.

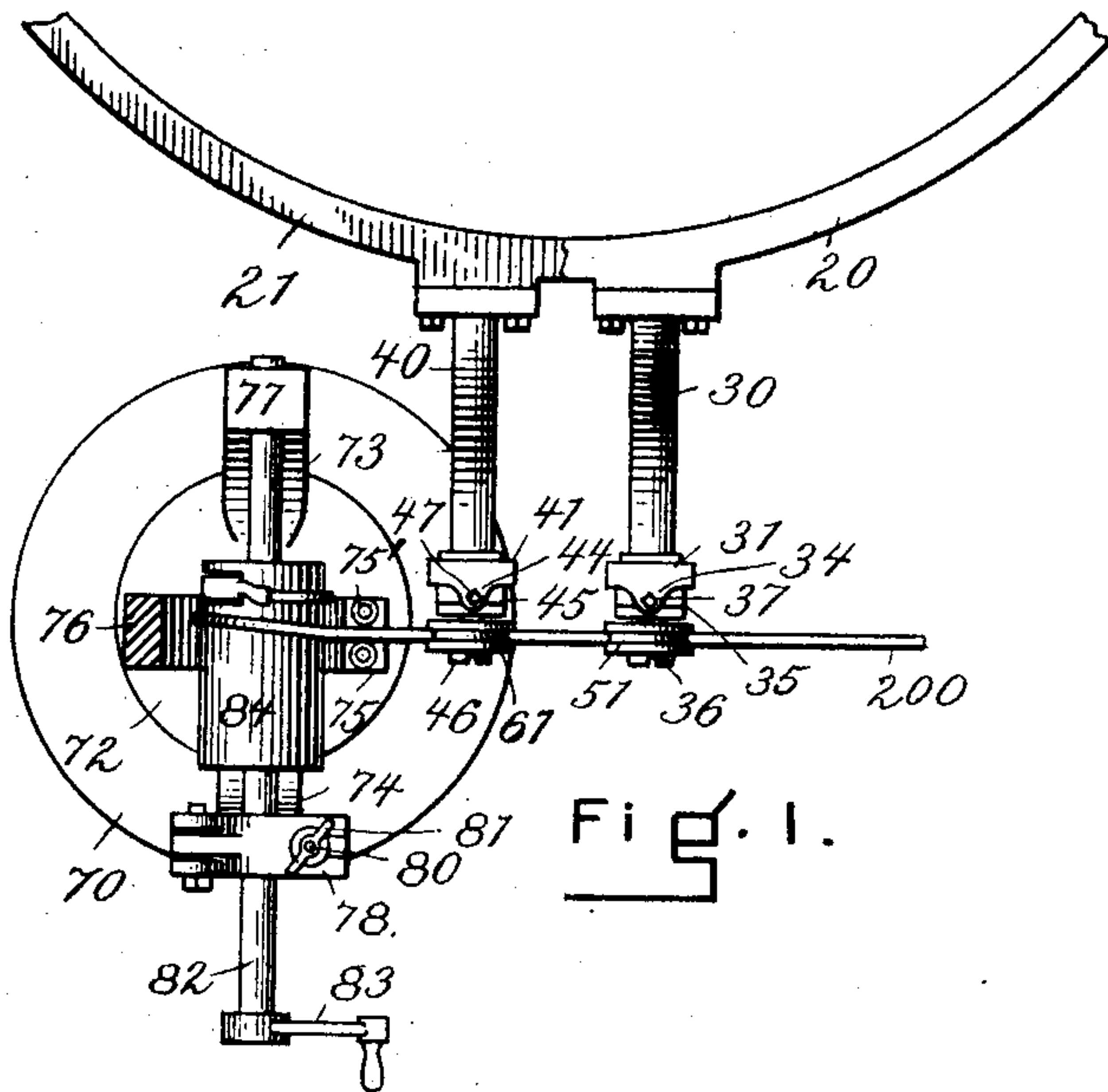


Fig. 1.

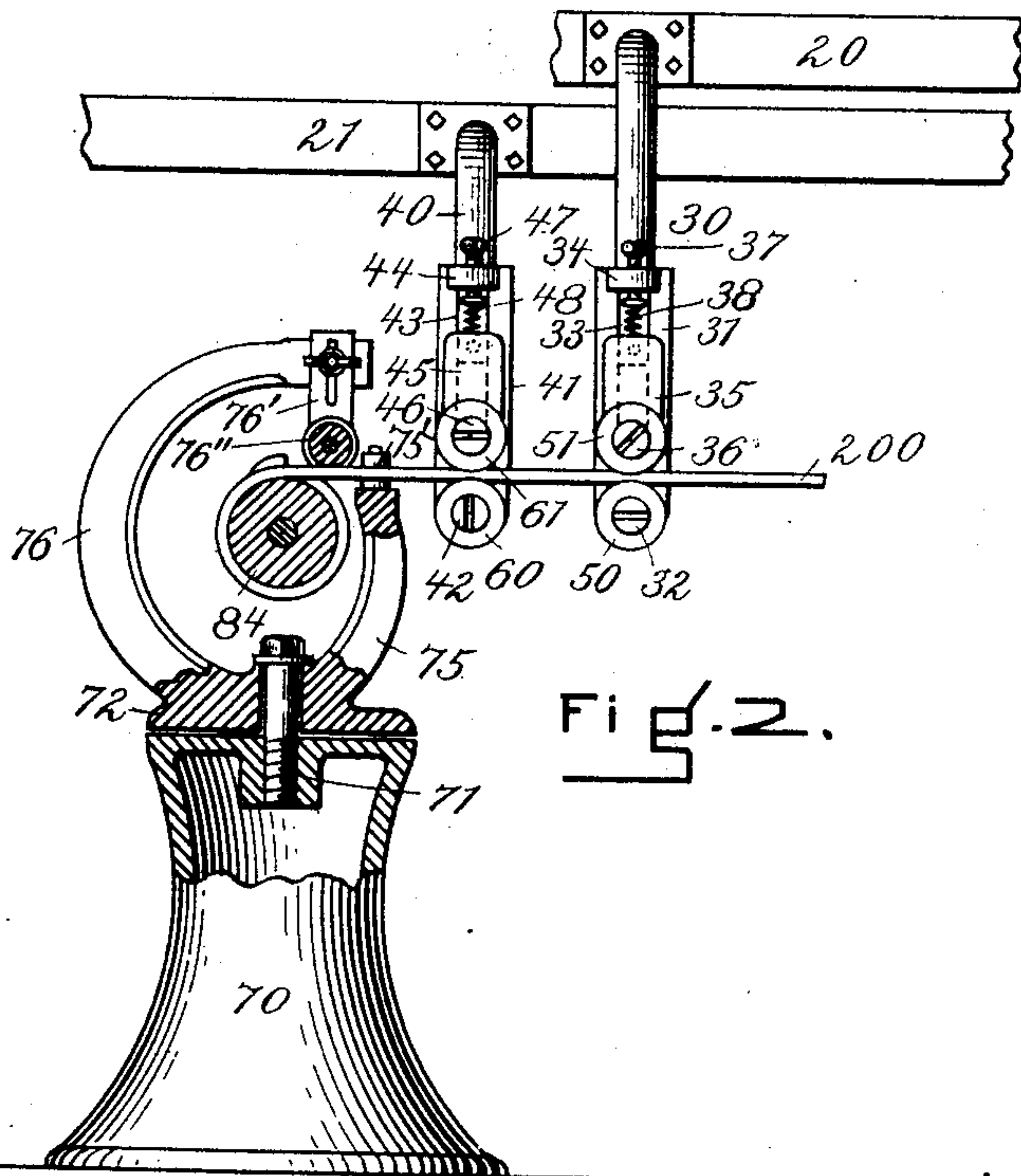


Fig. 2.

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UNITED STATES PATENT OFFICE.

GEORGE D. BURTON, OF BOSTON, AND EDWIN E. ANGELL, OF SOMERVILLE,
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ELECTRIC METAL-BENDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 475,194, dated May 17, 1892.

Application filed August 24, 1891. Serial No. 403,564. (No model.)

To all whom it may concern:

Be it known that we, GEORGE D. BURTON, residing at Boston, in the county of Suffolk, and EDWIN E. ANGELL, residing at Somerville, in the county of Middlesex, State of Massachusetts, citizens of the United States of America, have invented certain new and useful Improvements in Apparatus for Bending Pipes by Electricity, of which the following is a specification.

The object of this invention is to effect the coiling or bending of iron pipe, brass pipe, copper tubing, or other metallic pipe or tubing in a rapid and economical manner.

Figure 1 of the accompanying drawings represents a plan of this improved electric pipe-bending apparatus. Fig. 2 represents a front elevation thereof, partly in vertical section. Fig. 3 represents a side elevation thereof, the standards supporting the guide-rolls of the coiling device being broken off for convenience of illustration. Fig. 4 represents a transverse section of the coiling-mandrel provided with a clamp for clamping the end of the pipe. Fig. 5 represents a side elevation of the upper portion of the front standard for supporting the mandrel-shaft. Fig. 6 represents a diametrical section of one of the electric contact-rolls provided with a carbon tire. Fig. 7 represents a longitudinal section of a piece of pipe filled with sand preparatory to the heating and coiling operation. Fig. 8 represents a piece of spirally-coiled pipe formed on a cylindrical mandrel. Fig. 9 represents a plan view of a conical mandrel for use in this apparatus.

Similar numerals of reference indicate corresponding parts in the different figures.

This apparatus includes an electric converter for transforming an electric current of high voltage and small volume into a current of large volume and low voltage. The construction of the cores of the converter does not form a part of this invention and therefore need not be herein illustrated or described. The rings 20 and 21, whereof segments are represented in the drawings, are composed of copper or other highly-conductive material and constitute the positive and negative poles of the current-converter.

A bracket 30, composed of copper or other

highly-conductive material, is attached at its upper end to the converter-ring 20 and depends therefrom, and a bracket 40 is attached at its upper end to the other ring 21 and depends therefrom, being somewhat shorter than the bracket 30. The bracket 30, which constitutes the negative electrode, is provided at its outer end with a vertical standard 31, having a fixed stud 32 at its lower end, a central vertical slot 33, and a lug 34 at its upper end. An adjustable slide 35, provided with a stud 36, is guided in the slot 33. An adjusting-screw 37 projects through the lug 34, and a spring 38 is interposed between said adjusting-screw and said slide. A grooved contact-roll 50 is journaled on the fixed stud 32, and a similar grooved contact-roll 51 is journaled on the movable stud 36.

The bracket 40, which constitutes the positive electrode, is provided with a similar vertical standard 41, having a fixed stud 42, a vertical slot 43, and a lug 44. A slide 45, provided with a stud 46, moves in the slot 43, and its tension is regulated by the set-screw 47 and spring 48. A contact-roll 60 is disposed on the fixed stud 42, and a contact-roll 61 is disposed on the movable stud 46.

The contact-rolls are composed of copper or other conductive material and are provided with peripheral grooves.

Each contact-roll may be provided with a carbon tire 52, secured against a flange 53 by means of a nut 54, or one contact-roll of each pair may be so constructed.

A base 70 is disposed adjacent to the electric contact-rolls, said base being provided with a central stud 71, on which a plate 72 swivels. The plate 72 is provided with a rear curved arm 73, a front curved arm 74, a curved standard 75, having a vertical guide-roll 75', and an elliptical standard 76, the upper end of the latter being disposed at a point above the upper end of the curved standard 75 and provided with an adjustable arm 76', carrying a guide-roll 76''.

The upper end of the standard 73 is provided with a hinged lug 77, having a shaft-bearing, and the upper end of the standard 74 is provided with a hinged cap 78, which forms, with the upper end of the standard, a shaft-bearing 79. A screw-threaded arm 80

is pivoted to the standard 74, and a clamping-nut 81 thereon serves to hold the cap-plate in position and permits it to be opened. A mandrel-shaft 82 is journaled in the bearings of the lug 77 and standard 74 and provided with a crank 83 or other actuating device at its outer end. A mandrel 84 is fixed to the shaft 82 and disposed in line with the contact-rolls. This mandrel, which may be in the form of a cylinder or cone or other suitable form, is provided with a recess 85 near one end, in which a jaw 86 is pivoted, said jaw having a rear lug 87, through which an adjusting-screw 88 passes, said screw bearing against the bottom of said recess. This jaw, actuated by the adjusting-screw, serves to clamp the end of the pipe to be coiled or bent into contact with the mandrel.

In performing the process of bending pipe or tubing by this improved apparatus the pipe or tube 200 to be bent or coiled is filled with a filling of sand or other flexible filling 201 and passed between the contact-rolls 50 and 51 and between the contact-rolls 60 and 61, and the electric current is switched on. The pipe serves to close the circuit between the rolls 60 and 61 of the positive electrode and the rolls 50 and 51 of the negative electrode, and that portion of the pipe which spans the space between the pairs of rolls having a greater resistance than the rolls becomes heated and the metal is softened in a few seconds. The pipe is then fed forward between the guide-rolls 75' of the standard 75 and under the adjustable guide-roll 76'', connected with the standard 76 to the mandrel 84, where its end is clamped by the jaw 88. The mandrel-shaft is then turned and the pipe is wound around the mandrel in a spiral or other form, being continually heated as it passes between the pairs of electric contact-rolls. The upper rolls 51 and 61 yield to suit pipes of different diameters and are pressed down upon the pipe, forming a close contact by means of the springs 33 and 43. When a coil is finished, the hinged cap-plate 78 is released from its fastening device and swung open and the

mandrel-shaft and mandrel containing the coil of pipe removed from the apparatus and another mandrel, with its shaft, placed in position therein. The pipe is removed from the mandrel in any suitable manner. Any suitable coiling or bending apparatus may be employed in connection with the electric heater and the pipe bent into angular, serpentine, or other forms.

This method and apparatus afford a convenient means for bending or coiling pipe in continuous lengths in an economical manner.

We claim as our invention—

1. In an electric metal-working apparatus, the combination of an electric converter, electrodes connected with the positive and negative poles thereof, slotted standards attached to said electrodes, journal-boxes sliding in the slots of said standards, adjustable rolls journaled on fixed studs of said standards, rolls journaled on said journal-boxes, and springs for regulating the tension of the adjustable rolls.

2. In an electric metal-working apparatus, the combination of an electric converter, electrodes attached to the positive and negative poles thereof, and fixed and adjustable rolls supported on said electrodes, one or more of said rolls being provided with a grooved carbon tire.

3. In an electric metal-working apparatus, the combination of a base, a swiveled plate thereon, curved arms attached to said plate, one of said arms being provided with a pivoted lug and the other with a hinged cap, a shaft journaled in said standard, and a mandrel on said shaft.

4. In a metal-working apparatus, the combination of the plate 72, standard 75, provided with guide-rolls at its upper end, an elliptical standard 76, the arm 76', adjustable thereon, and the guide-roll 76'' on said adjustable arm.

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