

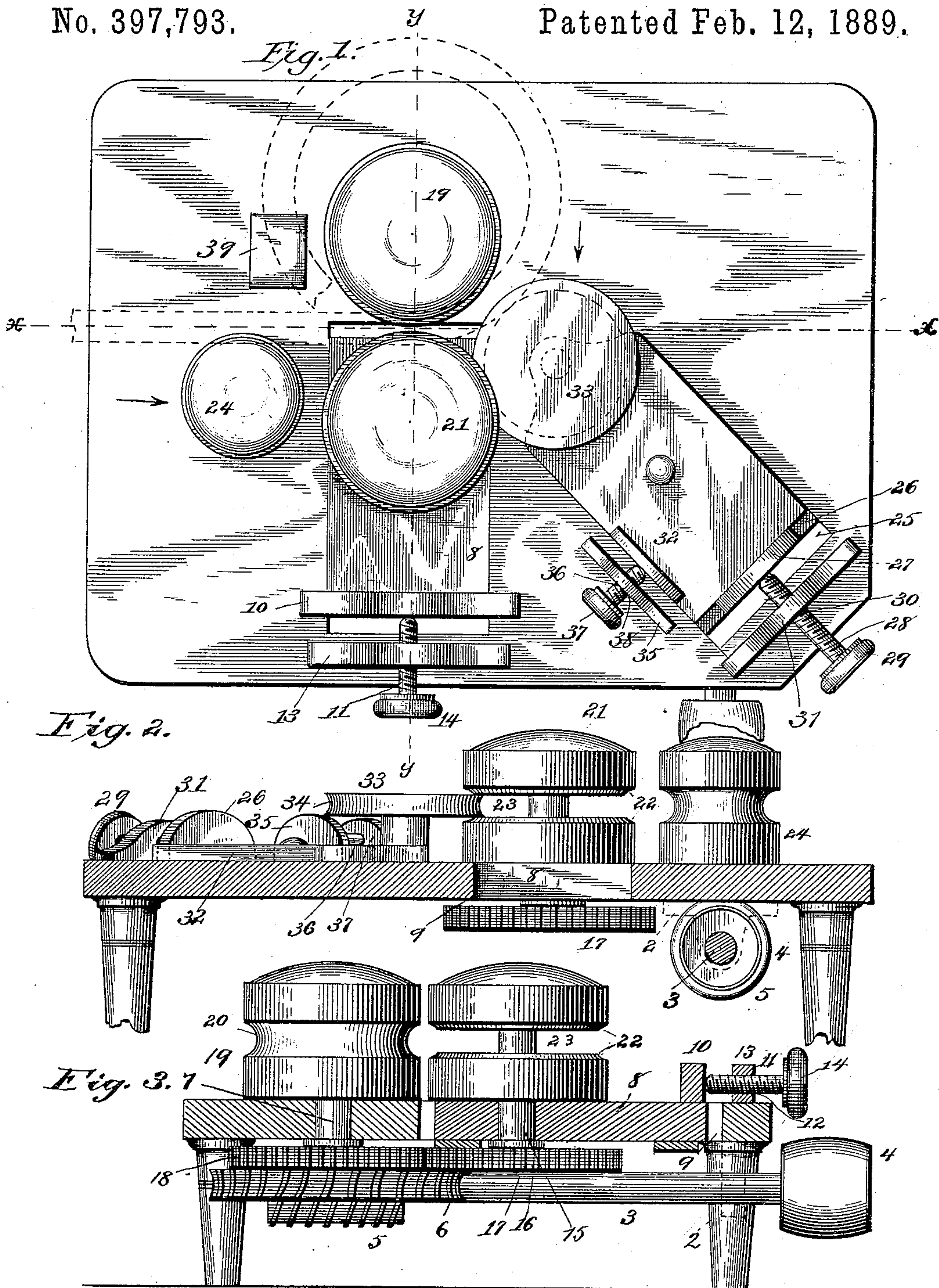
(No Model.)

H. E. FOWLER.

MACHINE FOR BENDING AND COILING PIPE.

No. 397,793.

Patented Feb. 12, 1889.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## MACHINE FOR BENDING AND COILING PIPE.

SPECIFICATION forming part of Letters Patent No. 397,793, dated February 12, 1889.

Application filed June 20, 1888. Serial No. 277,659. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT E. FOWLER, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Machines for Bending and Coiling Pipe; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for bending and coiling pipe; and it consists in the improved construction and arrangement or combination of parts hereinafter fully disclosed in the description, drawings, and claims.

The objects of my invention are, first, to provide a machine for bending and coiling pipe with a bending-roller which will bear against the side of the pipe and bend it immediately after it leaves the feed-rollers; second, to form one of the feed-rollers of a pipe-bending machine with a deep groove in the bottom of a shallow, partly-cylindrical, and circumferential groove, and to provide a narrow bending-roller which will project with its periphery into said deep groove; third, to journal said bending-roller upon an adjustable slide for adjusting it to bend coils of varying diameter, and, fourth, to journal said bending-roller upon a block or frame which is provided with means for laterally adjusting it, and to support said block or frame upon a slide provided with means for adjusting it toward and from the feed-rollers.

The construction of the machine by which I accomplish these objects is shown in the accompanying drawings, forming part of this specification, and in which the same reference-numerals indicate the same parts.

Figure 1 represents a top plan view of my improved machine for bending and coiling pipe, the coiled pipe being indicated by dotted lines; Fig. 2, a vertical section on the line  $x x$  of Fig. 1, and Fig. 3 a vertical section on the line  $y y$  of Fig. 1.

In the drawings, the numeral 1 indicates the machine table or frame, which is provided upon its under side with bearings 2 for the drive-shaft 3. Said drive-shaft 3 is provided with a suitable drive-pulley, 4, at its outer

end, and at its inner end with a worm, 5, which meshes with a worm-wheel, 6, which is secured upon the lower end of a shaft or spindle, 7, journaled in the machine frame or table.

A slide or block, 8, slides in a slot, 9, in the machine table or frame, and has an upwardly-projecting lip or shoulder, 10, at its outer end, against which the inner end of a screw, 11, (which fits and turns in a corresponding perforation, 12, in a lip, 13, upon the edge of the machine frame or table, and is provided with a suitable hand-wheel, 14, at its outer end,) may bear. A shaft or spindle, 15, is journaled in a bearing, 16, in the inner end of said slide or block, and has a cog-wheel, 17, upon its lower end, which meshes with a cog-wheel, 18, upon the shaft or spindle 7 below said table or frame, but above the worm-wheel upon said shaft. A feed-roller, 19, is removably secured upon said shaft or spindle 7 above the table or frame, and said roller is formed with a slightly less than semi-cylindrical circumferential groove, 20.

A feed-roller, 21, is removably secured upon the shaft or spindle 15 in the adjustable slide or block 8, and is formed with a slightly less than semi-cylindrical circumferential groove, 22, and with a still deeper narrow groove, 23, in the bottom of said groove 22.

A guide-roller, 24, is journaled upon the machine frame or table with its periphery in a line with said deeply-grooved feed-roller 21 and in a line at right angles to a line drawn between the centers of the two feed-rollers 19 and 21.

The machine frame or table is formed with a diagonal slot, 25, which extends from one corner of said table and toward the space between the feed-rollers, and a slide or block, 26, fits and slides in said slot and has an upwardly-projecting lip, 27, at its outer end. The inner end of a screw, 28, which is provided with a hand-wheel or disk, 29, and fits and revolves in a threaded perforation, 30, in a lip, 31, at the corner of the table, bears against said lip 27 of the slide 26 and serves to adjust the same in the slot. A plate or block, 32, is pivoted at its middle upon the upper side of said slide 26 and has a narrow bending-roller, 33, journaled upon its inner end. Said narrow bending-roller will fit into the



deep groove 23 in the feed-roller 21, and is formed with a circumferential partly-cylindrical groove, 34, which is formed with the same radius as the grooves of the feed-rollers, 5 so that said groove 34 may form a continuation of the groove 22 in said feed-roller 21, as will be seen by reference to Fig. 2 of the drawings. An upwardly-projecting lip, 35, is formed at the edge and near the outer end of 10 the slot 25, and a screw, 36, provided with a hand-wheel or disk, 37, is fitted in a threaded perforation, 38, in said lip and bears with its inner end against the side edge of the outer end or portion of said pivoted block or plate 32.

15 An oblique guide, 39, or a guide-roller or similar device is adjustably secured upon the machine frame or table at the forward or feed side of the feed-roller 19 and serves to guide the coil as it is formed by the rollers above 20 the same.

In practice feed and guide rollers of the appropriate diameter for the coils to be made, and having their circumferential grooves of a size to snugly fit the pipe to be bent, are 25 adjusted in their proper places, the adjustable slide for the deeply-grooved feed-roller 21 and the long cogs of the gear-wheels upon the roller-shafts or spindles admitting of feed-rollers of varying diameters being used, and 30 a bending-roller of a suitable diameter and with a circumferential groove corresponding to the grooves in the feed and guide rollers is adjusted. The pipe is now inserted between the feed-rollers, and the narrow bending- 35 roller will, by bearing against one side of said pipe and by being forced against it by the screw 28, bend it, and, when the desired bend or diameter of coil has been attained, by adjusting said bending-roller by means of the 40 screws 28 and 36 the pipe may be fed through the rollers and coiled without any stoppage or further adjustment, the guide 39 guiding the coils above the feed-rollers and preventing their being fouled or obstructed by the 45 pipe which is fed into the machine.

It will be obvious that the diameter of the coils is adjusted by the adjustment of the bending-roller, and that the diameter will be increased by tilting said roller out from the 50 feed-rollers by means of the laterally-tilting frame and its side screw, 36, and by drawing said roller away by the slide and its screw 28. When a cylindrical coil is formed, the bending-roller remains in its adjusted position; 55 but when a conical coil is to be formed the bending-roller is first gradually fed toward the feed-rollers and pipe by means of the slide and the end screw, 28, forming the larger coils, and thereupon, when said slide 60 has arrived at the inner end of its slot, fed into the deep groove in the feed-roller and still closer to said pipe, forming the smaller coils by means of the tilting frame or plate and the side screw, 36.

55 It will be obvious that, on account of the bending-roller projecting into the deep groove of the feed-roller, said roller will bear against

the pipe in the space between the feed-rollers and at a point very close to the point at which the deeply-grooved feed-roller bears against 70 it, so that the pipe will be gradually and evenly bent and fully supported while it is being bent, said feed-roller and bending-roller following the contour of the opposite feed-roller for a portion of its periphery, and 75 thus forming a perfect support for the pipe while it is being bent and causing a smooth and even curve without breaks and straight or uneven portions.

Instead of having the bending-roller to pro- 80 ject into a groove in the feed-roller, said roller may be so shaped as to project into the space between the feed-rollers in various other ways, or it may be substituted by one or more smaller shaping or bending rollers or a simi- 85 lar shaping or bending device without departing from the spirit of my invention, and one form of such arrangement of shaping or bending rollers forms the subject-matter of another application for Letters Patent, which 90 is filed together with this application.

Having thus fully described the construction and arrangement or combination of my improved machine for bending and coiling pipe, with its operation and advantages, what 95 I claim as new is—

1. In a machine for bending and coiling pipe, the combination, with a grooved feed-roll, of a feed-roll having a groove of greater depth and a bending and shaping roll having its 100 periphery extending into the periphery of said deeply-grooved roll, substantially as specified.

2. In a machine for bending and coiling pipe, the combination, with a grooved feed-roll, of a feed-roll having a groove of greater depth 105 and an adjustably-arranged bending and shaping roll having its periphery extending into the periphery of said deeply-grooved feed-roll, substantially as specified.

3. In a machine for bending and coiling pipe, 110 the combination, with a pair of feed-rollers, of a bending-roller which projects into the space between said feed-rollers to a point within the periphery of one of them, and a slide which forms a bearing for said roller 115 and is provided with a feed-screw for adjusting it toward and from said feed-rollers, substantially as described.

4. In a machine for bending and coiling pipe, the combination, with a pair of feed- 120 rollers, of a slide provided with a screw for adjusting it toward and from the space between said feed-rollers, a plate or frame pivoted upon said slide, a screw for tilting or laterally adjusting said pivoted plate or frame, 125 and a bending-roller which is journaled upon the inner end of said plate or frame, and, together with one of said feed-rollers, forces the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, sub- 130 stantially as described.

5. In a machine for bending and coiling pipe, the combination of a feed-roller, an opposite feed-roller formed with a deep groove



in its periphery, and a bending-roller which is journaled to project with its edge into the deep groove of said feed-roller, and, together with said roller, to force the pipe to follow the contour of said other feed-roller for a portion of its periphery, substantially as described.

6. In a machine for bending and coiling pipe, the combination of a feed-roller formed with a circumferential groove, a feed-roller formed with a circumferential groove and a deeper groove in the bottom of said groove, and a narrow bending-roller which is journaled to project into said deeper groove and formed with a circumferential groove of the same diameter as the grooves in said feed-rollers, and which, together with said deeply-grooved roller, forces the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, substantially as described.

7. In a machine for bending and coiling pipe, the combination of a circumferentially-grooved feed-roller, an opposite feed-roller formed with a circumferential groove and with a deep groove in the bottom of said circumferential groove, a circumferentially-grooved bending-roller which is journaled to project into said deep groove, and, together with said deeply-grooved feed-roller, to force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, and means for adjusting said bending-roller to project more or less into said deeply-grooved roller and toward said opposite feed-roller, substantially as described.

8. In a machine for bending and coiling pipe, the combination of a circumferentially-

grooved feed-roller, an opposite feed-roller formed with a corresponding circumferential groove and with a deep groove in the bottom of said groove, a slide which projects with its inner end toward the space between said feed-rollers, a screw for adjusting said slide toward or from said rollers, and a circumferentially-grooved bending-roller which is journaled at the inner end of said slide to project into the deep groove of said feed-roller, and, together with said feed-roller, to force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, substantially as described.

9. In a machine for bending and coiling pipe, the combination of the machine frame or table formed with the diagonal slot 25, the circumferentially-grooved feed-roller 19, the opposite feed-roller, 21, formed with the corresponding circumferential groove, 22, and with a deep groove, 23, in the bottom of said groove, the guide-roller 24, the oblique guide 39, the slide or block 26 in said diagonal slot, the screw 28, for adjusting said slide, the plate or block 32, pivoted upon said slide, the screw 36, for laterally adjusting said plate or block, and the narrow bending-roller 33, which is journaled at the inner end of said pivoted plate or block and projects into the groove 23 of said feed-roller 21, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT E. FOWLER.

Witnesses:

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