

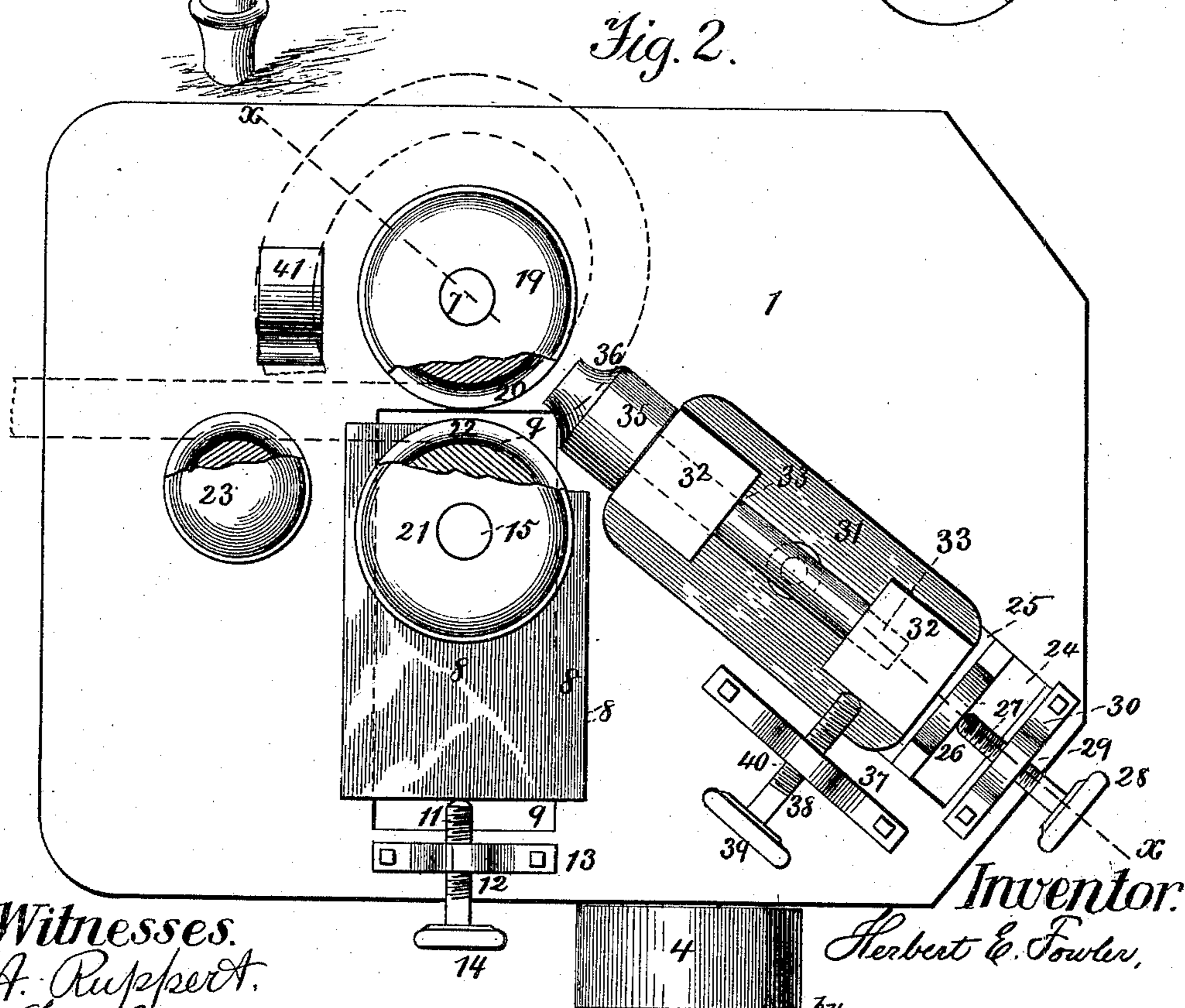
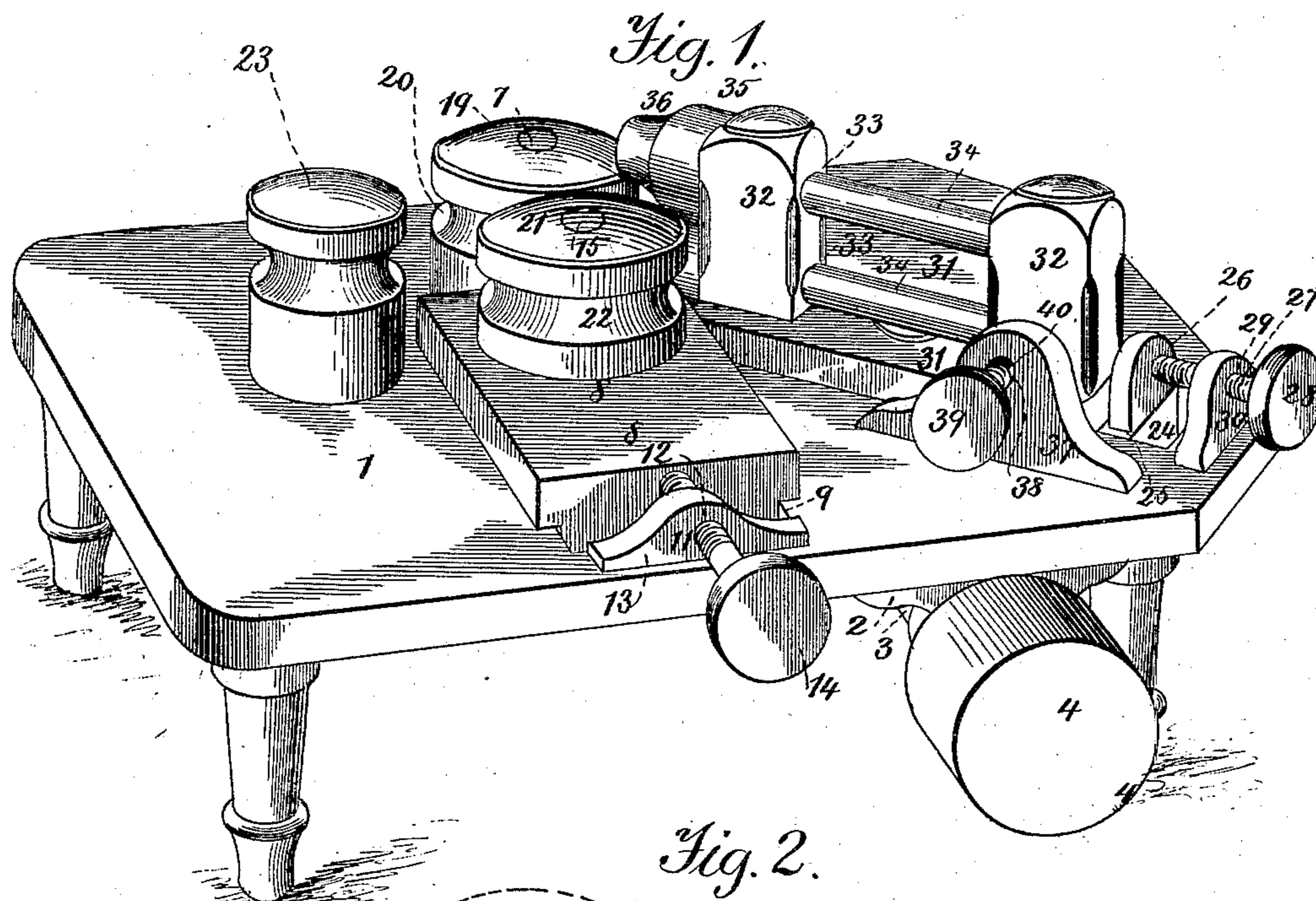
(No Model.)

2 Sheets—Sheet 1.

H. E. FOWLER.
MACHINE FOR BENDING PIPE.

No. 397,713.

Patented Feb. 12, 1889.



Witnesses.
A. Ruppert.
Wm. Lecher

Inventor.
Herbert E. Fowler,
by
James M. Blanchard,
his Attorney.

(No Model.)

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Fig. 3.

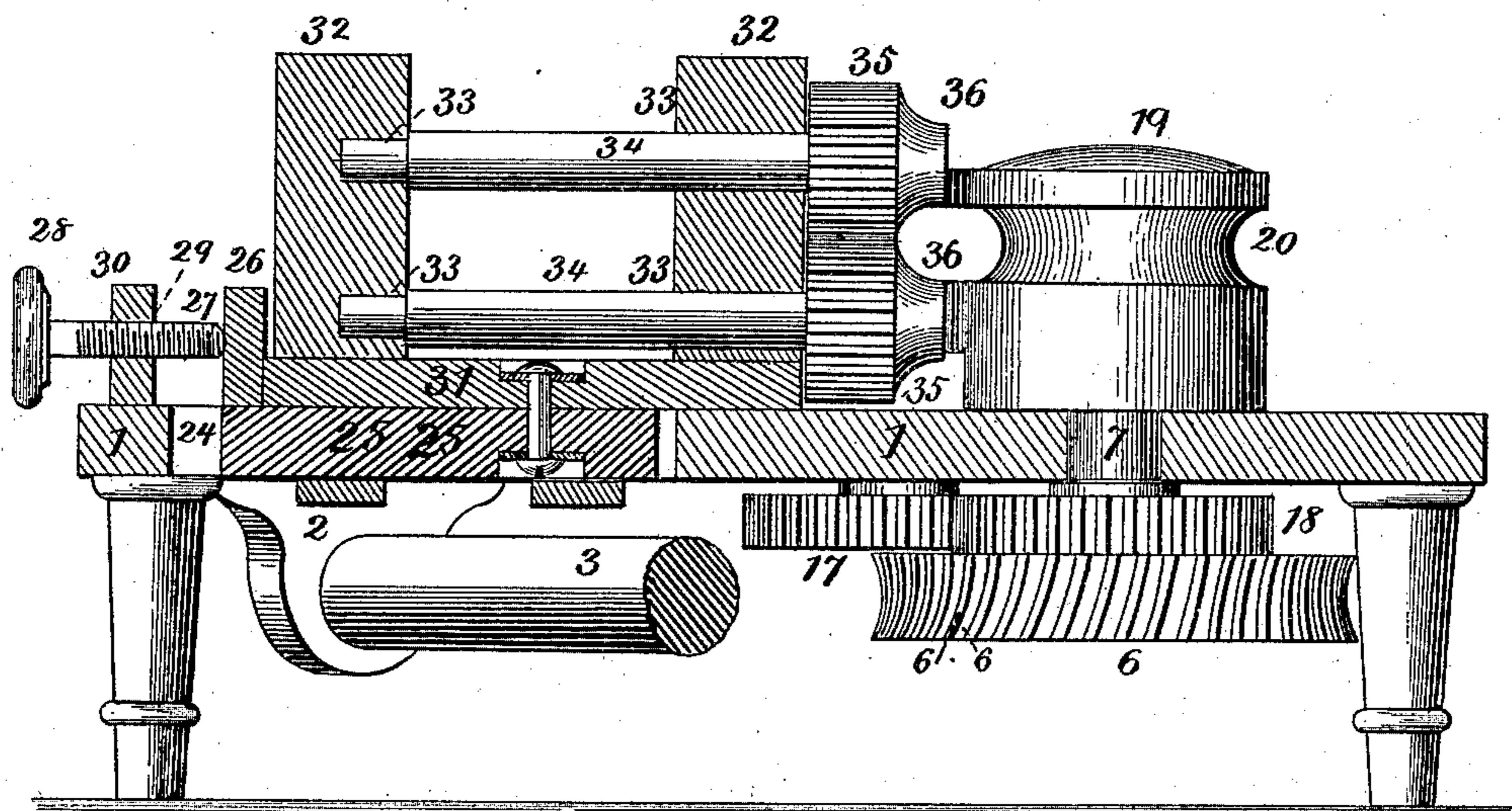
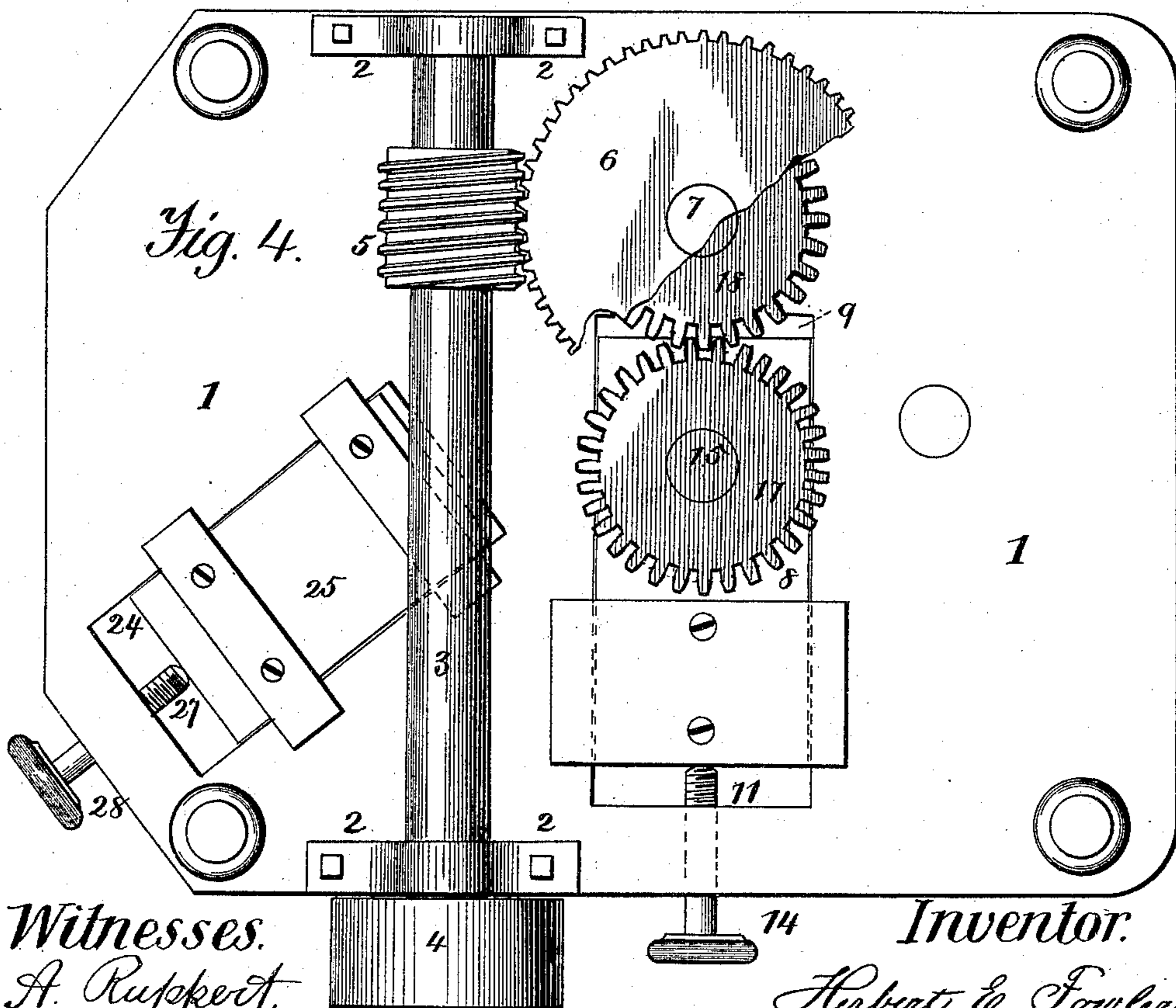


Fig. 4.



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UNITED STATES PATENT OFFICE.

HERBERT E. FOWLER, OF NEW HAVEN, CONNECTICUT.

MACHINE FOR BENDING PIPE.

SPECIFICATION forming part of Letters Patent No. 397,713, dated February 12, 1889.

Application filed May 12, 1888. Serial No. 273,734. (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 Pipes; 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 two molded, rabbeted, or conical bending-rollers journaled parallel with each other; second, to provide a machine for bending and coiling pipe with bending-rollers, which will bear against the side of the pipe and bend it immediately after it leaves the feed-rollers; third, to arrange said bending-rollers one above the other, with their free ends pointing toward the feed-rollers and to form said rollers with molded, grooved, or rabbeted ends, which will form together nearly a semicircle in section; fourth, to journal said bending-rollers upon an adjustable slide for adjusting them to bend coils of varying diameters; and, fifth, to journal said bending-rollers 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.

In the accompanying drawings, which form a part of this specification, and in which the same reference-numerals indicate the same parts, Figure 1 represents a perspective view of my improved machine for bending and coiling pipe; Fig. 2, a top plan view of the same, showing the coiled pipe indicated by dotted lines; Fig. 3, a vertical section on the line xx of Fig. 2, and Fig. 4 a bottom plan view.

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 the inner end of a screw, 11, bearing against its outer end. Said screw 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. A shaft or spindle, 15, is journaled in a bearing 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, which is formed with a corresponding slightly less than semi-cylindrical circumferential groove, 22, is removably secured upon the spindle or shaft 15 in the adjustable slide or block 8.

A guide-roller, 23, is journaled upon the machine frame or table with its periphery in a line with said 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, 24, which extends from one corner of said table and toward the space between the feed-rollers, and a slide or block, 25, fits and slides in said slot and has an upwardly-projecting lip, 26, at its outer end. The inner end of a screw, 27, which is provided with a hand wheel or disk, 28, and fits and revolves in a threaded perforation, 29, in a lip, 30, at the corner of the table, bears against the said lip 26 of the slide 25 and serves to adjust the same in the slot. A plate or block, 31, is pivoted at its middle upon the upper side of said slide 25, and has two uprights, 32, upon its upper face, which form longitudinal bearings 33 for two horizontal shafts 34, which are journaled one above the other and parallel with each other in said bearings. The bending-rollers 35 are secured upon the inner

ends of said shafts, and the peripheries or edges of said rollers are formed with molds, rabbets, or grooves, 36, which form nearly a semicircle in section when the rollers are placed in their proper position with their peripheries bearing against each other. The diameter for said semicircle formed by the grooves or rabbets of said rollers is the same as the diameter of the grooves of the feed-rollers, so that said rollers may form a continuation of the groove in the feed-roller 21, and may form a circular opening when brought to register with the groove in the feed-roller 19.

An upwardly-projecting lip, 37, is formed at the edge and near the outer end of the slot 24, and a screw, 38, provided with a hand wheel or disk, 39, is fitted in a threaded perforation, 40, in said lip, and bears with its inner end against the outer upright, 32, of said pivoted block or frame 31.

An oblique guide, 41, 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 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 adjusted in their proper places, the adjustable slide for the 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 bending-rollers of a suitable diameter and with grooves corresponding to the grooves in the feed and guide rollers are secured upon their shafts. The pipe is now inserted between the feed-rollers, and the bending-rollers will, by bearing with their molded rabbeted ends against one side of said pipe and by being forced against it by the screw 27, bend it, and when the desired bend or diameter of coil has been attained by adjusting said bending-rollers by means of the screws 27 and 38 the pipe may be fed through the rollers and coiled without any stoppage or further adjustment, the guide 41 guiding the coils above the feed-rollers and preventing their being fouled or obstructed by the 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-rollers, and that the diameter will be increased by tilting said rollers out from the feed-rollers by means of the laterally-tilting frame and its side screw, 38, and by drawing said rollers away by the slide and its screw 27.

When a cylindrical coil is formed, the bending-rollers remain in their adjusted position; but when a conical coil is to be formed the bending-rollers are first gradually fed toward the feed-rollers and pipe by means of the slide and the end screw, 27, forming the larger coils, and thereupon when said slide has arrived at the inner end of its slot fed toward the feed-

roller 21 and still closer to said pipe, forming the smaller coils, by means of the tilting frame or plate and the side screw, 38.

It will be obvious that on account of their molded, rabbeted, and reduced—nearly conical—shape the bending-rollers may be tilted fully into the space between the feed-rollers, so that said bending-rollers will bear against the pipe at a point comparatively near to the point at which the feed-roller 21 bears against it, so that the pipe will be perfectly supported while being bent, and will not be liable to have uneven or straight portions or breaks in the bends or coils. It will also be obvious that, on account of the shape of the bending-rollers, said rollers having their diameters increasing toward the inner ends, the metal of the pipe which is being bent will be drawn upon the outer convex side of the bend of the pipe by the portions of the rollers having the larger diameters, and consequently traveling relatively faster than the outer and smaller portions of the rollers, which revolve with less speed, and therefore have a backwardly drawing or upsetting action upon the pipe as they slip upon the same. This action of the bending-rollers will insure perfect bending without breaks in the pipe, admitting of coils of a smaller diameter, compared with the diameter of the pipe being formed, than has heretofore been possible with the machines now in use. Said bending-rollers may be used in connection with other means for supporting the pipe, and may either be stationary with relation to the said supporting means or may be movable around the same, and various other modifications and changes may be made in the construction of my machine without departing from the spirit of my invention.

The pipe will be bent while retaining its perfect shape in the coils, as the bending-rollers will bear firmly against the outer side of the bend or coil of the pipe, and by their shape force said pipe into shape while bending it, so that said rollers will prevent any flattening or change of shape in the pipe.

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

1. In a machine for bending and coiling pipe, the combination, with a pair of feed-rollers, of a pair of bending-rollers formed with molded ends journaled one above the other and arranged to project into the space between said feed-rollers, and, together with one of said rollers, to force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, and to form a continuation of the periphery of said first-named roller, substantially as described.

2. In a machine for bending and coiling pipe, the combination, with a pair of feed-rollers, of a pair of bending-rollers formed with molded ends journaled one above the other and arranged to project into the space

between said feed-rollers, and, together with one of said rollers, to force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, and to form a continuation of the periphery of said first-named roller, and means for adjusting said rollers toward and from said feed-rollers, substantially as described.

3. In a machine for bending and coiling pipe, the combination, with a pair of feed-rollers, of a pair of bending-rollers formed with molded ends journaled one above the other and arranged to project into the space between said feed-rollers, and, together with one of said rollers, to force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, and to form a continuation of the periphery of said first-named roller, and a slide which forms bearings for said bending-rollers, and is provided with a feed-screw for adjusting it toward or from said feed-rollers, substantially as described.

4. In a machine for bending and coiling pipe, the combination, with a pair of feed-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 plate or frame, and a pair of bending-rollers which are journaled one above the other at the inner end of said plate or frame and formed with molded ends, and, together with one of said feed-rollers, force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, substantially as described.

5. In a machine for bending and coiling

pipe, the combination of a pair of grooved feed-rollers, 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 laterally adjusting said plate or frame, and a pair of bending-rollers which are journaled upon said plate or frame and formed with molded ends which correspond to the grooves in the feed-rollers, and, together with one of said feed-rollers, force the pipe to follow the contour of the opposite feed-roller for a portion of its periphery, substantially as described.

6. In a machine for bending and coiling pipe, the combination of the machine frame or table formed with the diagonal slot 24, the feeding-rollers 19 and 21, formed with the registering circumferential grooves 20 and 22, the guide-rollers 23, the guide 41, the slide 25 in said slot 24, the screw 27, for adjusting said slide, the plate or frame 31, pivoted upon said slide and formed with the uprights 32, which are provided with the horizontal bearings 33, the screw 38, which bears against the outer upright, 32, the shafts 34 in said bearings 33, and the bending-rollers 35, upon the inner ends of said shafts and formed with the molds, grooves, or rabbets 36, which correspond in shape to the grooves in said feed-rollers, substantially as described.

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

HERBERT E. FOWLER.

Witnesses:

CHARLES H. HAYDEN,
MICHAEL R. ENSCOR.