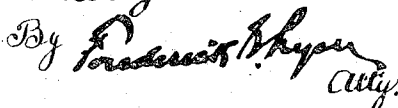


APPLICATION FILED SEPT. 30, 1915.

3 SHEETS—SHEET 1.

1,262,944.

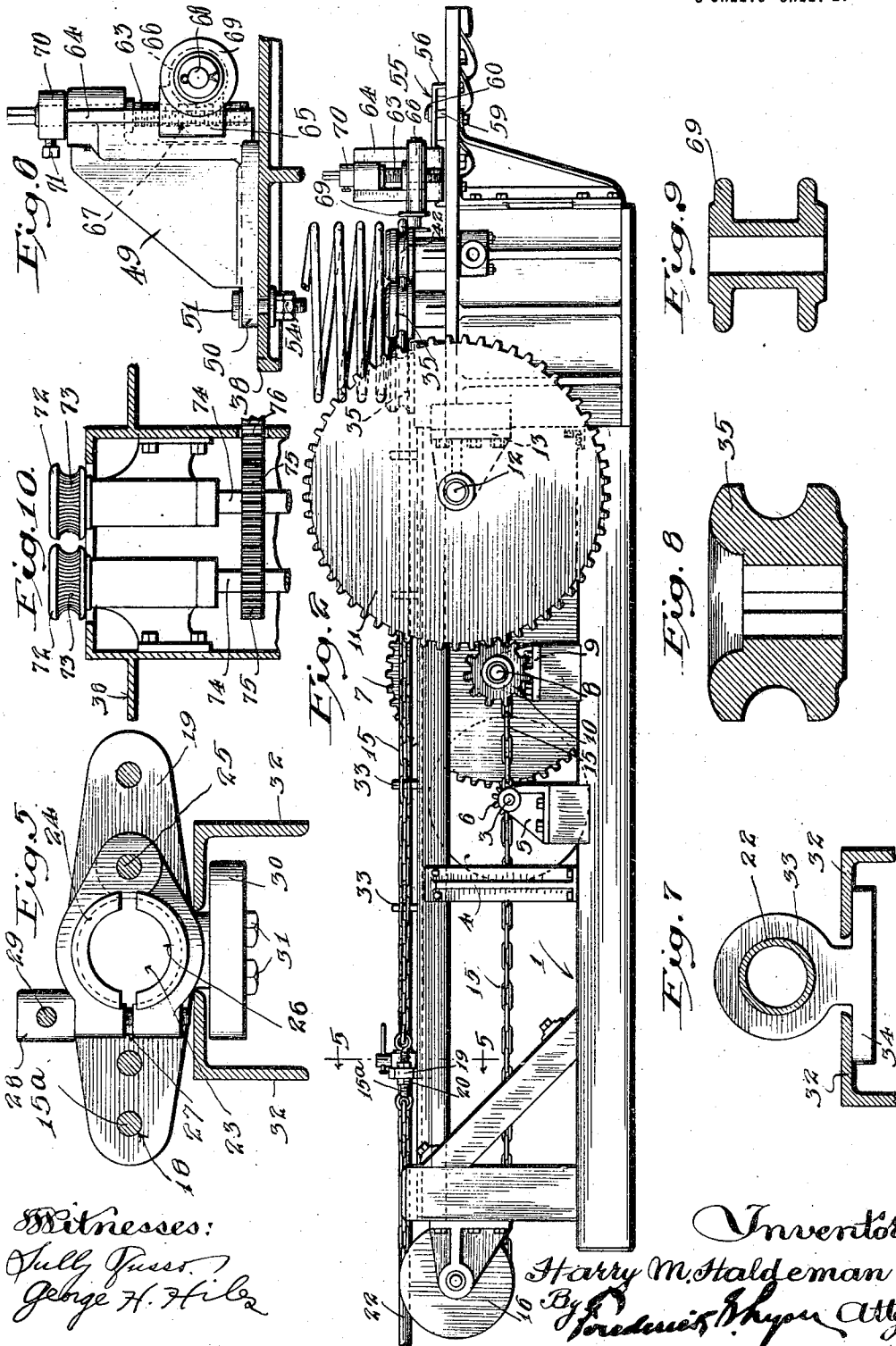


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3 SHEETS—SHEET 2.



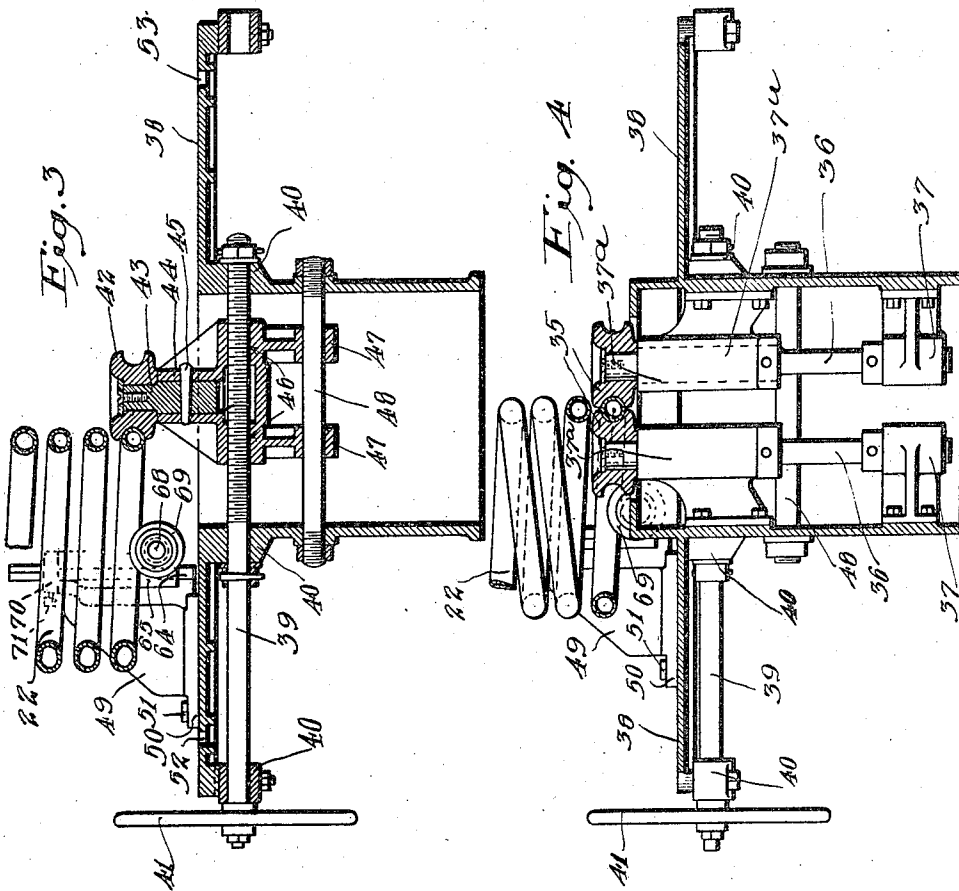
Witnesses:
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UNITED STATES PATENT OFFICE.

HARRY M. HALDEMAN, OF LOS ANGELES, CALIFORNIA.

PIPE-BENDING MACHINE.

1,262,944.

Specification of Letters Patent.

Patented Apr. 16, 1918.

Application filed September 30, 1915. Serial No. 53,334.

To all whom it may concern:

Be it known that I, HARRY M. HALDEMAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Pipe-Bending Machine, of which the following is a specification.

This invention relates to devices designed to make a bend or bends in pipes and rods.

An object of this invention is to effect the bending of pipes and rods in minimum time and with minimum labor.

Another object is to bend pipe and rods without injury thereto and so as to produce smooth even bends of any desired curvature.

Another object is to provide a bending machine in which pipes and rods may be easily and quickly bent into coils of various sizes and shapes.

Another object is to produce a machine of this character of maximum strength and simplicity.

Other objects and advantages will appear in the subjoined detail description.

The accompanying drawings illustrate the invention:

Figure 1 is a plan view of a machine built in accordance with this invention.

Fig. 2 is a front elevation of Fig. 1.

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 2, illustrating the pipe or rod clamp in detail.

Fig. 6 is an enlarged detail side elevation of the vertically bending means showing the table in section.

Fig. 7 is an enlarged detail elevation of one of the pipe or rod guides showing the track therefor in section.

Fig. 8 is an enlarged detail sectional view of one of the guide rollers.

Fig. 9 is a detail sectional view of the vertical bending rollers.

Fig. 10, is a fragmentary detail cross sectional view of the machine showing power-driven guide rollers.

There is provided a frame which as an entirety is indicated by the character 1 and which need not be described in detail, it being constructed of such material and the parts so arranged as to produce the requisite strength for a machine of this character.

Operating power from a suitable source, not shown, may be applied to the machine through a fast pulley 2 on a power shaft 3, there being loose or idler pulleys 4 mounted on the shaft 3, one on each side of the fast pulley 2.

The power shaft 3 is journaled at 5 on the frame 1 and is provided with a spur pinion 6 meshing with a spur gear 7 which is mounted on a gear shaft 8 journaled at 9 on the frame. The shaft 8 is provided at its opposite end with a spur pinion 10 meshing with a spur gear 11 mounted on a sheave shaft 12 which is journaled at 13 on the frame 1. The sheave shaft 12 is provided between its ends with spaced apart cupped chain sheaves 14 which engage chains 15 that are mounted upon said sheaves and extend lengthwise of the frame, said chains being also mounted around idler chain sheaves 16 journaled at one end of the frame.

Both ends of each chain are provided with screw eyes 15^a which are passed through perforations 18 in a yoke 19 and which are provided with nuts 20 bearing against the faces of the yoke to firmly lock the screw-eyes to the yoke. The yoke 19 is provided centrally with an orifice 21 to accommodate the pipe or rod 22 being operated upon, said pipe or rod also passing through an orifice 23 in a clamp 24 which is hinged at 25 to the yoke 19.

The clamp is provided with a split bushing forming a set of serrated flanged jaws 26 which project into the orifice 23 sufficiently to bring the inner face of the flange against the outer face of the clamp. The serrated jaws will be made of suitable size and shape to accommodate different sizes and shapes of pipes and rods, there being one set for each size and shape. The clamp is bifurcated at 27 at the side opposite the hinge 25 and said clamp is provided with a binding screw 28 to force the jaws of the clamp toward one another so as to tightly bind against the surface of the pipe or rod 22. The binding screw 28 may be turned by a pin 29 forming a handle and projecting from said binding screw.

The yoke 19 is provided with a retaining lug formed by plate 30 which is attached by screws 31 to the under edge of the yoke, the ends of said retainer underlying a pair of spaced apart rails or guides 32 which may be formed as shown in the drawings of angle bars extending lengthwise of the frame

and mounted thereon. The clamp is thus capable of movement along a fixed path determined by the guide rails 32.

At intervals along the guide rails 32 there are provided guide rings 33 through which is inserted the pipe or rod to be operated on, said guide rings being provided with flanges 34 adapted to underlie the upper legs of the angle bars 32 so as to retain the pipe or rod against lateral movement and against bending at any portion lying along the guides 32.

From the foregoing it is seen that turning of the fast pulley in the appropriate direction will force the pipe or rod toward the ends of the guide rails adjacent the cupped chain sheaves 14. At said end of the guide rails 32 the pipe or rod 22 passes between stationary guide rollers 35, said rollers being arranged in pairs and in the instance shown there being two such pairs close together. The rollers 35 have their peripheries of size and shape to correspond with the diameter and shape of the rod or pipe being operated on and said rollers are keyed on shafts 36, which shafts are journaled in bearings 37 and 37^a carried on the frame 1.

The rollers 35 are mounted on a circular table portion 38 of the frame 1 and said table portion is provided with a transversely extending screw shaft 39 journaled in bearings 40 of the table and extending to one side of the table and there provided on its projecting end with a hand wheel 41 whereby the screw-shaft may be turned.

Pipe engaging and bending means is transversely adjustably mounted on the shaft 39 and comprises a flanged bending roller 42 which is rotatably mounted on the upper end of a vertical shaft 43, said shaft being supported by a tubular support 44. A wedge pin 45 is inserted through the support and shaft to hold the latter in place and said support is formed with a screw-threaded bore 46 to receive the shaft 39. Depending from the support 44 are guide arms 47 which are apertured and receive a guide rod 48 that is secured to the frame 1 beneath the table and extends transversely of the frame.

The roller 42 is located in the same horizontal plane as are the guide rollers 35 and may be moved to either side of a point between the rollers 35 so as to engage and bend the pipe in either direction and to the desired extent, the pipe being adapted to engage in the groove or between the flanges of the roller. By turning the hand wheel of the shaft 39 the adjustment of the bending roller 42 may be effected as desired.

Vertical bending means is adjustably mounted on the table 38 and is designed to bend the pipe upwardly while it is being bent by the roller 42 so that spaced coils

will be formed. This means comprises an upright bearing member 49, the base 50 of which rests and is adapted to slide upon the table. Inserted through the base is a bolt 51 which is adapted to slide in arcuate slots 52 and 53, said slots being formed on opposite sides of and nearly surrounding the table. Nuts 54 are turned on the lower end of the bolt and when tightened lock the bearing member 49 against accidental movement. The bearing member may be moved to any desired position on the table.

A clamping plate 55 having depending end flanges 56 and being provided with a longitudinal slot 57 is provided for the purpose of holding the bearing member 49 in the desired position. On opposite sides of the base of the bearing member 49 are formed upright flanges 58 which the flanges of the clamping plate 55 are adapted to overlie. A bolt 59 is inserted through the slot 57 and one of the slots 52 and 53 to hold the clamping member in adjustable relation to the table. A nut 60 is turned on the upper end of the bolt 59 and is tightened when it is desired to hold the clamping plate 55 and bearing member 49 in adjusted position. In addition to the arcuate slots 52 and 53 the table is provided with slots 61 and 62 which are located between the slots 51 and 52 and provide means for the adjustment and securing of the bearing member 49 in various positions.

A vertical screw shaft 63 is journaled in the bearing 49 and on opposite sides of said shaft 63, on the bearing, are formed vertical guide flanges 64 which slidably and lockingly engage with flanges 65 formed on a vertically adjustable bearing 66. The bearing 66 is formed with a vertically screw-threaded opening 67 which receives the shaft 63. A horizontal shaft 68 is secured to the bearing 66 and has rotatably mounted thereon a flanged vertical bending roller 69 which is adapted to receive the pipe after it has been bent by the roller 42 and to direct the pipe upwardly as it is fed so that coils will be formed. The flanges of the roller 69 function to guide the pipe in a horizontal direction as it is being bent upward so that the coils will be of uniform diameter. By raising the roller 69 the coils formed in the pipe will be spaced a greater distance apart than when the roller is in its lowermost position.

In operation, a pipe is inserted through the guide rings 33 and then clamped by the jaws 26 of the clamp 24. The chain sheaves 14 are next caused to rotate in a clockwise direction through the medium of the drive pulley 2 and train of gears connecting the latter with the sheaves. As the pipe is moved toward the stationary guide rollers 35 it will be forced between and engage in the grooves thereof so that it is moved in a

straight line. The bending roller 42 is adjusted to the desired position which is to one side or the other of a point between the rollers 35 and will engage the pipe after it passes between the rollers 35 and cause it to bend in the desired direction. The vertical bending roller 69 is next adjusted to the desired elevation so as to bend the pipe outwardly or upwardly to provide for the formation of spirals.

The diameter of the coils formed may be regulated by the position of the roller 42 relative to the rollers 35 and by gradually adjusting the roller 42 during the bending operation spiral and other coils may be formed. The spacing of the coils relative to one another may be regulated by the adjusting of the vertical bending roller 69, it being seen that by elevating the roller the coils will be spaced apart a greater distance than when the roller is in its lowermost position.

It is seen that in view of the adjustment permitted the two bending rollers, pipe or rods may be bent into coils of various sizes and shapes in an extremely expeditious and reliable manner. The guide rollers 35 may be power driven by suitable means, not shown, if desired. The flanges of the rollers 35 and 42 overlie the pipe and prevent it from pulling upward as is the tendency caused by the vertical bending roller 69 which engages the pipe at a point above the rollers 35 and 42.

The shaft 63 stands above the bearing 49 and at its upper end is squared so that it may be grasped and turned with a suitable tool, not shown. A collar 70 is mounted upon the upper end of the shaft 63 and is held in position by means of a set screw 71. By turning the shaft 63 the bearing 66 will be raised or lowered as the case may be, causing the roller to be moved correspondingly.

With reference to Fig. 10 in the drawings, 72 designates guide rollers similar to the ones 35 but formed with peripheral corrugations 73 or otherwise roughened at their peripheries. These rollers are mounted upon vertical shafts 74 in the manner similar to the mountings of the rollers 35 in the preferred form. The shafts 74 each have mounted thereon a pinion 75, said pinions being located in meshing relation and being operatively associated with a drive pinion 76.

In this form the guide rollers 72 take the place of the endless chain in the preferred form and feed the pipe as well as guide it into position to be operated on. Any number of rollers 72 may be used and they are preferably arranged in pairs.

It is understood that the invention is not limited to the exact construction shown in the drawings and described above, but that

deviations therefrom may be made within the spirit and scope of the invention.

I claim:

1. A pipe bending machine comprising a frame, an endless pipe carrier mounted on the frame, pipe clamping means mounted on the carrier, pipe guides on the frame, stationary guide rollers journaled in fixed relation upon the frame and receiving the pipe therebetween, a transversely movable pipe engaging and bending roller mounted on the frame, means to move the roller to either side of the stationary rollers, a second pipe engaging and bending roller laterally adjustably mounted on the frame and adapted to be moved to either side of the first bending roller, means permitting movement of the second bending roller to either side of the first bending roller, and means to bodily elevate or lower the second bending roller relative to the first bending roller without changing the plane of the second bending roller.

2. A pipe bending machine comprising a frame, pulleys rotatably mounted on the frame, means to rotate certain of the pulleys, endless chains mounted on the pulleys, a pipe clamp connected with the chains, pipe receiving guide rings on the frame, guide rollers to engage and receive the pipe therebetween journaled on the frame, a pipe engaging and bending roller, a screw shaft mounted transversely of the chains and adjustably supporting the roller, means to rotate the shaft to move the roller to either side of the guide roller, said guide and bending rollers being flanged and located in the same horizontal plane, a second flanged pipe engaging and bending roller, a laterally bodily adjustable support for said roller, a vertically adjustable bearing for the roller mounted on said support, and means to clamp the support to adjusted position.

3. A pipe bending machine comprising a frame, pipe guiding means carried by the frame, a vertically adjustable pipe engaging and bending member mounted on the frame, means to move the pipe into engagement with the guiding means and bending member, said frame having arcuate slots therein extending around the guiding means, a support for the bending member, and a pin carried by the support and slidable in the slot.

4. A pipe bending machine comprising a frame, pipe guiding means carried by the frame, a vertically adjustable pipe engaging and bending member mounted on the frame, means to move the pipe into engagement with the guiding means and bending member, said frame having arcuate slots therein extending around the guiding means, a support for the bending member, a pin carried by the support and slidable in the

slot, and means slidable in said slots to lock the support in adjusted position.

5 5. In a pipe bending machine, a frame, a table carried by the frame, means to move
pipe along the frame and over the table,
pipe guiding means carried by the table,
said table having an opening therein extending transversely to the line of movement
of the pipe, an adjusting screw mounted
10 below in line with the opening in the table,
a flanged bending member adjustable horizontally within said opening upon said
screw and located in the same horizontal
plane as the guiding means, the flanges of
15 the bending member being located in a horizontal plane, a vertically flanged adjustable
bending member horizontally adjustably
mounted upon the table, and flanges of the
last named member being vertically disposed.
20

6. A bending machine comprising a frame, a member for bending pipe horizontally mounted on the frame, means to move
material to be bent into engagement with
the member, means to move the member
25 to one side or the other of the material whereby material will be bent to the right or left, a member for directing the bent
material upwardly mounted on the frame,
30 means for vertically adjusting said last-named member, said last-named member being movable in an arc along the margin of the table.

7. A pipe bending machine comprising a
35 frame, pipe guiding means carried by the frame, means carried by the frame to bend the pipe laterally, means to bend the pipe

upward after it has been bent laterally, means to move the pipe into engagement with the guiding means and the bending means, said first named bending means being adjustable to one side or the other of the guiding means, and means movable in an arc along the margin of the table to vertically adjust the last named bending means. 40 45

8. In a pipe bending machine, a frame, pipe guiding means carried by the frame, means to move pipe along the frame into engagement with the guiding means, means to engage and bend pipe laterally after it passes the guiding means, means to move said last named means to one side or the other of the guiding means, a flanged bending roller having its flanges disposed vertically, said bending roller being normally located above the plane of the first named bending means and adapted to engage pipe to one side of the first named bending means to direct it upwardly, means to vertically adjustably support the bending roller capable of vertical adjustment without changing the pitch of the bending roller, and means permitting bodily adjustment of said roller to one side or the other of the first named bending means and the guiding means. 50 55 60 65

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 22d day of September, 1915.

HARRY M. HALDEMAN.

In presence of—

CHAS. P. LANE,

L. BELLE WEAVER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."