

C. P. HIGGINS.
ROLLER BENDING MACHINE.

No. 533,989.

Patented Feb. 12, 1895.

Fig. 1.

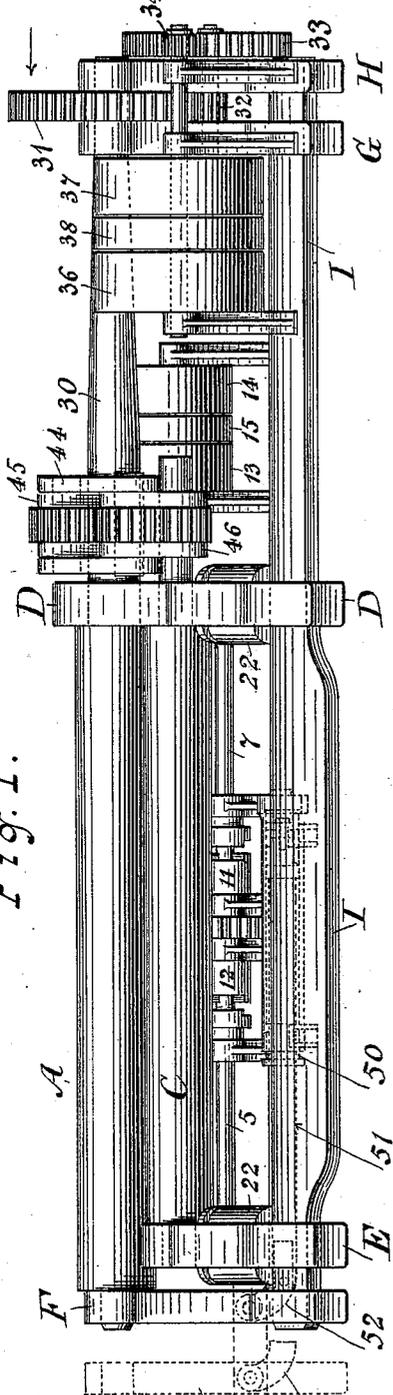
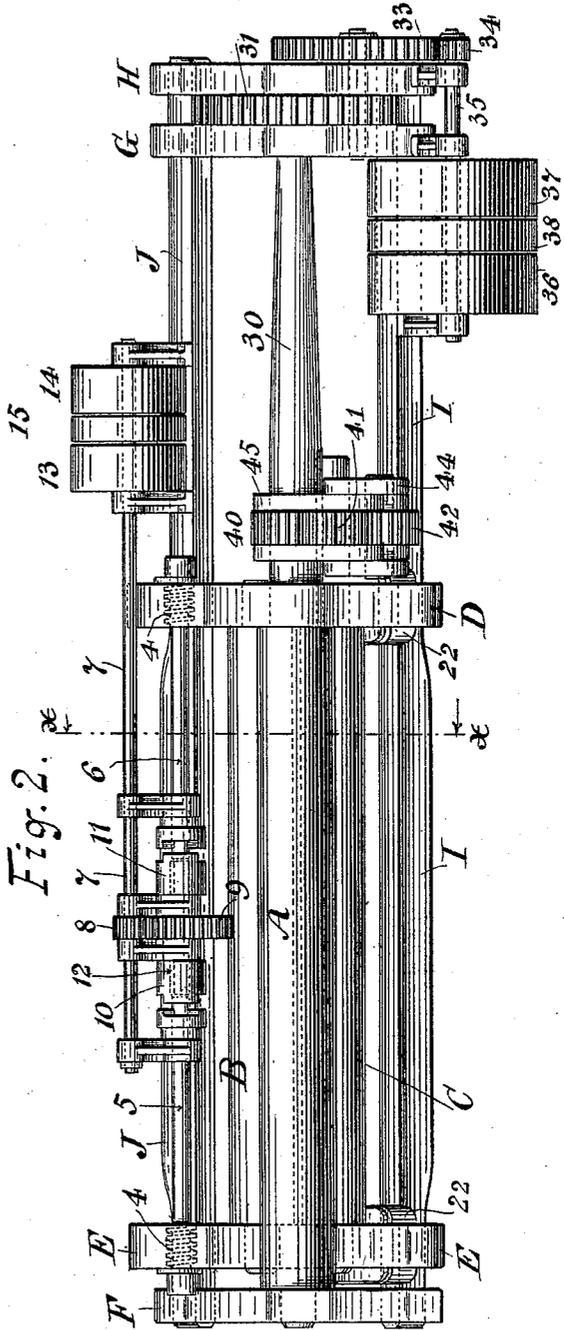


Fig. 2.



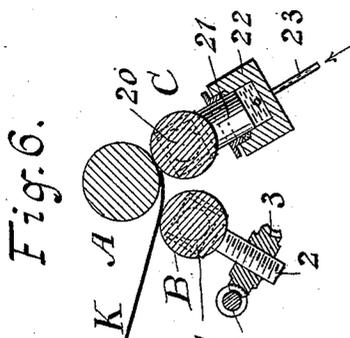
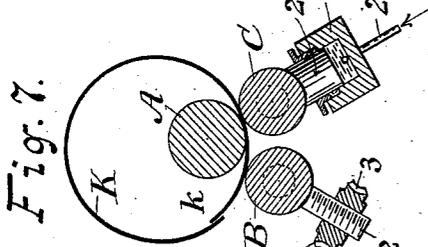
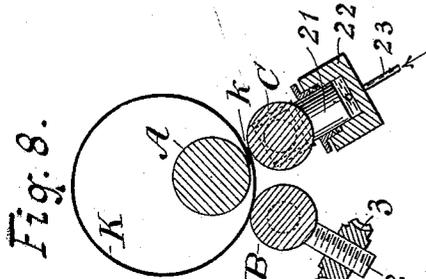
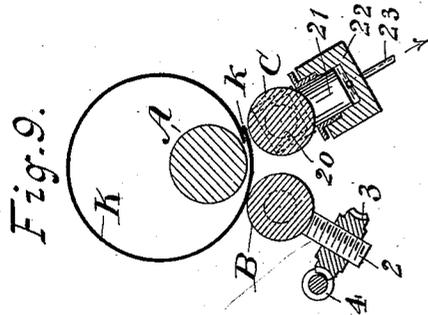
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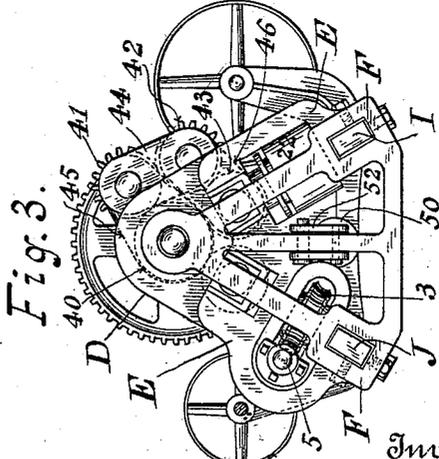
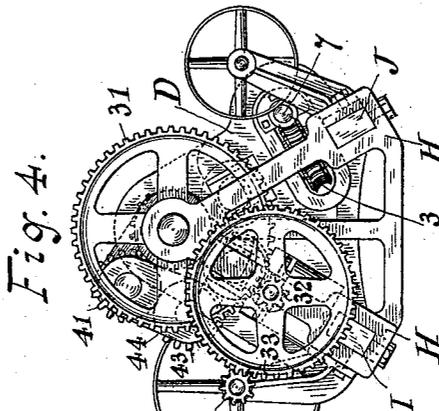
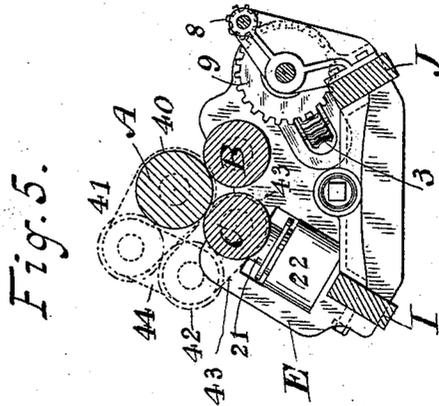
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UNITED STATES PATENT OFFICE.

CAMPBELL P. HIGGINS, OF ROSELLE, NEW JERSEY.

ROLLER BENDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 533,989, dated February 12, 1895.

Application filed March 13, 1893. Serial No. 465,838. (No model.)

To all whom it may concern:

Be it known that I, CAMPBELL P. HIGGINS, a citizen of the United States, residing at Roselle, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Roller Bending-Machines, of which the following is a specification.

This invention relates to roller bending-machines for rolling or warping metal plates into cylindrical form.

The invention consists in conjunction with a master roll, of two subordinate rolls, one of which is fixed and adjusted, the other automatically movable, the latter being sustained against the work by means of a definite yielding pressure.

Said invention further consists in certain various novel features of construction adapted for the embodiment of the said principle, and in order to enable others skilled in the art to which my invention appertains, to understand and use the same, I will proceed to describe its construction, explain its operation, and subsequently point out in the appended claims its novel characteristics.

Referring to the accompanying drawings, in which similar characters of reference indicate corresponding parts throughout the several views:—Figure 1 is a side elevation of the machine; Fig. 2, a plan view thereof; Fig. 3, an end view, exhibiting the roller-end of the machine; Fig. 4, an opposite end view, exhibiting the geared-end of the machine; Fig. 5, a transverse sectional view taken on the line $x-x$, Fig. 2; the machine being viewed endwise in the same direction as in Fig. 4; and Figs. 6, 7, 8, and 9, are transverse sectional views through the rolls, showing different periods of operation, the machine being viewed endwise in a direction opposite to that in Fig. 5.

A represents the master roll, B an adjustable subordinate roll, and C the movable subordinate roll held by hydraulic pressure. All said rolls are trunnioned at their inner ends in the vertical supporting frame D, and at their outer ends the subordinate rolls B, C, are journaled in the supporting frame E, while the master roll A is journaled in a separate frame F, which is made removable in

order to effect the insertion and removal of the work between each operation.

The frames D, E, F, as well as the gear frame G, H, are placed upon longitudinal base bars I, J, which may be readily removed, and bars of different lengths substituted when it is desired to substitute rolls A, B, C, of different lengths for bending various dimensions of work.

The master roll A is journaled in fixed position. The subordinate roll B is adjustably fixed with reference to the roll A, according to the intended diameter of the work to be rolled. The adjustment of said roll B is effected by means of its movable journal boxes 1, fitting guideways in frames D, E, said boxes being provided with screw shanks 2, which may be moved through the agency of the worm geared nuts 3, worms 4, and shafts 5, 6. The shafts 5, 6, are operated by a countershaft 7, through pinion 8, spur 9, and clutches 10, 11, on the extremities of the independent central shaft 12.

The shaft 7, may be driven in the one direction or the other by the fast pulley 15, upon which may be shifted a direct or crossed belts respectively, from the loose pulleys 13 or 14, thus moving the roller B up or down to the desired position of adjustment, where it is held at a fixed position during the bending operation of the machine.

The movable subordinate roller C is mounted at either extremity in journal boxes 20, sliding in suitable guideways in frames D, E, and said boxes are provided with hydraulic plungers 21, in cylinders 22, cast integral with or mounted in said frames D, E, and supplied by pipes 23, with hydraulic pressure, which for present purposes may be connected with a hydraulic pressure accumulator to afford a definite yielding pressure of the roll C, upon the master roll A.

It is obvious that both the boxes of the subordinate rolls may be mounted on hydraulic cylinders, the roll C always being held against the roll A by maximum pressure sufficient to bend the edge of the plate, while the pressure exerted by the roll B against the sheet could be varied at will.

As clearly shown in Figs. 6, 7, 8 and 9, the rolls, B, C, are adjustably mounted so as to

approach the roll, A, in lines directly radial to the latter, and are arranged as closely together as is possible without an interference with a full movement of the roll, B, toward
 5 the roll, A. This arrangement of the rolls enables the shortest possible bight on the plate, K, to be secured, and the complete and proper bending of such plate at its edges to be thoroughly effected. It also enables the
 10 plate to be bent into a curve of smaller radius than when a second feed-roll is interposed between the subordinate bending-rolls.

The master roll A is driven by means of its shaft 30, and a spur gear 31, mounted thereon,
 15 which is driven through the train of gearing 32, 33, 34, countershaft 35, and fast pulley 38, upon which direct and crossed belts may be respectively shifted from loose pulleys 36 and 37, to reverse the bending rolls A, B, C, during
 20 their operation.

The movable roll C, receives its rotation from the shaft of the master roll A, through a yielding train of gearing 40, 41, 42, 43, adapted to admit of the required motions
 25 without interfering with the transmission. The gears 41, 42, to this apparatus are pivoted in a link 44, swiveled on two other links 45, 46, pivoted on the driving and driven shafts.

The removable frame F, carrying the outer extremity of the master roll A, is moved off and on by means of a hydraulic cylinder 50, shown in dotted lines in Fig. 1, and also in
 35 Fig. 3, the same carrying a plunger 51, attached by yoke 52, to the said frame F, as also indicated by dotted lines in Fig. 1, and appearing in end view in Fig. 3. The frame F is pivoted on the yoke 52, so that it may be thrown down into a horizontal position as indicated in Fig. 1, after being pushed off the
 40 journal of the roll A, so as to clear the work.

The plate K is introduced to the rolls between A and B, and, as the edge comes down between the rolls A and C, the hydraulic
 45 pressure sustaining the roll C bends the extreme edge of the plate to the finished curvature of the drum. A further rotation of the roll A, bends the plate up into a cylindrical form until the lap K, with its double thick-
 50 ness, approaches B. The hydraulic pressure is then released from C, which allows the lap

K to pass over B, without kinking the plate, and the lap K, after being brought into position directly between A and C, is again sub-
 55 jected to the hydraulic pressure, so that both parts of the plate at the lap K, are bent to the desired curvature, forming an absolute contact between the two parts of the plate in the lap, and having the same curvature as the
 60 balance of the shell, thus obviating any preliminary bending or hammering of the plate previous to its introduction to the rolling machine.

The feature of hydraulic pressure on the roll C, enables the operator to release his
 65 work, or to shift it about in the rolls without altering the curvature at which the machine is set by the adjustment of the roll B.

The diameter of the work is predetermined by the adjustment of the roll B, the roll C,
 70 being advanced upon the roll A, in the same position for all diameters of bending.

What I claim, and desire to secure by Letters Patent, is—

1. In a roller bending-machine, the combination of one master-roll, and two subordinate
 75 bending-rolls, which latter rolls are movable to and from said master-roll and are arranged to approach the same in lines directly radial to the master-roll, substantially as and for the
 80 purposes specified.

2. In a roller-bending machine, the combination of a fixed master-roll with two subordinate rolls, one of which latter is adjustably
 85 fixed and the other sustained against the work by predetermined hydraulic pressure, variable at will.

3. In a roller-bending machine, the combination of a master-roll, an adjustably fixed subordinate roll, a movable subordinate roll,
 90 movable journal boxes supporting the same, and hydraulic cylinders and plungers connected to said boxes for the purposes described.

4. In a roller-bending machine, a movable
 95 housing for the top roll, in combination with the hydraulic cylinder for shifting said housing in and out of position for removable work.

CAMPBELL P. HIGGINS.

Witnesses:

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