(No Model.)

2 Sheets—Sheet 1.

W. J. PLECKER.

BENDING MACHINE.

No. 518,765. Patented Apr. 24, 1894.

Fig. 1.

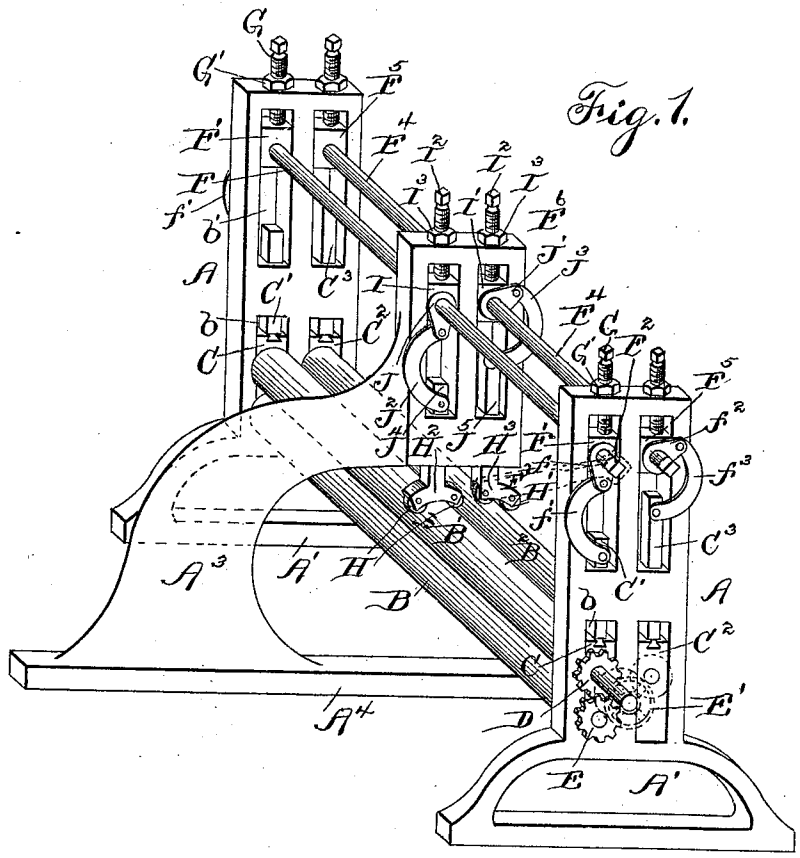
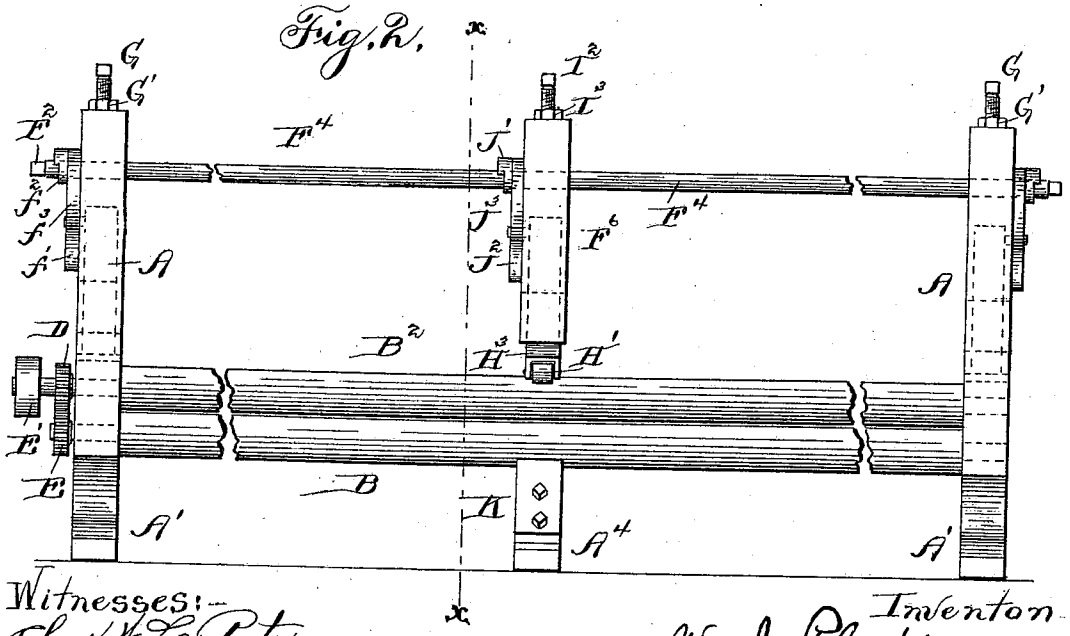


Fig. 2.



Witnesses:—
Chas. H. La Porte,
M. B. May

Inventor
W. J. Plecker
by Dewey & Bliss
Attys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

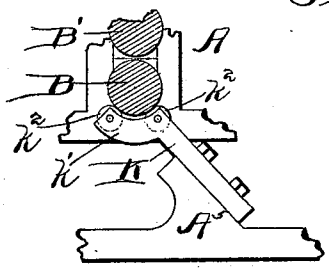


Fig. 4.

Fig. 5.

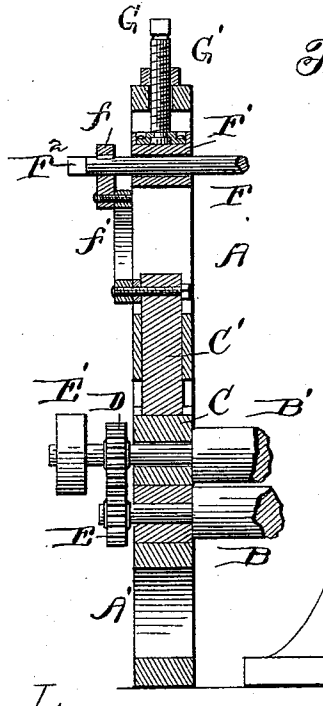
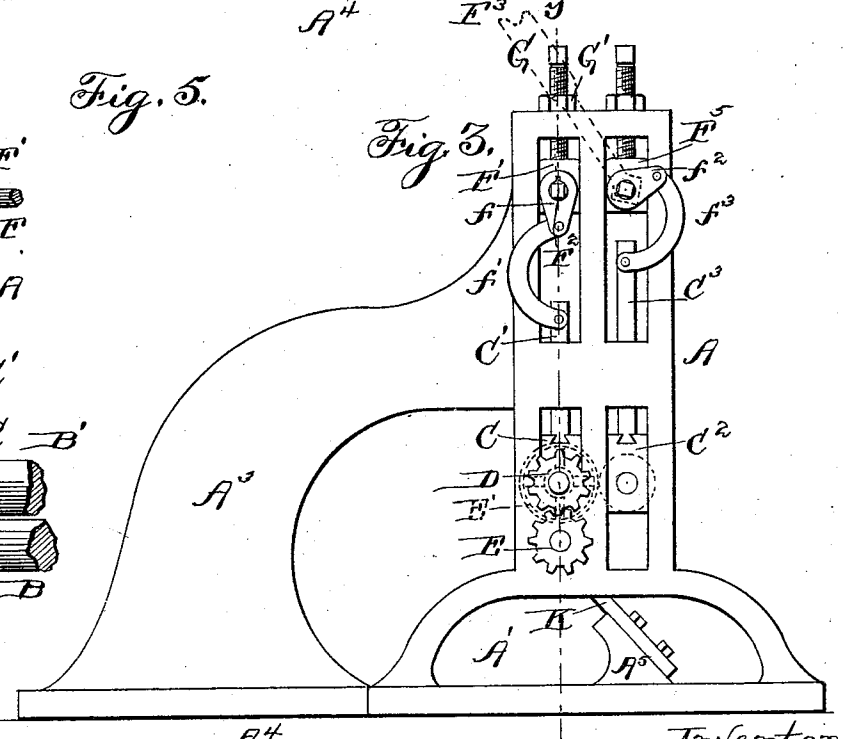


Fig. 3.



Witnesses:—
Chas. W. LaPorte.
M. B. May

Inventor
W. J. Plecker
by Dodger & Bliss Attys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM J. PLECKER, OF PEORIA, ILLINOIS.

BENDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 518,765, dated April 24, 1894.

Application filed November 29, 1893. Serial No. 492,356. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. PLECKER, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Bending-Machines; 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.

This invention relates to improvements in mechanisms for bending metallic plates, and has for its object the providing of a machine by means of which eaves troughs, spouting, conductor pipes, and other similar articles can be easily and expeditiously made.

The invention therefore consists, among other things, in the peculiar co-relating of the rolls to each other. These rolls are so mounted that two or more may be bodily and positively moved rapidly relatively to the other roll or rolls. Preferably there are supplementary adjusting devices which may be used independently of the mechanism by which the rolls are positively moved. Then one or more of the rolls is mounted in such way as to be capable of movement toward and from the path of the material when moving more or less horizontally past the other roll or rolls, as will be hereinafter described. With this roll or rolls there may be combined also means for adjusting it supplemental to the devices for moving it.

The invention also consists in combining with the forming rolls, and guide roll or rolls, anti-friction or supplemental supporting devices for preventing the springing or bending of the rolls, which anti-friction or supporting devices are so related to the rolls as to be moved with said rolls, and preserve the same mutual relations, and also relieve the rolls from the lateral strain which they experience. And the invention further consists in other features of construction and arrangement which will be fully understood from the description below, in connection with the drawings.

In the drawings, Figure 1 shows an improved bending machine in perspective. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation. Fig. 4 is a section on line *x—x* of Fig. 2. Fig. 5 is a partial section on the line *y—y* Fig. 3. Fig. 6 shows a slightly modified form of support for the stationary roll.

Referring to the drawings, I will describe one form in which the invention may be embodied, for it will be understood that I do not limit myself to exactly the details of construction and arrangement which are herein set forth. The machine is shown as having side standards or frames A—A, each standard having a suitable base or support A′ A′, and connected by cross sills or bars if desired. In these standards are mounted the forming rolls B, B′, the roll B, having a stationary bearing. The other forming roll B′ is mounted in bearing blocks C which slide in guides or slots *b* in the standards A A, the rolls B and B′ each having a longitudinal extension upon which are mounted pinions D and E, meshing with each other when the mechanism is ready to operate, there being means for imparting power to said rolls, such as a pulley E′ mounted on the extension of the roll B′. The bearing blocks C C may be moved bodily vertically and simultaneously by means of the following devices.

F is a rock shaft mounted in bearing blocks F′ F′, and having a squared projecting end F^2 to which may be fitted a crank or lever F^3 for rocking it. This crank is shown in dotted lines in Fig. 1. Keyed to the shaft F at each end is a short crank arm *f*, connected by a curved link *f′* to a sliding bar C′ to which is secured the bearing block C in which the roll B′ is mounted. Thus it will be seen that the roll may be bodily lifted by rocking the shaft F, which through crank arms *f f*, curved links *f′ f′* and sliding bars C′, C′ slides the bearing blocks C C in the guides *b b* in standards A A simultaneously. The blocks F′ F′ themselves slide in guides or slots *b′ b′* in the standards A, A, and are adjusted by means of screws G G and nuts G′ G′. This arrangement of parts enables the roll B′ to be adjusted relatively to the roll B, and at the same time it may be moved toward and from it quickly and easily without destroying the adjustment, for the sliding bars, the links, and the crank arms are so co-related that when the roll is lowered they are on a dead center and lock the roll in place. The guide roll B^2

is similarly mounted in sliding blocks C^2 C^2, which are moved by sliding bars C^3 C^3, curved links f^3, f^3, and crank arms f^2 f^2, the said crank arms being keyed to a second rock shaft F^4 mounted in bearing blocks F^5 F^5.

In bending plates of any thickness, I have found that the rolls are liable to bend and spring, and therefore I combine with them devices for overcoming this bending and springing. These consist of anti-friction rollers for rolls B', B^2, and a support for roll B, all bearing against the rolls where the greatest strain is experienced. These anti-friction rollers are designated by H H', and are mounted in supports or bearings H^2, H^3, which are adjusted in a way to be described.

A^3 is a curved standard having a base support A^4 which extends from the rear of the rolls to a point in front thereof. Formed with the standard A^3 is a frame F^6, having vertical guides in which are mounted sliding blocks I I'. These blocks serve as supplemental bearings for the rock shafts F, F^4, and are adjusted by screws I^2 and nuts I^3, similar to those at G and G'. On the rock shafts F and F^4 are keyed crank arms J J' which are connected by curved links J^2, J^3, and sliding bars J^4, J^5 with the bearings or supports for the anti-friction rollers H, H'. The crank arms J, J', and the links J^2, J^3, are duplicates of those at f, f^2 and f' f^3 respectively, and thus it will be seen that when the rolls B', B^2 are moved up or down by rocking the rock shafts F, F^4, the anti-friction rollers always preserve the same relation to the said rolls, and are moved up and down with them.

The support K for forming-roll B, (which roll is stationarily mounted and which therefore does not require that the support shall be adjustable,) consists of an arm or bar bolted or otherwise secured to an upward extension A^5 cast or formed on the forward part of the base support A^4 of standard A^3. The said arm is curved as shown at k' so as to fit the curvature of the roll, and is so placed as to receive the downward and rearward thrust of the said roll. Instead of employing merely a bar with a curved end, I may use anti-friction rollers similar to those above described.

The operation of the machine is as follows: The guide roll B^2 being in the position shown in full lines Fig. 4, the blank L is placed as shown in said figure with its edge between the rolls B, and B', and then the roll B' is moved down into position by means of the rock shaft F, the crank arms f, the curved links f', and the sliding bars C', thus tightly gripping the edge of blank. Then the roll B^2 is moved down into the position shown in dotted lines in Fig. 4, by means of the rock shaft F^4, the sliding bars C^3, the links f^3 and crank arms f^2,—the anti-friction rollers, as said, always preserving the same relation to the said roll. Power being applied to the rolls B and B' by means of the pinions D, E, and the pulley E' the blank is carried through the rolls, and assumes the proper curvature. The guide roll B^2 is adjusted up or down as is desired to make a curve greater or less, according to the style of the trough that is to be turned out.

I am aware that sheet metal bending machines have had forming rolls, whose ends could be separately and slowly moved relatively to the axes of the forming rolls. But such an arrangement was merely to provide an adjustment of a relatively permanent character; that is to say, to enable the operator to fix the guide roll in a desired position which it occupied during a continuing series of operations. But it is impossible with such machines to take with rapidity the several steps constituting each bending operation, it being well known that the inserting and initial guiding of the metal sheet is frequently the cause of delay. I overcome this by providing the guide roll in a carrier or holder (consisting in this case of the links, crank arms, rock shaft, &c.) which supports both ends of it uniformly and by which both ends can be simultaneously and rapidly moved relatively to the axes of the forming rolls, so that the operator at each bending operation can readily and instantly control its position. Moreover, it is frequently desirable to pass through the machine, blanks which might have been previously curved or shaped, in a cornice brake or other device. Heretofore, this has been practically impossible, as in the machines with which I am acquainted, the operation of raising or lowering one of the forming rolls was one taking considerable time, as each end of the roll has to be raised and lowered independently of the other. But by mounting the forming roll, (as well as the guide roll) in sliding boxes which are moved simultaneously by one mechanism, I can easily bend a blank upon which a bead or molding has been previously formed.

What I claim is—

1. In a bending machine, the combination with the stationary roll, of a movable roll mounted above said stationary roll, whereby the metal blank is fed between said rolls, the bearings for said movable roll, means for adjusting said bearings, and means for moving said bearings vertically independently of said adjusting means, substantially as set forth.

2. In a bending machine, the combination with the stationarily mounted roll, of the movable roll mounted above said stationary roll, the bearings for said roll, means for adjusting said bearings means for positively moving said bearings simultaneously, and a lock for holding said bearings in position against upward movement, substantially as set forth.

3. In a bending machine, the combination with the stationarily mounted roll, the movable roll, the bearings therefor, a rock shaft, means connecting said bearings with said shaft for moving said bearings positively, and devices for adjusting said rock shaft rela-

tively to said stationarily mounted roll substantially as set forth.

4. In a bending machine, the combination with the side frames or standards, having guides, and the roll B mounted in said standards, of the roll B′, the bearings therefor mounted in said guides, the adjusting devices for adjusting the bearings radially relatively to said roll B, and means for moving said bearings simultaneously relatively to said adjusting devices, substantially as set forth.

5. In a bending machine, the combination with the roll B, of the roll B′, the bearings therefor, the rock shaft, the means connecting the rock shaft with the said bearings for moving them positively, the bearings for the said rock shaft, and means for adjusting the said rock shaft bearings, substantially as set forth.

6. In a bending machine, the combination with the two opposing rolls B, B′, a bearing for each end of said roll B′, anti-friction rollers to receive the thrust of said roll B′, and arranged intermediate of its ends, and means for simultaneously adjusting both of said bearings and said anti-friction rollers toward and from said roll B, substantially as set forth.

7. In a bending machine, the combination with the two forming rolls, anti-friction rollers arranged in proximity to one of said rolls intermediate of its ends, means for positively lifting said roll in parallelism with the other forming roll, means for lifting said anti-friction rollers, and power devices connecting said means whereby they may be simultaneously operated, substantially as set forth.

8. In a bending machine the combination with the stationarily mounted roll, of the movable roll having bearings at each end, devices for adjusting said bearings independently of each other, anti-friction devices arranged to bear against said movable roll intermediate of its ends, and means independent of the adjusting devices for moving said movable roll and said anti-friction devices toward and from the stationarily mounted roll whereby the same relative adjustment of the rolls may be preserved though they may be separated temporarily, substantially as and for the purposes set forth.

9. In a bending machine, the combination with the opposing rolls, one of said rolls having movable bearings and the anti-friction rollers for the last said roll, of the rock shaft, the series of crank arms on said rock shaft and the series of links connecting said crank arms with said bearings and said friction rollers respectively, whereby they may be all moved simultaneously, substantially as set forth.

10. In a sheet metal bending machine, the combination with the two forming rolls, of the guide roll mounted in front of the rolls, the guides in planes parallel to the plane of the axes of the two rolls, the bearings for the guide roll sliding in the said guides, means for positively lifting the said bearings entirely independently of the forming rolls, and a lock to hold said bearings against vertical movement when in position, substantially as set forth.

11. In a sheet metal bending machine, the combination with a forming roll, of an opposing forming roll, and a guide roll, each of the last said rolls being supported adjustably in a carrier or support adapted to move simultaneously and uniformly both ends of the roll relative to the axes of the first aforesaid forming roll, substantially as set forth.

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

WILLIAM J. PLECKER.

Witnesses:
HENRY J. LOTTMANN,
CHAS. FREEMAN.