L. RAYMOND.

Bending Metal Plates.

No. 18,058.

Patented Aug. 25, 1857.

2 SHEETS—SHEET 1.

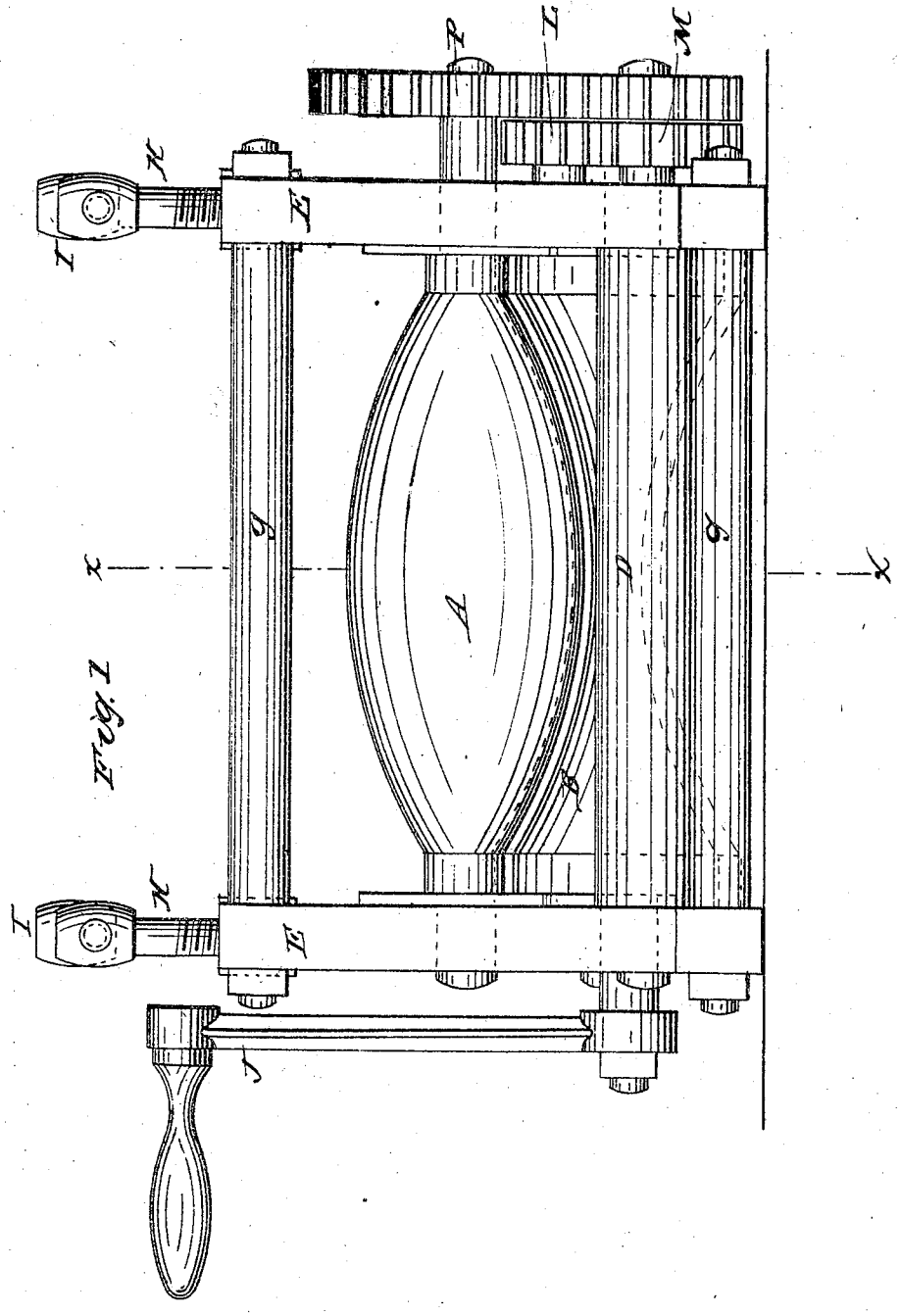


Fig. 1.

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BENDING MACHINE.

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PATENTED AUG. 25, 1857.
2 SHEETS—SHEET 2.

fig. 2

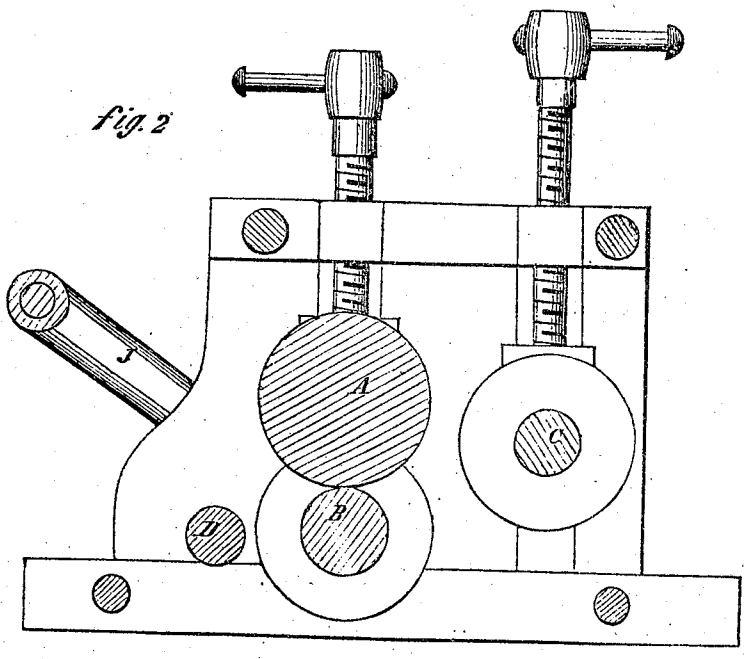


FIG. 2 TAKEN FROM PATENT OFFICE REPORT 1857 - VOL. III -
FIG. 3 OF DRAWING NOT ACCESSIBE (1912)

UNITED STATES PATENT OFFICE.

LEWIS RAYMOND, OF NEW YORK, N. Y.

IMPROVED BENDING-MACHINE.

Specification forming part of Letters Patent No. **18,058**, dated August 25, 1857.

To all whom it may concern:

Be it known that I, LEWIS RAYMOND, of the city, county, and State of New York, have invented a new and useful Improvement in Apparatus for Bending Sheet Metal, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of my bending-machine; Fig. 2, an end elevation of the same, and Fig. 3 a vertical cross-section of the same at the line *x x* of Fig. 1.

In the manufacture of boats of sheet metal and of many other articles it is frequently necessary to bend sheets of metal both transversely and longitudinally, and in some cases it is necessary to curve them also in the plane of their surface in order to fit them to particular positions.

The object of my invention is to produce a machine which may be employed for this purpose; and my invention consists, principally, in a combination of three rollers, by whose combined operation a sheet of metal may be bent both transversely and longitudinally, and which may also be employed to curve it in the plane of its surface.

My improvement is embodied in the bending-machine represented in the accompanying drawings. This machine contains four rollers A B C D, whose journals revolve in boxes. These boxes are secured in end frames or housings E E, which are rigidly connected by bolts or tie-rods *g g*. Two of these rollers A and B are situated vertically above each other. The upper one A has the form of a spindle whose diameter at the center is larger than at its journals. The lower roller B is concave, its concave surface being fitted to the convex surface of the upper roll. The boxes of the lower roll are stationary. Those of the upper roll are secured to screws H H, by means of which they may be elevated or depressed, so as to raise or depress the upper roll and hold it in any desired position with respect to the lower roll. The third roll C is of the same form as the lower roll B of the first pair. The boxes *h h* of its journals are also connected with screws I I, by means of which this roll may be raised or depressed, so as to set it in any desired position with respect to the other two. The fourth roll D is situated at that side of the pair A B which is opposite to the side at which the second concave roll C is located. Its boxes are stationary, and its office is to support the sheet metal as it is entered between the pair of rolls A B.

The journals of three of the rollers A, B, and D project beyond their boxes and form driving ends, to which cog-wheels are secured, by which the rotary motion imparted to one roll is communicated to the other.

A rotary motion is readily imparted to the concave roll B by means of a crank J. The cog-wheel K at the opposite end of this roll communicates motion to an intermediate wheel L, which gears into a wheel M, secured to the supporting-roll D, so that this roll and the concave roll revolve in the same direction, as indicated by the arrows respectively affixed to them in Fig. 3. The face of the wheel M upon the supporting-roll is broad enough to gear into a wheel P, secured to the driving end of the convex roll A, so that the latter is caused to revolve in the direction indicated by the arrow applied to it in Fig. 3. The second concave roll C has no cog-wheel secured to it, but is caused to revolve simply by the friction of the sheet metal bearing upon it. In machines for bending heavy sheets of metal it may, however, be advantageous to impart a positive revolving motion to the second concave roll in the same manner as to the other rolls by means of cog-wheels.

If the apparatus thus described is to be used simply for bending sheet metal in a transverse direction to its length, the second concave roller C is depressed by turning the screws I I until the line of its upper surface is on a level with that of the concave roll of the first pair. The rolls are then put in motion by turning the crank J, and the sheet of metal passed endwise over the supporting-roll D and entered between the first pair. As the rolls revolve, the sheet is seized, and by the revolution of the rolls is drawn between them, and it is passed out of the machine over the second concave roll C. If the sheet metal is thin, the convex roller A may be adjusted by turning the screws H H, so as to set it only as far from the concave roll beneath as the thickness of the sheet, in which case a single passage through the machine is

sufficient to bend the metal transversely or to give it the required trough-like form. If, however, the metal be thick, it may be necessary to set the upper roll at some distance from the lower one at the first passage and to pass the metal several times through the machine, setting the upper roller closer to the lower one at each passage.

If the sheet metal is to be curved in the direction of its length as well as transversely, the second concave roll C must be raised up by turning the screws I I, which support its boxes. In this case the sheet metal, after being curved transversely by the first pair of rollers, will be bent upward out of its direct course in passing through the machine by the action of the second convex roll C, so that in a single passage through the machine the sheet is bent both transversely and longitudinally. The amount of bend or curvature in a longitudinal direction will depend upon the distance to which the second convex roll C is elevated above the level of the first convex roll B, and the requisite curvature may be imparted at one passage, if the metal be thin and the amount of curvature required be not great, or several passages may be required, the second concave roll being set higher at each passage.

If the sheet metal is to be turned sidewise in the plane of its surface, as well as bent transversely, one end of the convex roll A is to be set by its screw closer to the concave roll B than its other end, so as to pinch the edge of the sheet, and thus roll it out thinner as it passes between the two rollers. In this case the pinched edge of the sheet will be extended in length, while the opposite edge is not affected, and consequently the sheet will be curved sidewise. This sidwise curvature may be effected at the same time with a longitudinal curvature by the raising of the second concave roll. Finally, by setting one end of the second concave roll higher than the other, the sheet may be skewed diagonally as it passes through the machine. All the curved forms of sheet metal which I have described are required in the manufacture of sheet-metat boats, and the machine is admirably adapted to form them. Its construction may be varied without affecting the principle of the invention to adapt it to different uses or to different circumstances. Thus, for example, the curvature of the opposite ends of the rolls may be different, or two convex rolls may be used in place of two concave ones, in which case the longitudinal curvature will be effected in an opposite direction to that I have described. In this case the single concave roll used should be highest. In all cases the supporting-roll D should be employed, as it prevents the sheet from sagging downward when the third roller of the combination, which I have hitherto called the "second concave roll," acts upon the sheet.

Having thus described my improved bending-machine, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of three rollers—convex and concave—substantially as herein set forth, so as to bend sheet metal transversely and longitudinally at one operation.

2. In combination with the above, a supporting-roll located, arranged, and driven substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

LEWIS RAYMOND.

Witnesses:
H. C. CALKIN,
JOHN ANDERSON, Jr.