J. F. CURRIER.

Machine for Bending Sheet-Metal Roofing-Plates.

No. 216,511. Patented June 17, 1879.

Fig. 1

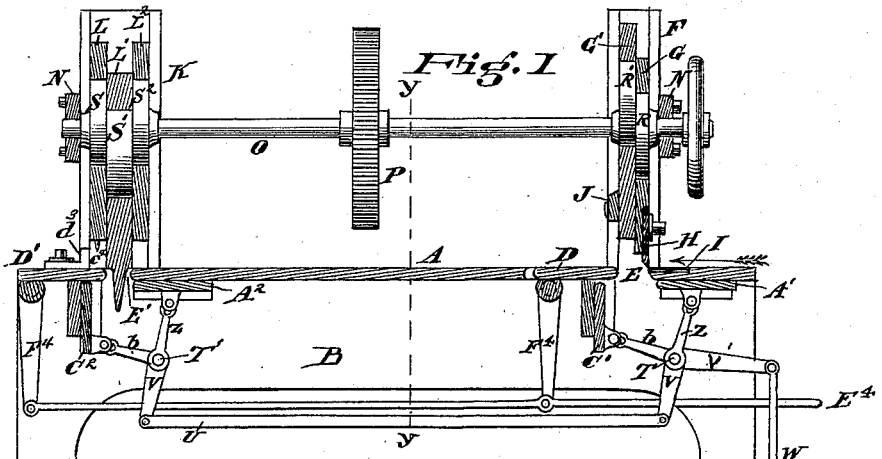


Fig. 2

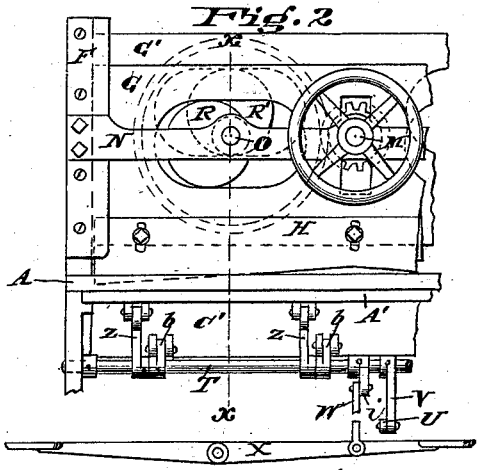


Fig. 3

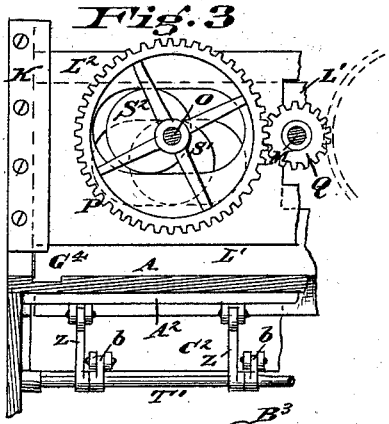


Fig. 4

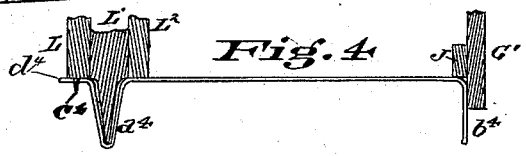


Fig. 5

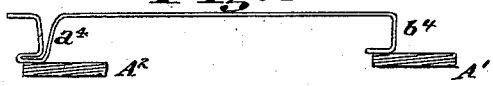
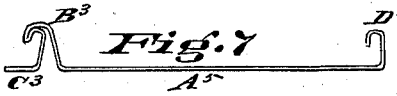


Fig. 6

Fig. 7



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IMPROVEMENT IN MACHINES FOR BENDING SHEET-METAL ROOFING-PLATES.

Specification forming part of Letters Patent No. **216,511**, dated June 17, 1879; application filed November 12, 1878.

To all whom it may concern:

Be it known that I, JOHN F. CURRIER, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and Improved Machine for Bending Sheet-Metal Roofing-Plates; and I do hereby declare the following to be a full, clear, and exact description of the same, which will enable others skilled in the art to make and use it, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a transverse vertical section of the machine. Fig. 2 is a front elevation of the same, part being broken off. Fig. 3 is a sectional view, taken in the line *y y*, Fig. 1, and looking toward the rear cam-plates. Figs. 4 to 6, inclusive, are sectional views of a sheet-metal roofing-plate illustrating the process of bending, and Fig. 7 is a sectional view of a finished roofing-plate.

Similar letters of reference indicate corresponding parts in the several figures of the drawings.

My invention has for its object to provide a simple and effective machine for bending and shaping sheet-metal roofing-plates; and to this end it consists, first, in the means by which the anchor, anchor-hook, and covering-cap are formed upon a roofing-plate; secondly, in the means for bending the edge of the plate which fits under the covering-cap of an adjoining plate; thirdly, in bending and squaring a sheet-metal roofing-plate in the same machine; fourthly, in bending and squaring a sheet-metal roofing-plate and punching the holes for the nails in the anchor; fifthly, in the means for discharging the finished plate from the machine; lastly, in the combination of various parts, as I will presently describe.

In the accompanying drawings, A represents the bed or table of the machine, supported by the frame-work B and legs C. D D^1 are rocking plates let into the table at the front and rear, so as to leave narrow slots E E^1 in front of each. The plates are journaled eccentrically in the end pieces of the frame, and their forward edges rest upon the side pieces of the frame when turned down level with the table. The slots form spaces for bending and folding the metal, and the rocking plates are used as a part of the table and as a means for lifting the finished roofing-plates clear of the slots.

F F are grooved uprights placed at the ends of the slot E in the front of the table to receive two cam-plates, G G^1, which work vertically in the grooves. The front cam-plate, G, carries a curved knife, H, at its lower edge, which, in connection with a metal bar, I, secured to the table at the front side of the slot E, acts as a shear for squaring the roofing-plates. The rear cam-plate, G^1, is employed for bending the squared edge of the roofing-plate by forcing it into the slot E, and is provided upon its back, a short distance above the edge, with a bar, J, for holding the roofing-plate down upon the table while the squared edge is being folded.

K K are also grooved uprights rising from the rear side of the table at the ends of the slots E^1 to receive three vertically-sliding cam-plates, L L^1 L^2. The intermediate plate, L^1, bends the roofing-plate into the slot E^1, and the two outer plates, L L^2, hold it in place upon the table.

The several cam-plates are operated from a driving-shaft, M, extending centrally across and above the table through vertical slots in the cam-plates, and having its bearings in cross-pieces N N, secured to the outside of the front and rear uprights. O O are cam-shafts, also having their bearings in the cross-pieces N, and arranged upon opposite sides of the driving-shaft, to which they are geared by the gear-wheels P and pinion Q, so that both shall rotate in the same direction.

The front end of each cam-shaft carries two cams or eccentrics, R R′, working within slots in the cam-plates, one set, R, to operate the knife-plate G, and the other set, R′, to operate the bending-plate G^1, and they are so arranged eccentrically to each other on the shafts as to move down the knife-plate first for cutting the roofing-plate, and then force down the bending-plate to bend the cut edge into the slot in the table. The rear ends of each cam-shaft carry three cams or eccentrics, S S^1 S^2, working within slots in the cam-plates L L^1 L^2, the outer and inner cams, S S^2, being arranged in the same position on the shafts to move their corresponding cam-plates simultaneously, and the intermediate cams, S^1, being arranged eccen-

trically to the other, so as to first move down the intermediate plate, L^1, for bending the roofing-plate into the slot E^1. The plates L L^2 immediately follow the downward movement of the plate L^1, and hold the roofing-plate upon the table while the portion bent into the slot is being again bent to form the covering-cap and anchor-hook.

T T′ are shafts arranged under the table at the front and rear, with their bearings in the side pieces of the frame. They are connected under the table by a rod, U, pivoted to two studs or arms, V, which project downward from the shafts. A stud, V′, extends from the front of the forward shaft, T, and is connected by a rod, W, to a double foot-lever, X, pivoted centrally to a cross-bar, Y, joining the two front legs of the machine. By alternately depressing the ends of the foot-lever the two shafts are oscillated in their bearings. The shafts are also connected by pins or arms Z Z with two horizontal folding-plates, A^1 A^2, which work between the shafts and table in front of the slots E E^1, and by similar pins or arms *b b* with two vertical folding-plates, C^1 C^2, which work between the shafts and the side pieces of the machine under the edges of the rocking plates D D^1.

The sheet of metal to be folded into a roofing-plate is laid upon the table by being passed in from the front of the machine under the cam-plates, and pushed back under the rear cam-plates against adjustable stops d^3 on the rear rocking bar. Power being applied to the driving-shaft, the cam-shafts are rotated, and the intermediate rear cams, S^1, first move down the intermediate cam-plate, L^1, upon the roofing-plate, and force it into the slot E^1, to form a loop, a^4, near one edge, as shown in Fig. 4. While the folding-plate is still in the loop the knife-plate G is moved down by its cams R, and the knife shears the metal square off at the end. Simultaneously with these movements the remaining plates are carried down by their cams, the front plate, G^1, bending down the cut end of the roofing-plate, as shown at b^4, Fig. 4, while the cross-bar J clamps the metal to the table or front rocking plate. The rear cam-plate, L^2, also holds down the roofing-plate, and the cam-plate L, moving down upon the rear rocking plate, D^1, is provided with punches c^4, which punch the nail-holes in the anchor d^4 of the roofing-plate, as shown in Fig. 4.

The continued rotation of the cam-shafts first raises the bending-plate L^1 out of the bend in the roofing-plate, and the knife-plate G out or partly out of the slot E, leaving all the remaining cam-plates, L L^2 G^1, down upon the metal. The cam-shafts are then stopped and one end of the foot-lever depressed, which operates the rock-shafts T T′ to throw forward the bending-plates A^1 A^2 against the loop a^4 and bent edge b^4 of the roofing-plate, bending them at right angles, as shown in Fig. 5. The opposite end of the foot-lever is then depressed, which retracts the bending-plates A^1 A^2 and throws up the bending-plates C^1 C^2 against the loop a^4 and bent edge b^4, forcing them upward to form the bends shown in Fig. 6. This completes the formation of the plates, as shown in Fig. 7, wherein A^5 represents the body, B^3 the covering-cap and anchor-hook, C^3 the anchor, and D^3 the bent edge opposite the anchor.

After the roofing-plate is formed, the cam-plates are raised and the rocking plates D D^1 swung upward by pulling forward a rod, E^4, connecting their studs F^4 on the under side of the table. This movement lifts the bends of the roofing-plate out of the slots E E^1, so that it may then be readily taken out of the machine.

G^4 is a transverse groove formed in the top of the table to receive the under flange formed on the end of a roofing-plate before being subjected to the action of the bending-machine. Grooves for the upper end flange of the roofing-plate may be formed in the ends of the cam-plate if desired. In order to give the roofing-plates the requisite bevel the two sets of cam-plates are arranged nearer together at one end than at the other.

Having thus described my invention, what I claim is—

1. A machine for bending sheet-metal roofing-plates, consisting in the combination, with a suitable table, of a knife for squaring the plates, devices for forming the anchor, anchor-hook, and covering-cap at one edge of the plate, and devices for bending the opposite edge of the plate, in order that it shall fit under the covering-cap of an adjoining plate when applied to a roof, substantially as described.

2. In a machine for making sheet-metal roofing-plates, the combination of the knife and bending-plates G G^1, operated by cams or eccentrics, with the table of the machine, for squaring the sheet metal and bending down the squared edge, substantially as described, for the purpose specified.

3. The combination of the cam-plates G G^1 and bending-plates A^1 C^1 with the slotted table, for the purpose of squaring the sheet-metal roofing-plate and forming the bent edge D^3 thereof, substantially as described.

4. The cam-plates L L^1 L^2, operated by the cams S S^1 S^2, with the slotted table of the machine, for the purpose of forming the bend a^4 in a roofing-plate, substantially as described.

5. The combination of the cam-plates L L^1 L^2 and bending-plates A^2 C^2 with the slotted table, for the purpose of forming the anchor C^3 and bends B^3 in the roofing-plate, substantially as described.

6. The combination of the rocking plates D D^1 with the slotted table, for the purpose of assisting in the formation of the roofing-plate and to clear them from the slots in the table when completed, substantially as described.

7. The combination of the front cam-plates, G G^1, and rear cam-plates, L L^1 L^2, with each other and the slotted table, for the purpose of simultaneously bending the sheet-metal roofing-plate with the bends a^4 and b^4, as shown in

Fig. 4 of the drawings, and substantially as described.

8. In a machine for forming sheet-metal roofing-plates, the combination of a series of plates for bending opposite edges of the roofing-plate at one operation, a series of plates to simultaneously bend both portions of the metal bent by the first series of plates, and a third series of plates to simultaneously finish the bending process, substantially as described, for the purpose specified.

9. The combination of the double treadle or foot-lever with the rock-shafts T T', to operate the bending-plates A^1 A^2 C^1 C^2, substantially as described, for the purpose specified.

10. The combination, with the slotted table, of the cam-plates G G^1, bending-plates A^1 C^1, and the rocking plate D, substantially as described, for the purpose specified.

11. The combination, with the slotted table, of the cam-plates L L^1 L^2, bending-plates A^2 C^2, and rocking plate D^1, substantially as described, for the purpose specified.

12. The combination of the front cam-plate, G, and rear cam-plates, L L^2, to hold the sheet-metal roofing-plate down upon the table while the parts a^4 b^4 are receiving their final bends, substantially as described.

13. The combination of punches C^4 with the rear cam-plates, L L^1 L^2, to bend the sheet-metal plate and punch the holes in the anchor, substantially as described, for the purpose specified.

14. The holding-bar J, combined with the cam-plate G and rocking plate D, substantially as described, for the purpose specified.

JOHN F. CURRIER.

Witnesses:

L. M. HOSEA,

E. A. ELLSWORTH.