(No Model.)

3 Sheets—Sheet 1.

# C. PUDDEFOOT.

## SEAMING MACHINE FOR SHEET METAL.

No. 354,654. Patented Dec. 21, 1886.

FIG. 1.

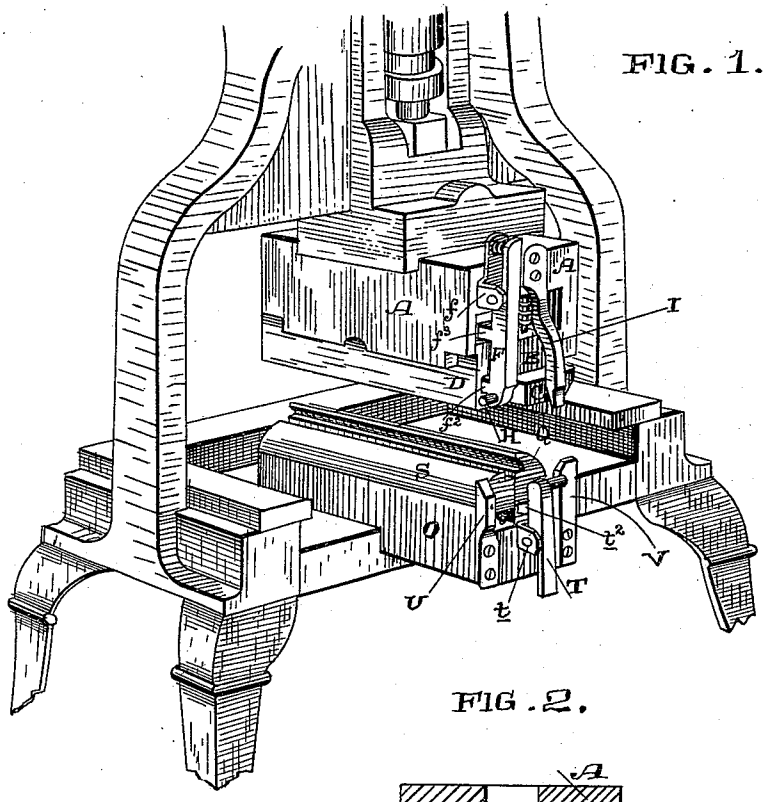



FIG. 2.

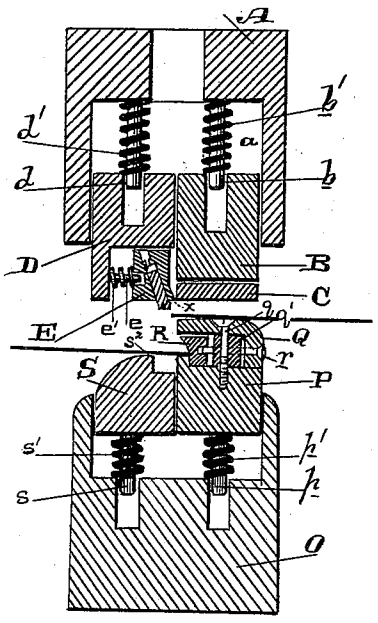



FIG. 3.

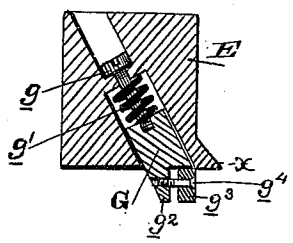
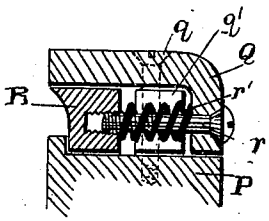



FIG. 4




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(No Model.)

3 Sheets—Sheet 2.

# C. PUDDEFOOT.

## SEAMING MACHINE FOR SHEET METAL.

No. 354,654. Patented Dec. 21, 1886.

FIG. 5

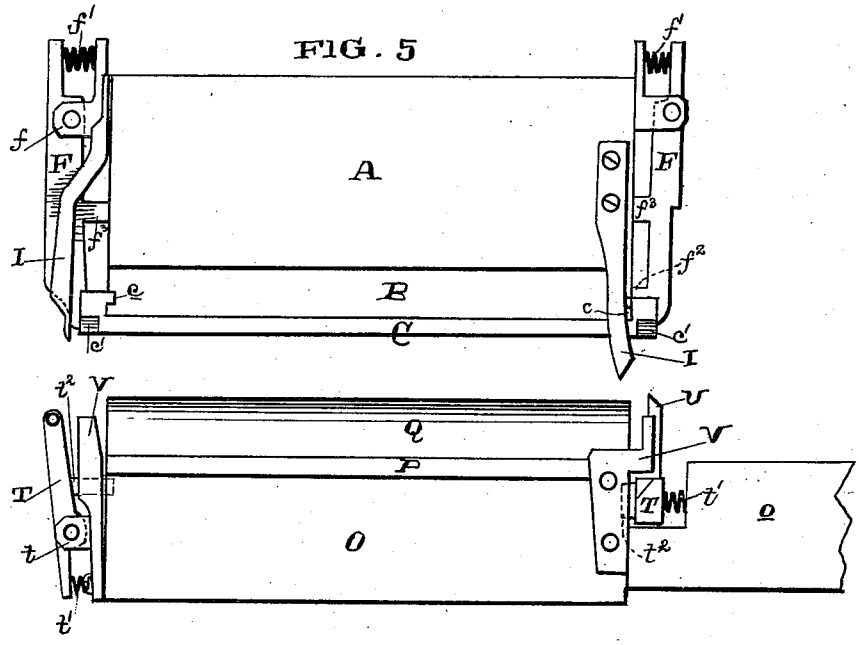



FIG. 6

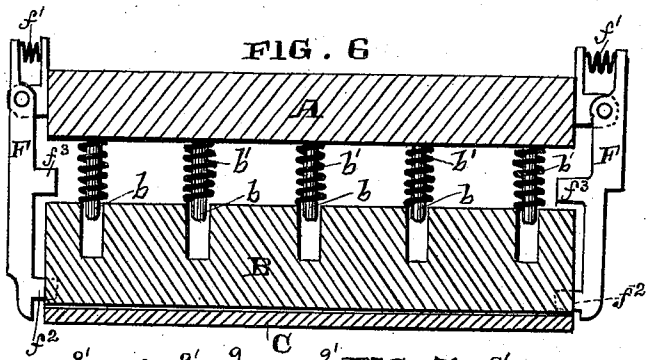



FIG. 7.

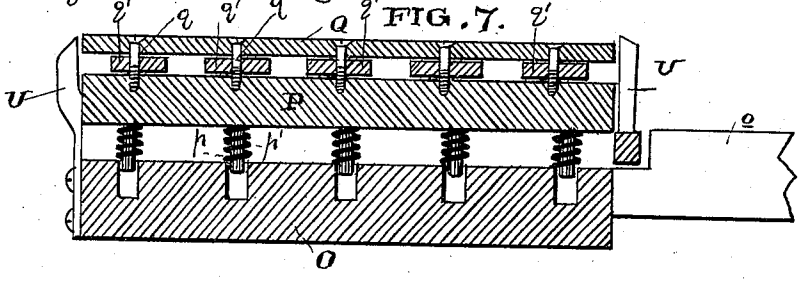
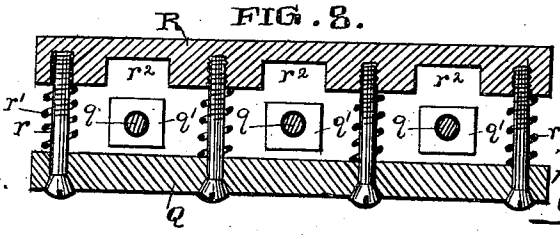



FIG. 8.




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# C. PUDDEFOOT.

3 Sheets—Sheet 3.

## SEAMING MACHINE FOR SHEET METAL.

No. 354,654. Patented Dec. 21, 1886.

Fig. 9.

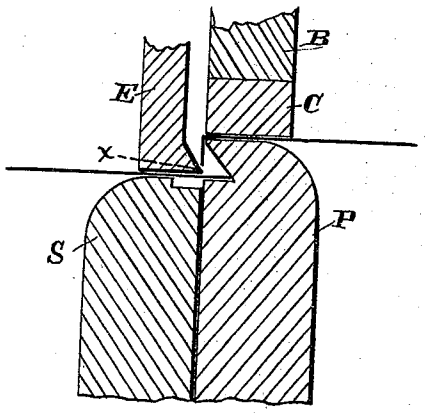



Fig. 10.

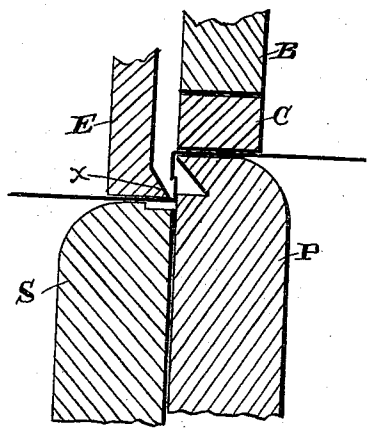



Fig. 11.

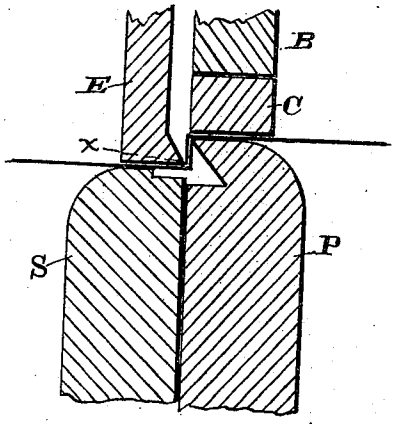



Fig. 12.

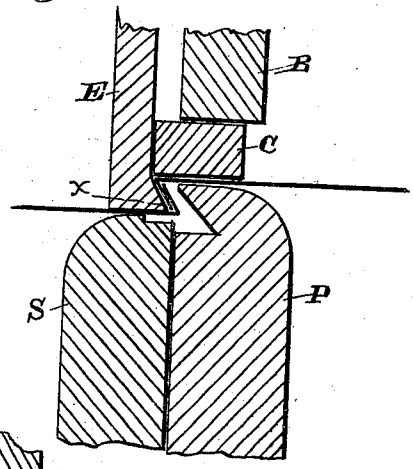
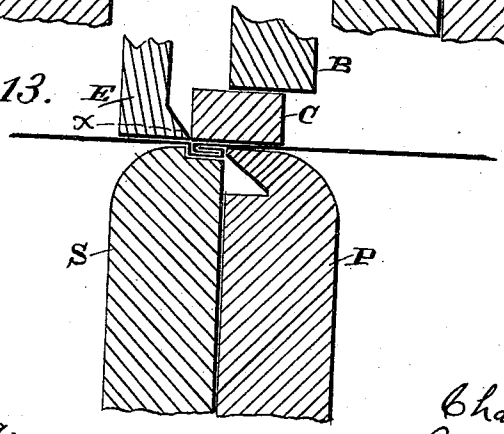



Fig. 13.




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# UNITED STATES PATENT OFFICE.

CHARLES PUDDEFOOT, OF OAKLAND, CALIFORNIA.

## SEAMING-MACHINE FOR SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 354,654, dated December 21, 1886.

Application filed July 6, 1886. Serial No. 207,272. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES PUDDEFOOT, of the city of Oakland and county of Alameda, State of California, have invented an Improvement in Seaming-Machines for Sheet Metal; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of machines which are used for joining the edges of sheet metal together, and which are usually known as "seaming-machines."

The particular seam which my machine is adapted to make is the ordinary one made by bending the edges of the two plates or sheets in opposite directions and then pressing them together over and down to a flat plane, in which the two edges are interlocked.

My invention consists in an upper and lower die-stock carrying the various bars and anvils hereinafter described, and to which movements and adjustments are given by which the overlapping edges of the two sheets or the opposing edges of the same sheet are first bent in opposite directions, then brought and held together, and finally pressed over and down flat to form the seam.

My invention consists particularly in the construction, arrangement, and operation of the various parts, which I shall hereinafter describe.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view. Fig. 2 is a cross-section of the two dies. Fig. 3 is a cross-section of bar E. Fig. 4 is a cross-section of anvil P Q. Fig. 5 is a side elevation of dies. Figs. 6 and 7 are longitudinal sections of bars A B C and anvils O P Q, respectively. Fig. 8 is a horizontal section of bars Q R. Figs. 9 to 13, inclusive, are details illustrating the successive steps in the operation of the machine.

A is the stock of the upper die. It has a deep groove or slot, *a*, made in its under side, in which the operating parts are contained.

B is a bar, which forms the body of the grip acting against the anvil below. It is mounted in the slot of the stock on pins *b*, fixed in said stock and seated in sockets in the bar, whereby said bar may have a vertical movement, being held down by means of springs *b'* around the pins. To the lower face of the bar B is fitted a bar, C, which has a lateral movement on its seat, being guided in this movement in any suitable manner, as by its ends having inwardly-turned tongues *c*, fitting in grooves in the ends of the bar B, Fig. 5. Both the bars B and C have, therefore, an up-and-down movement together, while the bar C has an independent movement laterally in a horizontal plane or at right angles to the joint movement of the two bars.

D is a bar seated in the slot of the stock A, parallel with and immediately alongside of the bars B C. This bar is also mounted on fixed pins *d* in the stock, so that it may have a vertical movement, and it is held down by springs *d'* around the pins. The lower face of the bar D is shouldered or rabbeted out, in order to fit thereto the bar E, which is set on edge, its lower edge being flush with the lower edge of the bar D. The bar E is mounted on guide-pins *e*, extending from the side of the bar D, and it is held by springs *e'*. These springs hold it against the edge of the laterally-moving bar C with sufficient force to keep said bar in place, but not to prevent it from having its independent vertical movement. It will be seen, therefore, that the bars D and E have a vertical movement in common, and the bar E has a second movement of its own to and from the bar D. The movements of the bars D and E are independent of those of the bars B and C, though the bars C and E, both having a side movement, execute it together under the force of the cams, to be explained, and are both returned by the springs of the bar E. The vertical movement of the bars B and C is subjected to no restriction or lock, but all the other movements are restricted as follows: Pivoted in brackets *f* on the ends of the stock A are the latches F, the upper ends of which are influenced by the springs *f'* to hold their lower ends in position. Their lower ends have lugs $f^2$, which are normally in position between the bars D and E, Figs. 1 and 6. They therefore lock the bar E, and thus prevent the lateral movement of the bars C and E. The bodies of the latches F, below the pivot-points, are provided with lugs $f^3$, which are inserted and remain normally in the slot of the stock A just above the bar D, whereby the vertical movement of the bars D and E is prevented.

The lower edge of the bar E, adjacent to the bar C, is upwardly and backwardly beveled, forming a toe, *x*, and in this bar is mounted the gage-bar G, which projects below the bar back of its toe, Fig. 3. This gage-bar has an upward movement, in order to let it move out of the way when its function is done and be projected again when required. For this purpose it is mounted in a socket in the bar E, in which it may move out and in, its downward movement being limited by the screws *g*, which are inserted in its upper portion, and its projection being effected by the springs *g'* around said screws.

The lower end of the gage-bar is made in two parts or sections, the one, $g^2$, being fixed and the other, $g^3$, being movable to and from the fixed part by means of a screw, $g^4$. This adjustment of the movable part of the bar provides for a greater or less width of flange to be made on the sheet metal, as I shall hereinafter more fully refer to.

O is the stock of the lower die. Its upper face is grooved or slotted for the reception of the operating parts.

P is a bar forming the body of the anvil, opposing the bars B and C of the upper die. This anvil-bar is mounted on pins *p* in the slot of the stock, so that it may have a vertical movement, and it is held up by the springs *p'* around said pins. The upper face of the bar P has fitted to it the bar Q, the back edge of which is rounded and extends downwardly, so that when resting on the bar P its body is raised above the upper face of said bar, leaving a space between the two bars opening inwardly. They are rigidly secured together by the screws *q*, which pass down through intervening small blocks, *q'*, seated in the space between the two bars, Figs. 2 and 4. In this space is fitted a gage-bar, R, extending its whole length, and having, preferably, a rounded front face, as shown, which fills up the opening of the space, forming a groove for the reception of the edge of the material being worked upon. In order to vary the depth of this gage-groove, I make the bar R to have a lateral movement in its seat, and I make it therefore of a width less than that of the space in which it is seated, so that it may move out and in. This movement is effected by the screws *r* passing into the bar R from the back of the bar Q, and springs *r'*, Fig. 4, hold the bar R well in place.

The object of the intervening blocks, *q'*, is to prevent any binding on the movable gage-bar R, so that it may have a free movement, which would not be the case if the bars P and Q were clamped directly together. The blocks do not interfere with the movement of the bar R, as said bar is notched out at $r^2$, and in these notches the blocks are loosely seated, Fig. 8. This entire construction is simply to provide an adjustable gage-groove. A simple groove in the bar P would answer for one size of flange on the work, but would not be adapted to make different sizes.

S is an anvil-bar seated in the groove of the stock O, parallel with and immediately adjacent to the anvil-bar P. It is mounted on pins *s*, so that it may have a vertical movement, and it is held up by springs *s'* around the pins. The upper edge of the bar S is shouldered or rabbeted out adjacent to the bar P, so that a shallow groove, $s^2$, is formed between the bars S and P.

The movement of the anvil-bar S is not restricted by any lock, but that of the anvil-bars P and Q is prevented by the following lock: Pivoted in brackets *t* on the stock O are the latches T, the ends of which are influenced by springs *t'* to hold their other ends in position, Fig. 5. The latches T have studs $t^2$, which enter the slot of the stock O just below the bar P, and thus prevent its downward movement. The two latches T might be arranged exactly alike at each end of the stock; but they are here shown as occupying the one a vertical position and the other a horizontal position, which latter position is rendered necessary because of the shank *o* of the stock, by which it is secured in the press.

The means by which the locks are relieved in order to free the parts, and by which the parts are actuated, are as follows: On one side and at each end of the stock O of the lower die are fixed cam-standards U, with which small pins H on the lower ends of the latches F of the upper die-stock, A, come in contact, thereby forcing the studs of said latches from their engagements and relieving the bars D and E, whereby they may have their vertical movement together, and the bars E and C may move laterally, Figs. 1, 6, and 7.

On the ends of the upper die-stock, A, are fixed cam-arms I, which come in contact with the ends of the latches T on the lower die-stock and force their studs out of engagement with the anvil-bar P, whereby said bar may have its vertical movement, Figs. 1 and 5. On the ends of the lower die-stock are the fixed cam-standards V, with which the beveled ends *c'* of the bar C of the upper die come in contact, whereby said bar is forced over sidewise, the bar E against which it bears being previously relieved of its lock, Fig. 5. The two dies are mounted in a suitable press, the lower one being fixed in position and the upper one having a vertically-reciprocating motion.

The operation of my seaming-machine is as follows: When the upper die has been moved down nearly to the lower one, one piece of sheet metal is placed under it so that it lies upon the anvil P under the bar C, and its edge extends over against the gage-bar G in the bar E. This bar G defines the width of the flange to be made on the edge of the sheet, and it will be seen that this width may be varied by adjusting the movable part of the bar to or from the fixed part. Another sheet of metal or the other edge of the same piece is now placed from the opposite side, so that it lies upon the anvil-bar S of the lower die and projects into the groove formed by the gage plate or bar R

in the bar P, and it will be seen that the amount of projection can be varied by adjusting said bar R back or out, and the flange to be made on the sheet can thus be varied in width, as desired. The upper die is now moved down (the gage-bar G being pushed back by the sheet) so that the bar C comes in contact with the first or upper sheet and grips it between itself and the anvil-bar Q of the lower die, and thus holds it in place. Continued movement of the upper die brings its stock and the bars D and E down, while the bars B and C remain stationary. The bar E, now coming in contact with the projecting edge of the upper sheet, bends said edge down over the inner edge of the anvil-bar Q, and immediately after coming in contact with the lower sheet bends the edge of said sheet up. The upper die, still moving down, causes the anvil-bar P and Q to be relieved of its latch, whereupon it moves down, and the bars B C of the upper die follow it, thus causing the flanges of the two plates to come together and overlap the toe *x* of bar E holding them. The bar C is now forced over sidewise, still moving down until it reaches into the base of the toe *x*, when the bars D and E are relieved and begin to be pushed back.

The object of the toe *x* is to hold the two flanges together, when the bar C begins to bend them over. Thus the overlapped edges of the sheets are bent over together and flattened down by the bar C in the shallow groove of the anvil S, whereby the seam is formed. I have shown in Figs. 9 to 13, inclusive, the several successive steps of forming the seam during the operation of the machine.

By making the anvil S with a plane surface and grooving the bar C of the upper one, I can reverse the seam made in joining the edges of the metal sheets, which will make the machine applicable to other work.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a seaming-machine for sheet metal, parallel anvil-bars, one of which has a gage-groove for the reception of the edge of the sheet resting on the other, said grooved bar supporting the other sheet on its top above the lower sheet, the edges of the sheets overlapping, in combination with the moving bar, whereby the edges of the sheet are bent in opposite directions, substantially as described.

2. In a seaming-machine for sheet metal, parallel anvil-bars, one of which has a gage-groove for the reception of the edge of the sheet resting on the other, said grooved bar supporting the other sheet on its top above the lower sheet, the edges of the sheets overlapping, in combination with a vertically-moving bar for gripping the upper sheet upon one of the anvil-bars and another vertically-moving bar whereby the edges of the sheets are bent in opposite directions, substantially as described.

3. In a seaming-machine for sheet metal, parallel anvil-bars, one of which has a gage-groove for the reception of the edge of the sheet resting on the other, said grooved bar supporting the other sheet on its top above the lower sheet, the edges of the sheets overlapping, in combination with the vertically-moving bar E, having a toe, *x*, whereby the edges of the sheet are bent in opposite directions and held, and the vertically and laterally moving bar C, whereby the bent edges are forced over together and flattened down, substantially as described.

4. In a seaming-machine for sheet metal, parallel anvil-bars, one of which has a gage-groove for the reception of the edge of the sheet resting on the other bar, said grooved bar constructed to support the other sheet on its top above the lower sheet, the edges of the sheets overlapping, in combination with the vertically-moving bar E, having a gage-bar for limiting the insertion of the upper sheet, whereby the edges of the two sheets are bent in opposite directions, substantially as herein described.

5. In a seaming-machine for sheet metal, parallel anvil-bars for supporting the sheets one above the other and overlapping, one of said bars having a gage-groove for defining the position of the lower sheet, in combination with the vertically-moving bar E, having a gage-bar for defining the position of the upper sheet, whereby the edges of the sheets are bent in opposite directions, and a vertically-moving bar for gripping the upper sheet against the anvil-bar and holding it in place, substantially as herein described.

6. In a seaming-machine for sheet metal, parallel anvil-bars for supporting the sheets one above the other and overlapping, one of said bars having a gage-groove for defining the position of the lower sheet, in combination with a vertically-moving bar for gripping the upper sheet, the vertically-moving bar E, having a gage-bar for defining the position of the upper sheet, and a toe, *x*, whereby the edges of the sheets are bent in opposite directions and held, and the vertically and laterally moving bar C, by which the bent edges are forced over together and flattened down, substantially as herein described.

7. In a seaming-machine for sheet metal, parallel anvil-bars for supporting the sheets one above the other and overlapping, one of said bars having a gage-groove adjustable in depth for defining the position of the lower sheet, in combination with the vertically-moving bar E, having an adjustable gage for defining the position of the upper sheet, whereby the edges of the sheets are bent in opposite directions, substantially as herein described.

8. In a seaming-machine for sheet metal, the anvil consisting of the bar P and the bar Q, secured on top and separated therefrom by a space, in combination with the laterally-moving gage-bar R in said space, whereby an ad-

justable gage-groove is formed for defining the position of the lower sheet, substantially as herein described.

9. In a seaming-machine for sheet metal, the anvil consisting of the bar P, the bar Q, and the blocks $q'$ between the two bars, forming a space between them, in combination with the notched bar R in the space and the screws and springs for adjusting it, substantially as herein described.

10. In a seaming-machine for sheet metal, the vertically-movable bar E, by which the edges of the sheets are bent, in combination with the movable gage-bar G therein, for defining the position of the upper sheet, said bar being movable in the bar E and having actuating-springs for projecting it, substantially as herein described.

11. In a seaming-machine for sheet metal, the vertically-movable bar E, by which the edges of the sheets are bent, in combination with the movable gage-bar G, for defining the position of the upper sheet, said bar having its lower end consisting of a fixed and a movable part for varying the position of the sheet, substantially as herein described.

12. In a seaming-machine for sheet metal, the grooved or slotted stock A of the upper die, the bar B, mounted on springs in said slot and having a vertical movement therein, the bar C on the lower face of bar B and having a lateral movement thereon, the bar D, mounted on springs in the stock and having a vertical movement, and the bar E, secured to the bar D and having springs influencing it to a lateral movement, said bar E having a toe, $x$, as described, in combination with the grooved stock O of the lower die, the grooved anvil-bar P, mounted on springs therein and having a vertical movement, and the shouldered or rabbeted anvil-bar S, also mounted in the stock O on springs and having a vertical movement, all arranged and adapted to operate substantially as herein described.

13. In a seaming-machine for sheet metal, the stock A of the upper die, having the vertically-moving spring-actuated bars B D and the vertically and laterally moving spring-actuated bars C E, the latter of which has a toe, $x$, as described, the gage-bar G in bar E, the latches F on the stock for locking the bars, and the cam-arms I on said stock for releasing the latches of the lower die, all in combination with the stock O of the lower die, having the vertically-moving spring-actuated bars or anvils P, Q, and S, with their grooves and shoulders, as described, the latches T, for locking the anvil P Q, and the cam-standards U V, for releasing the latches of the upper die and forcing the laterally-moving bar C to its movement, all arranged and adapted to operate substantially as herein described.

In witness whereof I have hereunto set my hand.

CHARLES PUDDEFOOT.

Witnesses:
S. H. NOURSE,
H. B. APPLEWHAITE.