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8. In machines for curling or beading the edges of sheet metal, the combination consisting of strips J independently pivoted at one end to the tool-carrying bracket F, and with the opposite ends supported in the toggle-plate B' through which they slide on the oscillation of the said bracket F, substantially as set forth.

9. In combination in a machine for curling or beading the edges of sheet-metal plates, a pair of toggle vise-plates with means for opening and closing the same, of a curling-bar with means for reciprocating the same toward and from said vise-plates, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

DANIEL SMITH.

Witnesses:

HERBERT BOWKETT,
HARRY DAVIS.

No. 654,495.

Patented July 24, 1900.

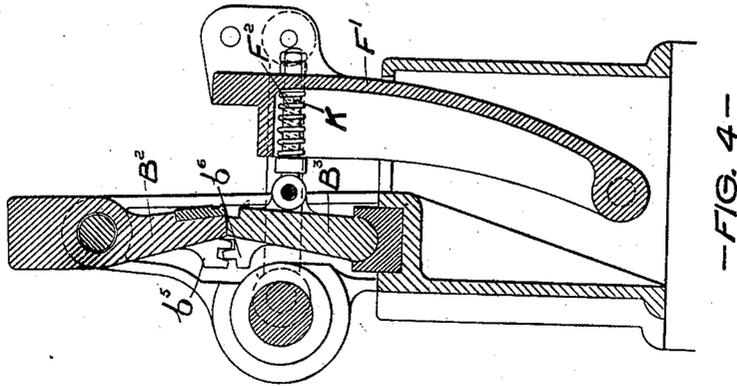
D. SMITH.

MACHINE FOR CURLING OR BEADING EDGES OF METAL SHEETS OR PLATES.

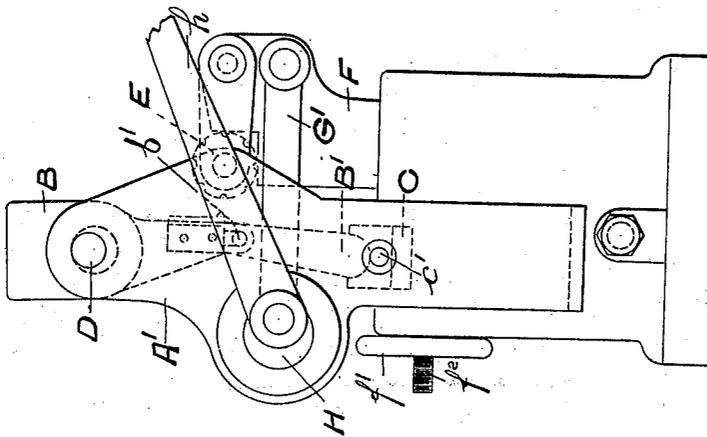
(No Model.)

(Application filed Mar. 5, 1900.)

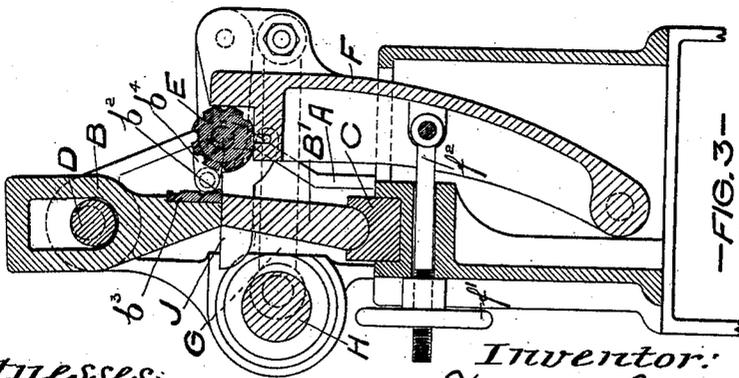
3 Sheets—Sheet 2.



—FIG. 4—



—FIG. 2—



—FIG. 3—

Witnesses:
E. B. Bolton
[Signature]

Inventor:
Daniel Smith
By [Signature]
his Attorneys.

No. 654,495.

Patented July 24, 1900.

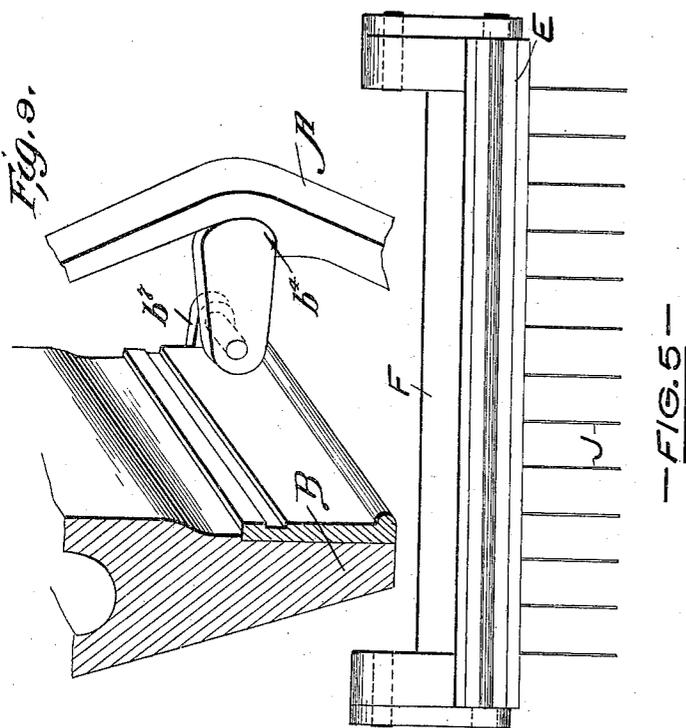
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MACHINE FOR CURLING OR BEADING EDGES OF METAL SHEETS OR PLATES.

(No Model.)

(Application filed Mar. 5, 1900.)

3 Sheets—Sheet 3.



Witnesses:

C. B. Bolton

Odum

Inventor:

Daniel Smith

By *Richard*

his Attorneys.

UNITED STATES PATENT OFFICE.

DANIEL SMITH, OF WOLVERHAMPTON, ENGLAND.

MACHINE FOR CURLING OR BEADING EDGES OF METAL SHEETS OR PLATES.

SPECIFICATION forming part of Letters Patent No. 654,495, dated July 24, 1900.

Application filed March 5, 1900. Serial No. 7,342. (No model.)

To all whom it may concern:

Be it known that I, DANIEL SMITH, a subject of the Queen of Great Britain and Ireland, and a resident of Castle Iron Works, Raglan street, Wolverhampton, in the county of Stafford, England, have invented certain new and useful Improvements in Machines for Curling or Beading the Edges of Metal Sheets or Plates, (for which I have filed an application in Great Britain, No. 9,541, bearing date May 6, 1899,) of which the following is a specification.

This invention consists of improvements in machines for curling or beading the edges of metal sheets or plates such as are used in the manufacture of boxes, trunks, and other articles, my object being to construct effective machines for the said purpose having fewer and simpler parts than those now in use.

In order that my invention may be more readily understood, I append hereunto three sheets of explanatory drawings, to be hereinafter referred to.

Figure 1 is a front elevation, Fig. 2 an end elevation, and Fig. 3 a sectional end elevation, of a machine constructed in accordance with my invention. Fig. 4 is a sectional end elevation showing a modified construction of the vise and tool-holder. Fig. 5 is a plan showing the curling or bead-forming tool in its relation to other parts of the machine. Fig. 6 is a sectional end elevation showing the curling or bead-forming tool to a larger scale, while Figs. 7 and 8 show to a still larger scale the stages in the operation of forming the curl at the edge of a metal plate or sheet. Fig. 9 is a detail view of one link interposed between the standard and one vise-plate.

The same reference-letters in the different views indicate the same parts.

I mount between suitably-disposed standards A A' the toggle vise-plates B B', having their adjacent edges arranged to grip the metallic plates to be operated upon. The lower toggle-plate B' is pivoted in the semicircular cavity of the inclined or wedge-shaped abutment-piece C, which can be adjusted as may be necessary for slightly raising or lowering the said plate B' by means of the end set-screws c c', as shown at Fig. 1 of the drawings.

The upper toggle-plate B, I pivot on the

eccentric shaft D, the ends of which are mounted and can rotate in journals or bearings formed with the standards A A', hereinbefore referred to, and I impart the necessary movements to the said plate B through the eccentric shaft D by a hand wheel or lever *d*. To insure that the toggle-plates B B' will move in unison on the partial rotation of the shaft D, the upper plate B is provided at its extremities with tooth-like projections *b b'*, which engage with corresponding recesses in the lower plate B', and therefore any movement imparted to the upper plate will be transmitted to the lower plate, and thus preserve the correct relationship between them.

The curling or bead-forming tool E consists of a bar of circular section longitudinally grooved, as illustrated at Figs. 5 and 6. The said grooves are of varying dimensions to suit different sizes of curls or beads. The tool is supported in bearings mounted on an arm or bracket F, which is pivoted at its lower end to the framing of the machine.

To prevent any rotation of the curling-tool after the necessary groove has been brought into the correct working position, a snug *f*, formed on one of the abutment-faces at the upper end of the bracket F, engages with another of the grooves adjacent thereto, as shown at Fig. 6.

The necessary reciprocation of the tool E is obtained through the oscillation of the bracket F, and such oscillation is imparted to the said bracket F by the connecting-links G G' and the eccentric shaft H, which is rocked or partially rotated by means of a lever, as *h*. The range of reciprocation to suit varying sizes of work is preferably made adjustable, and this is effected by means of the hand-wheel nut *f'* and eyebolt *f''*.

In the operation of forming, with my improved machine a curl or bead on the edge of a metal plate the said plate is placed between the jaws or adjacent edges of the toggle-vise formed by the plates B B', but is caused to project beyond the same a distance (regulated by any suitable stops conveniently arranged on the framework of the machine) sufficient to permit of the initial curl being formed. By movement imparted to the lever *d* the jaws or adjacent edges of the vise-plates

are then closed tightly upon the sheet to grip and hold it in position in readiness for the advance of the bead-forming tool E.

The advance of the tool E onto the projecting edge of the plate or sheet is effected by the operation of the hereinbefore-described lever *h*, a sufficient force being thereby applied to the tool E to cause it to curl the said edge to a curvature corresponding to the longitudinal groove which engages with it. Toward the completion of the advance or inward movement of the arm F the tool E, mounted thereon, is brought into contact with the semicircular projection *b*², formed on a detachable plate *b*³, fixed to the upper toggle or vise plate B, and on being pressed firmly against the same the portion of the metallic plate already in the groove is caused to be evenly bedded along its entire length, and thus assume the configuration shown at Fig. 7 of the drawings.

For the second or closing operation the tool E is withdrawn by a reverse movement of the lever *h*, the grip of the toggle-vise released by operating the lever *d*, and a further advance given to the plate or sheet into the groove of the curling-tool. After the plate or sheet has then been again gripped the tool E is once more advanced, and during its movement after reengagement with the plate the final or completed curl, as shown at Fig. 8, is formed.

I sometimes insert a wire in the curl at the commencement of the second operation.

In order to support the plate or sheet during the curling or bead-forming operations, strips, as J, are arranged along the under side of the plate or sheet, pivoted at one end to the arm or bracket F, while at the other end they are free to slide through apertures in the lower toggle-plate B'. I employ a convenient number of such supports and dispose them to give the necessary rigidity to the plate during the action of the die E, as illustrated.

To prevent the possibility of an accidental slipping of the gripping edges of the toggle-vise, hereinbefore referred to, relatively to the plate being operated upon, I pivot at each end of the upper toggle-plate B a link, as B⁴, which abuts in a recess formed in the standards A and A', respectively. One of such end links B⁴ is shown in the enlarged perspective view, Fig. 9. The said link *b*⁴ is pivoted to the projecting piece *b*⁷, which latter is formed with or rigidly attached to the toggle-plate B.

In the modification shown at Fig. 4 the toggle-vise and the bead-forming tool work dependently instead of independently, as in the arrangement hereinbefore described. The upper toggle-plate B² is mounted on a plain instead of an eccentric shaft, and the ends of each plate B² and B³ are fitted with a quadrant *b*⁵ and *b*⁶ of a sufficient length to permit the plates to move through an arc of the required magnitude. The lower toggle B³ is connected by means of jointed pins or

bolts, as K, to the arm or bracket F' and is retained in correct relationship by springs, as F². One such bolt, as K, with spring F², is employed at each side or end of the bracket. The forward movement of the arm F' imparts through the medium of the spring F² a similar motion to the lower toggle B³, and in consequence of the quadrant connection between the two toggles B² B³ the metallic plate between the adjacent edges is gripped preparatory to beading under the action of the forming-tool E. The continued advance of the arm F' (and the forming-tool E mounted thereon) causes a still tighter grip upon the plate and beyond a certain limit a compression of the spring F², which insures throughout the stroke a positive and continuous action of the toggle-vise. As the arm F' recedes the pressure on the spring is relieved and a corresponding movement is imparted to the toggle B³, thus releasing the metallic plate and permitting of its withdrawal from the machine.

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

1. The combination with a machine for curling or beading the edges of metal sheets, of a pair of toggle vise-plates pivoted between the side frames of the machine and opening and closing together on the rocking of a single lever, substantially as set forth.

2. In machines for curling or beading the edges of sheet metal, the combination consisting of toggle vise-plates B B' one of which has tooth-like projections *b b'* engaging corresponding recesses in the other, of the links *b*⁴ connected with the toggle-plate B and abutting in recesses formed in the standards A A', substantially as set forth.

3. In machines for curling or beading the edges of sheet metal, the combination with the toggle vise-plates B B' engaging at their adjacent ends, of the eccentric shaft D and operating-lever *d*, substantially as set forth.

4. In machines for curling or beading the edges of sheet metal, having a pair of toggle vise-plates B B', the combination with the pivot-like end of one of the said vise-plates of the wedge-shaped abutment-piece C and set-screws *c c'*, substantially as set forth.

5. In machines for curling or beading the edges of sheet metal, the combination with a sheet-holder of a reciprocating circular bar having a series of straight grooves of semicircular section extending through its length, substantially as set forth.

6. In machines for curling or beading the edges of sheet metal, the combination with a pivoted bracket F having the curling-tool mounted on its outer end, of the eccentric shaft H, operating-lever *h*, and connecting-links G G', substantially as set forth.

7. In machines for curling or beading the edges of sheet metal, the combination consisting of the pivoted bracket F having the curling-tool mounted on its outer end the eccen-

tric shaft H, operating-lever *h*, connecting-links G G', and eyebolt *f*² having one end jointed to the said pivoted bracket F and its opposite end screwed through the wheel-nut *f*¹, substantially as set forth.

8. In machines for curling or beading the edges of sheet metal, the combination consisting of strips J independently pivoted at one end to the tool-carrying bracket F, and with the opposite ends supported in the toggle-plate B' through which they slide on the oscillation of the said bracket F, substantially as set forth.

9. In combination in a machine for curling or beading the edges of sheet-metal plates, a pair of toggle vise-plates with means for opening and closing the same, of a curling-bar with means for reciprocating the same toward and from said vise-plates, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

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