

(No Model.)

2 Sheets—Sheet 1.

C. MILLS.
MACHINE FOR BENDING SHEET METAL.

No. 583,200.

Patented May 25, 1897.

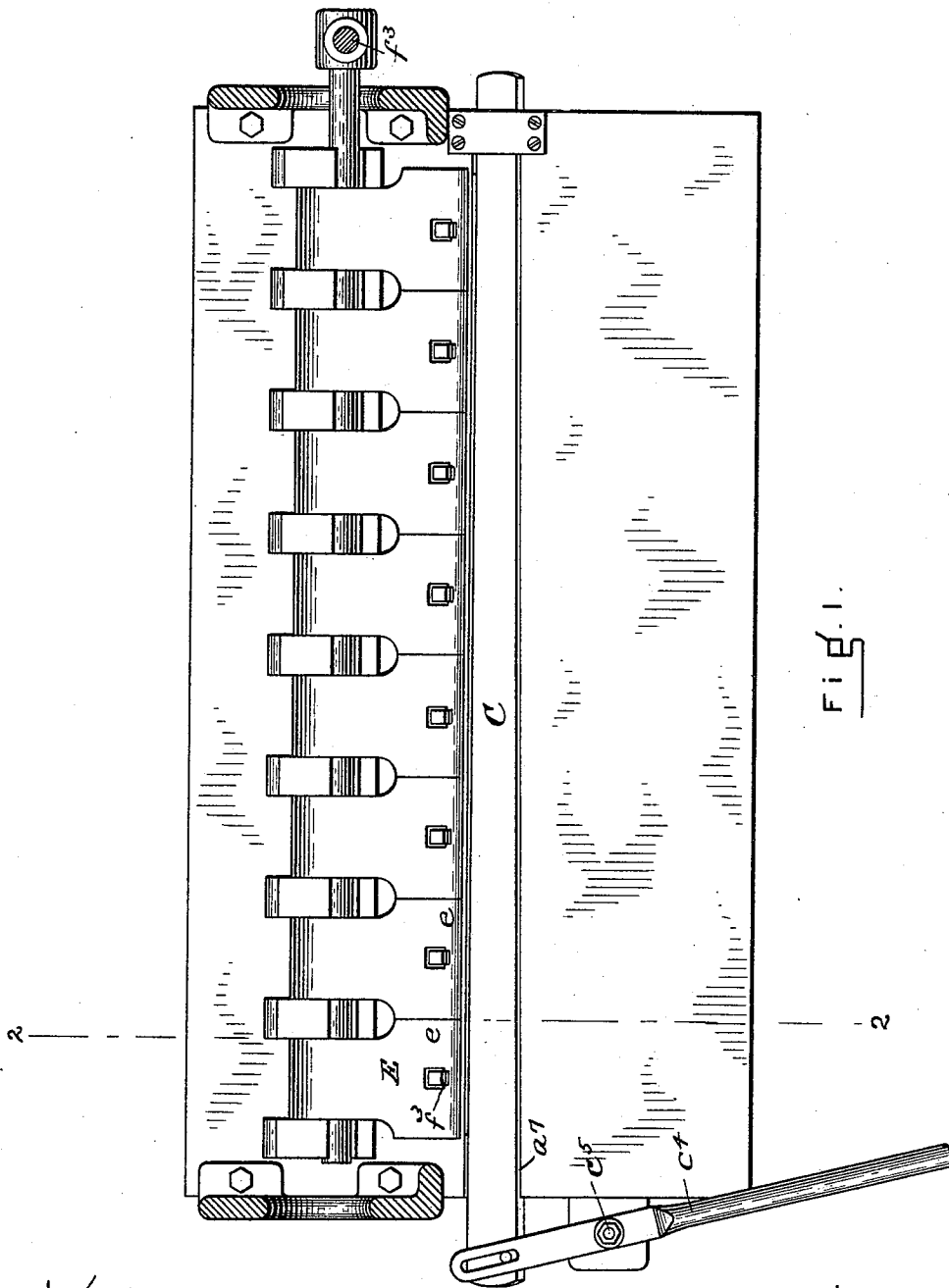


Fig. 1.

WITNESSES

Wm. L. Thompson
A. J. M. Hamara

INVENTOR
Charles Mills

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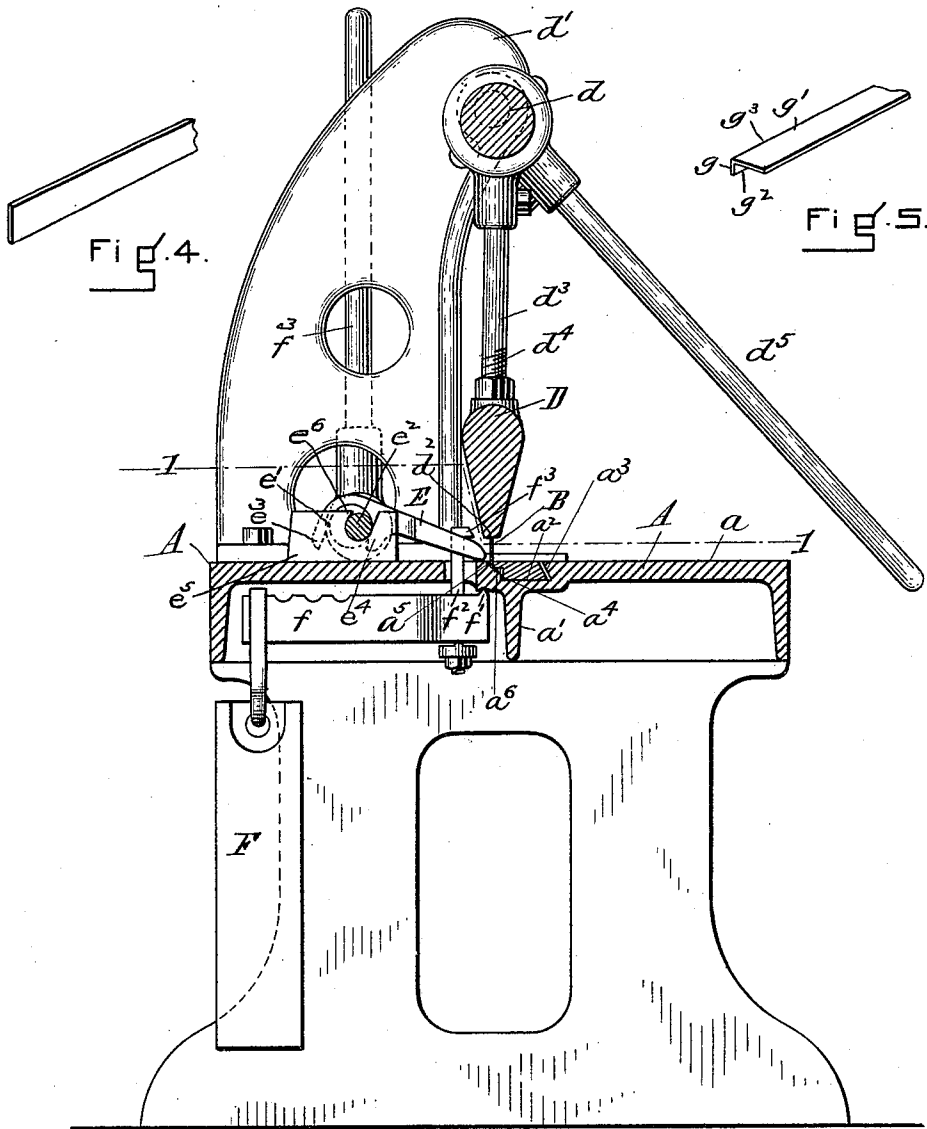
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UNITED STATES PATENT OFFICE.

CHARLES MILLS, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO THE PETTEE MACHINE WORKS, OF SAME PLACE.

MACHINE FOR BENDING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 583,200, dated May 25, 1897.

Application filed October 23, 1896. Serial No. 609,799. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MILLS, a subject of Victoria, Queen of Great Britain, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Machines for Bending Sheet Metal, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention is illustrated as incorporated in a machine adapted to bend a flat metal strip, such as is used for forming clips for attaching card-clothing to flats, from a flat form to an angular shape. It comprises a clamp for holding the flat strip in a perpendicular position by its lower edge, a presser to bear against the upper edge of the strip so held, and a series of folders which are simultaneously operated to turn the portion of the strip above the clamp from a perpendicular to a horizontal position.

In the drawings, Figure 1 is a view in horizontal section upon the dotted line 1 1 of Fig. 2 and in plan of the parts below said line. Fig. 2 is a view in vertical central section of the machine, also showing parts back of the section in elevation. Fig. 3 is a detail view in section, to which reference will be made. Fig. 4 is a view in perspective of a section of a flat strip of metal before it is bent. Fig. 5 is a view of it in perspective in its bent form.

A is the bed of the machine. It has a flat surface a , strengthened at its center by the longitudinal rib a' . It has opening from its upper surface a recess a^2 , the wall a^3 of which is undercut, and the opposite wall a^4 of which is straight or vertical, the recess above this vertical wall extending to the long narrow jaw or wall a^5 , which forms the back side of the recess and which rises from a shallow surface a^6 , a portion of which at the base of the wall a^5 forms the rest and gage for the lower edge of the metal strip B. This recess a^2 is slightly wider at the end a^7 than at its other end, its outer wall a^3 , formed to overhang, being very slightly inclined to the wall a^5 , which is straight throughout. There is arranged to be moved lengthwise in this recess

a long narrow clamp or jaw plate C. This plate has the inclined edge c , which extends under the overhanging edge a^3 , and it also has the straight edge c' and the extension c^2 , which laps upon the shallow surface a^6 and the long straight edge c^3 , which is a long jaw and bears against the side of the strip B near its lower end its entire length and serves to press it against the jaw-wall a^5 and hold it, as will appear. The clamping-plate C is also slightly wider at the end a^7 of the bed than at its other end, and its edge c is of the same inclination lengthwise of it and in relation to its jaw c^3 as that of the wall a^3 to the jaw-wall a^5 of the recess. Therefore a movement of the plate toward the end a^7 of the bed will cause the long opening between the jaw c^3 and the wall a^5 to be slightly increased, while the movement of the plate in the reverse direction will cause it to be decreased. This long opening varies according to the width of the strip which is to be held by the jaw, but it always is such that the jaw will be closed by the inward movement of the clamp-plate from the end a^7 against the side of the strip throughout its length, clamping it throughout its length between the jaw c^3 and the wall a^5 .

It will be understood, of course, that the strip to be bent is inserted between the members of the clamp when the clamp-plate is withdrawn or moved outward or when the opening between it and the wall a^5 is widest. The clamping-plate is closed and opened by the lever c^4 , pivoted at c^5 to the frame.

It will be seen that a clamp of this construction is especially well adapted for receiving and firmly holding by a continuous narrow edge or section a long strip, the long wedged relation between the back edge of the clamp-plate serving to permit the clamp by the application of relatively little power to be closed with great force against the strip, and when closed to be held closed without the addition of any locking instrumentality. This wedge construction also supports the clamp throughout its length and compensates for wear and permits the automatic adjustment of the clamp-plate to varying thicknesses.

D is the presser and evener bar suspended from the eccentric-shaft d , which has bear-

ings in the upper end of the brackets d' , bolted to the bed of the machine at each end. The presser is located immediately over the jaws c^3 and a^5 and slightly above them. It has a straight lower edge d^2 , which is adapted to be brought into contact with the upper edge of the metal strip B after it has been placed between the jaws of the clamp, but before it has been rigidly clamped, and it serves to exert a vertical pressure upon the upper edge of the strip throughout its length and thereby brings its lower edge into contact with the surface a^6 and hold it in contact therewith. It is connected with the eccentrics upon the eccentric-shaft by means of rods d^3 . These rods are provided at their lower ends with threaded sections d^4 , which enter threaded holes in the bar and provide means for the vertical adjustment of the bar. The eccentric-shaft is turned to lower and raise the bar by means of the lever d^5 , attached to one end of the shaft. Upon the bed A back of the clamp there is arranged a line of folders E, each of which has a relatively narrow folding edge e , which bears upon the surface of the bed adjacent to the jaw a^5 . These folders are adapted to be simultaneously moved against the metal strip after it has been clamped and turn the section which is above the clamp forward and downward upon the surface of the clamping-plate C, thereby changing the shape of the strip from its flat form represented in Figs. 2 and 4 to the angular form represented in Figs. 3 and 5.

Each folder is mounted upon an eccentric e' upon the common operating-shaft e^2 , the folder having the forked rear ends e^3 e^4 , which straddle the eccentric. The shaft e^2 is supported between the eccentrics by the blocks e^5 , each of which has an open bearing e^6 therefor. The forward end of each folder is held down by a weight F, hung upon the outer end of the lever f , which is fulcrumed at f' , and is attached to the folder by a rod f^2 , extending upward through a hole in the bed and a hole in the presser and engaging the presser by a laterally-extending lug or hook f^3 , which laps upon the upper surface of the presser. The weight F is represented as adjustable upon its lever f . The eccentric-shaft e^2 is turned by the lever f^3 , attached to one end of the eccentric-shaft. (See Figs. 1 and 2.) The position of the parts after the strip-clip has been leveled and clamped in its holder, but before the operation of the folders or benders to bend it, is represented in Fig. 2. The position of the parts at the end of the action of the folders is represented in Fig. 3.

It will be seen that the clip-strip when folded has the narrow section g and the wide section g' , (see Fig. 5,) and as prongs are subsequently formed from the narrow section and as the narrow section laps upon the outer edge of the clothing it is desirable for the purpose of providing a uniform width of strip and uniform location of prongs that the narrow section be the part that is gaged and

made of uniform width throughout, and it is therefore the section which is held by the clamps with its lower edge in contact with the surface a^6 , and it is the wider section of the plate above the clamps which is acted upon by the folders or benders and turned at a right angle to the narrower section. This insures perfect uniformity in width between the edge g^2 of the narrow section and the angle g^3 .

In operation the clip-strip is located between the jaws of the clamp, the presser and evenner bar D moved upon its upper edge, the clamp-plate moved inward to clamp its lower section rigidly against the stationary jaw a^5 , and the benders or folders moved forward to bend or fold the portion of the strip above the clamp forward or at a right angle to that held by the clamp. The folders or benders are then moved backward to their original position, the clamp-plate is moved to release the strip, the bar D lifted, and the formed strip removed.

By using a series of folders instead of one continuous folder, each folder operating in a sense independently, as shown, no irregularity in the folding of one point of the strip will affect the folding of the other parts of the edge.

While I have described the invention as incorporated in a machine for bending clip-strips, I would not be understood as limiting it to such an organization or to such use.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a machine for bending or folding thin strips of metal or other material, a clamp for engaging and holding the strip with the portion to be bent or folded extending therefrom and a series of pressers or folders adapted to be moved against said exposed strip-section and fold or bend it, as and for the purposes described.

2. The combination in a machine of the character specified of a strip-clamp to clamp and hold the strip by one edge, a strip-gage for determining the line of the fold, and a series or line of independent horizontal movable folders or benders, as and for the purposes described.

3. The combination in a strip-bending machine of the strip-clamp, a bar B to bear on the upper edge of the strip and a line or series of horizontally-movable independent folders or benders, as and for the purposes described.

4. In a machine of the character specified, an evening mechanism consisting of a stationary element and a movable element adapted to be reciprocated toward and from said stationary element and to locate and even one edge of said strip against said stationary element, a clamp adapted to clamp said strip when so located and serve as one element of the folding mechanism and a series of horizontally-movable independent folders or benders, as and for the purposes described.

5. In a strip-folding machine, in combina-

tion, a rest a^6 , a presser-bar D adapted to be moved toward and from said rest and to locate and press one edge of the strip against it, a strip-clamp adapted to hold said edge of the strip and a series of horizontally-movable independent folders or benders, as and for the purposes set forth.

6. The combination in a strip-bending machine of the strip-clamp for holding a strip by one edge only, and a series or line of independent strip benders or folders adapted to be moved horizontally upon the bed of the machine toward and upon the strip, and the ends of which are yieldingly held upon the surface of the bed and bent strip.

7. The combination of the strip-clamp comprising a stationary wall or jaw a^5 , a rest a^6 and a movable clamping-jaw c^3 with the series of benders or folders E, the ends of which rest upon the bed of the machine adjacent to the jaw a^5 and means for holding the ends in yielding contact with said bed and with the strip against and upon which the ends of the folders or benders are moved and means for simultaneously moving said folders or benders comprising the eccentrics e' upon the common shaft e^2 , which eccentrics make engagement with the folders or benders as specified, the folders or benders being inclined from their

eccentrics downwardly, as and for the purposes set forth.

8. The combination in a machine of the character specified of the bed A having the recess a^2 provided with a straight wall or jaw a^5 and a slightly-tapering side a^3 and a gage-surface a^6 with a long clamp-plate C having a straight jaw c^3 and a side c slightly inclined and adapted to be moved in said recess a^2 and to coöperate with the said inclined wall a^3 thereof and the jaw or wall a^5 thereof, as and for the purposes specified.

9. The combination in a machine of the character specified of the bed A having the flat upper surface, the recess a^2 shaped as specified, the clamp-plate C shaped as described, and movable in said recess as set forth, the bar D, the eccentric-shaft d , the eccentrics of which are connected by rods d^3 with said bar, means for turning the eccentric-shaft, the independent yielding benders or folders E, the shaft e^2 having the eccentrics e' to engage the said folders or benders and means for turning said shaft.

CHARLES MILLS.

In presence of—

F. F. RAYMOND, 2d,
J. M. DOLAN.