(No Model.)

4 Sheets—Sheet 1.

C. A. BONNEY.

LEATHER FOLDING MACHINE.

No. 550,929. Patented Dec. 3, 1895.

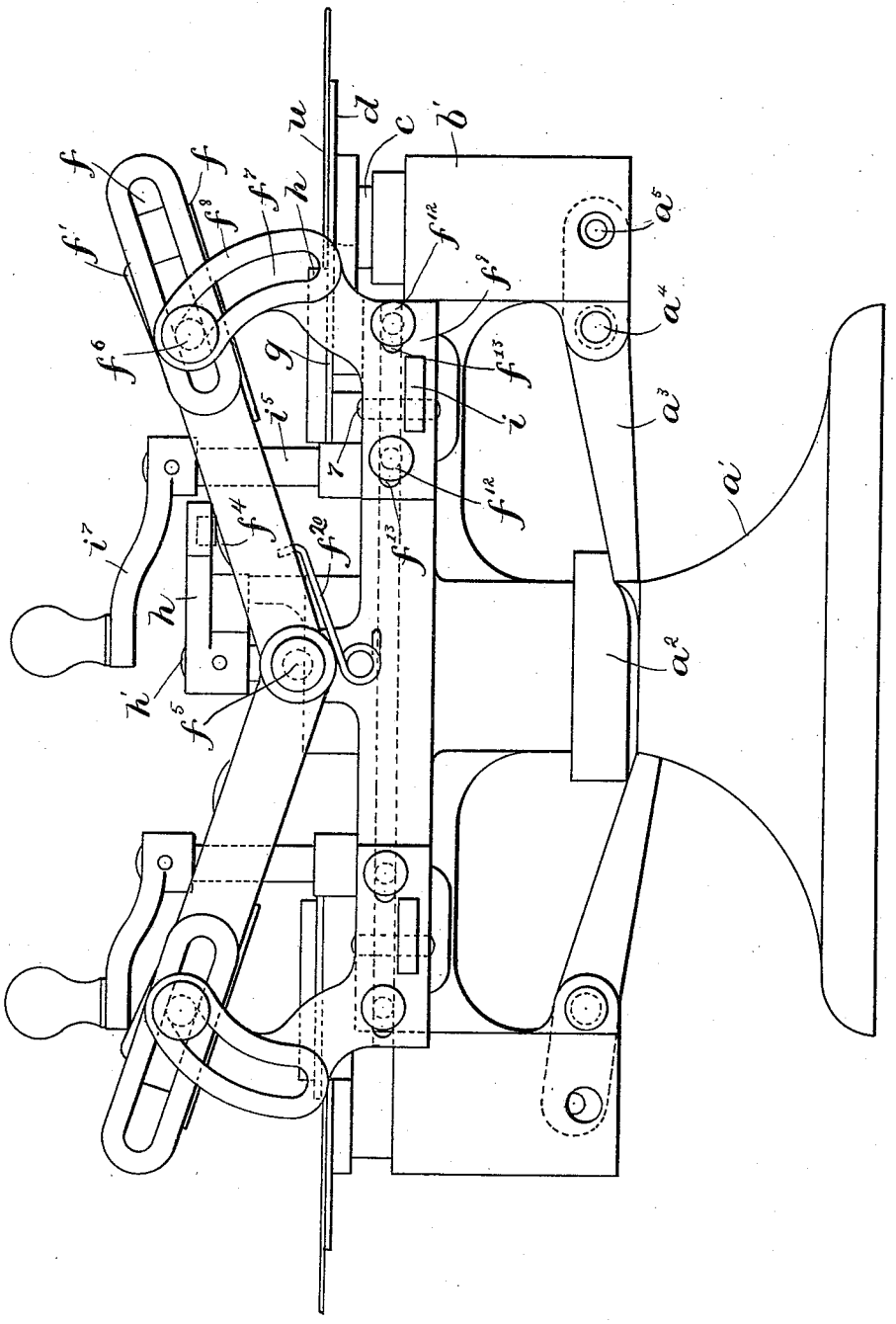

FIG. 1.

WITNESSES:
H. D. Harrison
Rollin Abell

INVENTOR:
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Attys.

(No Model.) 4 Sheets—Sheet 2.

C. A. BONNEY.

LEATHER FOLDING MACHINE.

No. 550,929. Patented Dec. 3, 1895.

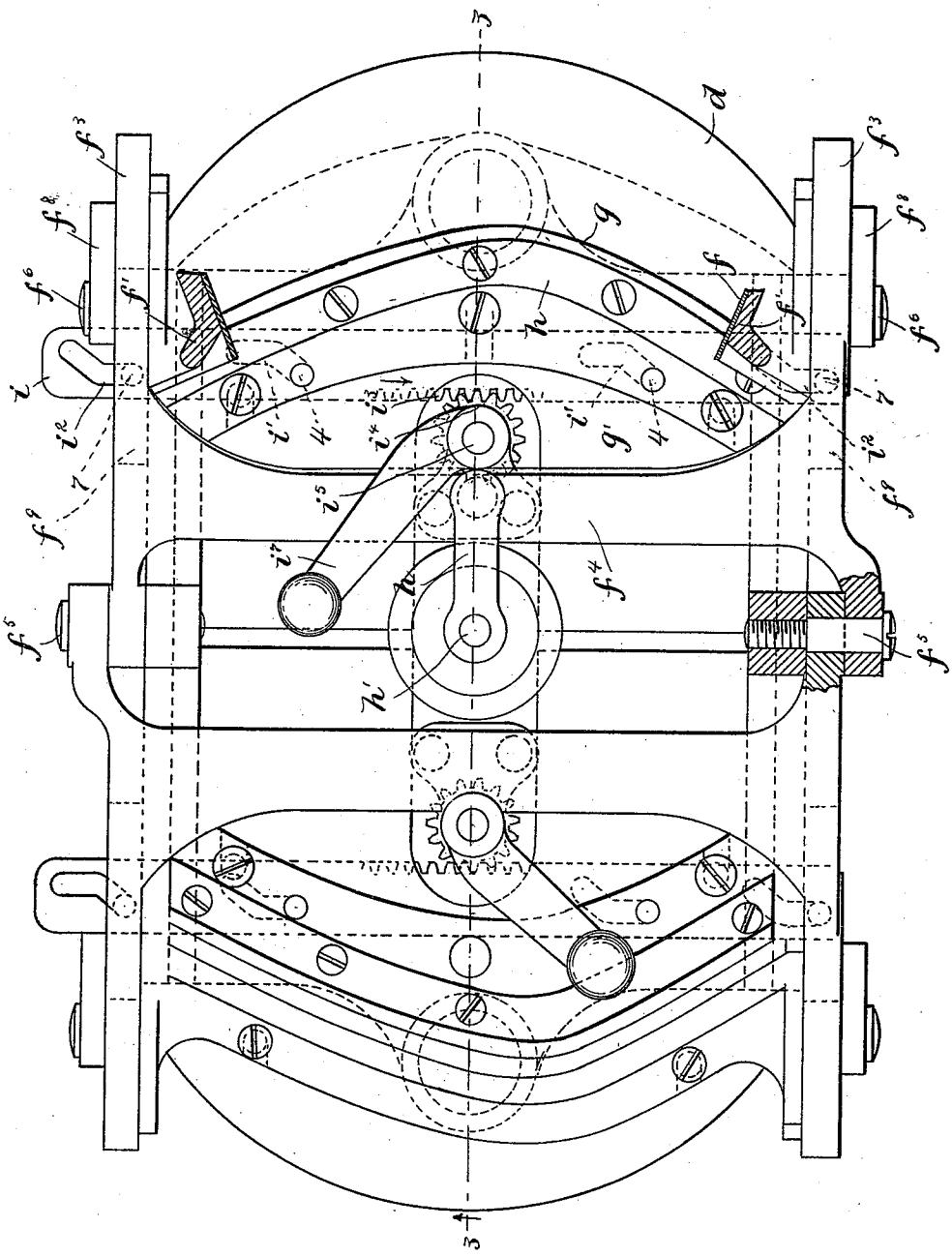

FIG. 2.

WITNESSES:
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INVENTOR:
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(No Model.) 4 Sheets—Sheet 3.

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LEATHER FOLDING MACHINE.

No. 550,929. Patented Dec. 3, 1895.

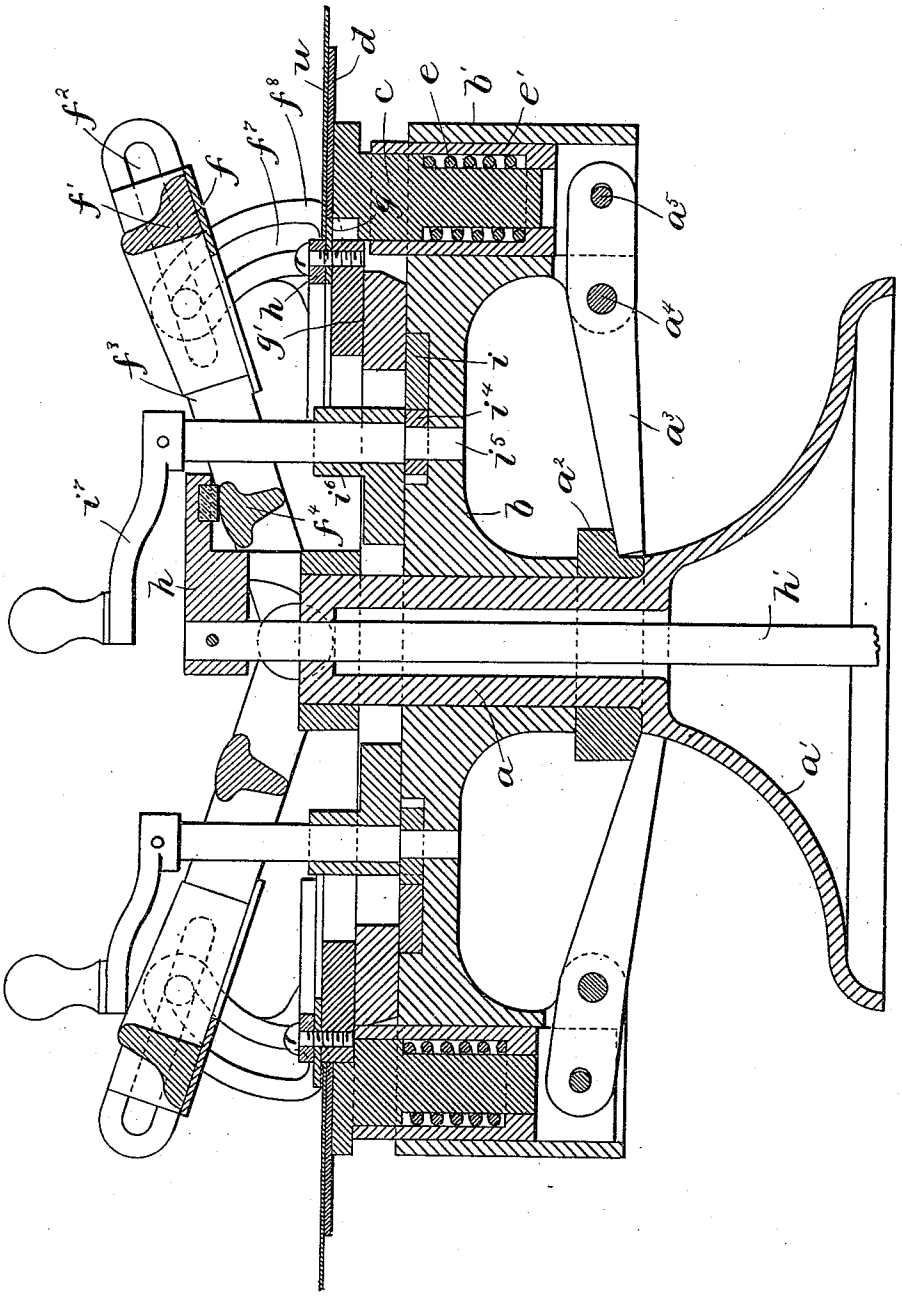

FIG. 3.

WITNESSES:
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INVENTOR:
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(No Model.) 4 Sheets—Sheet 4.

C. A. BONNEY.

LEATHER FOLDING MACHINE.

No. 550,929. Patented Dec. 3, 1895.

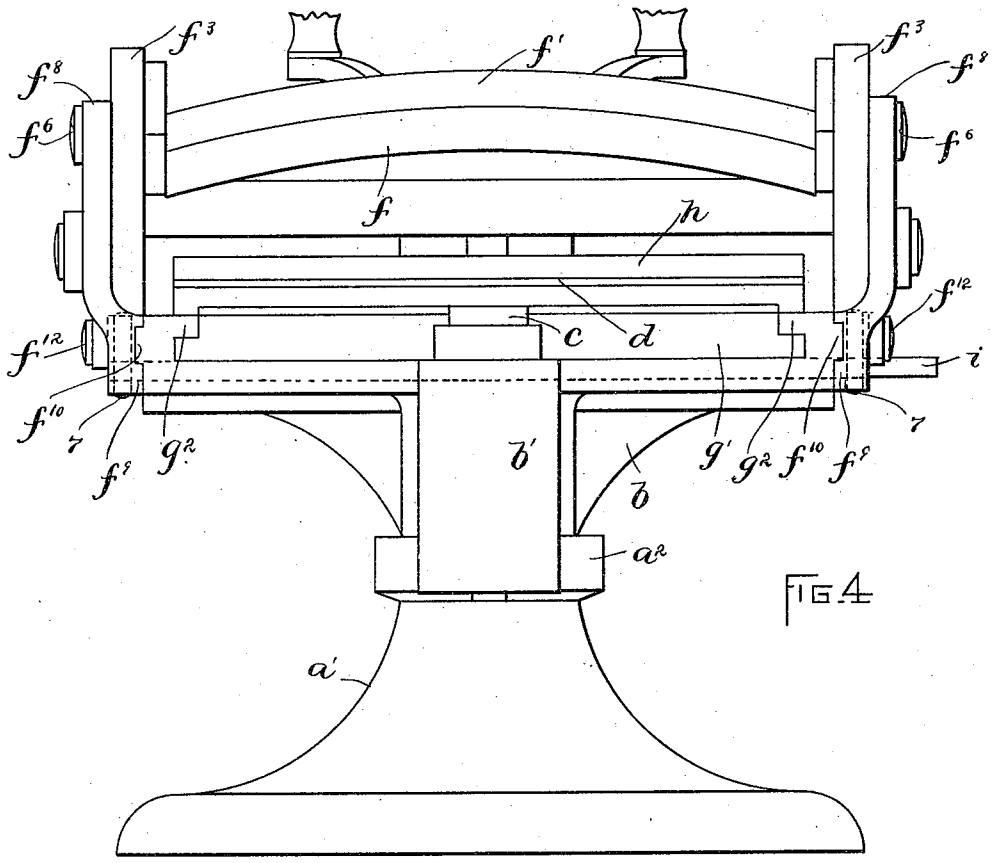

FIG. 4

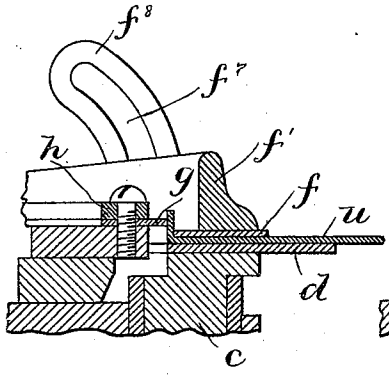

FIG. 5.

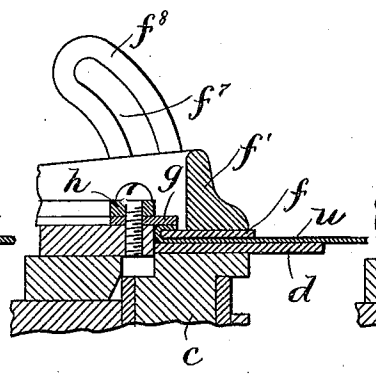

FIG. 6.

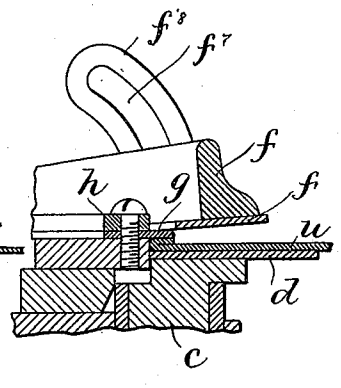

FIG. 7.

WITNESSES:
A. D. Harrison
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INVENTOR:
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UNITED STATES PATENT OFFICE.

CHARLES A. BONNEY, OF BROCKTON, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE BROCKTON FOLDING MACHINE COMPANY.

LEATHER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 550,929, dated December 3, 1895.

Application filed April 6, 1895. Serial No. 544,829. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. BONNEY, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Leather-Folding Machines, of which the following is a specification.

This invention relates to machines for folding pieces of flexible material, and particularly the edges of portions of the uppers of boots and shoes, in order to produce a finished margin by turning back the raw edge of the piece and pressing the backwardly-turned portion against the main body of the piece.

The invention has for its object to provide a machine adapted to fold a piece of material without unequally straining or stretching the material along the line of the fold, particularly when the said line is curved.

The invention also has for its object to produce a multiple folding-machine constructed so that one piece of work can remain under pressure while another is being folded.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a folding-machine embodying my invention. Fig. 2 represents a top view of the same. Fig. 3 represents a section on line 3 3 of Fig. 2. Fig. 4 represents a front elevation. Figs. 5, 6, and 7 represent sectional views showing different stages of the folding operation.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *b* represents the frame of the machine, which is provided with a vertical guide *b'*, containing a vertically-movable plunger *c*, to which is affixed a work-supporting plate *d*. The plunger and work-plate are supported by a spring *e*, Fig. 3, which is contained in a sleeve *e'* and permits the work-plate to yield to the downward pressure of the swinging former *f*, hereinafter described.

g represents a horizontally-movable folding-jaw secured to a slide *g'*, which is fitted to move in guides g^2 g^2, Fig. 4, on the frame *b*, its upper surface being flush with the upper surface of the work-plate *d* when the latter is in its normal position, so that one edge of an upper *u* or other piece to be folded placed upon the work-plate *d* may extend over the folding-jaw *g* and bear against a gage *h*, affixed to said jaw, the adjacent edges of the work-plate and jaw being close together and formed to fit each other along their entire length. The meeting edges of the work-plate and the inner edge of the former *f* have the form or contour which is to be imparted to the folded edge. In the present case said edges are curved, as shown in Fig. 2, the machine here shown being intended for folding the curved edges of parts of boot and shoe uppers; but it will be understood that said edges may be straight or of any other desired form suited to the requirements of the work.

The former *f* is affixed to a holder *f'*, the ends of which are fitted to slide in guides or slots f^2 in a swinging frame composed of side arms f^3 and a connecting cross-bar f^4, the inner ends of said side arms being pivoted at f^5 f^5 to ears on the supporting-frame. The ends of the holder *f'* are provided with projecting studs f^6, which enter curved slots f^7 in brackets f^8, which are formed on slides f^9 f^9, fitted to move horizontally on guides f^{10} f^{10} on the former *b*, said slides being secured by set-screws f^{12}, passing through slots f^{13} in the slides. The slots f^8 are formed and arranged so that when the former *f* is depressed by means provided for that purpose—namely, an arm *h*, bearing on the cross-bar f^4 of the swinging frame, and a rod *h'*, affixed to said arm and extending downwardly through the standard *a* to a suitable treadle, (not shown)—the former *f* will come to a bearing upon the upper on the work-plate *d* and its inner edge will coincide with the inner edge of the work-plate, the upper being clamped between said former and work-plate, as shown in Fig. 3. A continuation of the downward movement of the former *f* will then cause the former to depress the work-plate below the jaw *g*, thus turning the edge of the upper upwardly against the edge of the jaw *g*, as shown in Fig. 5. The jaw *g* is then advanced or moved forward by the means hereinafter described and turns the edge of the upper over

the edge of the former and upon the upper side thereof, as shown in Fig. 6, after which the former is retracted or moved outwardly and thus displaced or withdrawn from the folded edge of the upper, as shown in Fig. 7, the former being then free to be raised to its elevated position by means of springs f^{20}, Fig. 1, which act to raise the frame f^3.

The means employed to advance the jaw g and subsequently displace the former f are as follows: i represents a sliding bar fitted to move in a guide in the frame of the machine and provided with slots i' i', Fig. 2, which comprise oblique portions and longitudinal portions, said slots receiving studs 4 4, affixed to the slide g', carrying the jaw g. The bar i also has slots i^2 i^2, comprising longitudinal portions and oblique portions, said slots receiving studs 7 7, affixed to the slides f^9, carrying the sliding brackets f^8, which engage the holder of the former f. On the bar i are formed rack-teeth i^3, engaging a pinion i^4, affixed to a shaft i^5, journaled in a bearing i^6, affixed to the frame b, said shaft having a crank i^7 at its upper end, by which it may be rotated to impart endwise movement to the bar i. When the bar i is in the position shown in Fig. 2, the studs 4 4 on the slide g' are in the oblique portions of the slots i', while the studs 7 7 on the slides f^9 are in the longitudinal portions of the slots i^2. Consequently when the bar i is moved in the direction indicated by the arrow the studs 4, slide g', and jaw g will be moved forward during the first part of the movement of the bar and held stationary during the rest of said movement, while the studs 7 7, slides f^9, and former f will be held stationary during the first part of the movement of the bar and moved outwardly or retracted during the rest of the movement of the said bar. Hence the bar i first moves the jaw g to the position shown in Fig. 6, meanwhile holding the former f stationary, and then retracts or displaces the former f, as shown in Fig. 7, at the same time holding the jaw g stationary. When the former f is thus displaced, the spring e presses the work-plate d upwardly against the folded edge of the work, said edge being thus compressed between the work-plate and the projected jaw g and held compressed so long as the said jaw remains projected, the pressure being preferably increased by forcing the spring-supporting sleeve e' upwardly, as hereinafter described, after the displacement of the former f, and thus additionally compressing the spring e, so that it exerts an increased pressure on the work.

The mechanism above described constitutes an operative folding-machine, which may be supported by a fixed frame and used as a single machine. I consider it desirable, however, for reasons hereinafter set forth, to locate two duplicate mechanisms, each constructed to operate, as above described, on one frame, thus providing a twin machine. To this end I construct the frame b to rotate on a vertical central standard a, affixed to a base a', one of the said folding mechanisms being located at one side and the other at the opposite side of the standard, as shown in Figs. 1, 2, and 3.

After an upper has been folded and clamped as above described, the former f having been displaced and raised, the frame b is given a half-rotation on the standard a and carries the folding mechanism last operated away from the operator's position, at the same time causing a fixed cam a^2 on the standard a to depress the inner end of a lever a^3, which is pivoted at a^4 to the frame b, and is engaged at its outer end at a^5 with the spring-carrying sleeve e', said sleeve being thus raised to additionally compress the work, as above described. The cam a^2 is formed to hold the sleeve e' in its spring-compressing position until the mechanism returns to the front of the machine. Hence the work is held tightly compressed, while another piece is being folded by the other mechanism. It will be seen, therefore, that one operator is enabled to attend to two machines and that each machine keeps the folded piece under compression while the other machine is being operated, so that no time is consumed in waiting for a sufficiently protracted pressure. I am thus enabled to use cold pressing-surfaces and avoid the injury to the material which often results from the use of overheated pressing-surfaces. I may, however, heat the pressing-surfaces moderately by steam or otherwise, if desired.

The arm h and rod h', used to depress the former f, serve for both machines, their use being required only for the front machine.

I do not limit myself to the details of mechanism and construction here shown and may variously modify the same without departing from the spirit of my invention.

It will be seen that by the described method of folding (in successive steps) I avoid stretching or straining the material and produce a smooth fold that is not liable to lose its shape.

I claim—

1. A folding-machine comprising a yieldingly supported work-plate, a former movable toward and from said plate, the plate and former constituting a clamp adapted to grasp the work, a folding-jaw adjacent to said clamp, means for moving the clamp crosswise of the jaw to form a partial fold, and means for changing the relative positions of the clamp and jaw to complete the fold.

2. A folding-machine comprising a yieldingly supported work-plate, a former movable toward and from said plate, the plate and former constituting a clamp adapted to grasp the work, a folding-jaw adjacent to said clamp, means for moving the clamp crosswise of the jaw to form a partial fold, means for changing the relative positions of the clamp and jaw to complete the fold, means for withdrawing the former from the fold, and means for additionally compressing the fold between

the said plate and jaw after the withdrawal of the former.

3. A folding-machine comprising a yieldingly supported work-plate, a former movable toward and from said plate, a folding-jaw movable edgewise, mechanism for depressing said former to cause its co-operation with the jaw in partially folding the work, and mechanism for successively moving the jaw and former edgewise, whereby the jaw is caused to complete the fold and the former is removed from the fold, allowing the work-plate to compress the fold.

4. A folding-machine comprising a yieldingly supported work-plate, a former movable toward and from said plate, a folding-jaw movable edgewise, mechanism for depressing said former to cause its co-operation with the jaw in partially folding the work, mechanism for successively moving the jaw and former edgewise to complete the fold and remove the former therefrom, and means for pressing the work-plate toward the jaw to compress the fold.

5. A folding-machine comprising a spring-supported work-plate vertically movable on the frame of the machine, a swinging frame movable toward and from said plate, a holder adapted to slide on said frame and provided with a former, means for depressing said frame and former, a slide movable horizontally on the frame of the machine and provided with a folding-jaw, and mechanism for successively moving the folding-jaw and former horizontally.

6. A folding-machine comprising a spring-supported work-plate vertically movable on the frame of the machine, a swinging frame movable toward and from said plate, a holder adapted to slide on said frame and provided with a former, means for depressing said frame and former, a bar fitted to slide on the frame of the machine and provided with two series of slots, two slotted slides engaged with the holder of the former and with two of the slots of said bar, a slide engaged with the other slots of the bar and provided with a folding-jaw, and means for moving the bar endwise, the slots in said bar being formed to impart edgewise movements successively to the folding-jaw and to the former.

7. In a folding-machine comprising a rotary supporting frame, duplicate folding mechanisms carried by said frame and each comprising a spring-supported work-plate, a former movable toward and from said plate, a folding-jaw having an edgewise movement, and operating mechanism, substantially as described, for said jaw and former: the combination with said rotary frame and duplicate mechanisms, of a cam affixed to the axis of the frame, levers pivoted to the frame and engaged at their inner ends with said cam, spring holders engaged with the outer ends of said levers, and work-plate-supporting springs in said holders, said springs being compressed by the movement of the frame on its axis, as set forth.

8. In a folding-machine comprising a rotary supporting frame, duplicate folding mechanisms carried by said frame and each comprising a spring-supported work-plate, a former carried by a swinging frame, a folding-jaw having an edgewise movement, and mechanism for successively moving said jaw and former: the combination with said rotary frame and duplicate mechanisms, of a former-depressing device common to both mechanisms and comprising a rod passing through the axis of the frame, and an arm projecting from said rod and arranged to engage the former-carrying frame of one of said mechanisms.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of March, A. D. 1895.

CHARLES A. BONNEY.

Witnesses:
C. F. BROWN,
A. D. HARRISON.