

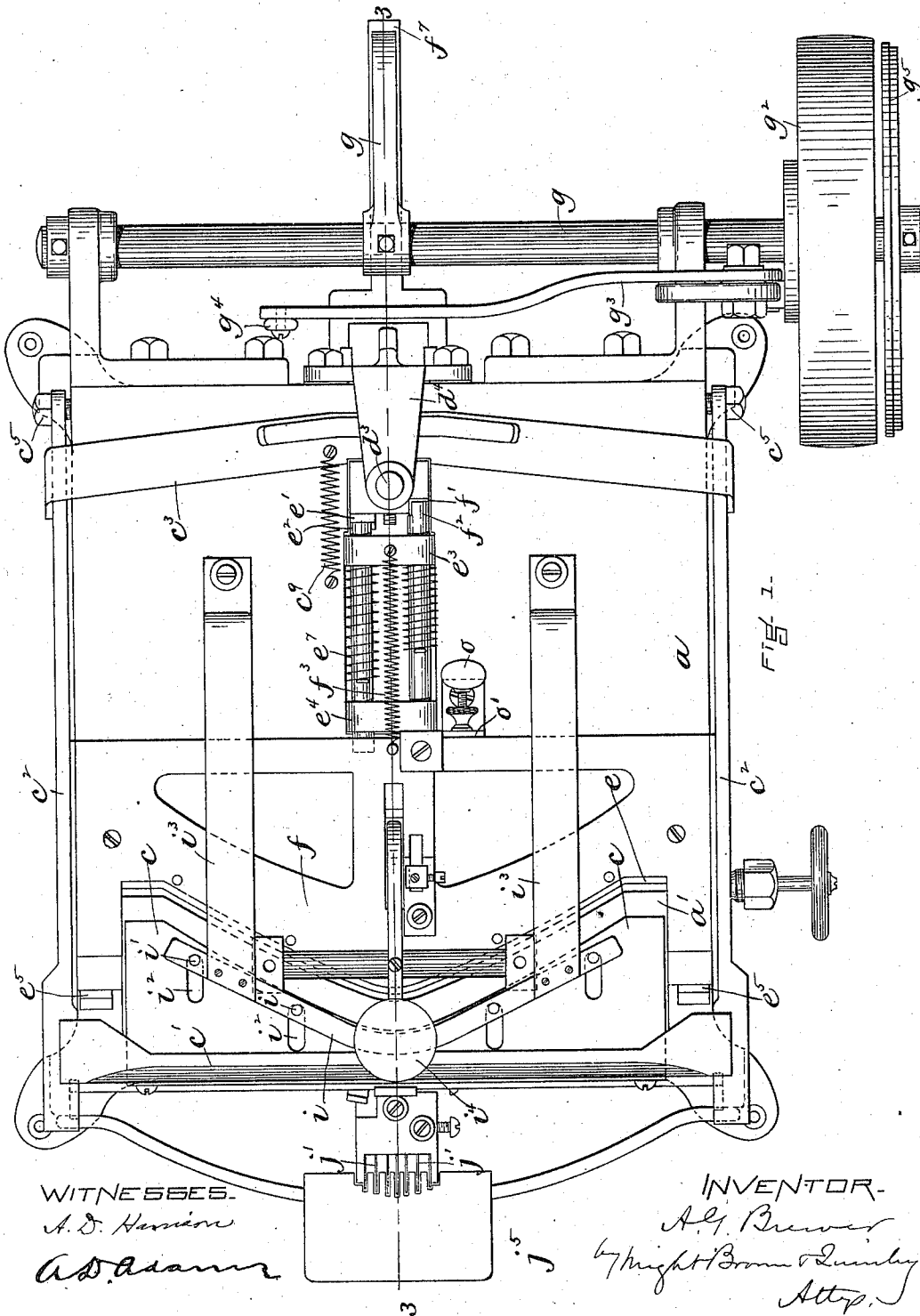
(No Model.)

4 Sheets—Sheet 1.

A. G. BREWER.
FOLDING MACHINE.

No. 579,419.

Patented Mar. 23, 1897.



WITNESSES.

A. D. Harrison

A. D. Adams

INVENTOR-

A. G. Brewer

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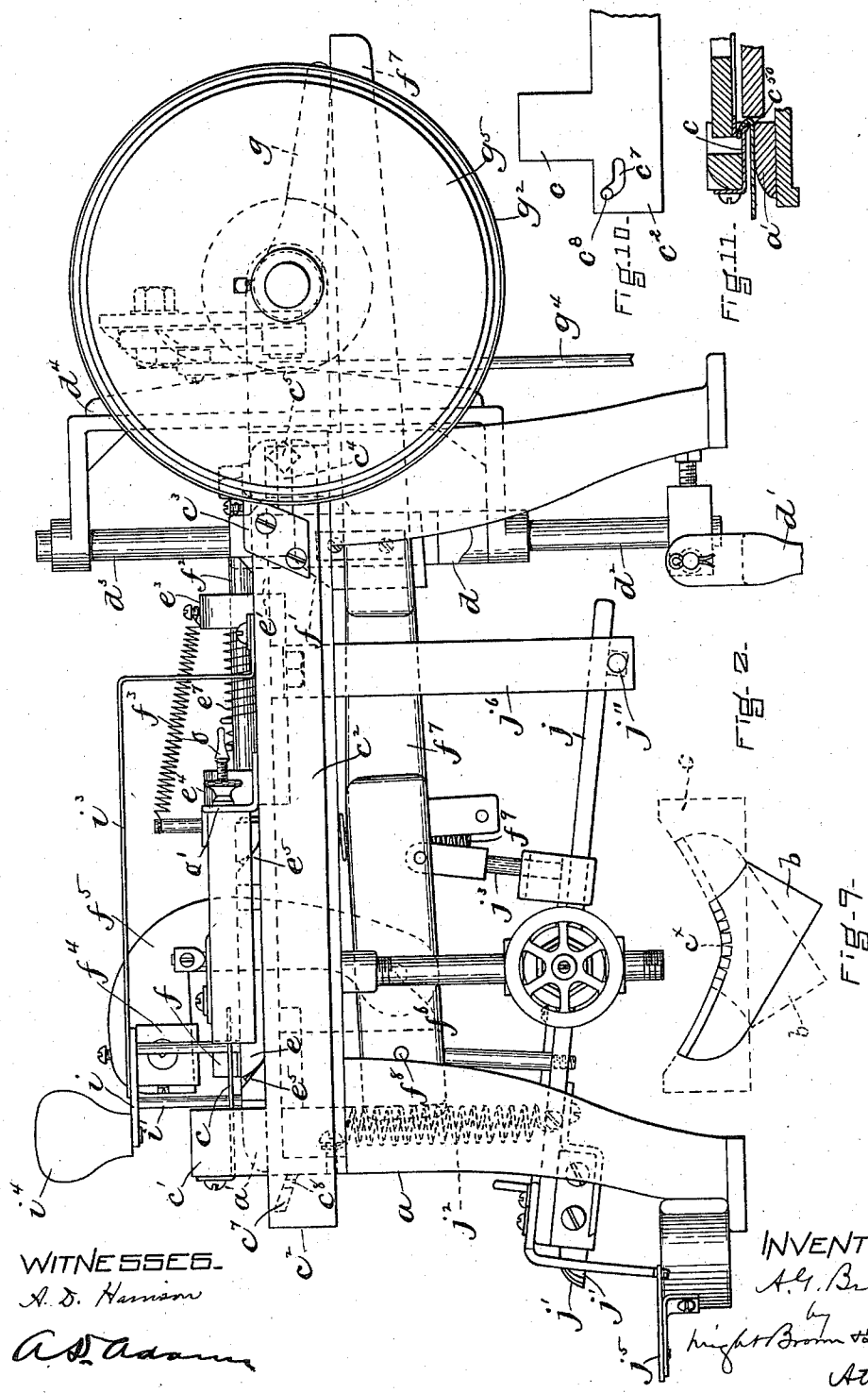
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4 Sheets—Sheet 2.

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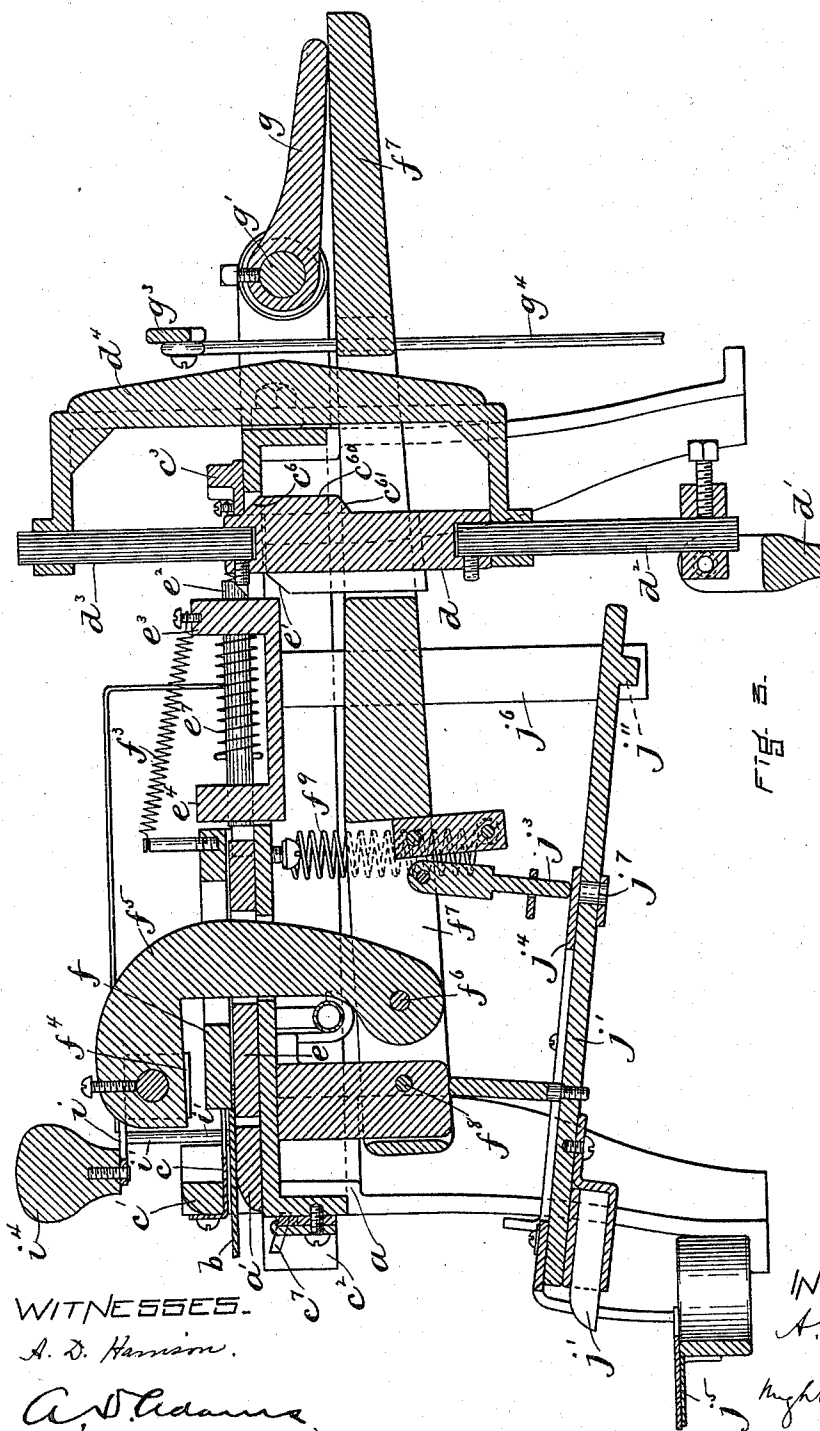
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4 Sheets—Sheet 3.

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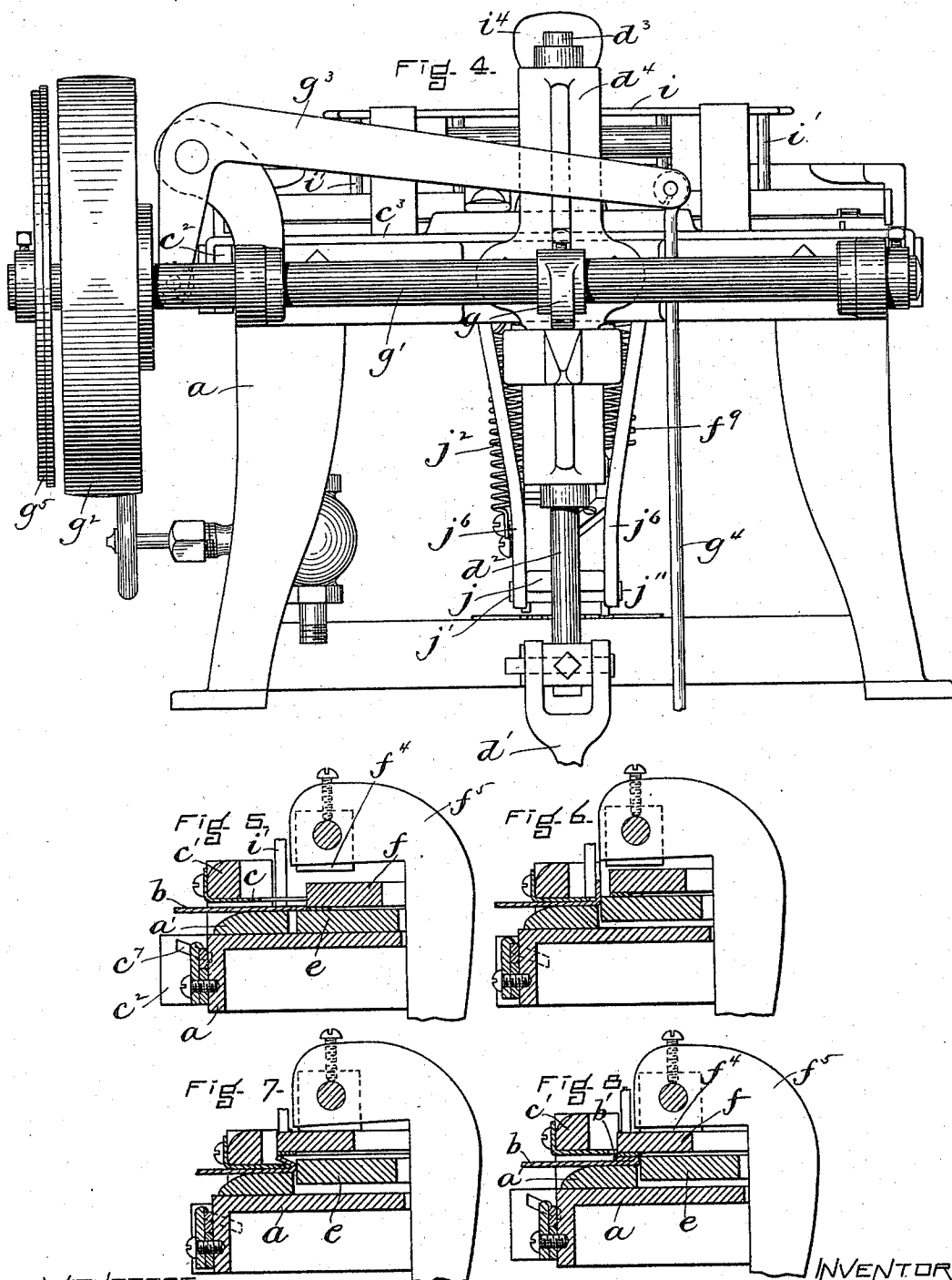
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UNITED STATES PATENT OFFICE.

ALBERT G. BREWER, OF HOPKINTON, MASSACHUSETTS.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 579,419, dated March 23, 1897.

Application filed March 30, 1896. Serial No. 585,326. (No model.)

To all whom it may concern:

Be it known that I, ALBERT G. BREWER, of Hopkinton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

This invention relates to machines for folding the edges of pieces of material, such as parts of uppers of boots and shoes; and it has for its object to provide a simple and efficient machine adapted to accurately fold the edge of a piece of material along either a straight line or a line having any desired curvature and to finally compress the folded portion.

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 top plan view of my improved folding-machine. Fig. 2 represents a side elevation of the same. Fig. 3 represents a section on line 3 3 of Fig. 1. Fig. 4 represents an end elevation. Figs. 5, 6, 7, and 8 represent views similar to portions of Fig. 3, showing different stages of the operation. Figs. 9, 10, and 11 represent views of details hereinafter referred to.

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

In the drawings, *a* represents the supporting-frame, having a fixed bed *a'*, which supports the piece of work *b* during the folding operation.

c represents a former, which is a thin sheet-metal plate attached to the front cross-bar *c'* of a frame, the other parts of which are the side bars *c² c²* and the rear cross-bar *c³*. The said frame, which for convenience I will hereinafter designate as the "former-carrier," is adapted to oscillate vertically and move horizontally on the frame of the machine, the side bars *c² c²* having slots *c⁴* in their rear ends (see dotted lines in Fig. 2) which receive studs *c⁵* on the frame *a*. Said studs serve as centers on which the former-carrier may swing vertically to move the former toward and from the bed *a'*, the slots *c⁴* permitting the carrier to move horizontally to project and retract the former, as hereinafter described.

The former-carrier is moved horizontally by means of an incline *c⁶*, Fig. 3, on a vertically-reciprocating head *d*, which is operated by means hereinafter described, and is arranged so that in moving upward the incline *c⁶* will bear against the rear cross-bar *c³* and move the carrier rearwardly or toward the right, as viewed in Figs. 2 and 3. The side pieces *c² c²* have inclined slots *c⁷*, Fig. 2, which receive studs *c⁸* on the frame *a*, said slots and studs causing the carrier to move downwardly at its outer end while it is being moved inwardly by the incline *c⁶*. A spring *c⁹*, Fig. 1, normally moves the carrier outwardly and holds it in the position shown in Figs. 2, 3, and 5, so that the former is normally raised above the bed *a'* to permit the ready insertion and removal of the work, the motion imparted to the carrier by the incline *c⁶* moving the former simultaneously backward and downward, as indicated in Figs. 6 and 7. Provision is made for the return of the former to its normal or raised position during the upward movement of the head *d*, the said provision being a vertical face *c¹⁰* on the head below the incline *c⁶*, which holds the former depressed on the work during a part of the upward movement of the head, and an incline *c¹¹* at the lower end of the face *c¹⁰*, which permits the former to be restored to its normal position during the latter part of the upward movement of the head. The object of this provision is to enable the former to be withdrawn from the fold prior to the final compression thereof by the means hereinafter described.

e represents a primary folder, which is a plate or bar movable vertically and also movable horizontally to a slight extent toward and from the bed *a'*, said folder being moved forward and upward from the position shown in Figs. 2, 3, and 5 to bend the edge of the piece *b* upwardly at right angles with the body of the piece, as shown in Fig. 6. The folder is normally flush with the bed *a'*, so that the front edge of the piece *b*, when first inserted, rests on the upper surface of the folder.

The primary folder *e* is moved forward toward the bed *a'* by an incline *e'* on the head *d*, which is arranged to strike a rod *e²*, affixed

to the primary folder, said rod sliding in fixed guides $e^3 e^4$ on the frame a . Fixed inclines $e^5 e^5$ on the frame a are arranged to raise the folder e while it is being moved forward, the
 5 folder having inclined faces which ride up said inclines. The inclines $e^5 e^5$ cause the primary folder to move backward and downward when the incline e' descends.

f represents a secondary folder, which serves
 10 to complete the fold partially formed by the primary folder and also as a gage for the work and as a platen to force the folded edge b' closely against the body of the piece b . Said secondary folder is a plate or bar which rests
 15 loosely on the upper surface of the primary folder and is moved vertically thereby, but has an independent horizontal movement caused by an incline f' on the head d , (see dotted lines, Fig. 2,) arranged to strike a rod f^2 ,
 20 affixed to the secondary folder, when the head d rises, and thus force the secondary folder forward from its normal position (shown in Figs. 3 and 5) to the position shown in Figs. 7 and 8. A spring f^3 forces the secondary
 25 folder back to its normal position when the head d descends. Springs $e^7 e^7$ on the rods $e^2 f^2$ hold the forward ends of said rods in engagement with sockets in the folders.

f^4 represents a presser-foot arranged to
 30 force the secondary folder downwardly while it is in its advanced position, as shown in Fig. 8, thus pressing the folded edge b' against the body of the piece b . The presser-foot is secured to a link f^5 , which is pivoted at f^6 to a lever f^7 . Said lever is pivoted at f^8 to a
 35 bracket affixed to the frame a , its swinging end being held by a spring f^9 in contact with an arm g at the rear end of the machine. Said arm is affixed to a shaft g' , which is
 40 journaled in bearings on the frame a and supports a loose driving-pulley g^2 . The pulley is movable by a bell-crank lever g^3 and a treadle (not shown) connected with said lever by a rod g^4 into and out of engagement with
 45 a disk g^5 , affixed to the shaft g' , said disk and the corresponding side of the pulley constituting a friction-clutch. When the pulley g^2 is connected with the disk g^5 , it imparts motion to the shaft g' (the pulley being continuously driven by a belt) and causes the
 50 arm g to depress the lever f^7 and operate the presser-foot f^4 . The pulley g^2 slips on the disk g^5 when the presser-foot reaches the limit of its downward movement, so that the rotation of the shaft g' ceases at this point.
 55 The head d , having the former and folder operating inclines, is movable in suitable guides on the frame a and is connected by a rod d' with a mechanism (not shown) whereby the head may be reciprocated, the head being raised, preferably, by the movement of a treadle arranged to be moved by the operator's foot and depressed by a spring connected with the treadle. As here shown, the head d is
 60 connected by two studs $d^2 d^3$ with a yoke d^4 , this construction being adopted for the sake of strength and durability. The steps of the

folding operation are indicated in Figs. 5, 6, 7, and 8. At the commencement the former c is raised, the primary folder is flush with the bed a' , and the secondary folder is moved
 70 back from the edge of the primary folder to serve as a gage for the work, as shown in Fig. 5. The piece b being introduced the operator raises the head d , causing its inclines to
 75 act successively, the former being first moved down upon the piece and the primary folder then moved forward and upward, as shown in Fig. 6, partially forming the fold. The secondary folder then moves forward, as shown
 80 in Fig. 7, turning the edge b' downwardly over the former, but not pressing said edge forcibly against said former. The former then moves backwardly and upwardly to its starting position, and the operator connects the
 85 pulley g^2 with the disk g^5 , causing the presser to descend upon the secondary folder and to press the latter firmly down upon the folded edge, thus completing the fold, after which the folders resume the position shown in Fig. 90
 5, the operating-treadles being released.

It will be seen that the means which successively operate the former, the primary folder, and the secondary folder provide for the projection of the secondary folder to advance the fold while said folder is raised above the former by a space considerably wider than the thickness of the edge b' , and also for the withdrawal of the former from under the folded edge before the latter is pressed downwardly, the said edge projecting loosely over the former. Hence there is less liability of backward movement or displacement of the work by the withdrawal of the former than would be the case if the folded edge were
 100 pressed down upon the former while it is being withdrawn. This provision for projecting the secondary folder while it is elevated and for leaving the folded edge loose and free from pressure against the former during the
 105 withdrawal thereof is an important feature of my invention.

To prevent the piece b from being moved back by the backward movement of the former, I provide a clamp for said piece composed of a bar i , having a series of pins or feet i' , extending through slots i^2 in the former and bearing on the piece b . The bar i is normally supported by spring-arms i^3 , affixed to the frame a , and is provided with a handle
 120 i^4 , whereby the operator may press the bar and its feet downwardly to clamp the piece b .

j represents a lever carrying a gang of slitting-knives j' . Said lever is pivoted at j'' to hangers j^6 on the frame a and is normally raised by a spring j^2 . A strut j^3 , pivoted to the lever j' , is arranged to bear on a plate j^4 on the lever j and depress said lever and its knives, causing the latter to slit a pile of pieces b , supported on a bed j^5 , affixed to the
 125 frame a . When the operation of the knives is not desired, the plate j^4 may be displaced, allowing the strut j^3 to pass through a hole j^7 in the lever j without moving the latter. The

knives are arranged to slit the curved edges of the pieces to permit them to be readily folded.

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

The studs c^8 are preferably connected flexibly with the frame a , so that they can yield vertically to a slight extent, sufficiently to compensate for variations in the thickness of the stock being folded.

The former c has its acting edge shaped to fold both the right and left quarters b of a boot or shoe upper, as indicated in Fig. 9, Sheet 2, where the two quarter-pieces are shown, one in full lines and the other in dotted lines. The peculiarity of the acting edge of the former is its extension in both directions from the deepest portion c^x to accommodate the two quarters. The folders are of course shaped to correspond with the former.

The clamping pins or feet i may be dispensed with and means provided for raising the former abruptly before moving it backwardly, so that the former will not have a tendency to drag the piece b backwardly, there being room between the former and the secondary folder for an upward movement of the former, as shown in Fig. 7. To this end the slot c' may be formed as shown in Fig. 10, Sheet 2, it being horizontal for the greater portion of its length and abruptly inclined or nearly vertical at the end occupied by the stud c^8 when the former is in its operative position, the inclined portion of the slot causing the former to rise abruptly at the commencement of its backward movement. Any other suitable means may be employed to secure this result.

The liability of displacement of the work by the backward movement of the former may be reduced by making the former with a downwardly-projecting lip c^{50} at its forward edge, as shown in Fig. 11, Sheet 3, thus giving the former a very limited bearing on the piece b , so that when the former is withdrawn it will have little or no tendency to drag back the piece b .

o represents an adjustable stop to limit the backward movement of the secondary folder and regulate the width of the folded edge. Said stop is a screw which is adjustable in a fixed bracket o' and arranged to bear against the rear edge of the secondary folder when the latter is retracted.

I do not claim, broadly, the combination of a work-support, a former having an edgewise movement over said support, and a clamp interposed between the work-support and former to prevent the work from moving backwardly with the former, my invention, so far as the clamp is concerned, being limited to the yieldingly-supported bar and the pins thereon projecting through slots in the former.

I claim—

1. In a folding-machine, the combination

of a fixed supporting-bed, a former movable sidewise toward and from the bed, and edgewise over the same, a primary folder movable vertically at the inner edge of the bed to partially form the fold, a secondary folder movable horizontally over the primary folder to advance the fold, and mechanism for operating the former and folders successively, said mechanism having provision for elevating the folders, for projecting the secondary folder while it is elevated, whereby the edge projected by said secondary folder is left loose between the folder and former, and for withdrawing the former from under the folded edge while the said edge is loose.

2. In a folding-machine, the combination of a fixed supporting-bed, a former movable sidewise toward and from the bed, and edgewise over the same, a primary folder movable vertically at the inner edges of the bed, to partially form the fold, a secondary folder movable horizontally over the primary folder to advance the fold, mechanism for operating the former and folders successively, a presser arranged to act on the secondary folder, and mechanism for operating said presser.

3. In a folding-machine, the combination of a fixed supporting-bed, a former movable sidewise toward and from the bed, and edgewise over the same, a primary folder movable vertically at the inner edges of the bed, to partially form the fold, a secondary folder movable horizontally over the primary folder to advance the fold, mechanism for operating the former and folders successively, a presser arranged to act on the secondary folder, a lever connected with said presser, a shaft having a friction-clutch member, and an arm or cam bearing on said lever, a loose driving-pulley on said shaft having a clutch member, and means for engaging said clutch members to apply power to the presser.

4. A folding-machine, comprising a fixed bed or table, a primary folder adjacent to the bed, means for moving the primary folder forward toward the bed, means for raising the primary folder while it is moving forward, means for moving the secondary folder forward independently of the primary folder, means for pressing the secondary folder downwardly while projected, and a former cooperating with said folders and bed.

5. A folding-machine, comprising a fixed bed or table, a former movable sidewise toward and from the table, and edgewise over the same, a primary folder movable vertically at the inner edge of the bed, a secondary folder movable longitudinally over the primary folder, a head movable in guides on the frame of the machine, and provided with a series of inclines, devices for imparting motion from said inclines to the former and folders, and means for reciprocating said head.

6. A folding-machine, comprising a bed or table, a former cooperating therewith, folding devices cooperating with the bed and former, a presser, power-driven mechanism

for operating the presser, said mechanism including an oscillating lever, a lever having a gang of slitting-knives, arranged to be actuated by said oscillating lever, a bed or table
5 to support pieces for the action of said knives, and means for detachably engaging the knife-carrying lever with the oscillating lever.

7. In a folding-machine, a former having a lip at its forward or acting edge, whereby the
10 former is given a limited bearing on the work.

8. In a folding-machine, the combination with the work-support, the former, and the

primary and secondary folders, and mechanism for operating said former and folders, of an adjustable stop to limit the backward
15 movement of the secondary folder.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of March, A. D. 1896.

ALBERT G. BREWER.

Witnesses:

A. D. HARRISON,

A. D. ADAMS.