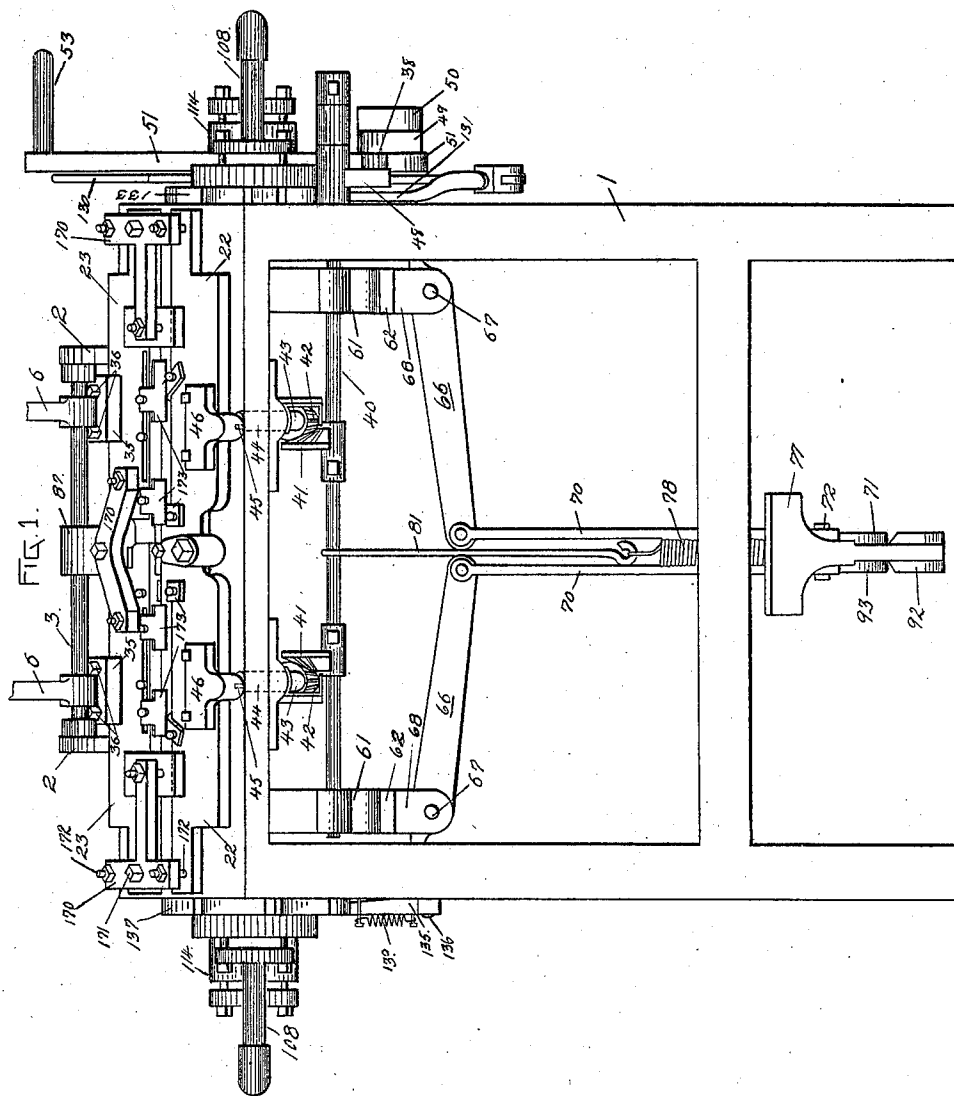


J. MAITLAND.
FOLDING MACHINE.
APPLICATION FILED OCT. 23, 1905.

963,232.

Patented July 5, 1910.

6 SHEETS—SHEET 1.



WITNESSES

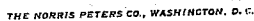
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6 SHEETS—SHEET 2.

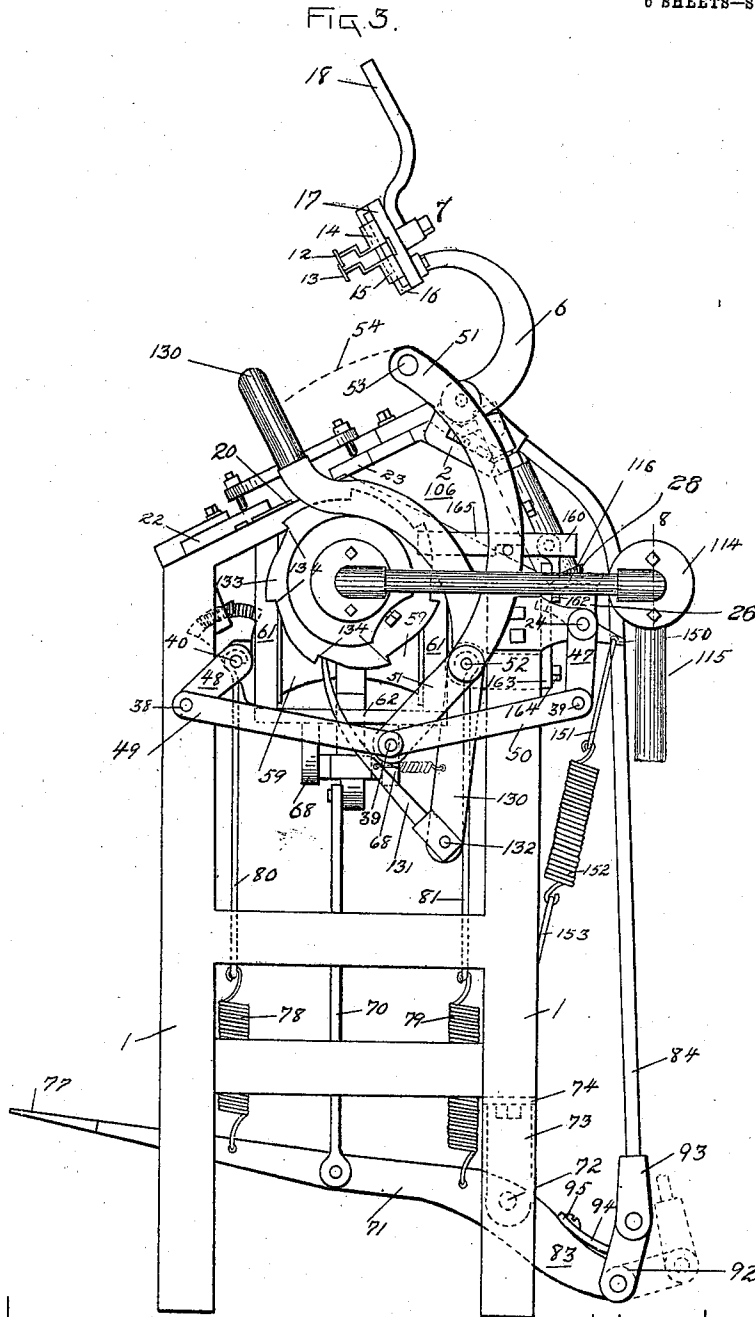


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6 SHEETS—SHEET 3.



WITNESSES

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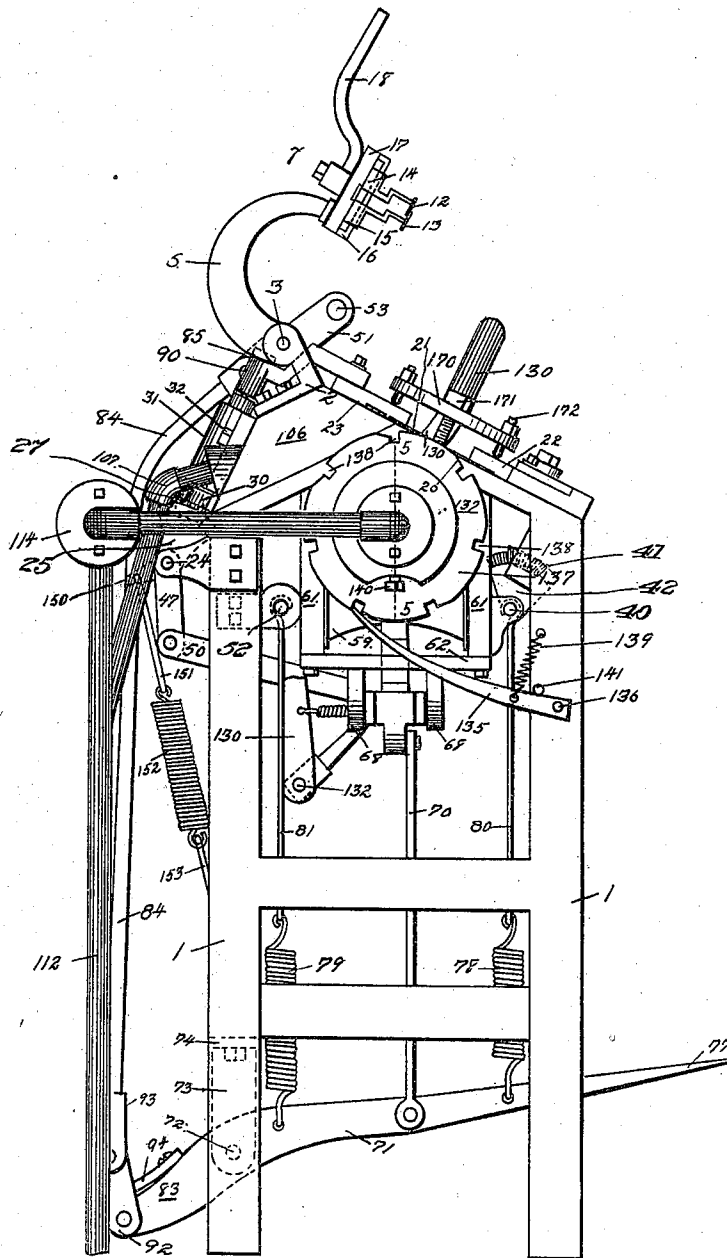
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6 SHEETS—SHEET 4.

FIG. 4



WITNESSES

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6 SHEETS—SHEET 5.

FIG. 7.

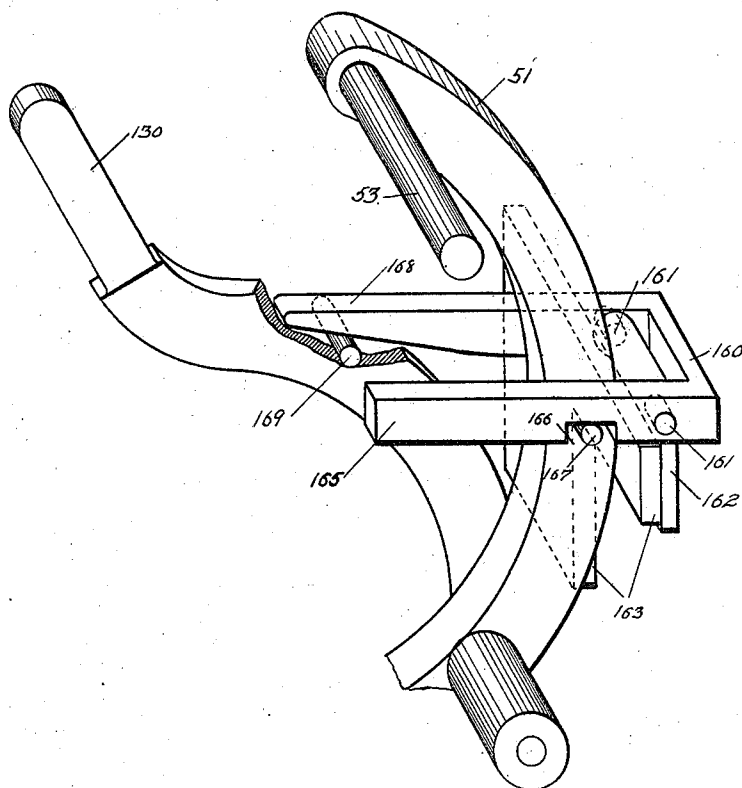
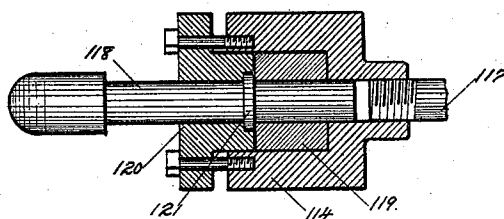


FIG. 8.



WITNESSES

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6 SHEETS—SHEET 6.

FIG. 9.

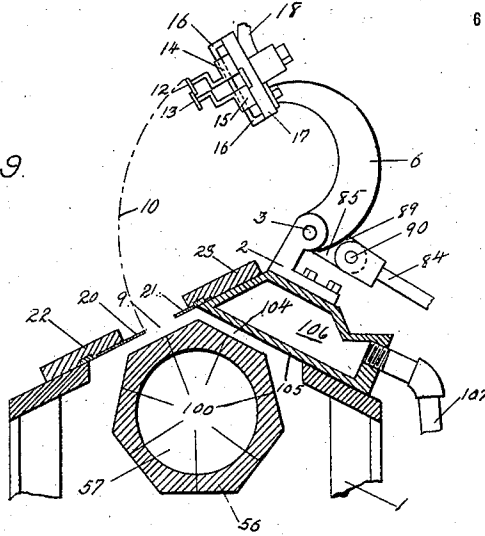


FIG. 10.

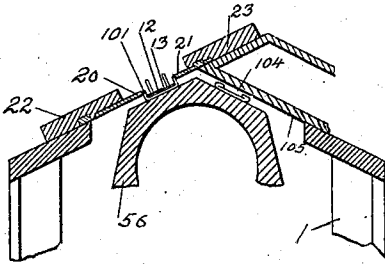


FIG. 12.

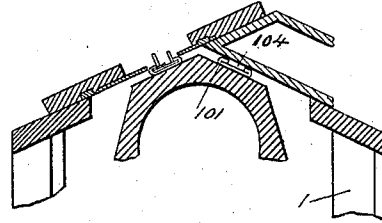


FIG. 11.

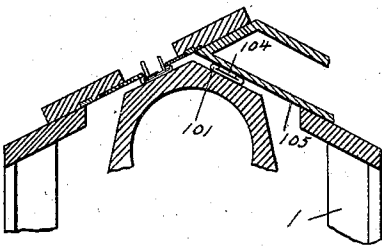
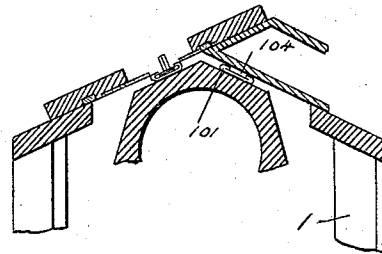


FIG. 13.



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UNITED STATES PATENT OFFICE.

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FOLDING-MACHINE.

963,232.

Specification of Letters Patent.

Patented July 5, 1910.

Application filed October 23, 1905. Serial No. 284,021.

To all whom it may concern:

Be it known that I, JOHN MAITLAND, a citizen of the United States, residing at Cohoes, county of Albany, and State of New York, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

The invention relates to such improvements and consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a view in front elevation of the improved folding machine. Fig. 2 is a rear elevation of the same. Fig. 3 is an end elevation as the same appears when viewed from the right hand end of the machine as shown in Fig. 1. Fig. 4 is a view in elevation of the opposite end of the machine. Fig. 5 is a vertical section of a portion of one end of the machine taken on the broken line 5—5 in Fig. 4. Fig. 6 is a view in side elevation of one of the slide-boxes which support the revoluble bed-plates. Fig. 7 is a view in perspective on an enlarged scale of the locking mechanism which locks the infolders in an outward position. Fig. 8 is a vertical central section of the stuffing-box taken on the broken line 8 in Fig. 3. Fig. 9 is a detached view partly in section of a portion of the machine illustrating the relative positions of the folding mechanisms, press-plate and bed-plates. Fig. 10 is a similar view showing a blank in the folding position between the former and bed-plate with its edges upturned against the inner ends of the infolders. Fig. 11 is a similar view showing a blank in the folding position between the former and bed-plate with its edges folded over onto the former by the infolders and another blank in the pressing position between the press-plate and another bed-plate and the bed-plates forced upward to press the infolds of one blank between the infolders and the bed-plate while the former is still within the folds, the folds of the other blank being at the same time pressed between the press-plate and another bed-plate after the former has been withdrawn from the folds

of the blank. Fig. 12 is a similar view showing the bed-plates lowered to reduce the pressure and the infolders withdrawn to their outward position. Fig. 13 is a view similar to that shown in Fig. 12 except that the former has been collapsed and the plates withdrawn from the folds ready to be removed from the blank to the position shown in Fig. 9.

This invention is shown applied to a machine known as a hand machine in which the former and infolders are operated by hand and includes a plurality of blank supporting beds located upon the periphery of a rotary shell to which rotary movements may be imparted by hand to give revoluble movements to the beds, such as will carry them successively from the folding position to the pressing position, the rotary shell being supported in slide bearings having a vertical reciprocatory movement, whereby a collar or cuff blank may have its edges inturned or folded upon one of the revoluble beds by the folding mechanisms at the folding position and pressed between the infolders and such bed while the former plates are still within the fold and at the same time another blank which has been previously folded in this manner and removed from the folding mechanism may be finally pressed and its folds fixed between another bed and the stationary press-plate in the pressing position.

Another novel feature consists in pressing the folds of the blanks between two plates or beds, each of which is separately heated.

These and other novel features will be hereinafter more fully described and claimed.

The folding mechanisms and their operation are similar to that of hand machines heretofore in use, one form of which is illustrated in U. S. Patent No. 713,230 issued to Walter J. Beattie and John Maitland, November 11, 1902, to which reference may be had in connection with this specification.

Referring to the drawings, 1, represents the main frame of the machine. Bolted to the top of the machine are the brackets 2—2 which support the shaft, 3, rotary therein. Fixed upon said shaft, as by set-screws, 4, are the bracket arms 6—6 which support the former-head, 7, shown in Figs. 3, 4 and 9, and not shown in Figs. 1 and 2, the arms

6—6 being broken away for convenience of illustration. The former-head is adapted to swing to and from the folding position, 9, as shown by the curved broken line, 10, in Fig.

9. The former may be of any known kind of collapsible former such as that shown in said Patent No. 713,230, issued to Beattie and Maitland in 1902 to which reference may be had for a fuller description of the same. The drawings show two former-plates, 12 and 13, projecting from the slide-blocks, 14 and 15, movable toward and from each other on the slide-bar, 16, depending from the head-block, 17, being operated by the hand-lever 18. The machine is also provided with infolders adapted to coöperate with such former-plates for infolding the edges of collar blanks or analogous articles which infolders may be of any of the well-known forms and operated in any known manner, as for example like those shown in said Patent No. 713,230. The drawings show infolding plates, 20 and 21, secured to the slide-blocks, 22 and 23, adapted to coöperate with the former-plates as will be hereinafter more fully explained.

- As a means for communicating slide movements to the infolder consisting of plate, 21, and slide-block, 23, I provide a rock-shaft, 24, Figs. 2 and 3, upon which are keyed the bevel gear sectors, 25 and 26, adapted to engage with the bevel-gears, 27 and 28, fixed upon crank-shafts, 29 and 30, rotary in bearing sleeves, 31, secured to the machine frame by bolts 32. The upper end of each crank-shaft is provided with a wrist-pin, 33, pivotally connected with the lugs, 34, depending from the brackets, 35, secured to the machine-frame by the screw-bolts, 36, whereby a circular motion of the wrist-pin, 33, is communicated through the brackets, 35, to the slide-block, 23, and the folder-plate 21. As a means for communicating similar movements to the other slide-block, 22, and infolder-plate, 20, I provide the rock-shaft, 40, Figs. 1 and 3, upon which are fixed the bevel gear sectors, 41, engageable with the bevel-gears, 42, fixed upon the crank-shafts, 43, rotary in bearings in the upper part of the frame as indicated by dotted lines 44. The upper ends of these crank-shafts, 43, are each provided with a wrist-pin indicated by dotted lines 45 (precisely like the wrist-pins, 33) for operating the other infolder which wrist-pins are pivotally connected with the brackets, 46, bolted to the slide-block 22.

- As a means for communicating rock movements to the rock-shafts, 24 and 40, the shaft, 24, is provided with a rock-lever, 47, (see Fig. 3) fixed thereon and the rock-shaft, 40, with the rock-lever 48. These rock-shafts are pivotally connected by means of the links, 49 and 50, with the lower end of the hand-lever, 51, as by the pivots, 52, 38 and

39. The hand-lever, 51, is fulcrumed upon the shaft, 52, and provided with a handle, 53, for operating the same by hand.

When the parts just described are in the position shown in Figs. 1, 2 and 3, the infolders are expanded to the limit of their outward movement and they can be moved inwardly toward each other so as to coöperate with the former-plates to infold the edges of a blank by moving the handle, 53, of the hand-lever, 51, along the curved broken line, 54, which will impart through the links, 49 and 50, crank levers, 47 and 48, shafts, 24 and 40, the gear connections and crank shafts, the required movements to the slide blocks of the infolders as above described.

As a means for supporting the blanks while having their edges infolded by the folding mechanisms above described which may be of any known type I provide a shell or cylinder, 56, having a steam chamber, 57, extending lengthwise of the machine beneath the infolders. The arrangement of this shell is more fully shown in Figs. 5 and 9. The shell is provided with end trunnions, 58, adapted to rotate in the bearing blocks, 59, at each end of the machine, each block having a bearing aperture, 60, Fig. 6, adapted to receive the trunnions. These bearing blocks are each capable of vertical reciprocatory slide movements in a slide box composed of the side pieces 61, secured to and depending from the upper part of the frame and connected at their bottom by the cross-bars 62. The trunnions are each provided with a sleeve, 63, Fig. 5, connected by link, 64, with the short end, 65, of lever, 66, fulcrumed upon pin, 67, passing through the ears, 68, depending from the cross bars 62. The long arm of each lever, 66, is connected by the links, 70, with the foot lever or treadle, 71, fulcrumed upon the pin, 72, supported by ears, 73, depending from the bracket or base, 74, secured to the cross-bar, 75, of the frame by means of the bolts, 76, 1. shown in full in Fig. 2 and by dotted lines in Fig. 3. The long arm of the foot-lever is provided with the foot-rest, 77, and is also connected by springs, 78 and 79, and links, 80 and 81, with the shafts, 40 and 52. The short arm, 83, of the foot-lever is connected by the toggle link, 84, with the crank-arm, 85, Fig. 2, fixed upon shaft 3, by the set-screw, 86, through sleeve 87. The upper end of the link, 84, is provided with the block, 88, having ears, 89, pivotally secured to the crank-arm, 85, as by the pivot-rod, 90, shown in Fig. 9. It will thus be seen that the springs, 78 and 79, shown in the closed position serve to maintain the former-head and the treadle when out of use in approximately the positions shown in Figs. 3 and 4, that is, with the former head in an elevated position to give ample room for placing the blanks to be folded in the folding position upon the

blank supporting bed as will be hereinafter more fully described.

The former may be lowered to the folding position either by hand acting through handle, 18, or by foot on the treadle 77. In case it is desired to raise the former from the folding position while the treadle is depressed this can be done through the handle, 18, provision being made for buckling of the toggle link, 84, the lower end of which link includes a short toggle-link, 92, pivoted at its lower end to the short end of the foot-lever, and at its upper end pivoted to the block, 93, in which case the toggle link, 92, and the block, 93, would assume the positions indicated by dotted lines in Fig. 3. The stop, 94, secured by screw, 95, to the foot-lever serves to prevent the link, 92, and block, 93, from being brought into the same straight line or from buckling in the wrong direction.

When it is desired to fold a blank for collars, collar-bands, or analogous articles, the blank is placed upon that one of the blank-supporting beds, 100, located opposite the folding position, 9, (see Fig. 9) and the former-head swung down along the curved broken line, 10, to the folding position. Such movement of the former-head also acts through link, 84, upon the treadle to raise the shell, 56, on the periphery of which are located the seven blank supporting beds until that bed which is opposite the folding position rises to meet the former-plates, 12 and 13, in the folding position as indicated in Fig. 10, the blank, 101, being shown resting upon the bed and the former-plates, 12 and 13, resting upon the blank causing the edges of the blank to be upturned against the inner ends of the folder-plates. The folder-plates are then forced inwardly in the manner previously described until they occupy the position shown in Fig. 11, which folds the edges of the blank over the folder-plate. Great pressure is now exerted upon the foot-lever which forces the bed-plate up toward the infolder-plates and presses the edge-folds of the blank while still containing the former-plates between said bed-plate and the infolders. The pressure is then removed from the foot-lever, or reduced to slight pressure relieving the pressure upon the infolders after which the infolders are withdrawn or moved outwardly to the position shown in Fig. 10. The former is then collapsed so that its plates are withdrawn from the infolds formed at the edges of the blanks, as shown in Fig. 13, which permits the former to be entirely removed from the blank to the position shown in Fig. 9 without disturbing the position of the blank upon its supporting bed. As the former-head rises to its elevated position the treadle is also permitted to rise under the influence of springs, 78 and 79, which

depresses the bed-plate to the relative position shown in Fig. 9 thereby lowering the blank considerably below the plane of the infolders so that by a rotative movement of the bed-supporting shell the blank is carried forward to the pressing position, 104, as shown in Figs. 10, 11, 12 and 13, which presents the next succeeding bed to the folding position when another blank is inserted and the operation of folding repeated. When such operation of folding reaches the stage where pressure is exerted upon the blank and former-plates between the bed and infolders by great pressure upon the foot-lever pressure is also exerted upon the blank last folded and which is now located at the folding position between the press-plate, 105, and the neighboring bed of the shell whereby the infolds of the blank are fixed by great pressure after the former-plates have been withdrawn from such infolds. I am thus able to press the blanks to fix the infolds in the pressing position at the same time another blank is being folded in the folding position thereby securing increased speed of the machine.

Other machines after folding a blank in the folding position withdraw the former-plates and then fix the infolds by pressure in the same folding position. More time is required for fixing the folds where no previous pressure has been exerted upon the fold while the former-plates are located within the infolds. In my improved machine no time is required to remove the blanks after the folds have been fixed as the blanks are successively carried from the folding position to the pressing position and then onward until they are dropped from the lower side of the shell or are removed therefrom by some automatic device.

The press-plate, 105, is the bottom plate of a steam-chamber, 106, which extends longitudinally of the machine directly over one side of the bed-supporting shell. As a means for admitting steam to the steam-chamber I provide steam-pipes, 107, leading thereto. As a means for heating the steam-chamber, 57, in the bed-supporting shell I provide the steam-pipes, 108, connected therewith by stuffing boxes on the ends of the shell trunnions as seen in Fig. 5. The inner end of this pipe is provided with a flange, 109, upon which bears a packing, 110, held in place by the follower, 111, which permits of the rotary movements of the shell while the ends of the steam-pipe within the trunnions remain stationary. The steam-pipes which supply the shell and the press-plate chamber may have common supply pipes, 112, or be arranged in any known manner. A stuffing box, 114, is also provided to connect a stationary branch, 115, of the supply-pipe with the oscillatory branch, 116, which leads directly to the shell

which permits of the vertically reciprocating movements of the shell. A central longitudinal section of this stuffing-box is shown on an enlarged scale in Fig. 8, where-
 5 in the pipe, 118, leading to the shell is capable of a rocking movement in the stuffing box when a vertical movement is imparted to the shell. The packing, 119, is given pressure by the follower, 120, which
 10 follower also bears upon the flange, 121, on the pipe holding the same in the stuffing-box. I am thus able to provide a means for pressing the infolds of a collar-blank or analogous article to fix the fold between
 15 two plates both of which are separately and independently heated thereby enabling the fold to be fixed in less time than would be required if the same was heated on one side only, it being well known that folds or
 20 creases can be much more quickly and permanently fixed by pressing the folds upon heated surfaces.

As a means for imparting to the shell rotary movements a hand-lever, 130, is fulcrumed upon the shaft, 52, and provided at
 25 its lower end with a pawl, 131, pivotally secured to the lever by a pin, 132, and adapted to engage with the ratchet, 133, fixed upon one of the shell trunnions. The
 30 ratchet teeth, 134, are so spaced on the ratchet-wheel that a movement of the hand-lever through the arc represented by the broken curved line, 54, in Fig. 3, rotates the ratchet-wheel one space, the distance between the ratchet-teeth, which movement is
 35 communicated to the shell, and the blank-supporting beds, 100, given a revoluble movement which is equal to the distance between the folding and pressing positions, so that
 40 the bed which was formerly in the folding position is carried to the pressing position and a new bed presented to the folding position. As a means for retaining the bed thus moved to the folding position in that position while the edges of the blank are being
 45 folded by infolders over the former-plates I provide a stop, 135, fulcrumed at one end upon the frame at, 136, with its other end maintained in contact with the wheel, 137,
 50 having the notches, 138, in its periphery, being held against the wheel by the spring 139. This wheel is fixed to the shell trunnion by means of the set-screw, 140, so that the stop will engage with one of the notches when the shell has been rotated the proper
 55 distance to bring the blank supporting beds into the folding and pressing positions thereby insuring their exact location in such position. The stop, 135, is prevented from
 60 following the wheel, 137, during its upward vertical movement by means of the pin, 141, which limits the upward movement of the stop so that the upward movement of the bed-supporting shell and wheel, 137, induced
 65 by the action of the foot-lever in press-

ing the blanks, releases the parts from stop 135. In the practical operation of the machine the treadle will be fully released simultaneously with the rotary movement of the shell so that the wheel, 137, will drop sufficiently to have its notch engaged by the stop to correctly locate the blank supporting beds.

As a means for automatically restoring the infolders and their operating mechanism to their outward positions shown in the drawings, after they have been moved to the inward position by the hand-lever, 51, the rock-shaft, 24, is provided with the rock-lever, 150, connected by link, 151, spring, 152, and link, 153, with the frame of the machine which serves to normally maintain such parts in the position shown in the drawings. After the edges of the blanks are folded over the former-plates by a forward movement of the hand-lever, 51, the lever is held in that position by a grasp upon the handle during the subsequent pressing operation, after which the handle is released and said spring, 152, serves to extend
 9 the infolders, after which the former is collapsed and its plates withdrawn from the folds and the former lifted up from the blank. As a means for preventing the contraction of the infolders during such operation of collapsing and removing the former or at any other time after the infolders have been expanded until the shell has been rotated and the blank so folded carried from the folding position to the pressing position, I provide a locking mechanism which
 1 locks the hand-lever, 51, in the position shown in the drawings until the same is released by a movement of the hand-lever, 130, along the broken circular line, 54, to rotate
 1 the shell. Such locking mechanism consists of a two-armed latch, 160, pivoted upon the pins, 161, supported by leaf, 162, secured to the bracket, 163, which bracket is secured to one of the legs of the machine as by a bolt
 1 164. One arm, 165, of the latch is provided with a recess, 166, adapted to receive the pin, 167, which projects from the hand-lever, 51, as shown in Figs. 3 and 7. The other
 1 arm, 168, of the latch is adapted to be engaged by the pin, 169, prejecting from the hand-lever, 130, when such lever is moved along the curved broken line, 54, Fig. 3, to rotate the bed-supporting shell, and tilt it
 1 upward on the pivots, 161, sufficiently to release the pin, 167, from the notch, 166, thereby releasing the lever 51.

Various old and well-known devices are shown in the upper surface of the machine in Fig. 1 of the drawings which form no
 1 part of the present invention and therefore will not be fully described, it being sufficient to state that the blocks, 170, held to the frame by bolts, 171, are provided with adjustable screws, 172, which bear upon the

infolder-blocks, 22 and 23, to enable them to resist the upward pressure of the bed-plates when the treadle is used to press the blanks. The parts marked, 173, are simply gages which serve as guides for inserting the blanks in the proper folding position, in the usual well known manner.

What I claim as new and desire to secure by Letters Patent is—

1. In a folding machine, the combination with folding mechanism, comprising a former and infolders; means for imparting operative movements thereto; and a press-plate supported at an angle relatively to the plane of the infolders; of a movable blank-supporting bed, coöperative with the folding mechanism, in one position, to infold the edges of a blank and with the press-plate, in another position, to press and fix the infolds; and means for moving the blank-supporting bed from one position to the other, substantially as described.

2. In a folding machine, the combination with folding mechanism comprising a former and infolders; means for imparting operative movements thereto; and a press-plate supported at an angle relatively to the plane of the infolders; of a plurality of movable blank-supporting beds; means for successively moving the beds from the folding to the pressing position, and means for simultaneously forcing the bed, occupying the folding position, toward the infolders, and the bed, occupying the pressing position, toward the press-plate, whereby the folds of a blank are subjected to initial pressure in the folding position and to final pressure, independently of the folding mechanism, in the pressing position, substantially as described.

3. In a folding machine, the combination with a press-plate; of a plurality of revoluble blank-supporting beds successively movable from the folding to the pressing position; means for infolding the edges of a blank upon that one of the beds located in the folding position; means for communicating intermittent revoluble movements to the beds, whereby such beds are successively carried from the folding position to the pressing position; and means for producing pressure between a bed in the pressing position and the press-plate, whereby an interposed folded blank will be pressed and the folds therein firmly fixed, substantially as described.

4. In a folding machine, the combination with a press-plate; and means for heating the same; of a plurality of blank-supporting beds arranged at an angle to one another and movable successively from the folding to the pressing position; means for heating the beds; means for infolding the edges of a blank upon the beds successively in the folding position; means for moving the beds

successively from the folding to the pressing position; means for producing pressure between one of the beds in the pressing position and the press-plate, substantially as described.

5. In a folding machine, the combination with a set of folding mechanisms including a former and infolders and means for operating them; and a press-plate; of a shell rotatively mounted in a reciprocatory slide-box having on its periphery a plurality of blank-supporting beds adapted to be brought, by rotation of such shell, successively into position to coöperate with said folding mechanisms and press-plate successively; means for imparting intermittent rotative movements to such shell; and means for imparting reciprocating movements to such shell alternately with said rotative movements.

6. In a folding machine, the combination with a set of folding mechanisms capable of being operated at the folding position; and a press-plate located at the pressing position; of a member rotatory in reciprocatory bearings movable toward and from such folding mechanisms and press-plate, and provided on its periphery with blank-supporting beds severally adapted to be carried by the rotary movements of the member into and out of the folding and pressing positions successively; and means for imparting to the member alternately reciprocatory and rotary movements, substantially as described.

7. In a folding machine, the combination with a press-plate; of a plurality of revoluble blank supporting beds successively movable from the folding to the pressing position; mechanism for revolubly moving the beds intermittently; means for forcing the beds successively toward the press-plate; a collapsible former capable of being moved to and from the folding position; infolders movable inwardly and outwardly to and from the former; means for operating the infolders; means for automatically locking the infolders at the end of their outward movements; and a releasing device, on the mechanism for revolubly moving the beds, adapted to release the locking mechanism while the bed is being moved from the folding to the pressing position, substantially as described.

8. In a folding machine, the combination with a vertically movable blank-supporting bed; treadle mechanism for imparting vertical movements to the bed; an oscillatory former adapted to swing to and from the bed and infolders capable of coöperating with the former; and a toggle link connection between the treadle and the former, substantially as described.

9. In a folding machine, the combination with a press-plate; of a plurality of revolu-

ble blank supporting beds, successively movable from the folding to the pressing position; means for infolding the edges of the blank upon the bed located in the folding
5 position; a hand-lever for communicating intermittent revoluble movements to the beds; means for automatically limiting such revoluble movements, whereby such beds are successively stopped in the pressing po-

sition; means for producing pressure between a bed in the pressing position and the press-plate, substantially as described.

In testimony whereof, I have hereunto set by hand this 20th day of October, 1905.

JOHN MAITLAND.

Witnesses:

GEO. A. MOSHER,
E. M. O'REILLY.