

G. J. DORMANDY.
FOLDING MACHINE.
APPLICATION FILED JUNE 8, 1904.

935,785.

Patented Oct. 5, 1909.
3 SHEETS—SHEET 1.

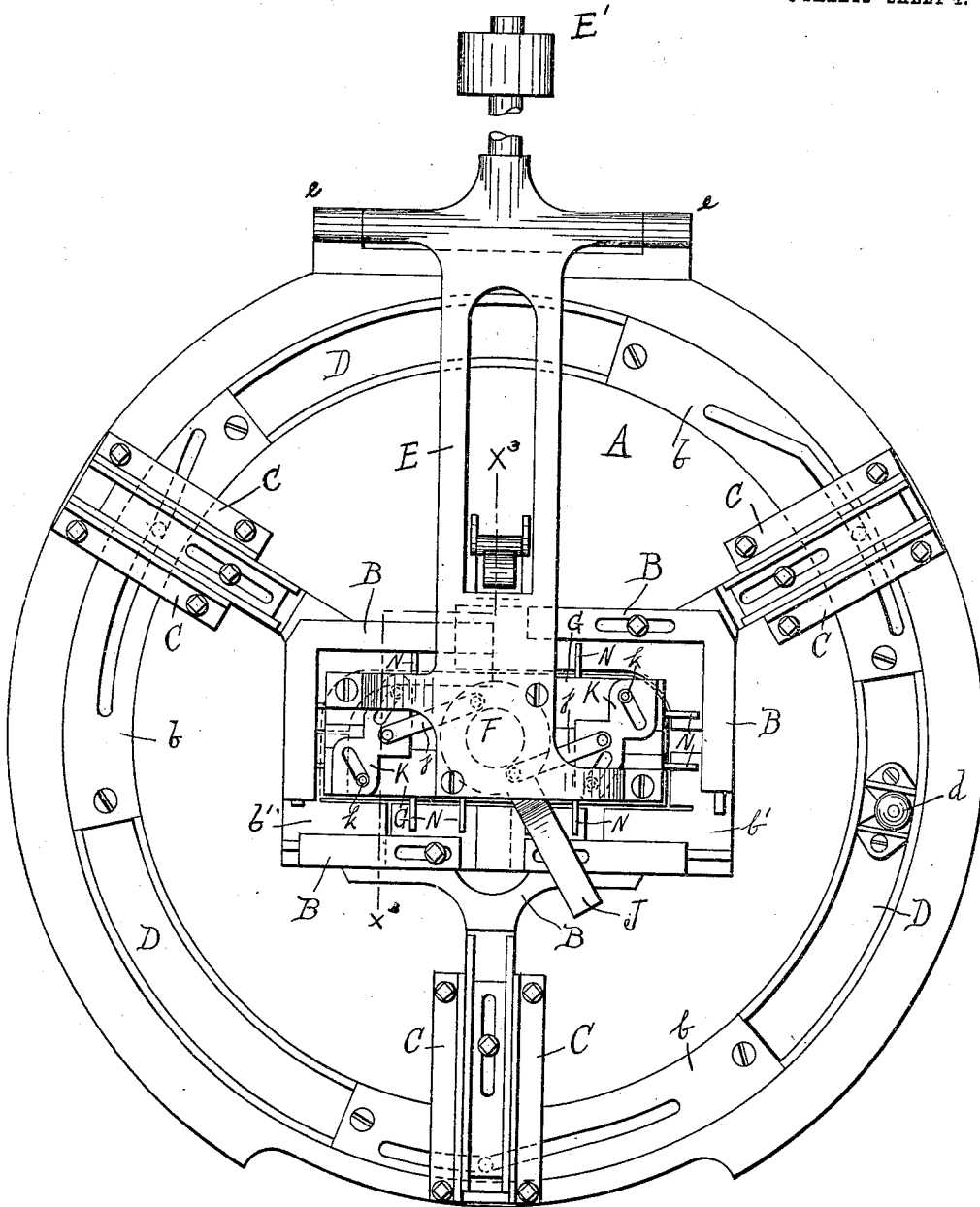


FIG 1

WITNESSES

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INVENTOR

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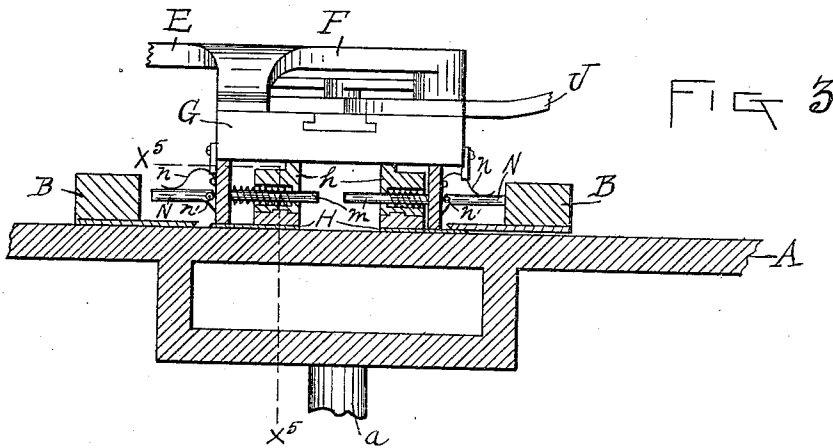
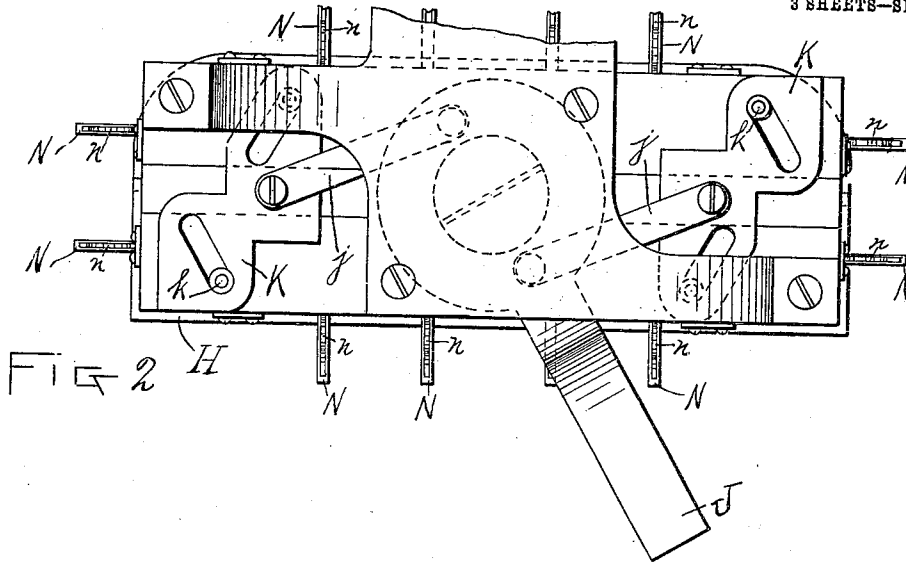
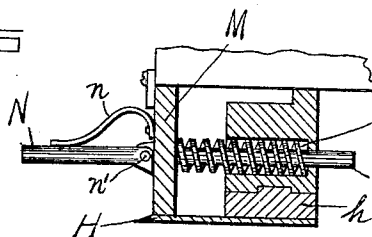


FIG 4

WITNESSES
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3 SHEETS—SHEET 3.

FIG 5

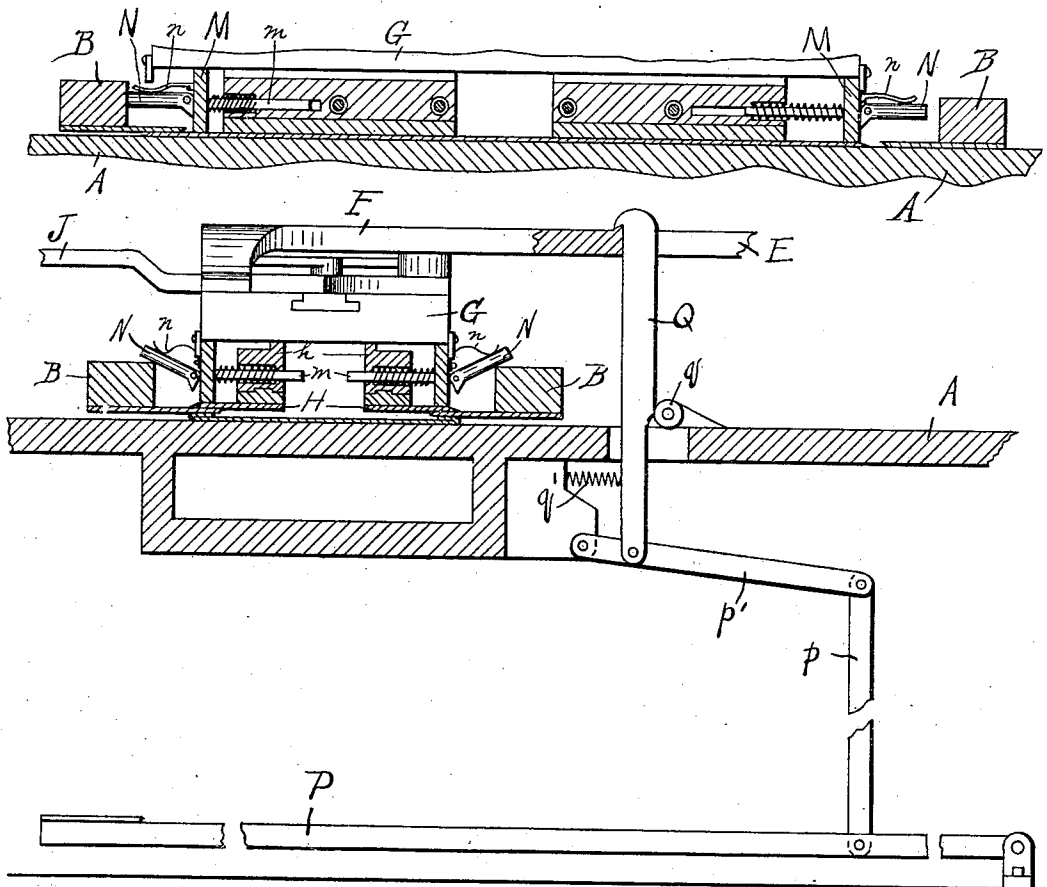


FIG 6

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UNITED STATES PATENT OFFICE.

GARRY J. DORMANDY, OF TROY, NEW YORK, ASSIGNOR TO UNITED SHIRT & COLLAR COMPANY, OF TROY, NEW YORK, A CORPORATION OF NEW YORK.

FOLDING-MACHINE.

935,785.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed June 8, 1904. Serial No. 211,608.

To all whom it may concern:

Be it known that I, GARRY J. DORMANDY, a citizen of the United States, residing in Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

My invention relates to machines for in-turning or in-folding the edges of blanks for cuffs, collars, or like articles; and more particularly to mechanism and parts for effecting the folding and pressing of the folds of blanks that constitute the two parts of a cuff or analogous article preparatory to sewing said parts together.

One of the principal objects of my invention is to produce a machine that will afford a more simple construction and operation, and it contemplates such arrangement of the fold-defining, infolding and pressing mechanisms that the part or member which fills the office of a fold-defining instrumentality shall serve the further purpose of bringing about a suitably powerful creasing pressure on the folds of the blanks.

Other objects will appear during the description hereinafter following.

I will first describe a folding machine embodying my invention and then point out the novel features in the claims.

Figure 1 is a top view of a folding machine embodying the invention of the present application. Fig. 2 is a top view of a convenient form of expanding and contracting die or templet for use in the machine illustrated in Fig. 1. Fig. 3 is a transverse section of the die or templet illustrated in Fig. 2 and taken on the plane of the dotted line x^3-x^3 of Fig. 1. Fig. 4 is an enlarged section of a detail of the die or templet. Fig. 5 is a longitudinal section of the die or templet of Fig. 2 and a portion of the bed-plate of the machine, taken on the line x^5-x^5 of Fig. 3. Fig. 6 is a transverse section similar to that of Fig. 3, showing the pressure treadle and its connection, the parts being in that stage of operation in which the pressure is applied to the folds of the blank.

Similar letters of reference are employed to designate corresponding parts in the several figures of the drawings.

The bed and in-folding mechanism of themselves are of a well-known type illus-

trated in several prior patents granted to me, and therefore need not be described in very great detail.

A designates the bed of a folding machine embodying my invention, which bed is intended to serve as a support for the blanks to be infolded in said machine.

The folding mechanism comprises a series of infolders B B B, fitted to move inwardly and outwardly with respect to the blanks on the bed of the machine, by any suitable means such as slideways C which may be integral with or adjustable upon the bed, as may be determined by the particular use to which the machine is to be applied.

For operating the infolders to effect their inward and outward movements, is shown an oscillating ring D having a handle d which is convenient for actuating the same when the machine is not operated by power.

Intermediate of the oscillating ring D and the infolders B are a corresponding series of cams, comprising in the present instance, cam plates b , the eccentric cam slots of which are preferably arranged in such manner that upon a continued movement of the oscillating ring in one direction, the infolders B B B will be caused to operate successively in order of time, this being a well-known means for in-folding of blanks in what has come to be known as a "locked corner blank."

The infolders B comprise, as usual, heavy or stock portions and the plate or blade portions b' , which latter, during the inward movements of the infolders, are adapted to engage with those edge portions of the blanks which extend beyond the templet or fold-defining member, to carry such edge portions of the blanks over the edge portions of the templet in the well-known manner. Such in-folding blades will also preferably be fitted to be capable of a sufficient extent of upward and downward movement relatively to the bed of the machine, in order that the folds of the blanks formed by, and which rest upon the bed beneath, the infolders, may be pressed between the infolders and the bed, through the application of a suitably powerful creasing pressure or force applied to the in-folding blades, whereby such folds may be firmly fixed. This fixing or creasing of the folds of the blank has become practically a necessity in the present advanced

stage of perfection in the art of cuff and collar manufacturing, and it is necessary in order to secure the most accurate results; and it has further been found very desirable to effect the pressing or creasing of the folds of the blanks after the removal of the edges of the templet or fold-defining member from such folds, but before the infolders are moved outwardly or away from such folds, thus avoiding the possibility of a disturbance or reopening of the fold owing to the outward movement of the folders before the creasing is effected. To further increase the efficiency of the creasing or pressing operation, I have illustrated the now well-known feature of heating the bed of the machine as by means of steam admitted to the hollow chamber formed in the bed beneath its central portion, a steam pipe *a* being illustrated as a means of conveying the steam to the hollow chamber of the bed.

I will now describe a die or templet which is new not only in combination with the infolding and blank-supporting instrumentalities already described, but is in itself radically new. The die illustrated in the drawings annexed hereto is of the so-called expanding and contracting type more commonly known as a "collapsible die." The said die is mounted at the end of a swinging arm *E* which by reason of pivots or hinges *e* at the rear of the machine, constitutes a convenient means whereby the die or templet may be elevated above the bed, or lowered to bring it in contact with the blanks upon the bed, and the arm *E* may be conveniently provided with a counterweight *E'* to facilitate the elevation of the die. At the outer end of the swinging arm *E* is mounted the part *F* which is conveniently arched and to which the die proper is connected. The die proper consists of the stock portion *G* beneath which are movably mounted, by means of downwardly extending hangers *h*, the die or templet plates or blades *H*. The hangers *h* being connected to the stock portion *G* through suitable guiding means such as diagonal slideways, are connected to receive inward and outward movements in such slideways through an operating handle *J* which extends forwardly from the die or templet to a position where it may be easily grasped by the operator and oscillated from side to side to effect the expanding and collapsing of the die or templet. A convenient connecting mechanism is the following: A longitudinally movable cam plate *K*, fitted to slide in reverse directions upon the stock *G*, is provided with cam slots which engage with pins *k* that extend upwardly from the hangers *h*. Links *j* connecting the operating arm *J* with the cam plate *K* serve, when the operating handle is oscillated, to transmit a to-and-fro motion to the cam plates *K*, which thereby operate upon the cam pins *k* to effect

the inward and outward movement of the hangers *h* upon which the die plates *H* are mounted.

The mechanism already described would be sufficient for the mere in-folding of cuff blanks if it were not desired to press the same upon the bed of the machine before removing therefrom. If it were attempted to collapse the die by means of the handle *J* after the folds of the blanks were turned inwardly over the edge portions of the die, and thereafter to expand the die plates to their normal or outward position and bring them downwardly upon the infolders, it would be found that owing to the necessary thinness of the die plates *H* and their resultant flexibility, a suitably powerful creasing pressure could not be brought to bear upon the folds of the blank beneath the infolders through the instrumentality of the die. Practice has shown that a very heavy creasing pressure is necessary to produce an effective fixing of the folds of a blank, and for ordinary work about one ton pressure is considered to be the smallest desirable pressure. In order to make the die or templet of the present machine operative as a combined die and pressing device, *i. e.* to make it adaptable to the transmission of such high pressure to the infolders resting upon the folds of the blanks, I have provided means whereby it is possible to temporarily strengthen or back up the said thin edge portions of the die plates after the completion of the folding act and during the application of powerful downward pressure to the die. The specific means illustrated in the drawings for effecting this strengthening or backing up of the thin edge plates comprises the movable or removable braces *M*, of which there should be one or more for each of the expanding and contracting plates of the die or templet, and which movable braces are mounted through a sliding rod *m* to move inwardly and outwardly independently of the hangers *h*. This movement is preferably in a horizontal direction and is controlled by a spring *M'* whose tendency is to force the said braces to their outward or operative position. Inasmuch as such braces would, while in an outward position, interfere with the in-folding operation of the infolders *B*, I have provided a bar or pusher *N* whose function is to engage with a part of the infolder during the inward movement of the latter, whereby the infolder may automatically cause the brace *M* to move out of the way, or to its inward position. At the left-hand side of Fig. 3 is shown the brace *M* in its outward position before having been engaged by the infolder *B*, and in such figure it is apparent that the said brace is in such position as to interfere with the folding operation. On the right-hand side of Fig. 3 the infolder is shown as having engaged with the pusher *N* and to

have forced the brace M to its inward position out of the way. A spring *n* acting upon the pusher N tends to keep the same in a horizontal position, a hinge *n'* being provided to permit an upward swinging of the pusher, for a purpose that will appear hereinafter.

In order to effect a suitably powerful downward force upon the die or templet, a treadle may be employed, as a suitable power-applying member. P represents such a treadle, and *p*, *p'*, Q represent suitable link and leverage connections between the treadle P and the templet-carrying arm E. The link Q is preferably a hooked member adapted to engage a complementary projection upon the arm E, and a fixed roller *q* adapted to engage an inclined surface on the rear of the link Q serves as a means of effecting an operative connection between the parts Q and E when the treadle is lowered, the same becoming disengaged when the treadle is again released, so that the templet-carrying arm E may be elevated. A spring *q'* may be employed to press the link Q toward the roller *q* to insure a disengagement of the parts Q and E.

The operation of the machine heretofore described may be as follows: The operator places one or more thicknesses of material constituting a blank upon the bed of the machine in a position in which the plates of the expanded die or templet may be brought into contact with the blanks, the edge portions of the die plates resting directly upon the blanks upon the bed and within edge portions of the blank. At this initial stage of the operation the infolders will be in their outward position, as shown at the left in Fig. 3. Having brought the expanded die into contact with the blanks, the operator then, by means of the handle *d*, effects the inward movement of the several infolders, with the result of interturning the extending edges of the blanks over the edge portions of the die plates at the same time forcing inwardly the temporary braces M (shown at the right of Fig. 3). The next step will be to contract the die or templet so as to withdraw the plates thereof from within the folds of the blank. After this, the die or templet should be elevated, which permits the temporary braces M to snap back to their outward or operative position. The operator then again lowers the die or templet until the blades thereof rest upon the infolders, which latter are now in their inward position. This stage of operation is illustrated in Fig. 6, where the purpose of the hinges *n'* and springs *n* will be obvious. Finally, the operator pressing the treadle, causes the engagement of the link Q with the templet-carrying arm E, as already explained, a further movement of the treadle P effecting a downward pressure upon the templet-carrying arm,

which serves to transmit to the die, and through the infolder to the folds of the blanks, an effective creasing pressure. After this, the operator releases the treadle, elevates the die, moves the infolders outwardly again, when the blanks may be removed from the bed, the machine then being in readiness for a second operation.

Obviously some features of my invention may be used without others, and the invention may be embodied in widely varying forms; therefore,

Without limiting the invention to the construction shown and described, or enumerating equivalents, I claim and desire to secure by Letters Patent the following:—

1. An expanding and contracting die for an in-folding machine, comprising in combination with the expanding and contracting plates thereof, means for temporarily backing up said plates near their edge portions, substantially for the purpose described.

2. A die for an infolding machine comprising expanding and contracting fold-defining parts and movable means constructed and fitted to back up said fold-defining parts, in combination with fold-pressing means operative through said fold-defining parts and said movable means.

3. A die for an in-folding machine, comprising a plate or plates for defining the folds to be formed in a blank, means to effect the removal of said fold-defining plate or plates from its fold defining position, and means for subsequently backing up such plate or plates, whereby the die may cooperate in bringing about a powerful creasing pressure upon such folds.

4. In a folding machine, the combination of a support for the blank, a die which comprises a fold-defining plate or plates capable of withdrawing from their fold defining position, in-folding mechanism for folding edge portions of the blanks over edge portions of the die, and pressing mechanism for forcing the die and the said support toward each other relatively subsequently to the withdrawal of the plates of the die from the folds of the blanks and their return movement above the folds; the said die provided with means whereby said fold-defining plate or plates may be strengthened or backed up during the pressing operation, whereby when said pressing mechanism is operated a powerful creasing pressure is transmitted to the folds of the blanks to fix such folds with a sharp crease.

5. In a machine for folding cuff blanks or analogous articles, the combination of a support for the blanks, a templet having expanding and contracting plates provided with thin edge portions which are adapted to bear directly upon the blanks upon said support, and within edge portions of the blanks, for defining the folds of the blanks,

infolders constructed to move inwardly and outwardly whereby edge portions of the blanks may be folded over edge portions of the templet, means to temporarily strengthen or back up the said edge portions of templet plates, and means to apply a powerful creasing pressure to said templet plate edge portions while so strengthened, to be communicated thereby to the infolders while the latter are in their inward position, whereby the folds of the blanks may be pressed between the support and the infolders after withdrawal of the plates of the templet from the folds and thereby fixed with a sharp crease.

6. In a folding machine, the combination of a support for the blanks to be infolded, an expanding and contracting die having edge portions adapted to bear directly upon the blanks upon said support and within edge portions of said blanks, infolders fitted to move inwardly and outwardly for folding edge portions of the blanks over edge portions of the die, a treadle with operative connections between the treadle and die for forcing the die downwardly, and means for automatically backing up the edge portions of the die during the pressing operation; whereby a blank may be infolded, the die contracted, elevated, expanded and lowered upon the infolders above the folds of the blanks, and said treadle operated to effect a powerful creasing pressure between the support and infolders, to fix the folds with a sharp crease.

7. In a folding machine, the combination of a support for the blanks to be infolded, an expanding and contracting die having edge portions adapted to bear directly upon the blanks upon said support and within edge portions of said blanks, infolders fitted to move inwardly and outwardly for folding edge portions of the blanks over edge portions of the die, a treadle with automatically attachable and detachable connections between the treadle and die for forcing the die downwardly, and means for automatically backing up the edge portions of said die during the pressing operation; whereby a blank may be infolded, the die contracted, elevated, expanded and lowered upon the infolders above the folds of the blanks, and said treadle operated to effect a powerful creasing pressure between the support and infolders, to fix the folds with a sharp crease.

8. A die for an in-folding machine, having a fold-defining plate or plates capable of withdrawal from their fold defining position, in combination with a movable brace or braces normally backing up said plates whereby the die coöperates in pressing the folds of the blanks, and a pusher or pushers whereby said brace or braces are temporarily removed during the in-folding operation.

9. In a folding machine, the combination of a support for the blanks, a die which comprises a fold-defining plate or plates capable of withdrawing from the folds of the blanks, in-folding mechanism for folding edge portions of the blanks over edge portions of the die, and pressing mechanism for forcing the die and the said support toward each other relatively subsequently to the withdrawal of the plates of the die from the folds of the blanks and their return movement above the folds; the said die provided with means whereby said fold-defining plate or plates are strengthened or backed up during the pressing operation, whereby when said pressing mechanism is operated a powerful creasing pressure is transmitted to the folds of the blanks to fix such folds with a sharp crease; said backing up means comprising braces movable from operative to inoperative positions.

10. In a folding machine, the combination of a support for the blanks, a die which comprises a fold-defining plate or plates capable of withdrawing from the folds of the blanks, in-folding mechanism for folding edge portions of the blanks over edge portions of the die, and pressing mechanism for forcing the die and the said support toward each other relatively subsequently to the withdrawal of the plates of the die from the folds of the blanks and their return movement above the folds; the said die provided with means whereby said fold-defining plate or plates are strengthened or backed up during the pressing operation, whereby when said pressing mechanism is operated a powerful creasing pressure is transmitted to the folds of the blanks to fix such folds with a sharp crease; said backing up means comprising vertically extending movable bracing members having springs holding the same normally in outward or operative position, and means for moving said braces into inoperative position during the folding operations.

11. In a folding machine, the combination of a support for the blanks, a die which comprises a fold-defining plate or plates capable of withdrawing from the folds of the blanks, in-folding mechanism for folding edge portions of the blanks over edge portions of the die, and pressing mechanism for forcing the die and the said support toward each other relatively subsequently to the withdrawal of the plates of the die from the folds of the blanks and their return movement above the folds; the said die provided with means whereby said fold-defining plate or plates are strengthened or backed up during the pressing operation, whereby when said pressing mechanism is operated a powerful creasing pressure is transmitted to the folds of the blanks to fix such folds with a sharp crease; said backing up means comprising vertically extending movable braces having

means for holding the same normally in operative position, and a part extending into the path of the infolders whereby the braces may be moved into inoperative position when the infolders are moved inwardly.

12. In a folding machine, the combination of a support for the blanks, a die which comprises a fold-defining plate or plates capable of withdrawing from the folds of the blanks, in-folding mechanism for folding edge portions of the blanks over edge portions of the die, and pressing mechanism for forcing the die and the said support toward each other relatively subsequently to the withdrawal of the plates of the die from the folds of the blanks and their return movement above the folds; the said die provided with means whereby said fold-defining plate or plates are strengthened or backed up during the pressing operation, whereby when said pressing mechanism is operated a powerful creasing pressure is transmitted to the folds of the blanks to fix such folds with a sharp crease; said backing up means comprising vertically extending movable braces having means for holding the same normally in operative position, and a part extending into the path of the infolders whereby the braces are moved into inoperative position when the infolders are moved inwardly, the said part fitted to move or swing upwardly during the pressing operation.

13. In a folding machine, a die having a thin fold-defining plate, and a brace normally bearing against the fold-receiving portion of the die-plate and movable from such normal position, in combination with fold-pressing means operative through said brace and said die-plate.

14. In a folding machine, a die having a thin fold-defining plate, a brace normally bearing against the fold-receiving portion of said die-plate, means for automatically moving said brace from such normal position, and automatically operative means for throwing said brace-moving means out of operative position.

15. In a folding machine, a die having a thin fold-defining plate, a brace normally bearing against the fold-receiving portion of said die plate, an infolder, and means moving simultaneously with said infolder to move said brace from its normal position.

16. In a folding machine, a die having a thin fold-defining plate, a brace normally bearing against the fold-receiving portion of said die-plate, an infolder, pressing means, means moving simultaneously with said infolder to move said brace from its normal position, and means to return said brace to its normal position before the operation of said pressing means.

17. In a folding machine, a combined die and pressing device, comprising a stock portion and a thin fold-defining plate, to-

gether with a brace normally extending between said stock portion and the fold-receiving portion of said die-plate and movable from its normal position.

18. In a folding machine, a combined die and pressing device, comprising a stock portion and a thin fold-defining plate, a brace normally extending between said stock portion and the fold-receiving portion of said die-plate, an infolder, and means moving simultaneously with said infolder serving to move said brace from its normal position.

19. In a folding machine, a combined die and pressing device comprising a stock portion and a thin fold-defining plate, a brace normally extending between said stock and said plate and near the edge of said plate, an infolder, and means extending between said infolder and said brace, whereby the inward movement of one is communicated to the other.

20. In a folding machine, a bed, a combined die and pressing device comprising a stock portion and a contractible fold-defining plate, a brace normally extending between said stock and said plate, and near the edge of said plate, an infolder, means for giving said infolder and said plate relatively overlapping movement, whereby a blank is folded, means for moving said brace from its normal position during such folding movement, means for withdrawing said plate from such fold, and means for forcing said plate upon said infolder with said brace in normal position, whereby a creasing pressure is given to such fold.

21. In a folding machine, a support for a blank to be folded, a die having a fold-defining plate over which the edge of the blank is folded, a brace normally bearing against the fold-receiving portion of the die-plate and movable from its normal position, and fold-pressing means constructed and fitted to operate through said brace to produce compression between said plate and said support.

22. In a folding machine, a support for a blank to be folded, a die having a fold-defining plate, a brace normally bearing against the fold-receiving portion of said die-plate and movable from such normal position, an infolder, means for moving said infolder over the edge of said plate to fold an edge of the blank, and automatically operating means for moving said brace from its normal position during the folding operation.

23. In a folding machine, a support for a blank to be folded, a die having a fold-defining plate, a brace normally bearing against the fold-receiving portion of said die-plate and movable from such normal position, an infolder, means for moving said infolder over the edge of said plate to fold

an edge of the blank, automatically operating means for moving said brace from its normal position during the folding operation, means for pressing the fold of the
5 blank, and means for returning said brace to its normal operative position after the completion of the folding operation and before the pressing operation.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GARRY J. DORMANDY.

Witnesses:

E. O. HOUSE,

E. H. HOUSE.