

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

935,786.

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

FIG 1

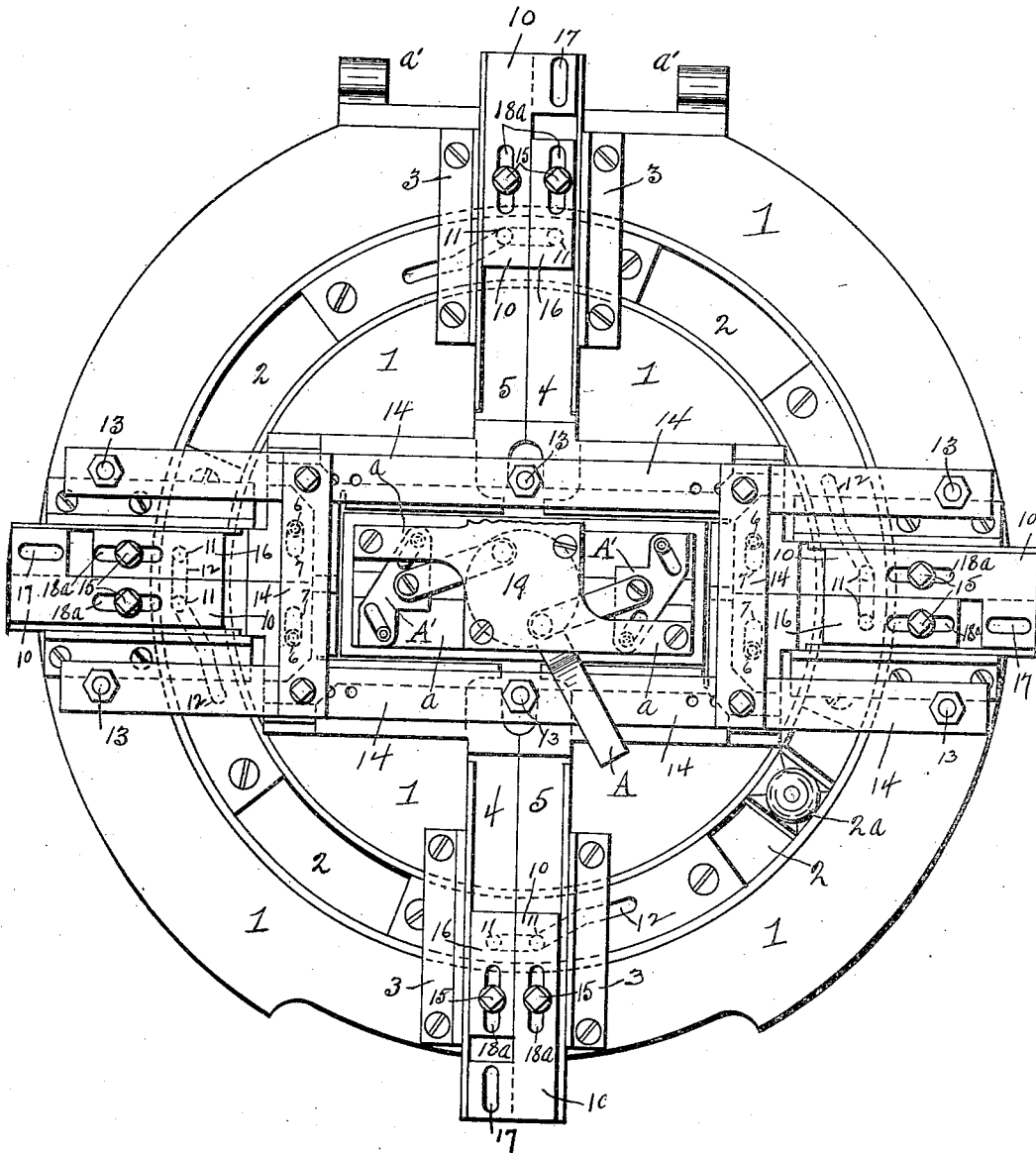
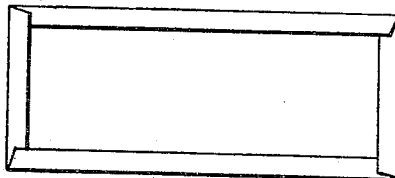


FIG 10

WITNESSES

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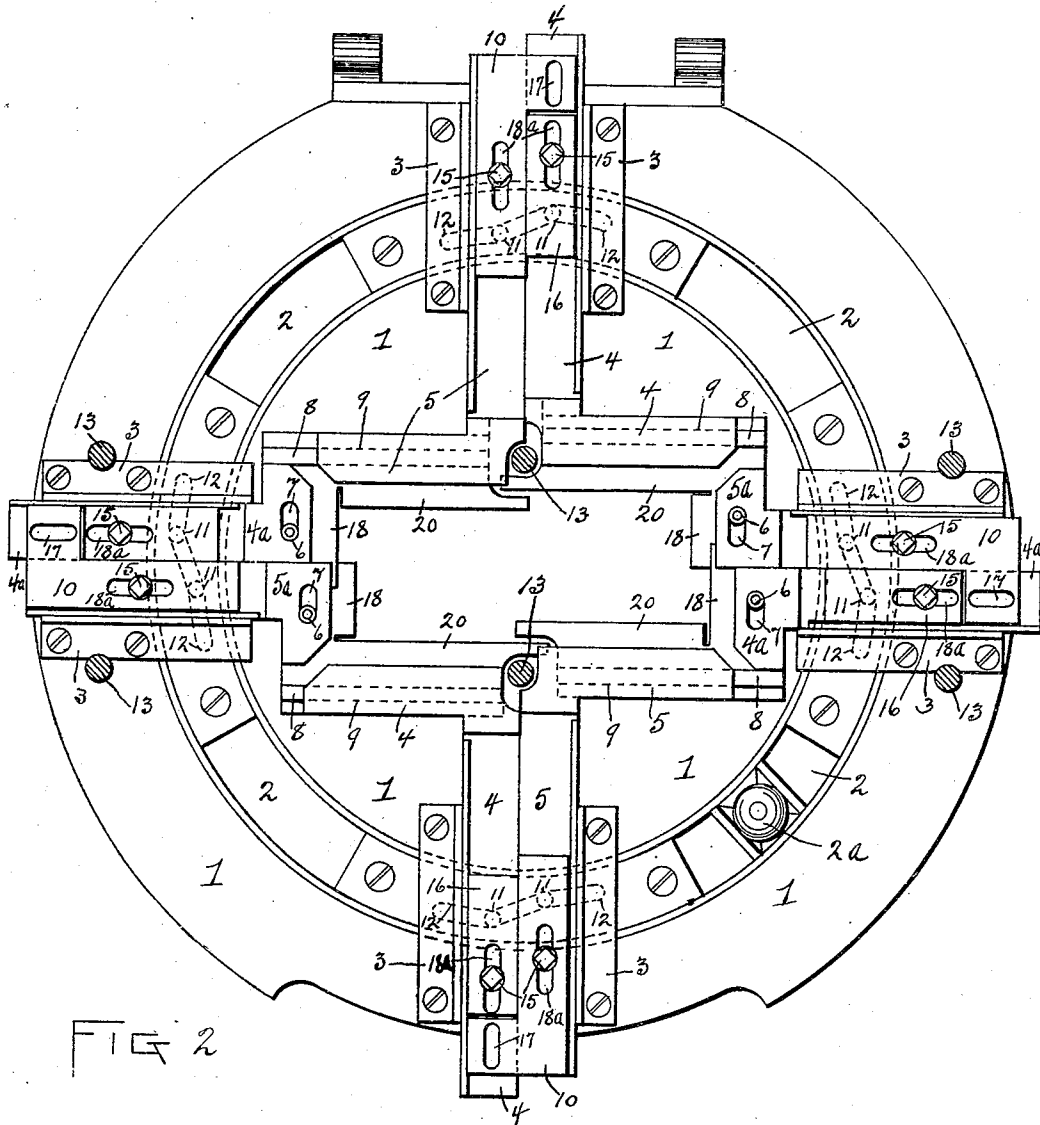
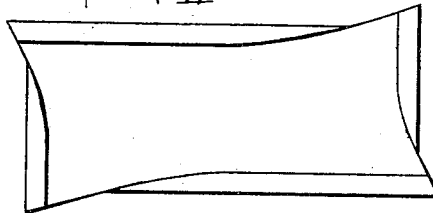


FIG 2

FIG 11

WITNESSES

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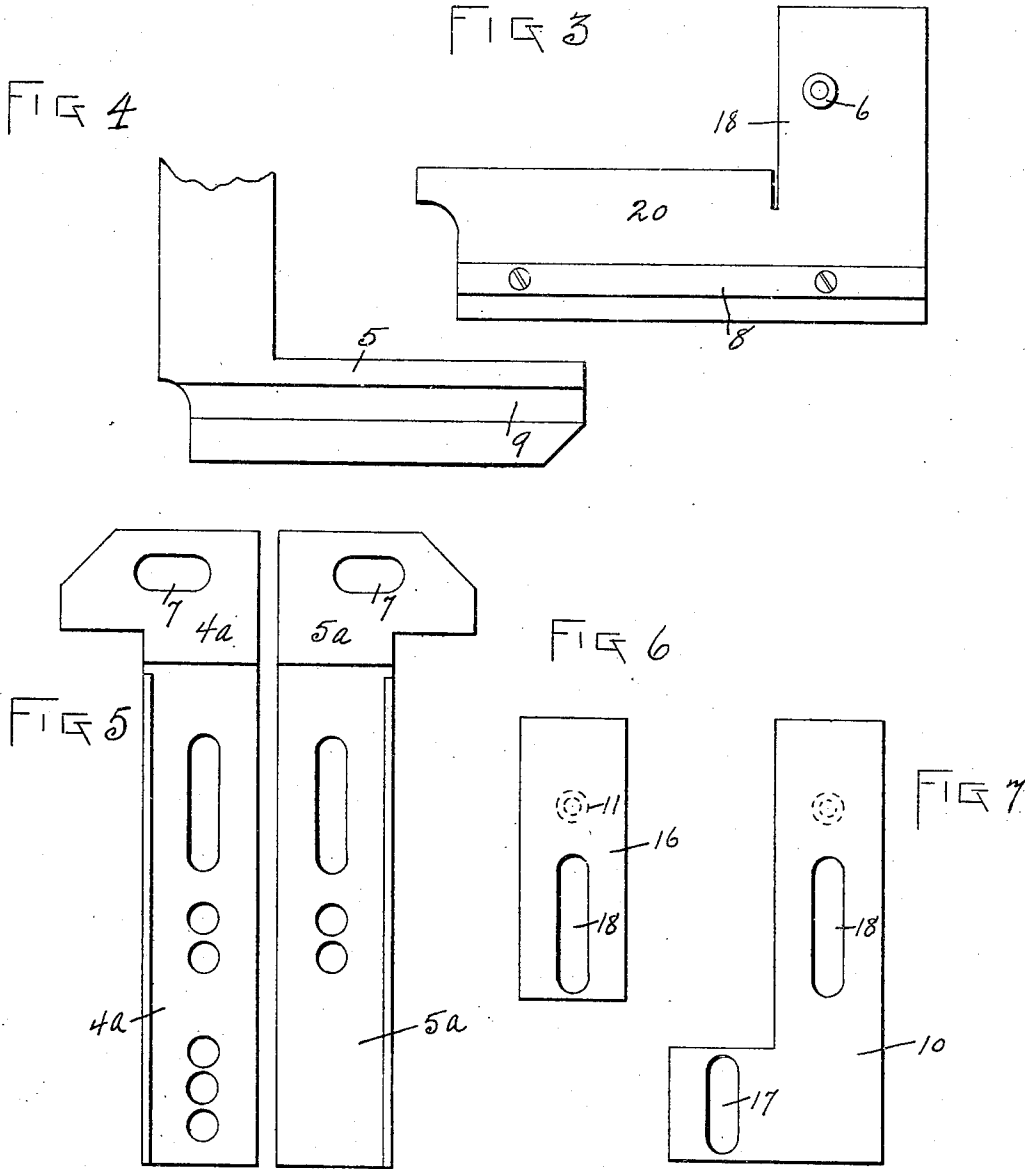
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5 SHEETS—SHEET 3.



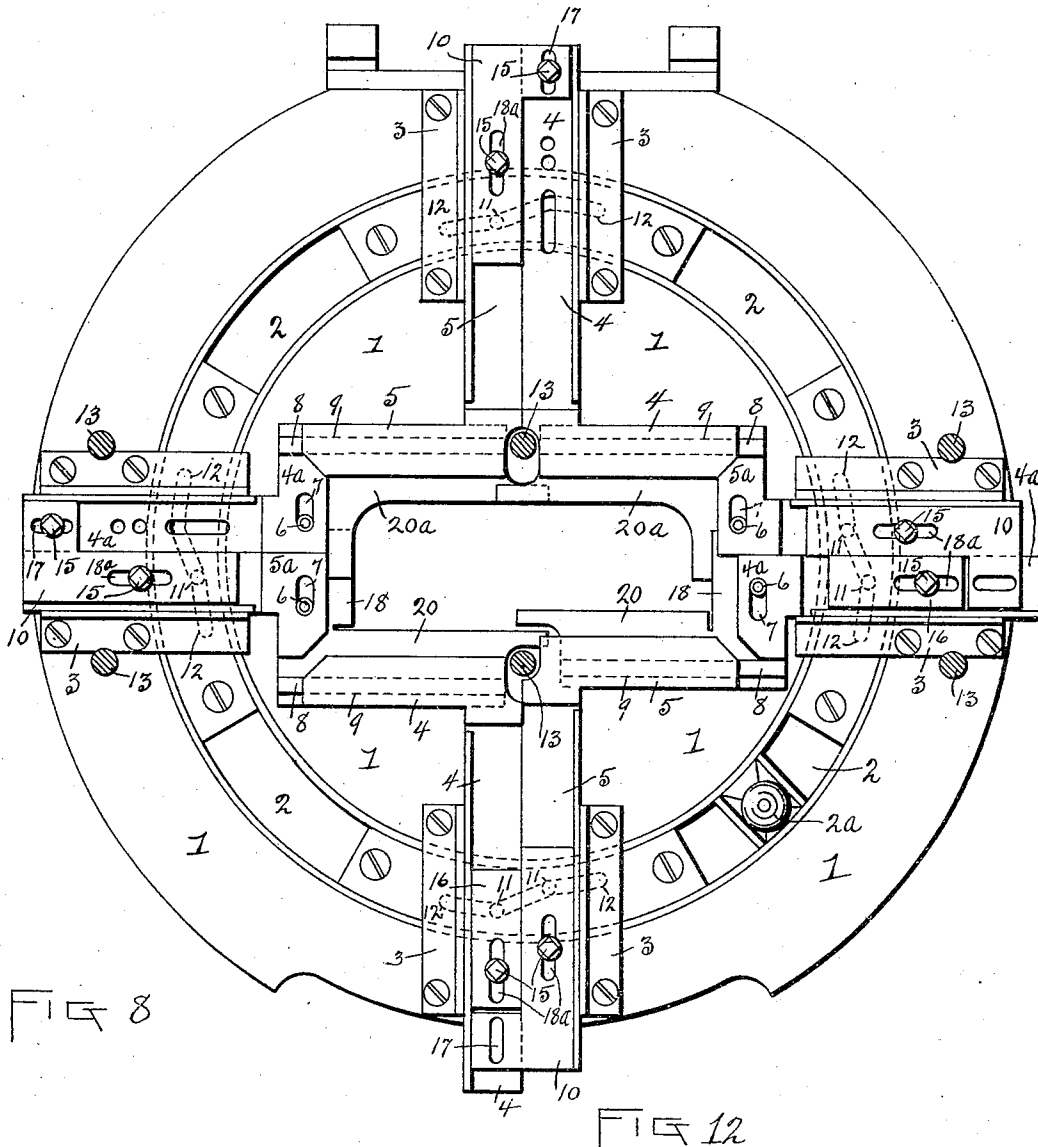
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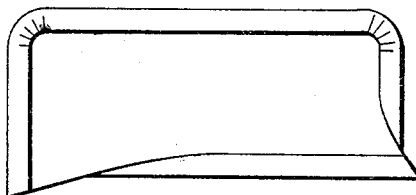
935,786.

Patented Oct. 5, 1909.
6 SHEETS—SHEET 4.



WITNESSES

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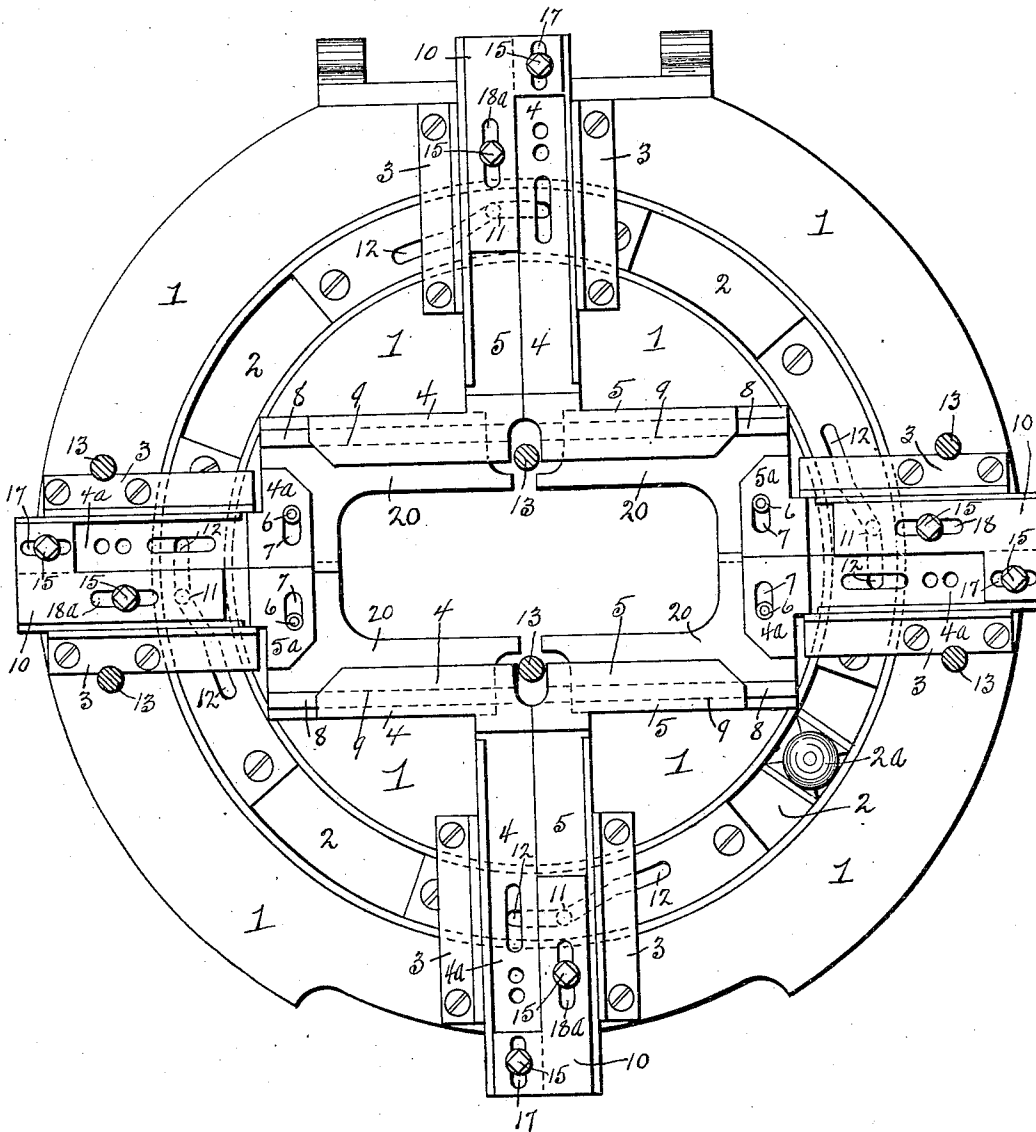


FIG 9

WITNESSES
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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.

935,786.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed June 8, 1904. Serial No. 211,610.

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 inturning or infolding the edges of blanks for cuffs, collars or like articles; and more particularly to mechanisms and parts for effecting the folding and pressing of the folds of blanks intended to constitute the two parts of a cuff or analogous article preparatory to sewing such parts together.

One of the principal objects of my invention is to produce a machine that will afford a greater range of operation and availability as regards the character of the work to be done, and in simplifying such mechanisms and the means of adjusting and altering the same for various styles of blanks to be infolded, or for forming the various kinds of folds which may be produced upon such blanks.

Another object is to produce a machine capable of certain special classes of work, which it has heretofore been impracticable to accomplish upon a single machine.

Other objects will appear during the description hereinafter followed.

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 my invention showing the parts in their initial position ready for operation upon a cuff blank having four square corners; Fig. 2 is a plan view of the machine shown in Fig. 1 with the die or templet and the pressure producing parts omitted; the mechanisms being in an advanced stage of operation; Fig. 3 is a plan view of one of the infolder blades or plates; Fig. 4 is a bottom view of one of the side infolder slides to which the infolder blade of Fig. 3 is adapted to be slidably connected; Fig. 5 is a plan view of a pair of end infolder slides; Figs. 6 and 7 are plan views of adjusting blocks by means of which the various infolders may be adjustably connected to the infolder actuating mechanism; Fig. 8 is a plan view of a modification of my invention, which shows the same principles as applied to the infolding of blanks for cuffs having

two square and two rounded corners commonly termed "half-round"; the parts being shown in an advanced stage of operation, at which part of the blank will have been folded in actual use; Fig. 9 is a plan view of a further modification showing how the machine of Figs. 1 and 8 may be adapted to the infolding of cuffs having all four corners rounded, ordinarily termed an "all-round" or "full-round" cuff; Fig. 10 illustrates a folded blank as produced by the machine of Fig. 1; Fig. 11 shows such blank after its infolding has commenced, but before completion thereof, this being the condition in which the blank will exist when the infolders have arrived at the stage of operation illustrated in Fig. 2; Fig. 12 illustrates a half-round cuff blank which has been partly turned on a machine such as illustrated in Fig. 8, before the completion of the infolding operation.

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

The present invention relates principally to the radically new construction and arrangement of the parts comprised in the folding mechanism, and the combination thereof with the blank-supporting member or bed, the blank-defining member or templet and the pressing mechanism, all of which may be of any well known or approved form.

The drawings herewith illustrate what I consider to be the most approved forms of bed, templet and pressing mechanism as adapted to cooperate with the novel infolding mechanism hereinafter to be fully described.

The support in the present machine upon which the blanks may rest during the operations to be performed upon them may be of the circular form illustrated in several prior patents granted to me. Such bed is illustrated by the designating numeral 1.

The die employed in the present machine is of the well known expanding and contracting variety, commonly called a "collapsible die", and as illustrated in Fig. 1, it will be seen to comprise an operating handle A, which is suitably connected to a templet stock a and in a well known manner operatively connected, as by means of links, with to-and-fro moving cam plates A', which in turn have cam connections with

the members which carry the die plates proper, the latter being so mounted as to be movable inwardly and outwardly, preferably in a diagonal direction. With such an arrangement an oscillation of handle A, whether by hand or whether power-operated, will effect outward and inward movements of the die plates so as to expand and contract the templet as a whole. The purpose of so expanding and contracting the templet is in order that the plates thereof, which serve to define the blades of the blanks, may be withdrawn from such folds after their formation in order to permit a proper pressing of such folds. Therefore, I do not wish to limit myself to a contracting and expanding templet, since any templet which is capable of withdrawing from the folds of the blanks is within the contemplation of my invention; and in certain cases it might be desirable to employ a die or templet which is not intended to be withdrawn from the folds of the blanks before the latter are removed.

Any ordinary means for supporting the templet so as to be capable of being elevated from and accurately positioned upon the blanks upon the support may be employed, such as a swinging arm carrying the templet at its forward end and pivoted in bearings a' , a' , at the rear of the machine. I have shown such arm broken away to better illustrate the infolding mechanism in Fig. 1.

A convenient pressing mechanism is that illustrated in Fig. 1, as comprising parts or bars 14 which extend over all of the infolders when the latter are in their inward position; the said pressure bars being connected in suitable manner as by means of pressure rods 13, which may pass through the bed of the machine, to a treadle or other power applying means, the treadle being a well known and convenient power applying means when the machine is not operated by power.

An oscillating or to-and-fro moving member or ring 2 is employed as an infolder actuating means. Other means may obviously be employed, but a great advantage lies in the use of the oscillating ring, inasmuch as it permits the adjustment or replacement of the cam or other members which serve to transmit the oscillating motion of the ring to the infolders; and further permits all of such members to be actuated in unison. A handle 2^a is illustrated as a convenient means to oscillate the ring 2 when the same is to be done by hand.

For the formation of the blank illustrated in Figs. 1 and 10 are employed four infolder plates, each one of them having the form of an L, as will be more clear from Fig. 3, the two arms of the L extending respectively along the side and along the end of the

blank from each corner thereof. The branches of each infolder plate are represented by the numerals 20 and 18 respectively. Heretofore, such L-shaped infolders have sometimes been fitted to receive a diagonal movement inwardly and outwardly, which would obviously result in causing a bunching of the material on the blank carried over the corner of the die or templet in such diagonal movement, forming what is known as a crush corner. In order to form a so-called locked corner, various means have been devised, one of which is the provision in such infolders of a slot which is arranged in alinement with one or the other of the inner edges of the plate, as clearly shown in Figs. 1 and 3, together with means for causing the infolder to be moved inwardly, first in a direction substantially parallel with the said slot, this forming a fold along one of the adjacent sides of the blank, the extending edge of the fold passing into the said slot; and a subsequent inward movement of the infolder in a direction at an angle to its former movement, serving to infold the other adjacent edge of the blank and the extending edge of the fold already formed. This particular device I do not, in the present application, claim as new, inasmuch as I have referred to it in a prior pending application. For effecting the inward movements of the L-shaped infolder plates in two directions successively, I have illustrated the following novel means: For each infolder plate there are provided two slides which are guided in directions at an angle to each other, preferably a right angle, as shown in Figs. 1 and 2. Referring for convenience to Fig. 2 and taking the lower left-hand infolder plate, the two arms of which are marked 18 and 20 respectively, the operating mechanism therefor will be seen to consist in the forwardly extending slide 4, which is guided to move toward and from the operator, and the laterally extending slide 5^a which is guided to move to the left and right. The infolder plate is not rigidly connected to either of the operating slides 4 or 5^a, but is movably connected with both of them in such manner that by giving proper extent and speed of inward and outward movement to the respective slides, any manner of inward and return movements may be communicated to the infolder blade.

A convenient mode of movably connecting the infolder blade with its two actuating slides is by providing a sliding connection between the infolder blade and one of the slides and a slotted connection between the infolder blade and the other slide. Thus the slide 4 is shown to be provided with a groove or a slide-way 9 which is preferably parallel to the edge of the infolder blade and is adapted to engage with a tongue 8 formed upon the branch 20 of the infolder blade.

With such arrangement it is obvious that forward and backward movements of the slide 4 will effect outward and inward movements, relative to the blank, of the branch 20 of the infolder blade, at the same time leaving the infolder blade free to be moved in a direction at right angles to the movement of slide 4. Instead of providing a similar connection between the branch 18 of the infolder blade and the slide 5^a it is sufficient to simply provide a slotted connection, preferably by forming a slot 7 in the slide 5^a to engage a roller stud 6 upon the infolder blade. By this means inward and outward movements of the slide 5^a may effect inward and outward movements of the branch 18 of the infolder blade relatively to the blank, independently of the movement of the infolder blade effected through the slide 4, as already described. The remaining four infolder blades are shown as being constructed and fitted in precisely analogous manner, the description of which it is unnecessary to repeat. The slides 4, 4^a, 5 and 5^a are preferably of an L form, as shown in Figs. 1, 4 and 5, in order to better carry out the purposes described. The guiding means for the slides 4, 4^a, 5 and 5^a may conveniently be analogous to that shown in my said prior patents, and consists in slide-ways formed by means of members 3, 3, which may be attached to the bed of the machine in an adjustable or replaceable, or other suitable manner.

As a special improvement, and one which is permitted by the already described arrangement of infolder operating slides, I have shown each slideway constructed large enough to contain the slides 4 and 5, or the slides 4^a and 5^a of two adjacent infolders. This forms a more simple construction, dispensing with otherwise necessary parts; permits the two slides to be operated through a single cam, as will hereinafter appear; and further permits the use of an inter-connection through which the two slides within the single slideway may be secured to each other to form in effect a single slide for certain purposes.

10 and 16 represent adjusting blocks, each one of which may be adjustably attached to one of the pair of slides mounted in each slideway. These adjusting blocks are provided with slots 18^a, by which they are adapted to be secured by bolts 15 to the slides 4 and 5 respectively. The adjusting blocks are each provided with a downwardly extending pin 11 which may or may not be provided with a roller and which is adapted to pass through slots provided in the slides 4 and 5 for that purpose (see Fig. 5) and to engage with cam slots 12 formed in the oscillating ring 2 or in cam plates removably attached thereto. The infolder actuating cams 12 are so formed, as illustrated in Figs. 1 and

2, that the cam pins 11, 11, corresponding to the slides 4, 5, respectively, are in initial position engaged with a concentric or inoperative portion of the cam; this concentric portion being succeeded by an eccentric portion serving to carry in succession the two pins 11, 11, inwardly; and thereafter a second concentric portion.

Sometimes it is desirable to produce a blank by the method which I have conceived and illustrated in Figs. 10 and 11, namely by folding one end portion of each edge of the blank in alternation, and subsequently folding the other end portion of each edge of the blank, and with it the overlapping portion of the fold already formed. This results in the blank of Fig. 10, whose construction is such that any two blanks may be interlocked in a simple and obvious manner, and with either end of one blank engaging either end of the other. This result is easily effected in the machine of Figs. 1 and 2 by providing the cams 12 all of identical construction. Fig. 2 shows such cams as having operated upon one of each pair of cam pins and the slides 5, 5, 5^a and 5^a connected therewith, at which stage each of the L-shaped infolder blades is moved inwardly in only one direction and the blank at such stage having assumed the form illustrated in Fig. 11. A continued movement of the oscillating ring 2 (which of course may be continuous from the initial movement until the infolding is complete) serves to force inwardly the remaining slides 4, 4, 4^a and 4^a to complete the infolding of the blank.

The operation of the machine of Figs. 1 and 2 as above described may be as follows: The operator places one or more thicknesses of material constituting a blank upon the bed of the machine in the position in which the plates of the expanded die or templet may be brought into contact with the blank, the edge portions of the die plates resting directly upon the blanks upon the bed or support and within edge portions of the blanks. At this initial stage of the operation, the infolders will be in their outward position, as shown in Fig. 1. Having brought the expanded die into contact with the blanks the operator then, by means of the handle, moves the oscillating ring 2 in the direction of the hands of a watch. The first effect of this is through the cam pins 11 to force inwardly the slides 5, 5, 5^a and 5^a, which partly completes the infolding of the cuff blank; and the continued movement of the oscillating ring effects the inward movement of the remaining slides 4, 4, 4^a and 4^a, thus completing the infolding. The next step will be to withdraw the plates of the die from within the folds of the blank and then to bring into operation the pressing mechanism to squeeze the folds and thereby fix them with a sharp crease, which may be

assisted by suitably heating the bed of the machine. The die may now be elevated, if it has not already been elevated, and the infolders may be moved outwardly by the return oscillation of the ring 2, the blank removed, and the machine is then in readiness for a new operation.

With the modifications of Figs. 8 and 9, where rounded corners are shown, there is no possibility of producing four locked corners, inasmuch as the rounded corners are preferably formed by crushing or forcing in diagonally the extending edges of the blanks. Therefore a modified operation is necessary.

The machine of Fig. 8 may be constructed simply by removing two of the infolder blades of the machine of Fig. 1 and substituting blades of rounded form and then re-adjusting the infolder operating mechanism as follows: In order to effect diagonal movements in the infolder blades corresponding to the two rounded corners of the cuff, it is only necessary to disconnect or remove two of the adjusting blocks 16, for example those at the left hand and rearward sides of the machine. This breaks the cam connection between the corresponding slides 4, 4^a and the oscillating ring. The purpose of the off-set of the adjusting blocks 10 (Figs. 1, 2, 7 and 8) will now be apparent. The adjusting screws 15, which formerly connected slides 4, 4^a to the adjusting blocks 16, are now employed to rigidly connect the adjusting blocks 10, 10 to said slides 4, 4^a, as clearly shown in Fig. 8, whereby the slides 4 and 5 at the rear of the machine are rigidly connected so that they will move inwardly in unison, and the same is true of the slides 4^a and 5^a at the left. The modified operation of such machine will be as follows: On the initial movement of the oscillating ring not only will all the slides 5, 5, 5^a and 5^a be moved inwardly (as described in connection with the machine of Fig. 1), but also will the slide 4, at the rear of the machine, and the slide 4^a at the left, be moved inwardly, the resultant action upon the two rounded infolder blades 20^a being a diagonal movement. This stage of operation is represented in Fig. 8 and the condition that the cuff blank will assume at this stage is illustrated in Fig. 12. The continued movement of the oscillating ring will serve to carry in the remaining slides 4 and 4^a to complete the infolding. This forms a locked-corner half-round cuff blank of advantageous construction and such that any two blanks may be interlocked without the necessity of employing two machines, or of re-adjusting a machine to produce the complementary portions of the cuff.

The modification shown in Fig. 9 consists in making the same change in the form of infolder blade as that described in connection with Fig. 8, upon all four corners, whereby the so-called "full-round" cuff is

produced. With this arrangement it is preferable to remove all of the adjusting blocks 16 and to connect all of the adjusting blocks 10 with the corresponding slides 4 and 4^a, whereby all of the infolder blades will be adapted to receive diagonal inward and outward movements, as already described in connection with Fig. 8.

The formation of the oscillating ring 2 and the cams secured therein is such as to render the latter adjustable relatively to the ring. The curvature of the cams corresponds with the curvature of the ring, and the cams can be set at any point desired or can be detached and replaced. When screws such as those shown in Fig. 1 are employed for securing the cams in place on the ring, the adjustment can be secured by forming a new threaded hole in the ring for each position of the screws, or the adjustment may be accomplished as has been set forth in previous patents granted to me. I refer particularly to Letters Patent 714,787, granted Dec. 2, 1902.

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, nor enumerating equivalents, I claim and desire to secure by Letters Patent the following:

1. A folding machine having an infolder for folding two blank edge portions meeting at a corner of the blank and the following actuating means therefor: an inwardly and outwardly sliding rigid slidebar, a movable connection between said slidebar and infolder whereby the slidebar may communicate its inward and outward movements to the infolder but also permitting the latter to move transversely to said slidebar, a second rigid slidebar also connecting with the infolder but independent of the first named slidebar and arranged in a relatively transverse direction thereto; and a rigid to-and-fro moving actuating part with direct connections to each of said slidebars whereby said actuating part may effect the movements of the infolder through both of said slidebars.

2. A folding machine having an infolder for folding two blank edge portions meeting at a corner of the blank and the following actuating means therefor: a rigid bar fitted to move inwardly and outwardly, a movable connection between said bar and infolder whereby the bar may communicate its inward and outward movements to the infolder but also permitting the latter to move transversely to said bar, a second rigid bar also connecting with the infolder and also fitted to move inwardly and outwardly but independent of the first named bar and arranged in a relatively transverse direction

thereto; and a rigid actuating part having direct connections to each of said bars, said actuating part being annular in form and in location substantially surrounding the space enclosed by all the infolders on said machine, so that a number of separate infolders may be connected to and operated from said part.

3. A folding machine having an infolder for folding two blank edge portions meeting at a corner of the blank and the following actuating means therefor, a rigid bar fitted to move inwardly and outwardly, movable connections between said bar and infolder whereby the bar may communicate its inward and outward movements to the infolder, but also permitting the latter to move transversely to said bar, a second rigid bar also connecting with the infolder, the same being independent of the first named bar and extending outwardly from the infolder in a direction relatively transverse to the first bar and adapted to be moved inwardly and outwardly in the direction of its length; and a rigid actuating part oscillating in a horizontal plane and having a direct connection to, for pushing inward and pulling outward in the direction of its length, said second bar, and also having a direct connection for moving said first bar.

4. A folding machine having an infolder for folding two blank edge portions meeting at a corner of the blank, and the following actuating means therefor: an inwardly and outwardly moving rigid bar, a movable connection between said bar and infolder whereby the bar may communicate its inward and outward movements to the infolder, but also permitting the latter to move transversely to said bar, a second rigid bar independent of the other and arranged in a relatively transverse direction thereto; a rigid actuating member with direct connections for actuating both said slidebars, at least one of said connections being changeable, whereby said bars may be moved simultaneously or in sequence as desired, and the infolder thereby caused to move inward diagonally or in two different directions, as desired.

5. A folding machine having an infolder for folding two blank edge portions meeting at a corner of the blank, and the following actuating means therefor: an inwardly and outwardly sliding slidebar, a movable connection between said slidebar and infolder whereby the slidebar may communicate its inward and outward movements to the infolder, but also permitting the latter to move transversely to said slidebar, a second slidebar independent of the other and arranged in a relatively transverse direction thereto; a to-and-fro moving part for actuating said slidebars, movement transmitting connections between said part and said slidebars, one of which connections is detachable,

and the slidebar corresponding to the detachable connection adapted to be coupled with a slidebar of an adjacent infolder; and such adjacent infolder and slidebar therefor.

6. A folding machine having an infolder for folding two edge portions meeting at a corner of a blank, two independent slides one of which moves at an angle with the other, a sliding connection between said infolder and one of said slides, a to-and-fro moving part for actuating said slides, and connections including adjustable cam engaging members between said part and said slides, whereby said slides may be moved simultaneously or in sequence, as desired.

7. In a folding machine, inwardly and outwardly moving infolders, a slideway, a plurality of slides engaged therein, each slide in connection with one of said infolders, a cam-engaging portion on each slide, and a part provided with cams for moving said slides, said cam-engaging portions being separately adjustable, whereby the movements of said slides may be independently regulated, and detachable means for connecting said slides to each other to operate in unison.

8. In a folding machine, inwardly and outwardly moving infolders, a slideway, a plurality of slides engaged therein, each slide in connection with one of said infolders, a cam-engaging portion on each of said slides, and a part for moving said slides successively in order of time through a single cam slot with which each of said cam-engaging portions engages.

9. An infolding machine comprising in combination a plurality of infolders, at least two of which are L-shaped whereby such L-shaped infolders may operate upon two adjacent blank edge portions meeting at a corner of the blank, and infolder operating mechanism comprising a number of slides arranged in pairs, each L-shaped infolder connected with two slides each of a different pair, and a part for actuating said slides.

10. An infolding machine comprising in combination a plurality of infolders, at least two of which are L-shaped whereby such L-shaped infolders may operate upon two adjacent blank edge portions meeting at a corner of the blank, and infolder operating mechanism comprising a number of slides arranged in pairs, each L-shaped infolder connected with two slides each of a different pair, cam-engaging portions and a part for actuating said slides through said cam-engaging portions, whereby the several slides may be actuated at different times, substantially for the purpose described.

11. An infolding machine comprising in combination a plurality of infolders, at least two of which are L-shaped whereby such L-shaped infolders may operate upon two adjacent blank edge portions meeting at a cor-

- ner of the blank, and infolder operating mechanism comprising a number of slides arranged in pairs, each L-shaped infolder connected with two slides each of a different pair, changeable cam-engaging portions and a part for actuating said slides through said changeable cam-engaging portions whereby the relative inward movements of the infolders may be regulated.
- 10 12. An infolding machine comprising in combination a plurality of infolders, at least two of which are L-shaped whereby such L-shaped infolders may operate upon two adjacent blank edge portions meeting at a corner of the blank, and infolder operating mechanism comprising a number of slides arranged in pairs, each L-shaped infolder connected with two slides each of a different pair, changeable cam-engaging portions and a part for actuating said slides through said changeable cam-engaging portions whereby the relative inward movements of the infolders may be regulated, and means to rigidly connect each pair of slides when forming crush corners.
- 15 23. In a folding machine, a plurality of L-shaped infolders, each adapted to fold a portion of two adjacent edges of a blank, a slide connected to each arm of each of said infolders, two of said slides each connected to a separate infolder being adjacent to each other, and means for moving said adjacent slides either successively or synchronously, including a device for fastening the said two slides together.
- 20 24. In a folding machine, a plurality of L-shaped infolders, each adapted to fold a portion of two adjacent edges of a blank, a

slide connected to each arm of each of said infolders, two of said slides each connected to a separate infolder being adjacent each other, and detachable means for coupling said adjacent slides for synchronous movement.

15. In a folding machine, a plurality of L-shaped infolders, each adapted to fold a portion of two adjacent edges of a blank, a slide connected to each arm of each of said infolders, two of said slides each connected to a separate infolder being adjacent each other, a moving part, cam connections between each of said adjacent slides and said part, one of said connections being detachable, and detachable means for coupling said slides.

16. A folding machine having a plurality of L-shaped infolders together adapted to fold a plurality of edges of a blank, a slide connected to each arm of each of said infolders, said slides being arranged in pairs which are connected to the adjacent arms of separate infolders, a moving part for actuating said slides, and connections, one of which is detachable between said slide-moving means and each pair of said slides, whereby the slides of each pair may be moved either successively or synchronously without reference to the relative time of movement of another pair.

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.