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Patented Nov. 11, 1902.

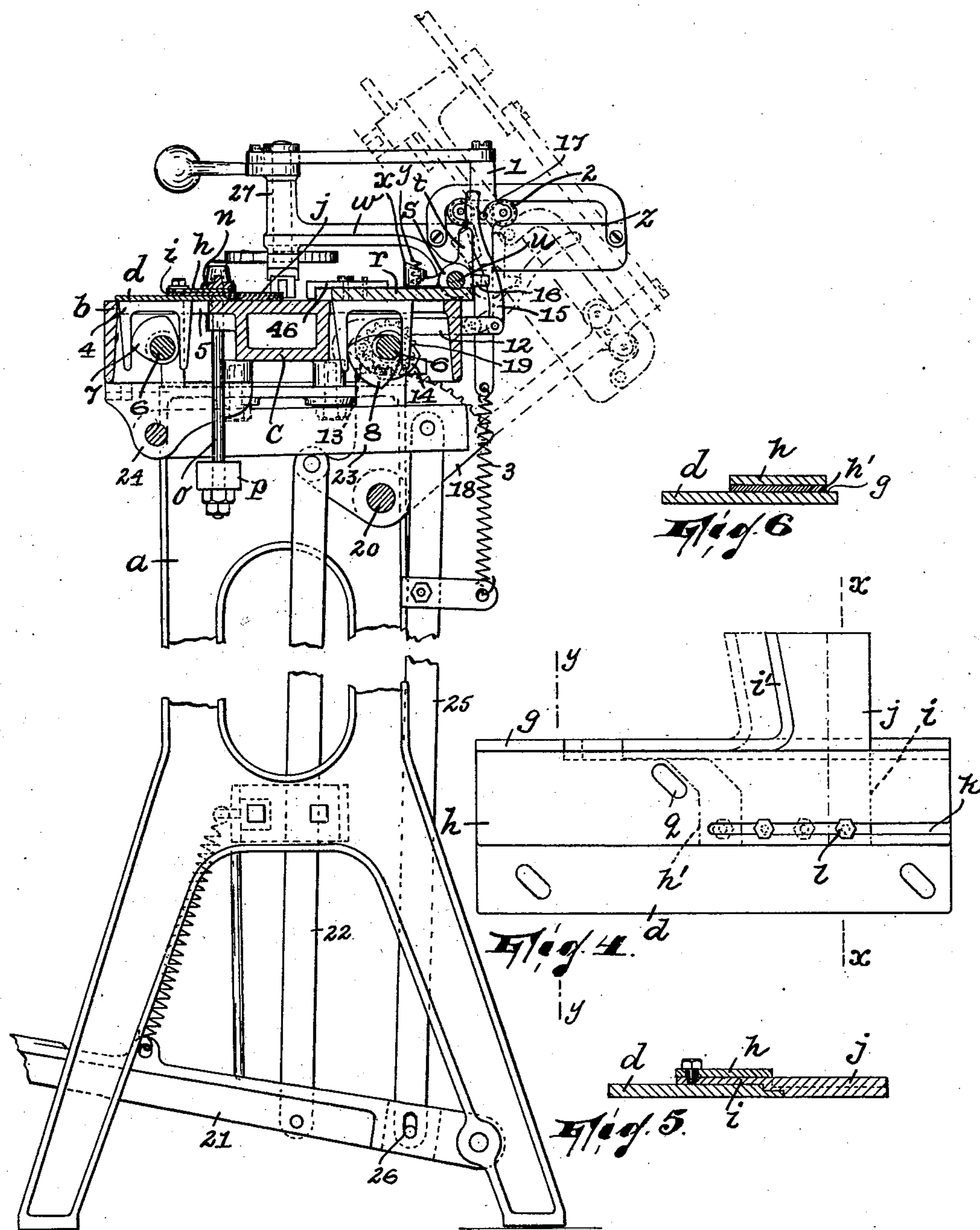
C. H. KNAPP.

MACHINE FOR FOLDING COLLAR BLANKS, &c.

(Application filed Apr. 12, 1902.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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Fig. 1.

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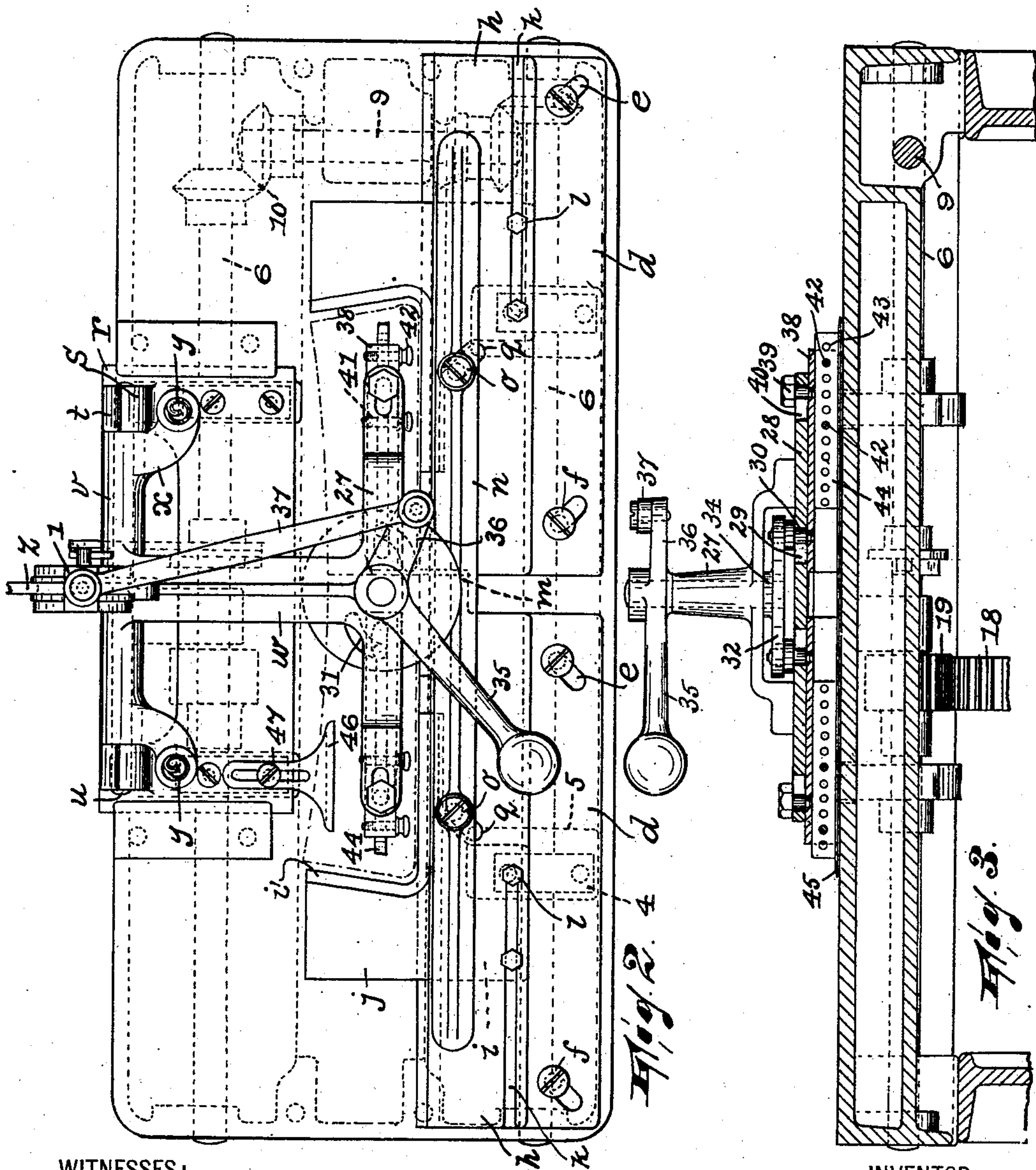
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

CHARLES H. KNAPP, OF PATERSON, NEW JERSEY.

MACHINE FOR FOLDING COLLAR-BLANKS, &c.

SPECIFICATION forming part of Letters Patent No. 713,112, dated November 11, 1902.

Application filed April 12, 1902. Serial No. 102,500. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. KNAPP, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Machines for Forming Collars, Wristbands, and the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to machines for folding collars, cuffs, wristbands, and other similar articles. Heretofore the several operations subsequent to lowering the die into position on the material to be folded and expanding the die—viz., moving the folding-plates into coöperative relation with reference to the die, so as to effect the formation of the fold in the material, contracting the die and removing it, and then applying pressure to the folding-plates, so as to crease the material where folded—have been performed by separate mechanisms, some or all of which were adapted to be operated independently of each other, usually manually. The object of this invention is to provide a machine of the kind referred to with means whereby the several operations designated may be performed all from one element as the main operating means.

The invention will be found fully illustrated in the accompanying drawings, wherein—

Figure 1 is a view, partly in side elevation and partly in vertical section, of my improved machine. Fig. 2 is a top plan view thereof. Fig. 3 is a view showing the bed and the parts which are carried thereby, except portions of the die, in section; and Figs. 4, 5, and 6 are detail views of the folding devices.

In so far as general features of construction are concerned my improved machine is patterned somewhat after that set forth in United States Letters Patent No. 668,920, issued to me February 26, 1901; but it is more nearly similar to that machine for which I filed ap-

plication for United States Letters Patent on January 17, 1902, Serial No. 90,105.

On the stand *a* is supported the usual bed *b*, which is provided with the ordinary centrally-disposed heat chest or chamber *c*, adapted to be connected with a steam or other generator of a heat-carrying medium. On the top of the bed and near the front thereof are arranged plates *d*, provided with slots *e*, which are formed obliquely in the plates and which receive guiding pins or screws *f*, that are carried by the bed. The inner longitudinal edge of each plate *d* is rabbeted, as at *g*, and between said plate and another plate *h*, which is sustained spaced from it by still another and intermediate plate *h'*, projects the blade-like guiding portion *i* of an adjustable extension-plate *j* of said plate *d*, said extension-plate having a rabbet *i'*. It should be remarked that the extension-plates *j* are not only adjustable, but removable, so that they may be substituted for others having different form, their function being to coact with certain other parts to give to the collar or other article being made by the machine its own peculiar shape. Each plate *h* is provided with a longitudinal slot *k*, receiving set-screws *l*, mounted in and designed to secure in position the extension-plate *j*.

m is simply an integral projection on one of the plates *d* and overlapping the other plate *d*, designed to insure the proper relative movement of these two parts.

n is a presser-bar which extends longitudinally across the two plates *h* near their inner edges and which is penetrated by vertical bolts *o*, which are connected at their lower ends by a cross-piece *p*. It should be remarked that each plate *d* and the plates *h* and *h'* are provided with coincident slots *q*, disposed obliquely the same as the slots *e* are, so as to permit the proper movement of the several plates in an oblique direction.

At the back of the machine and on the bed-plate is arranged another sliding plate *r*. It should be remarked that this plate has no part in the folding of the material such as the plates *d* have. This plate is formed at the back with bearings *s* and stops *t*, the bearings receiving the shaft *u* of the cylindrical fulcruming portion *v* of an arm *w*,

which carries the parts of the die of the machine. The said cylindrical portion *v* of the arm *w* is provided with integral projections *x*, carrying springs *y*, adapted to take against the stops *t* when the arm is thrown back on its fulcrums, and thereby act as buffers. The arm *w* is formed with a rearward extension *z*, constituting a guide on which is mounted a traveler 1, provided with antifriction-rollers 2, which run on said guide. The lower end of this traveler is connected with the frame by a spiral spring 3. As this traveler is movable on the guide, when it is near the fulcrum end thereof it acts to some extent to keep the parts horizontal, as shown in Fig. 1; but when it is moved back on the guide it tends to throw the parts into the dotted-line position shown in said figure.

The several plates *d* and *r* carry downwardly-extending forked projections 4, penetrating slots 5 in the bed of the machine. Lengthwise of the machine extend two revolvable shafts 6, carrying cams 7 and 8, the cams 7 being received by the forked projections 4 of and thus adapted to reciprocate the plates *d* and the cams 8 being received by the forked projection of and thus adapted to reciprocate the plate *r*. The cams 7 may have any arrangement dependent upon the relative movement which the two plates *d* and the parts they carry are to have. The two shafts are operatively connected by a short shaft 9, to which they are coupled by intermeshing bevel-gearing 10. The several shafts are preferably journaled in some portion of the bed. Relatively to the cams 7 the cams 8 should be so arranged that after the former have effected the inward movement of the plates *d* and the parts they carry the plate *r* shall be moved rearwardly by its cam 8 to assist in effecting certain steps in the operation of the machine hereinafter to be particularly pointed out.

In the rear vertical portion 11 of the bed *b* is guided a hook 12, which receives the rear shaft 6 and is provided on one side face thereof with an antifriction-roller 13, which is adapted to be engaged by a cam 14 on said rear shaft 6, so as to move the hook longitudinally. The rear end of the hook is pivotally connected to the lower end of a lever 15, which is afforded a shifting or movable fulcrum in a bifurcated projection 16 at the back of the plate *r*, the upper end of the lever being engaged with a pin 17, projecting laterally from the traveler 1. Thus on turning the shaft 6 the cam 14 will wipe against the roller 13, thus forcing the hook 12 inwardly, so as to turn the lever 15 on its fulcrum. Somewhat previously the cams 8 started to force the plate *r* rearwardly, so that said plate *r* and hook 12 are for a time moving together, but in opposite directions, with the result that an increased motion is imparted to the upper end of the lever 15. The lever by engaging the pin 17 forces the traveler 1 rearwardly, which in the manner above set forth causes the arm

w to be thrown into the dotted-line position shown in Fig. 1. Upon a reverse movement of the shaft the plate will be caused to move inwardly, thus releasing the lever 15, and when the arm *w* is again thrown into the horizontal position, manually, the spring 3 pulls on the traveler to return it to its forward position and by pin 17 to reset lever 15.

The various shafts are rotated back and forth by means of a segment 18, which engages a pinion 19 on the rear shaft 6 and which is journaled on a stub-shaft 20 below said rear shaft. 21 is a treadle-lever, which is connected with an eccentric point on the segment by a pitman 22, being adapted, as it is raised and lowered by foot power, to rock the segment 18 back and forth, and so rock the shafts 6 through the pinion 19.

23 is a lever which is fulcrumed in a bracket 24 under the bed *b* and extends over the cross-piece *p*. Its free end is connected with the treadle-lever 21 by another pitman 25, said pitman 25 having a slot-and-pin engagement 26 with the treadle-lever 21, so that the treadle-lever does not begin to effect movement in the lever 23 until it has moved the segment a considerable distance. By means of the treadle-lever, pitman 25, lever 23, cross-piece *p*, bolts *o*, and presser-bar *n* the plates *d* and the parts they carry are forced down against the material, which has been meantime folded by the coaction of said plates and the die, so as to press against the material and crease it.

The free end of the arm *w* is formed with a head 27, carrying a rigid plate 28, having longitudinal slots 29, in which are guided pins 30, whose upper ends are received by cam-slots 31 in a disk 32, having a spindle 34, which is journaled in the head 27 of said arm and carries a handle 35. It should be remarked that a crank 36, forming a portion of the handle, and the traveler 1 are connected by a pitman 37.

38 represents die-holders, preferably formed of inverted-U-shaped material, as seen in Fig. 1, and carrying the pins 30. They are guided for true rectilinear movement longitudinally of the head of the arm by pins 39, which penetrate slots 40 in the plate 28. Said die-holders are penetrated by two or more orifices 41, adapted to receive pins 42, which may project through any two of a series of orifices 43 in blocks 44, to which the die-plates 45 are directly connected. By means of the pins and orifices the size of the die proper formed by the die-plates 45 may be adjusted.

46 is a finger which is secured for adjustment backward and forward from the front of the machine by a slot-and-pin connection 47 with the plate *r*, it being designed to hold and steady the material while being operated upon.

Operation: Assuming that the various parts stand in the relative disposition shown in full lines in Fig. 1, where the die is resting on the bed expanded and the plates *d* in their retracted position, the treadle 21 is pressed

upon and through the pitman 22, segment 18, pinion 19, rear shaft 6, coupling-shaft 9, front shaft 6, cams 7, and forked projections 4 moves the plates *d* inwardly obliquely, so that they, with their extension-plates *j*, coact with the expanded die-plates 45 to fold the edges of the material being acted upon and upon which said die rests back over the edges of the die-plates. Slightly subsequently the cams 8 come into play by engaging the forked projection 4 of the plate *r* to push the latter rearwardly, said plate carrying with it the arm *w*, in which the die is mounted. At the same time plate *r* pushes back against lever 13, which in turn through pin 17 pushes rearwardly on the traveler 1, the said action of the lever on the traveler being slightly later augmented by the pull of the hook 12 on the lower end of lever 15, said hook being at this time acted upon by the cam 14. As the traveler approaches the rear end of the guide *z* the spring 3 connected to it causes the arm and the parts it carries to be thrown into the dotted-line position shown in Fig. 1. The rearward movement of the traveler causes the pitman 37 to turn crank 36, and so rotate the cam-disk 32 to thus effect the contracting of the die, so that by this means and also by the rearward motion of the plate *r* said die is previously to being elevated by the arm *w* thrown out from under the plates *d* and *j*. As the segment 18 approaches the limit of motion which the pitman 22 is adapted to impart to it the lever 21 (whose slot-and-pin connection 26 affords slight lost motion with pitman 25) begins to pull downwardly on pitman 25, which thus through lever 23 depresses the cross-piece *p*, bolts *o*, presser-bar *n*, and consequently plates *d* and *j*, thus effecting, with the assistance of the bed *b*, heated by chamber *c*, the creasing of the material where folded. Lever 21 is now released, and the pressure being thus removed from the plates *d* and *j* the completed article is removed from the machine and the new one placed in position as soon as lever 21 has risen sufficiently, so that the cams 7 and 8, which now move reversely, have forced their respective plates *d* and *r* to their initial positions. The new material being properly placed in position, the operator manually lowers arm *w*, which, as it approaches its resting position on the material, permits the spring 3 to move the traveler forward again on the guide until it occupies the position shown in full lines in Fig. 1. This last-mentioned action of the traveler again effects a turning of the disk 32 and the consequent expanding of the die, which latter is thus again made ready for coaction with the plates *d* and *j*. As above stated, the forward movement of the traveler 1 also acts, by means of pin 17, to reset the lever 15 and hook 12. From this point on the operation is substantially a series of repetitions of the steps described.

While the arm *w* and the parts of the die

carried by said arm are not actuated by the main actuating means—*i. e.*, the treadle-lever—except when the arm is elevated and the die contracted, still it will be observed they are more or less under its control—that is to say, the arm cannot be lowered and kept in that position until the treadle-lever is raised sufficiently so that the cams 8 permit the plate *r* to move forward, and so cause the release of lever 15, nor can the parts of the die be moved and made to remain where arranged without permitting the arm *w* to assume its horizontal position on account of the action of the spring on the traveler.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a folding or other similar machine, the combination of a suitable frame, actuating means in said frame, folding means, a fulcrumed arm, a portion of said folding means being carried by said arm, a movable part on said arm adapted to control the position thereof, operative connecting means between said movable part and the portion of the folding means carried by said arm, and operative connection between said movable part and the actuating means, substantially as described.

2. In a folding or other similar machine, the combination of a suitable support comprising a movable member, another support carried by said member and movable therein, forming means carried by said movable support, and means, actuated by and upon the movement of said member, for moving said movable support, substantially as described.

3. In a folding or other similar machine, the combination of a suitable support comprising a movable member, another support carried by said member and movable therein, forming means carried by said movable support, and means, actuated by and upon the movement of said member, for actuating said forming means, substantially as described.

4. In a folding or other similar machine, the combination of a suitable support comprising a movable member, another support carried by said member and movable therein, forming means carried by said movable support, and means, actuated by and upon the movement of said member, for moving said movable support and actuating the forming means, substantially as described.

5. In a folding or other similar machine, the combination of a suitable support comprising a movable member, a fulcrumed support arranged on said member, forming means carried by said fulcrumed support, and means, comprising a part movable on said fulcrumed support, actuated upon the movement of said member, and operatively connected with said forming means, for moving said fulcrumed support and actuating the forming means, substantially as described.

6. In a folding or other similar machine, the combination of a suitable support com-

prising a movable member, a fulcrumed support arranged on said member, forming means carried by said fulcrumed support, a traveler arranged to move on said fulcrumed support, 5 operative connecting means between the traveler and the forming means, and a lever engaging the traveler and said member and adapted to actuate said traveler upon the movement of the member, substantially as 10 described.

7. In a folding or other similar machine, the combination of a suitable support comprising a movable member, a fulcrumed support arranged on said member, forming means 15 carried by said fulcrumed support, a traveler arranged to move on said fulcrumed support, operative connecting means between the traveler and the forming means, a lever engaging the traveler and said member and adapted to 20 actuate said traveler upon the movement of the member, and means, movable oppositely to said member, for coacting therewith to move said lever, substantially as described.

8. In a folding or other similar machine, 25 the combination of a fulcrumed support, forming means carried by said fulcrumed support, a traveler arranged to move on said fulcrumed support, operative connecting means between the traveler and the forming means, a lever 30 engaging the traveler, and oppositely-movable means for actuating said lever, substantially as described.

9. In a folding or other similar machine, the combination, with the frame, of a fulcrumed support, forming means carried by 35 said fulcrumed support, a traveler arranged to move on said fulcrumed support, operative connecting means between the traveler and the forming means, a lever engaging the traveler, a spring connecting the traveler and the 40 frame, and means for actuating said lever, substantially as described.

10. The combination of a frame, a fulcrumed support, said fulcrumed support having a 45 guide extending substantially from the fulcrum thereof, a movable part arranged to move

on said guide substantially from one end to the other thereof, elastic connecting means between said part and a suitable portion of the frame, a lever engaging said part, and 50 means for moving the lever, substantially as described.

11. The combination of a frame comprising a movable member, a fulcrumed support on said member, said fulcrumed support having 55 a guide extending substantially from the fulcrum thereof, a movable part arranged to move on said guide substantially from one end to the other thereof, forming means carried by said support, operative connecting 60 means between said part and the forming means, elastic connecting means between said part and a suitable portion of the frame, a lever engaging said part and said member, and means, coacting with said member, to 65 move the lever, substantially as described.

12. In a contractile die for a folding or other similar machine, the combination of a suitable support, die-holding means movably arranged in said support, means for actuating 70 said holding means, die-carriers, said carriers and the holders having each a plurality of orifices adapted to register with each other, and pins penetrating said orifices and shaped to fit the same, substantially as described. 75

13. In a folding or other similar machine, the combination, with a suitable support, of forming members of which one comprises a movable part adapted to coact with the other to effect the forming, actuating means, and 80 means, controlled by said actuating means, for transmitting actuation to the other member, said first-named member being controlled from said actuating means, substantially as described. 85

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of April, 1902.

CHARLES H. KNAPP.

Witnesses:

JOHN W. STEWARD,
ROBERT J. POLLITT.