

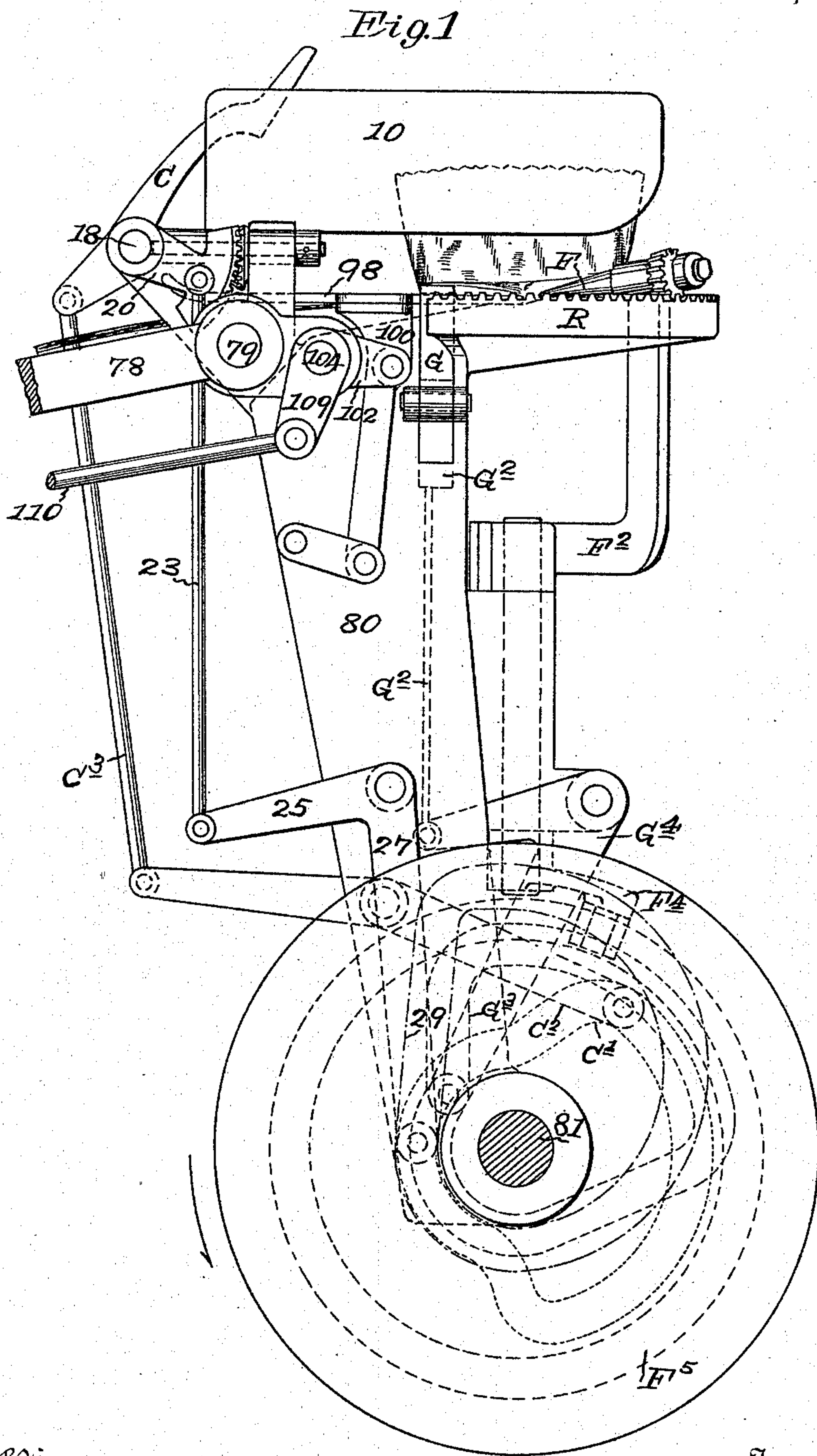
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4 Sheets—Sheet 1.

W. A. LORENZ & E. E. CLAUSSEN.  
PAPER BAG MACHINE.

No. 573,278.

Patented Dec. 15, 1896.



Witnesses:  
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*A. S. Howe*

Inventors:  
*William A. Lorenz*  
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By their Attorney  
*W. H. Holmes*



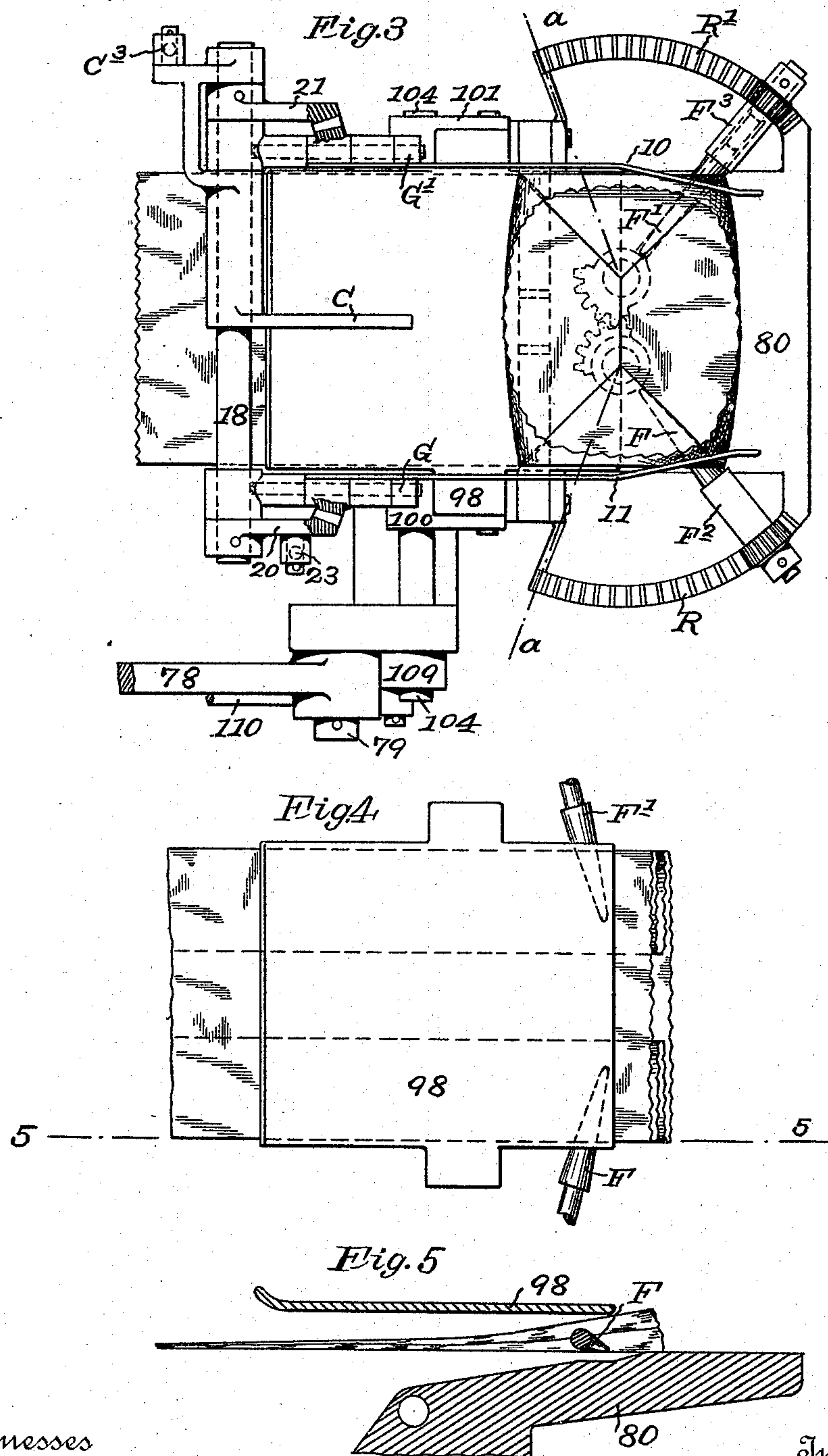
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Fig. 6

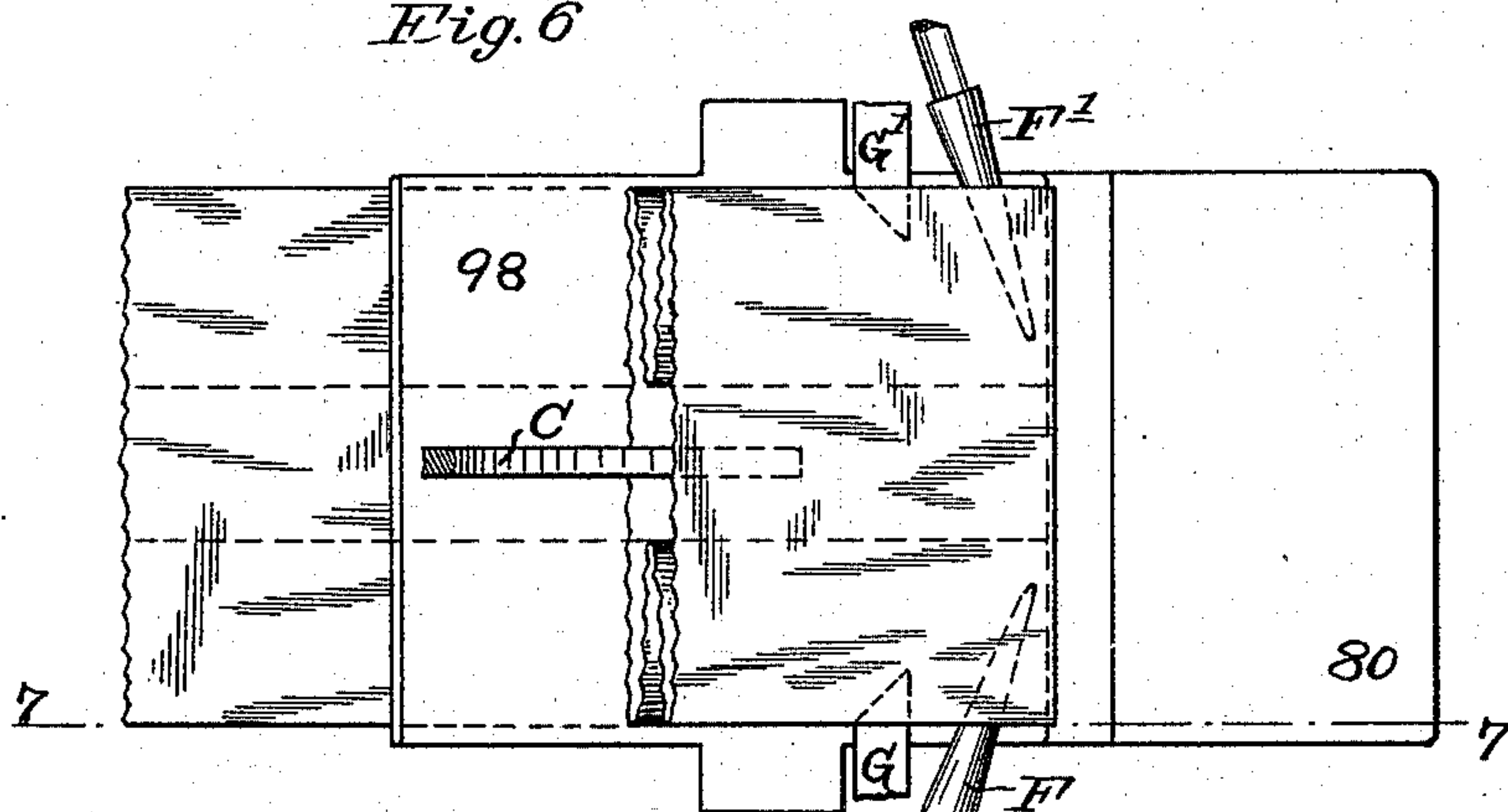


Fig. 7

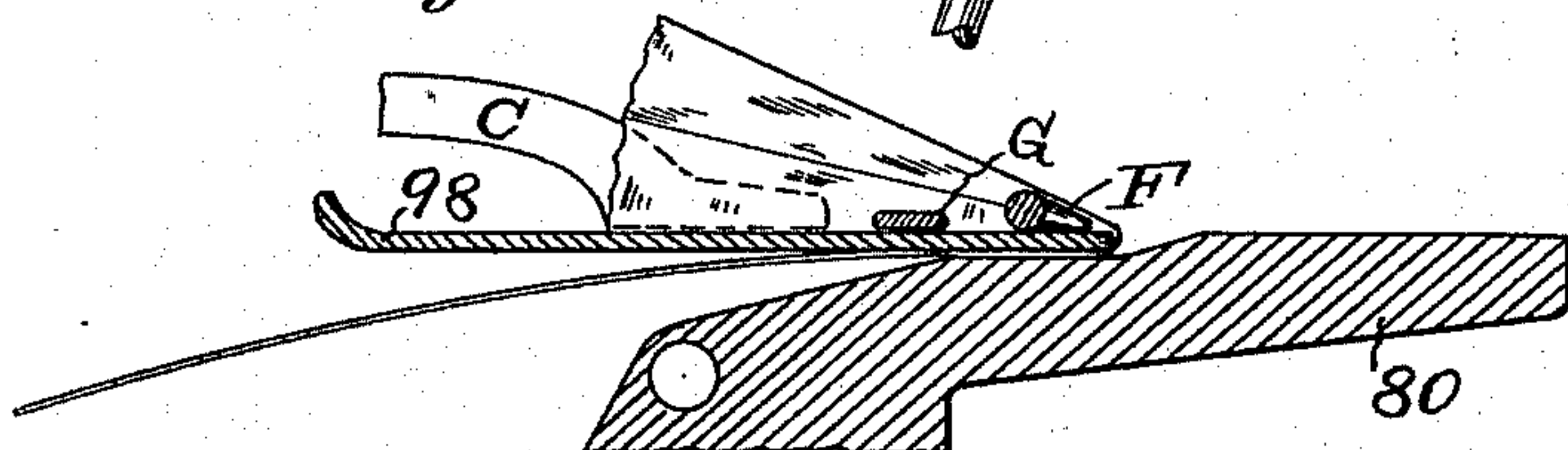


Fig. 8

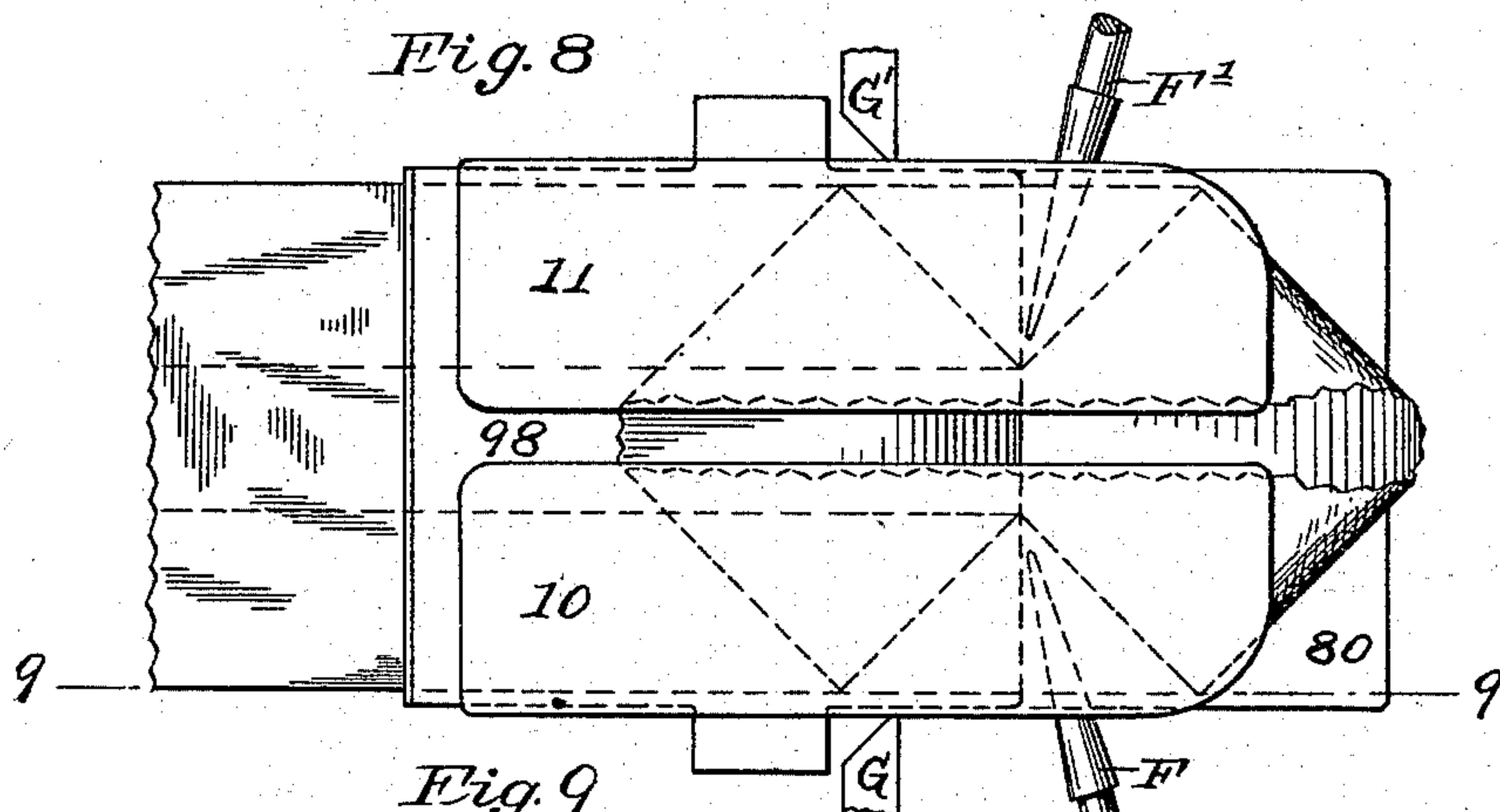
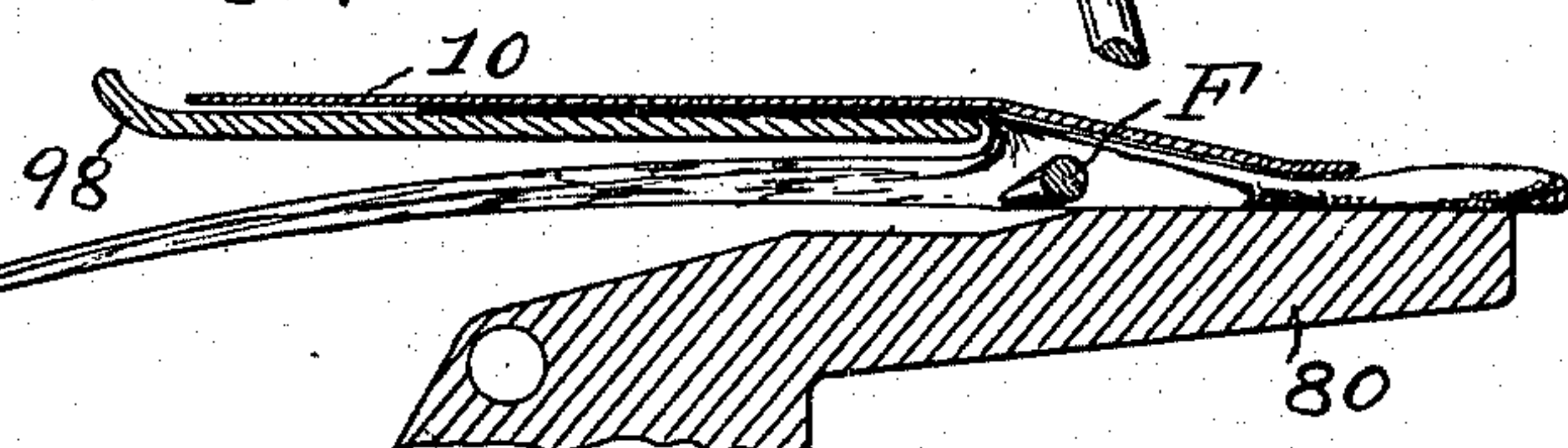


Fig. 9



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# UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ AND EDWARD E. CLAUSSEN, OF HARTFORD, CONNECTICUT, ASSIGNORS TO ALBERT H. WALKER, TRUSTEE, OF SAME PLACE, AND THE CONSOLIDATED S. O. S. BAG COMPANY, OF NEW YORK, N. Y.

## PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,278, dated December 15, 1896.

Application filed April 20, 1896. Serial No. 588,286. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM A. LORENZ and EDWARD E. CLAUSSEN, citizens of the United States, residing at Hartford, in the  
5 county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a full, clear, and exact specification.

10 This invention relates to improved means for converting tucked-paper tubes into diamond-folded bag-blanks as a step in the art of manufacturing square-bottomed paper bags. The tubes upon which this machine  
15 is adapted to operate may be made and fed thereto in any of several ways now well known in making paper bags, and the means which form the subject of this invention may be employed in connection with various types  
20 of paper-bag machines, although it is herein shown only in its adaptation to one of the leading types.

Figure 1 of the drawings is a side view of that portion of the machine embodying our present  
25 invention, showing in connection therewith a paper-bag blank folded as far as the box stage. Fig. 2 is a view of what is shown in Fig. 1, with the blank omitted, looking from the right-hand side thereof. Fig. 3 is a plan  
30 view of the machine and blank of Fig. 1. Fig. 4 is a plan view, and Fig. 5 a side view, partly in section, taken on the line 5 5 of Fig. 4, of the presser-plate and the conical fingers in the position occupied by them when first en-  
35 gaging with a blank. Fig. 6 is a plan view, and Fig. 7 a side view, partly in section, taken on the line 7 7 of Fig. 6, of the blank and of the mechanism most intimately engaged therewith in the position occupied by them when  
40 the blank has been folded back and is about to be opened out into the box-like form. Fig. 8 is a plan view, and Fig. 9 a side view, partly in section, taken on the line 9 9 of Fig. 8, of the completely-diamond-folded bag and of  
45 the mechanism in the position which allows of the release of that blank therefrom.

The particular type of machine above referred to, to which this invention is herein shown to be adapted, is that shown and de-  
50 scribed in Letters Patent No. 361,951, of

April 26, 1887, and in these drawings enough of the machine of that patent is shown to enable the connection of this invention therewith to be understood.

The traveling folding bed or carriage 80 is  
55 pivotally mounted upon the shaft 81 and is connected, by means of a pin 79 and a connecting-rod 78, with a crank adapted to oscillate the carriage through a suitable angle of  
60 movement to enable it to receive the tubes from the drawing-rolls, to perform its operation thereon, and to deliver it to supplementary mechanism adapted to paste and cross-fold the bottom flaps. The presser-plate 98,  
65 attached at its ends to the arms 100 and 101, is located upon the carriage in a position transverse to the passing tubes, its front edge being so located and adapted as to form in those tubes the well-known primary trans-  
70 verse fold of the blank. The upper surface of the carriage 80 is preferably recessed to receive the presser-plate, as shown in Figs. 5, 7, and 9, so as to give room for the lower plies  
75 of the blank to pass under the fingers, as shown in Fig. 5 and as hereinafter described.

The shaft 104 is mounted on bearings in the carriage 80, and is provided with arms adapted to engage with the presser-plate arms 100 and 101. That shaft has fixed upon its end the  
80 arm 109, which is connected by means of the rod 110 with a cam similar to that of the above-mentioned patent or to any device suitable for imparting to the presser-plate the  
85 required motion toward and from the upper surface of the carriage. The parts so far  
85 enumerated are substantially similar in construction and function to the correspondingly-indicated parts of the above-mentioned Patent No. 361,951, the particular function of the  
90 presser plate being to hold the tubular blanks upon the surface of the carriage while the folding devices are operating upon them and incidentally to define upon the blank the lo-  
95 cation of that well-known transverse fold which predetermines the position of the center of the diamond fold.

The mechanism which forms the subject of our present invention will now be described. This consists of two different pairs of mech-  
100 anism, one pair of which operates to hold one



ply of the blank against the presser-plate, while the opposite ply is carried away therefrom by the other pair of devices in the operation of forming the right-angle triangular folds incident to the folding of a flat bottom upon collapsed tucked tubing. The side grippers  $G$  and  $G'$  (best shown in Figs. 1 and 2) are pivoted upon the carriage and are connected by means of the toothed rack  $G^2$  with the cam  $G^3$  by means of the crank-arm  $G^4$ , the movement of the cam being sufficient to carry the grippers from their position shown in Fig. 8 to that shown in Figs. 2 and 6. The grippers are beveled upon their rearward edges, as shown in Figs. 6 and 8, at an angle of substantially forty-five degrees, so as to agree with the corresponding angle of the triangular side folds of the blank, and these grippers, although mounted upon the carriage, are long enough to extend above the presser-plate when the latter is in its downward position and to clamp the ply of the blank thereto.

The devices which operate to form the right-angle triangular folds in the blank consist of the fingers  $F$  and  $F'$ . These are preferably conical and are revolubly mounted in the upper ends of the arms  $F^2$  and  $F^3$ , and those arms are pivotally journaled in bearings located side by side upon the carriage beneath the front edge of the presser-plate and at a distance apart substantially equal to the distance between the inner edges of the tucked sides of the blanks, so that the movements of the arms are upon centers substantially coincident with the inner apexes of the triangular folds of the blank, as shown in Fig. 3. This extent of movement of the arms from the position shown in Fig. 3 is about sixty to seventy degrees, or substantially to the position represented by the angular lines  $a$  of that figure.

The fingers  $F$  and  $F'$  are shown to be provided with bevel-gears, and those gears are adapted to mesh with segmental racks  $R$  and  $R'$ , which are attached to or form a part of the carriage 80, and those racks are so located as to agree with the sweep of the bevel-gears as the latter are moved by the oscillation of their respective arms  $F^2$  and  $F^3$ . This oscillation of the arms operates in connection with the racks  $R$  and  $R'$  to impart to the fingers  $F$  and  $F'$  a rolling or oscillatory movement, so that the lower surfaces of the fingers which come in contact with the blank operate to smooth out the folds without friction. The arms  $F^2$  and  $F^3$  are operated by means of the arm  $F^4$ , which engages in the cam-groove  $F^5$ , and those arms are connected together by means of toothed sectors, (best shown in Figs. 2 and 3,) which operate to impart equal angular motion to each of them.

The fingers  $F$  and  $F'$  are preferably made in the form of cones so shaped and mounted that their apexes coincide with the bottoms of the tucks of their respective sides of the blank. The axes of these cones are inclined

upward at their outer ends, so that the lower surfaces of the fingers rest upon the top surface of the carriage 80 when the fingers are in their forward position, and the corresponding surfaces of the carriage are made plane and smooth in order that the fingers may grip the lower plies of the blank as they roll forward to the position shown in Fig. 3. They thus prevent any slipping of the blank upon the carriage, and because of their form have a perfect rolling contact upon the paper, preventing movement or distortion of the blank during this part of the operation.

The plates 10 and 11 are operated by means of the sectors 20 and 21, the rod 23, arms 25 and 27, and cam 29 in substantially the same manner as the correspondingly-designated parts are operated in our Letters Patent No. 410,841, of September 10, 1889, their function being to flatten down the blank from its box-like form (shown in Figs. 1 and 3) to its flattened condition. (Shown in Figs. 8 and 9.)

The clip  $C$  is pivotally mounted upon the shaft 18, or upon any convenient pivot, and is connected with the cam  $C'$  by means of the arm  $C^2$  and the rod  $C^3$ , and that cam is so constructed as to cause the clip  $C$  to move from the position shown in Fig. 7 to that of Fig. 1, its function being to hold down the rearward end of the blank while it is in the position shown in Fig. 7. It may also be utilized to assist in flattening the blank from the box-like form into the diamond form, coöperating in this latter function with the side plates 10 and 11, or with whatever devices may be substituted therefor.

The operation of this machine is as follows: The presser-plate and the conical fingers being in the position shown in Figs. 4 and 5, the carriage 80 is moved backward and the oncoming tube is pushed between the plate and the carriage. In the formation of the tucked tubes their edges are preferably left unpressed, so that they tend to spring apart, as shown in Fig. 5, so as to allow the conical fingers to pass into the tucks. The leading end of the tube is advanced to a suitable distance beyond the edge of the presser-plate, and then the latter by the operation of its cam is brought down upon the carriage so as to clamp the tube thereto, the conical fingers  $F$  and  $F'$  being moved forward a sufficient distance to clear the edge of the presser-plate as the latter is brought down. Then the conical fingers, by means of their arms  $F^2$  and  $F^3$ , are carried back to their position shown in Figs. 6 and 7, so as to fold the upper ply of the tube down upon the presser-plate and to enable the grippers  $G$  and  $G'$  and the clip  $C$  to engage with and hold that ply to the plate. The arms  $F^2$  and  $F^3$  are then moved forward to the position shown in Fig. 3, rolling upon the blank and carrying its lower ply forward, so as to form the inner triangular folds. During this operation the clip  $C$  may be lifted, as shown in Fig. 1, so as to allow the paper to take its natural position.



Then the side plates 10 and 11, or their equivalent devices, are brought into operation, so as to fold down the sides of the box-like portion of the blank (shown in Figs. 1 and 3) into the flattened diamond form shown in Figs. 8 and 9. The conical rollers are then moved back and the presser-plate is elevated to the position shown in Figs. 8 and 9, so as to allow the flattened blank to be drawn away and passed on to mechanism adapted to paste, cross-fold, and complete the blank into a bag.

The clip C may be allowed to retain its hold upon the folded-over end of the blank, so that the latter, instead of assuming the box-like form shown in Figs. 1 and 3, will be distended in the direction of its length, so as to approximate its final diamond-folded form, and in that case other devices than the side plates 10 and 11 may be employed to assist in the completion thereof, such devices, for instance, as those of the drop-plate mechanism 226 of the above-mentioned Patent No. 361,951; or the clip may be employed to assist the side plates 10 and 11 in the flattening-down operation, those plates having a space between them to allow of the presence of the clip, as shown in Fig. 8.

The conical form of the fingers and the positive turning motion imparted to them by the segmental racks, while not considered by us to be indispensable features of this invention, are yet regarded as highly important. It is conceivable that fixed flat or cylindrical fingers might be made to perform the functions of these conical rotating fingers with some degree of success, but we greatly prefer the form and arrangement shown herein.

A leading feature of this invention resides in the fact that the fingers, which are the principal means herein employed for operating in the tucks of the blank, do not have to be withdrawn therefrom after their work is done in order to allow the blank to be drawn away. Nearly if not quite all of the devices known to us for performing this function upon a tucked-paper tube must be retracted beyond the side margins of the blank in order to disengage them therefrom. This operation of entering and retracting the folding devices necessitates the employment of reciprocating mechanism, which, at the high speed necessary for the profitable manufacture of paper bags, imposes serious wear upon the parts and renders them more or less noisy in operation. No such reciprocating movements are needed to enable the conical fingers of this invention to enter the tucked sides of the tube, inasmuch as the mechanism is so arranged as to allow the two plies of the tucked sides to pass on opposite sides of the fingers, as shown in Fig. 5, and after the operation of folding is completed the presser-plate is lifted sufficiently to allow the blank to pass along, with the conical fingers remaining in the tucked sides thereof.

We claim as our invention—

1. Means for forming the characteristic tri-

angular folds in the side plies of a tucked-paper tube, consisting of oppositely-disposed conical fingers, adapted to swing upon centers substantially coincident with the apexes of the said conical fingers and of the triangular folds, substantially as described.

2. In combination with means for supporting a blank of tucked-paper tubing, means for forming the characteristic triangular folds in the side tucks thereof, consisting of fingers located and remaining in the plane of the side tucks, and adapted to oscillate laterally in the plane of the triangular folds to be made, upon centers located in line with the apexes of those triangular folds, substantially as described.

3. In combination with means for supporting a blank of tucked-paper tubing, means for forming the characteristic triangular folds in the side tucks thereof, consisting of fingers located and remaining in the plane of the side tucks, and adapted to oscillate laterally in the plane of the triangular folds to be made, upon centers located in line with the apexes of the triangular folds, with means for rotating the fingers upon their axes as their arms are thus laterally vibrated, substantially as described.

4. In combination with means for supporting a blank of tucked-paper tubing, a pair of oppositely-disposed fingers, a pair of arms upon which those fingers are mounted, the arms being adapted to vibrate upon axes located substantially in line with the apexes of the respective triangular folds to be made, with means for vibrating the arms, substantially as described.

5. In combination with a traveling folding-bed, oppositely-disposed arms mounted thereon and adapted to vibrate on centers located at a distance apart substantially equal to the distance between the bottoms of the tucks of the blanks, each arm having a finger revolvably journaled thereon, with the line of its axis intersecting that of its arm, with gears and a fixed rack adapted to rotate the fingers as they are moved by their respective arms, substantially as described.

6. In combination with a traveling folding-bed, having a presser-plate, and with fingers carried thereon adapted to fold the front end of the blank down upon the top of the plate, a clip C, carried upon the folding-bed and adapted to engage the thus-turned-back portions of the blank, substantially as described.

7. In combination with a traveling folding-bed, having a presser-plate, and with fingers carried thereon adapted to fold the front end of the blank down upon the top of the plate, side grippers adapted to clamp down upon the presser-plate the side margins of the blank thus turned over upon it by the fingers, substantially as described.

8. In combination with a traveling folding-bed, and with a presser-plate mounted thereon, a pair of fingers also carried upon the



4  
folding-bed and located substantially midway  
between the clamping-surfaces of the folding-  
bed and the presser-plate when the latter is  
in its raised position, with means substan-  
5 tially as described for elevating the presser-  
plate when receiving and when discharging  
a blank, whereby the fingers are enabled to  
remain in the plane of the side tucks of the  
blank, substantially as described.

10 9. In combination with a traveling folding-  
bed, and with a presser-plate carried thereon,  
a pair of oscillating arms and a pair of fingers

revolubly journaled thereon, the axes of the  
fingers intersecting the axes of their respec-  
tive arms on a line passing through the in- 15  
tersection of the folding edge of the presser-  
plate with the bottoms of the tucks of the  
blank, substantially as described.

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