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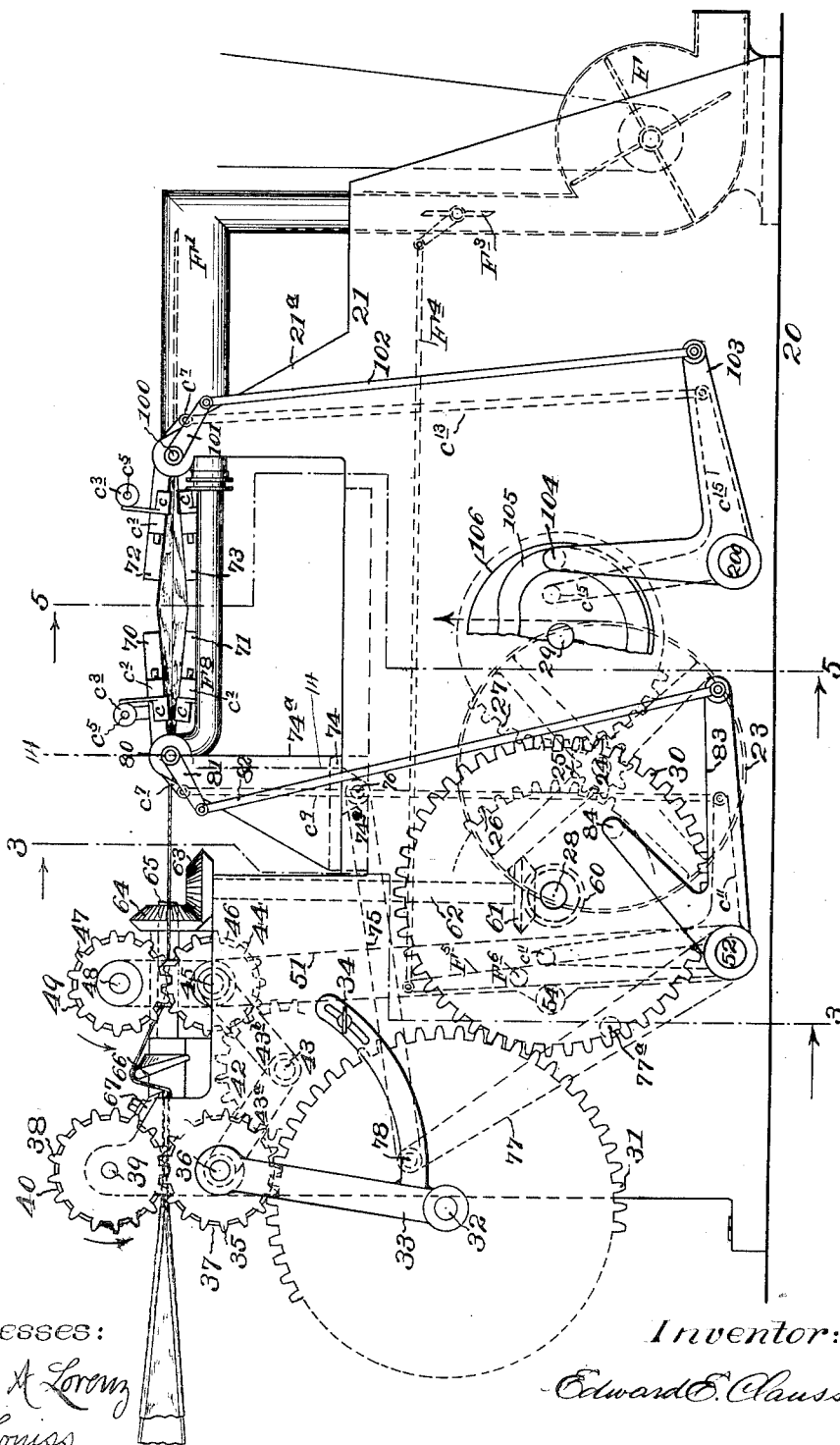
6 Sheets—Sheet 1.

E. E. CLAUSSEN.
PAPER BAG MACHINE.

No. 586,735.

Patented July 20, 1897.

Fig. 1.



Witnesses:

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Inventor:

Edward E. Claussen

(No Model.)

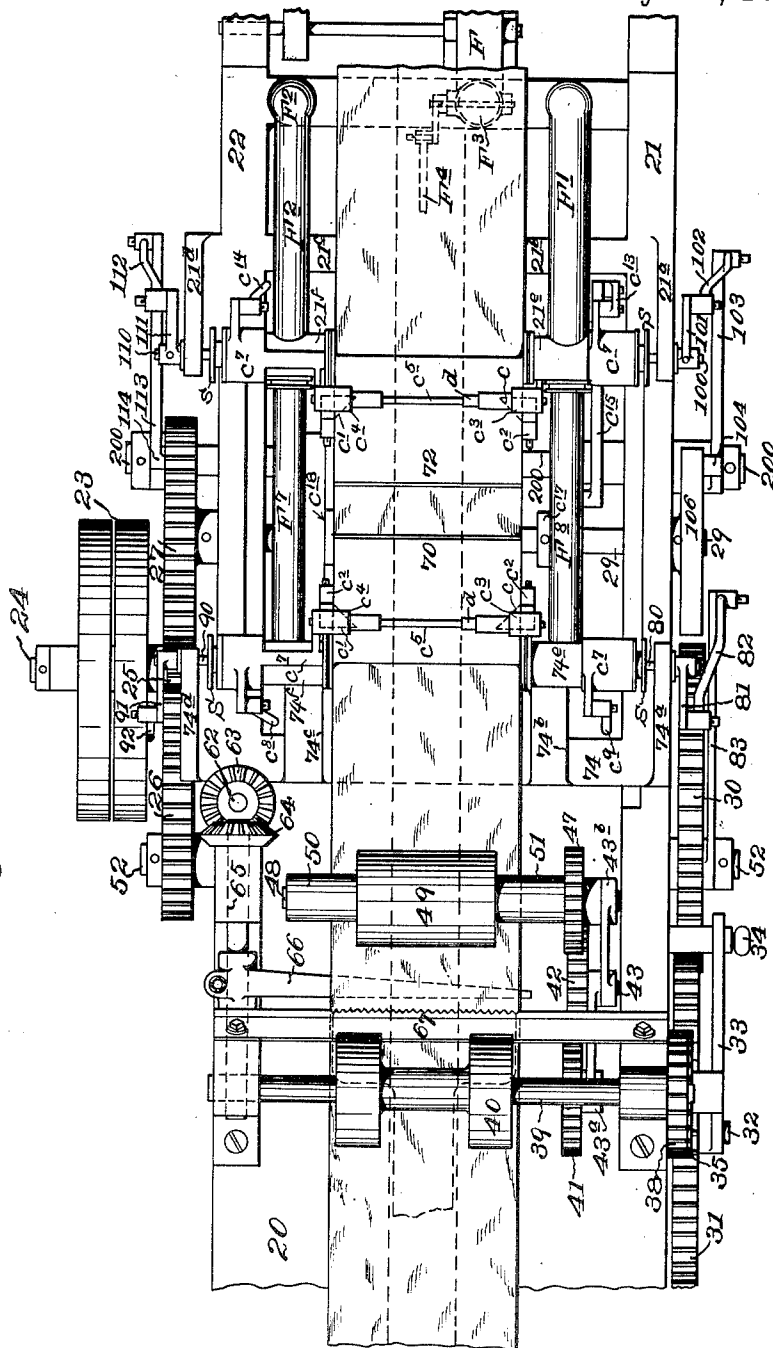
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Fig. 2.



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Fig. 3.

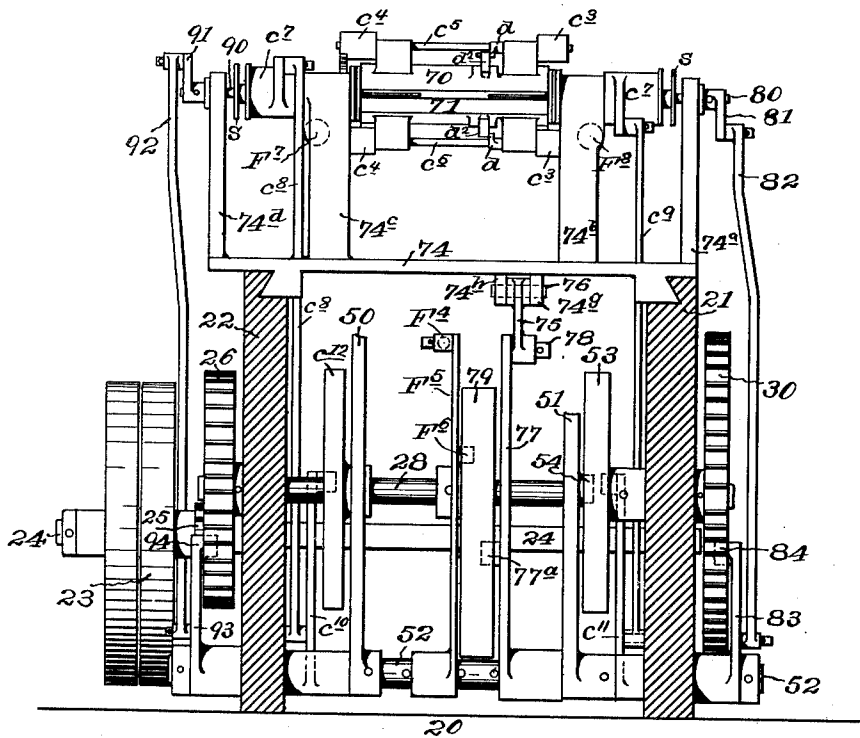
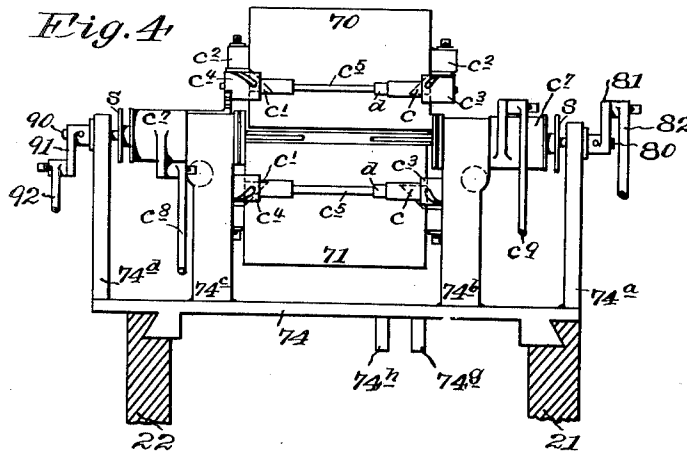


Fig. 4.



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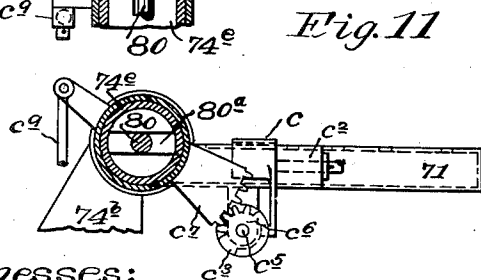
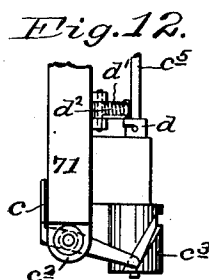
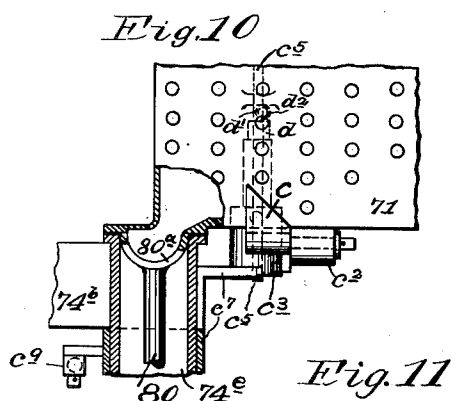
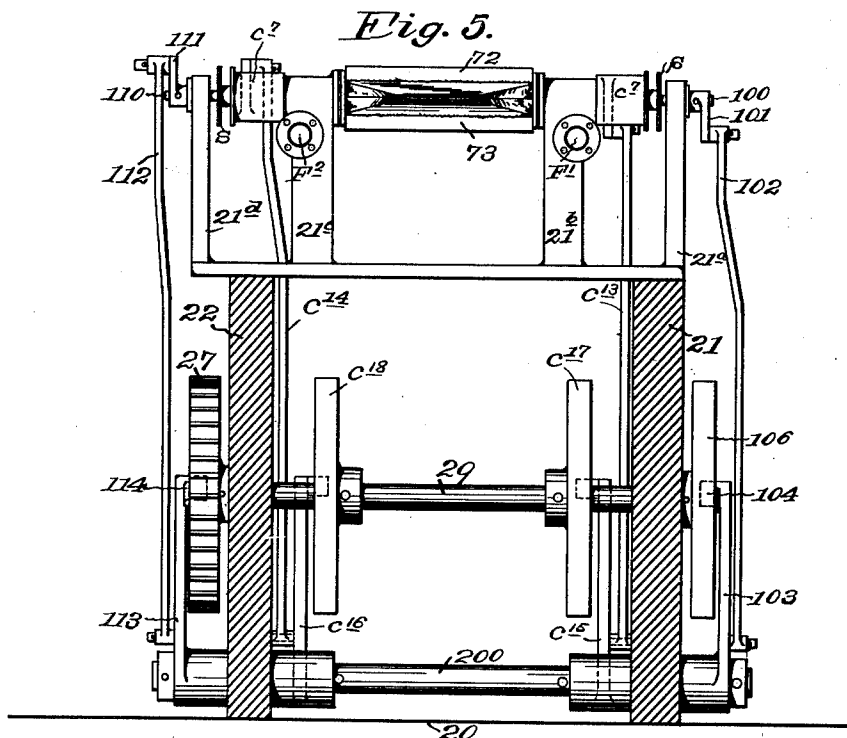
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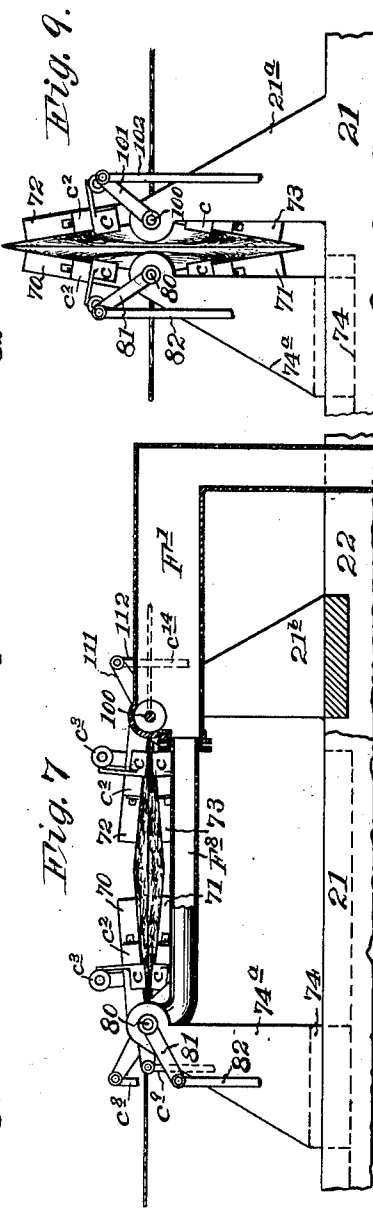
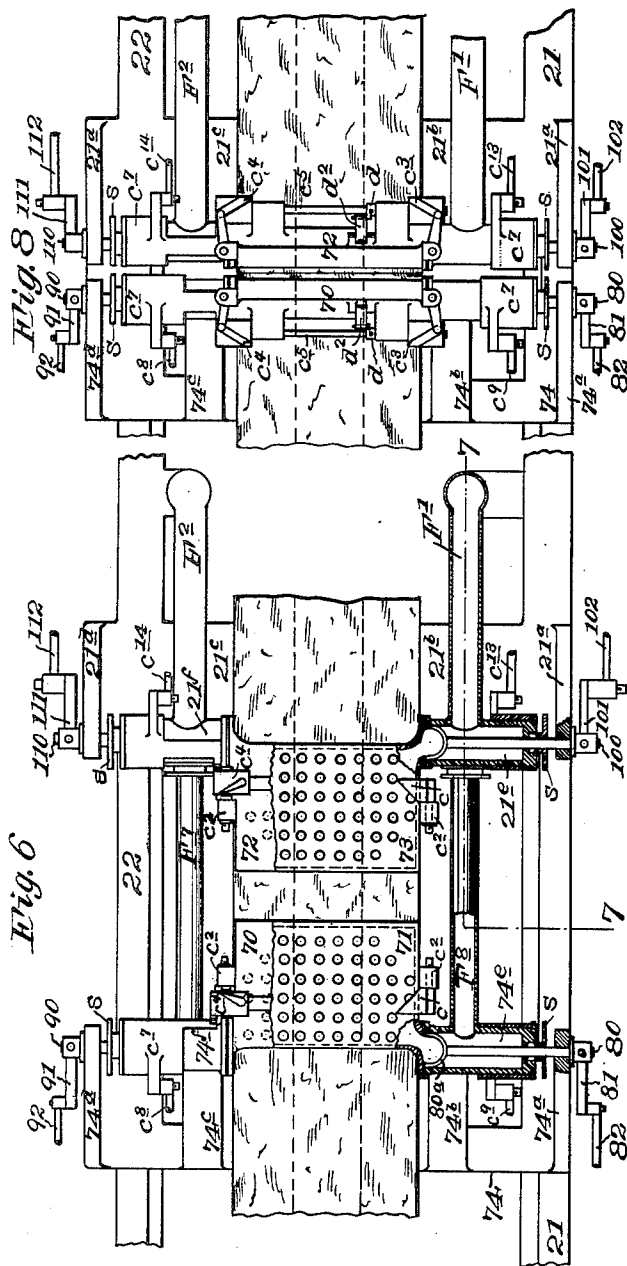
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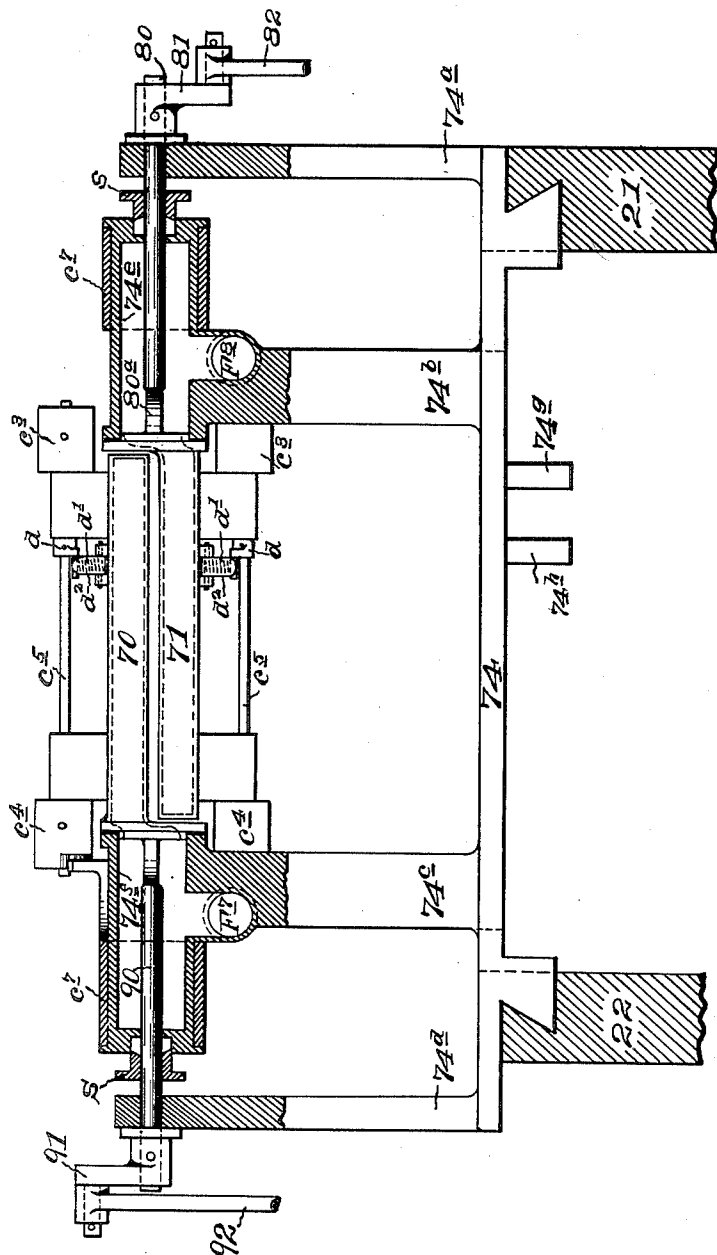
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No. 586,735.

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Fig. 14.



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UNITED STATES PATENT OFFICE.

EDWARD E. CLAUSSEN, OF HARTFORD, CONNECTICUT, ASSIGNOR TO
ALBERT H. WALKER, TRUSTEE, OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 586,735, dated July 20, 1897.

Application filed July 20, 1896. Serial No. 599,791. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. CLAUSSEN, a citizen of the United States, residing at Hartford, in the 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.

This invention relates to improved machinery for automatically manufacturing square-bottomed paper bags from tucked paper tubing, and is herein shown as being adapted for manufacturing such bags in accordance with the method set forth in my Letters Patent No. 520,256, of May 22, 1894, although portions of this machine are also susceptible of use in other methods, including those wherein a single blank is operated upon instead of a double blank, as herein indicated.

The object of this invention is to provide simple, reliable, and rapid means for forming the diamond folds in bellows-sided tubular blanks preparatory to folding them into their final form. The subsequent operations of pasting, cross-folding, and closing the flaps to complete the bag are quite simple and may be performed in many ways already well known in this art; but the earlier preliminary operations of converting the blank into the diamond form is a much more difficult one on account of the intricacy of the right-angled triangular folds and of the plies which are folded over them to form the side folds of the bottom. In my present invention this object is accomplished by means of suction boxes or formers arranged in pairs, one member of a pair being on one side and the other member being on the other side of the blank. One of these members is journaled at one edge of the tube with its suction portion projecting across the upper side thereof, while the other member of the pair is journaled at the opposite edge with its suction-surface projecting beneath the tube. Thus the suction-surfaces of the two boxes of a pair are superimposed with the tube between them, while the axes of their bearings are at right angles to the tube. Those axes are substantially coincident with each other and with the location of the characteristic primary transverse fold-line which is to be made in the blank.

The boxes are hollow, forming vacuum-chambers which communicate through their bearings with any suitable exhausting mechanism, and those walls of the two boxes which face toward each other are provided with perforations in order to allow the suction to operate upon the blank which is held between them. These boxes are also provided with grippers, which are adapted to hold the plies of the blank against the perforated inner walls of the respective boxes, and the beveled inner ends of these clips serve as formers for defining the characteristic right-angled triangular folds which are to be formed in the bellows sides in the process of converting the blank into the diamond-folded form. Mechanism is provided for operating these boxes and their respective clips in proper time with each other and with the remainder of the machine.

The machine herein shown and described employs two pairs of these suction-boxes, one pair being arranged upon supports which are fixed relative to the framing of the machine, while the other pair of suction-boxes is mounted upon a reciprocating carriage which moves toward and from the stationary pair of boxes, the two pairs thus coacting to fold a double blank in substantially the manner set forth in the Patent No. 520,256, above referred to.

Figure 1 of the drawings is a front elevation of the preferred construction of my improved paper-bag machine, showing a blank of sufficient length to make two bags in position ready for the diamond-forming mechanisms to operate upon it and showing the striker in position to sever the next blank from the continuous tube, and also showing at the left a portion of the former from which the tucked tubing is drawn into the machine. Fig. 2 is a plan view of that which is represented in Fig. 1. Fig. 3 is a left-hand end view in section, taken on the line 3 3 of Fig. 1, looking in the direction of the arrows. Fig. 4 is an end view of the upper section of the mechanism shown in Fig. 3, showing the bottom-forming devices turned at right angles to the position occupied by them in the latter figure. Fig. 5 is a left-hand end view in section taken on the line 5 5 of Fig. 1. Fig.

6 is an enlarged plan view, partly in section, of the bottom-forming mechanism. Fig. 7 is a front view of the mechanism of Fig. 6, partly in section, taken on the line 7 7 of that figure. Fig. 8 is a plan view, and Fig. 9 a front view, both in enlarged scale, of the bottom-forming mechanisms in the position occupied by them at the conclusion of the diamond-folding operation. Fig. 10 is a fragmentary plan view, and Fig. 11 a side view, both partly in section, of one of the boxes and its side clip mechanism. Fig. 12 is an end view of the devices of Fig. 10, showing one of the side clips and its cam. Fig. 13 is a sectional side view of a suction-box with its clip-retaining presser-foot. Fig. 14 is an end view, drawn to an enlarged scale, in vertical section, taken on the line 14 14 of Fig. 1, looking toward the right as the machine appears in the latter figure. This line of section passes through the axes of oscillation of the suction-boxes 70 and 71, but does not cut those boxes or their respective shafts.

In the various views, the numeral 20 indicates in a general way the bed of the machine, consisting mainly of the side frames 21 and 22, in which are journaled the various shafts and mechanisms, as hereinafter more fully described.

Motion is communicated to the machine by means of the pulley 23, mounted on the shaft 24, which is journaled in the frames 21 and 22 and carries the pinion 25, meshing on each side into the gears 26 and 27 and fastened on the shafts 28 and 29, respectively.

On the right-hand side of the machine the shaft 28 has fixed upon it the gear 30, meshing into the gear 31, which is mounted on the stud 32, fixed in the yoke 33. That yoke is loosely mounted on the shaft 36 and is clamped to the frame 21 by the thumb-screw 34. The gear 31 meshes into the gear 35, fastened to the shaft 36, which is journaled in the frames 21 and 22 and has fixed upon it the lower rear drawing-roll 37. The gear 35 meshes into the gear 38, fastened to the shaft 39, which is also journaled in the frames 21 and 22 and carries the upper rear drawing-roll 40. Fastened to the shaft 36 is also the gear 41, meshing into the pinion 42, rotatably mounted on the stud 43, which also forms a swiveling connection for the arms 43^a and 43^b. The pinion 42 meshes with the gear 44, which is fastened to the shaft 45, carrying the lower front drawing-roll 46. The gear 44 meshes again into the gear 47, which is fastened to the shaft 48, carrying the upper drawing-roll 49. The shafts 45 and 48 are journaled in the arms 50 and 51, which are fixed on the shaft 52, journaled in frames 21 and 22, and are caused to vibrate by means of the projection 54, which engages with the cam 53. That cam is so formed as to carry the arms and their rolls 46 and 49 backward toward the rolls 37 and 40 just before the blank is severed, so as to form a slack in the tube, as shown in Fig. 1.

Fastened to the shaft 28 near the frame 22

is a miter-gear 60, meshing into the miter-gear 61, fastened on the vertical shaft 62, which is journaled in the frame 22. At the upper end of the shaft 62 is a miter-gear 63, meshing into the miter-gear 64, which is fastened on the striker-shaft 65. That shaft is journaled in bearings on the frame 22 and carries the striker-arm 66, which revolves across the path of the tube, carrying it against the serrated knife 67 and severing a blank therefrom at each revolution.

The reciprocating carriage 74 is fitted to slide upon the frames 21 and 22, as best shown in Figs. 3 and 4, and is provided with the lugs 74^e 74^h, to which is attached the connecting-rod 75 by means of the stud 76. The other end of the connecting-rod 75 is jointed to the cam-arm 77 by means of the pin 78, which is pivotally mounted upon the cross-shaft 52, and receives a vibratory motion through the projection 77^a, which engages in a groove of the cam 79, which is fixed upon and rotates with the shaft 28.

The carriage 74 is provided with the upwardly-extending arms 74^a, 74^b, 74^c, and 74^d. At the upper ends of these arms are journaled the suction-boxes 70 and 71 upon axes which are in line with each other and transverse to the direction of movement of the carriage 74, located in the horizontal plane of the tube to be operated upon. The upper box 70 is journaled on the arms 74^c 74^d and lies above the paper tube, while the lower box 71 is journaled on the arms 74^a 74^b and lies below the paper tube.

The arrangement of the bearings and the means whereby the exhausting apparatus is connected therewith are best shown in Figs. 6, 7, 10, 11, and 14. The suction-boxes are preferably rectangular in outline and are hollow, with perforations through those walls thereof which are to come in contact with the paper-bag blank. The lower suction-box 71 is attached to or integral with the shaft 80, which is journaled in the arms 74^a and 74^b and has fixed upon its outer end the arm 81, which, by means of the rod 82, is connected with the cam-arm 83, pivoted on the stud 52. The arm 83 is also provided with a projection 84, which engages with a cam-groove cut in the side of the gear 30. The upper suction-box 70 is similarly provided with the shaft 90, journaled in the arms 74^c and 74^d, and by means of the arm 91, the rod 92, and the cam-arm 93 is operated by a cam-groove cut in the side of the gear 28. These grooves in the gears 30 and 26 are so formed as to cause their respective suction-boxes 71 and 70 to oscillate upon their bearings from the position shown in Fig. 7 to that shown in Fig. 9, the axes of these bearings being in line with each other and with the location of the primary transverse-fold line characteristic of this type of paper bag.

The suction-boxes 72 and 73 are similar to the boxes 70 and 71 and are similarly mounted at the upper ends of the fixed arms 21^a, 21^b,

21^c, and 21^d, those arms being attached to or integral with the side frames 21 and 22, as best shown in Figs. 5, 6, and 7, the upper suction-box 72 being mounted on the arms 21^c 21^d, while the lower box 73 is mounted on the arms 21^a 21^b. These suction-boxes are provided with the shafts 100 and 110, arms 101 111, rods 102 112, cam-arms 103 113, which engage with cam-grooves in the faces of the cam 106 and the gear 27, respectively. These grooves are so timed with relation to the grooves in the sides of the gears 26 and 30 as to cause each pair of suction-boxes to open and close simultaneously, and the groove in the cam 79 is so timed with relation to the suction-box cams as to move the carriage 74 from the position shown in Figs. 6 and 7 to that shown in Figs. 8 and 9 simultaneously with the opening of the two pairs of suction-boxes.

As a means of exhausting the air from the interior of the suction-boxes I have shown in Figs. 1 and 2 an exhausting-fan F, which is connected with the two pairs of suction-boxes by means of the pipes F¹ F² F⁷ F⁸. In the main pipe leading to the fan is located the oscillating valve F³, which is connected, by means of the rod F⁴, to a cam-arm F⁵, which is loosely supported upon the cross-shaft 52 and is provided with the projection F⁶, engaging in a groove in the side of the cam 79 on the shaft 28. That cam-groove is so formed as to open and close the valve F³ in the main suction-pipe in suitable relation to the operating time of the suction-boxes.

The manner in which the suction-pipes F¹, F², F⁷, and F⁸ communicate with their respective suction-boxes is best shown in Figs. 6, 10, and 11. Those pipes open into an interior chamber in the hubs 21^c 74^c and 21^f 74^f, respectively, each of which forms the inner bearing for its adjacent suction-box. From these interior chambers communication is made with the suction-boxes, as best shown in Figs. 10 and 11, the shafts 80, 90, 100, and 110 being considerably smaller than the air-chambers through which they pass and being connected with their respective suction-boxes by a cross-bar, as best shown by 80^a in Fig. 11. The outer or connecting-rod ends of these shafts pass through stuffing-boxes s, by means of which the chamber is rendered externally air-tight in the usual manner.

Each of the suction-boxes is provided with a pair of clips c and c', which are journaled in hubs c², adjacent to the edges of the boxes. These clips are fitted to swing over so as to clamp the respective plies of the blank upon the blank-engaging walls of their suction-boxes and are beveled at their outer ends so as to coincide with and define the triangular folds characteristic of a bellows-sided square-bottomed bag, the beveled edges of the clips being so located upon the suction-boxes as to engage the plies of the blank at those portions thereof which are to form the aforesaid triangular folds. A downwardly-projecting

portion of each of the clips is made to engage with a spiral groove cut in the cams c³ c⁴, which are fixed upon the opposite ends of the shaft c⁵, journaled in bearings preferably integral with the backs of the suction-boxes and transversely thereto. The grooves in the cams c³ are right-handed and the grooves in the cams c⁴ are left-handed, so that when the cam-shafts c⁵ are turned in one direction they will simultaneously close both members of each pair of clips and will open them when turned back. The arrangement and relation of the clip and its operating means to the suction-boxes is best shown in Figs. 10, 11, and 12. The shafts c⁵ and their clips are operated by means of pinions c⁶, fixed upon the ends of their respective shafts, and those pinions engage with the sectors c⁷, which are journaled upon cylindrical portions of the hubs 21^c, 21^f, 74^c, and 74^f. The sectors c⁷, which operate the clips upon the suction-boxes 70 and 71, are mounted upon the hubs 74^f 74^c, respectively, which form the bearings for those boxes. These sectors are connected by means of the rods c⁸ and c⁹ to the cam-arms c¹⁰ and c¹¹, respectively, the former engaging with the cam c¹², while the latter engages with a groove cut in the side of the cam 53, both fixed upon the shaft 28. These cams are so formed as to cause their respective sectors and clips to be operated simultaneously.

The sectors c⁷, which operate the clips upon the suction-boxes 72 and 73, are mounted upon the hubs 21^f 21^c, respectively, and are connected by means of the rods c¹³ c¹⁴ to the cam-arms c¹⁵ c¹⁶, which are loosely mounted upon the shaft 200 and engage with the cams c¹⁷ and c¹⁸, respectively, by means of which the two pairs of clips carried upon the suction-boxes 72 and 73 are operated simultaneously with each other and with the clips mounted upon the suction-boxes 70 and 71.

The cams which operate the sectors c⁷ and the clips are so formed as to allow those sectors to follow the oscillatory movement of their respective suction-boxes as the latter are swung from the position shown in Figs. 6 and 7 to that shown in Figs. 8 and 9, so as to retain the clips in contact with their respective plies. As a means for compensating for the slight irregularity that may occur in practice in thus causing the sectors to follow their respective boxes I preferably provide each of the clip cam-shafts c⁵ with a presser-foot device (best shown in Fig. 13) for the purpose of pressing those shafts toward the two ends of their oscillatory movement, so as to hold their respective clips firmly down upon the plies when in their inward position, as shown in Figs. 10 and 12, and for holding them steadily when in their outer position. One of these positions of the presser-foot is represented in Fig. 13 by full lines, while its opposite position is shown by dot-and-dash lines. It consists of arms d, fixed upon each of the clip cam-shafts c⁵, and

of spring-cases d' , pivotally attached to the under side of each of the suction-boxes. Each of these contains a spring d^2 , which presses against a pin in the upper end of the arm d , thus serving to press that arm toward one or the other of its extreme positions.

The suction-pipes F^7 and F^8 , which communicate with the suction-boxes 70 and 71, connect with the main suction-pipes F' and F^2 by telescoping joints, which allow of the movement of those pipes F^7 and F^8 with the carriage 74.

The operation of this machine is as follows: The bellows-sided tubing is drawn from the former (shown in the left-hand part of Fig. 1) by means of the drawing-rolls 37 and 40, passing beneath the serrated knife 67 and between the drawing-rolls 46 and 49. The drawing-rolls are so geared with relation to the revolutions of the striker as to feed through a suitable double length of tubing for each of those revolutions, and the front pair of drawing-rolls 46 and 49 are, by means of their arms 50 and 51, moved backward toward the drawing-rolls 37 and 40 just previous to the severing of the tube by the striker in order to form a slack in the tube to facilitate the cutting off of the blank, as shown in Fig. 1. The forward end of the double blank passes from the drawing-rolls 46 and 49 to and between the suction-boxes 70 and 71 at a time when the carriage 74 is at that end of its stroke nearest to the drawing-roll, as shown in Fig. 1, the forward end of the blank passing to and between the suction-boxes 72 and 73. When the blank reaches its proper position with relation to the suction-boxes, the valve F^3 is turned by means of its groove in the cam 79 to the position shown in Fig. 1, thus permitting the air to be drawn by means of the exhaust-fan F from all four of the suction-boxes simultaneously, thus drawing the adjacent plies of the blank against the perforated walls of those boxes and slightly opening the blank, as shown in Figs. 1 and 7. While the blank is in this position the clips c and c' are rocked by means of their cams c^3 and c^4 , the sectors c^7 , and the cams 53, c^{12} , c^{17} , and c^{18} into the openings of the bellows folds thus made by the operation of the suction through the boxes, gripping each of the side plies of the blank upon its adjacent suction-box surface. Meanwhile the carriage 74 is moved forward by means of its cam 79 at approximately the speed of that portion of the blank which is being fed by the rolls 46 and 49. Simultaneously with this forward movement of the carriage the suction-boxes 70 and 71 and 72 and 73 are opened in opposite directions upon their respective bearings by means of the cams 26, 30, 27, and 106, and this opening movement of the boxes and advancing movement of the carriage are continued until they reach the position shown in Figs. 8 and 9, thus expanding the middle reach of the blank, through the transformations shown in Figs. 10 and 11 of the above-mentioned patent, No. 520,256,

to the condition shown in Fig. 12 thereof. The valve F^3 is then closed, so as to stop the operation of the suction, the clips c and c' are opened, and the blank thus released from the suction-boxes is transferred to suitable devices for cutting apart the two blanks and for pasting and completing the bottom folds. When thus released from the blank, the carriage moves back toward the drawing-roll to receive the succeeding blank and the suction-boxes resume the position shown in Figs. 1 and 7 in time to engage with and operate upon that blank.

The length of the blank is determined by the gearing and may be changed by replacing the gear 30 with a gear of the desired size, adjusting the gear 31 into mesh therewith by means of its yoke 33.

It is not an essential feature of this invention that the folding devices be used in duplicate, operating upon a double blank, as herein shown, as the carriage 74 and the devices mounted thereon may with equally good results be employed in connection with a single blank, performing its work upon that single blank in precisely the same manner as that work is herein shown to be performed in conjunction with the suction-boxes 72 and 73 upon a double blank, or the suction-boxes 72 and 73, journaled upon a stationary portion of the machine, may receive single blanks from any convenient blank-severing mechanism, the diamond-folded blanks when completed being transferred by means of any suitable take-off device to any suitable flap folding and pasting devices. Therefore either of the two sets of devices which are herein shown and described as operating jointly upon a double blank may be adapted to the folding of single blanks, upon either a moving or a stationary bed, by changes easily within the range of mechanical skill on the part of a mechanic practiced in the art of making and using paper-bag machinery.

An important feature of this invention is the arrangement whereby the two members of a pair of suction-boxes are journaled concentrically with their common axes located in the plane of the blank to be operated upon, thereby enabling the primary transverse-fold lines of the blank to be made in substantial coincidence with that common axis of the boxes. This is very desirable, inasmuch as those folds, if made upon lines not coincident with the axis of oscillation of their folding devices, are liable to be more or less distorted and irregular.

I claim as my invention—

1. In combination with means for supporting a paper-bag blank, means for forming the primary transverse folds therein, consisting of a suction-box supported at one side only of the blank, to oscillate upon an axis located in substantial coincidence with the line of the desired primary transverse fold, and having an overhanging suction-surface extending across the plies to be folded, with an edge

defining the line of the fold to be made, substantially as described.

2. Means for forming the primary transverse fold in a paper-bag blank, consisting of a suction-box journaled substantially in the plane of the blank to be folded, and having a perforated surface for engaging therewith, a pair of clips mounted upon the opposite edges of the suction-box, having beveled ends which in their closed position serve to define right-angled triangular folds in the blank, the suction-box having also mounted thereon a shaft and cams for simultaneously operating the clips.

3. Means for forming the primary transverse fold in a paper-bag blank consisting of a pair of suction-boxes disposed on the opposite flat sides of the blank and supported on independent bearings at the opposite edges thereof, the axes of the bearings being substantially coincident with each other and with the desired location of the transverse-fold line of the blank, substantially as described.

4. Means for forming the primary transverse fold in a paper-bag blank, consisting of a pair of suction-boxes, having independent bearings located at opposite edges of the blank, their axes being coincident with each other and with the plane of the blank, the blank-engaging portions of the suction-boxes projecting from their respective bearings past each other upon opposite sides of the blank, and having perforations in their adjacent walls, with means substantially as described for simultaneously oscillating the boxes away from each other upon their respective bearings.

5. In a paper-bag machine, in combination with oscillating members thereof, having clips mounted thereon consisting of a clip-operating cam-shaft, a toothed pinion thereon, and

a toothed gear journaled concentrically with the axis of the oscillating member, and engaging with the pinion, with means for operating the oscillating member and the clips, in suitable time and relation to each other, substantially as described.

6. Means for diamond-folding a double-length, bellows-sided blank, consisting of two pairs of oppositely-disposed suction-boxes, one pair being arranged to oscillate upon stationary bearings, and the other pair being arranged to oscillate upon a movable carriage, with means for moving the carriage so as to carry the suction-boxes mounted thereon toward and from the boxes mounted on the stationary bearings.

7. Means for diamond-folding a double-length, bellows-sided blank, consisting of two pairs of oppositely-disposed suction-boxes, one pair being arranged to oscillate upon stationary bearings, and the other pair being arranged to oscillate upon a movable carriage, with means for moving the carriage toward and from the boxes mounted on the stationary bearings, each of the suction-boxes being provided with a pair of bevel-ended clips for defining the right-angled triangular side folds in the blanks, substantially as described.

8. The combination of a pair of folding suction-boxes arranged to oscillate upon stationary bearings toward and from each other, a pair of suction-boxes similarly mounted upon a moving carriage, with means for exhausting the air from both pairs of suction-boxes and for moving the carriage so as to carry one of the two pairs of suction-boxes toward and from the other, substantially as described.

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