No. 126,378. G. R. CLARKE. Patented May 7, 1872.

Paper-Box Machine.

4 Sheets--Sheet 1.

Fig. 3.

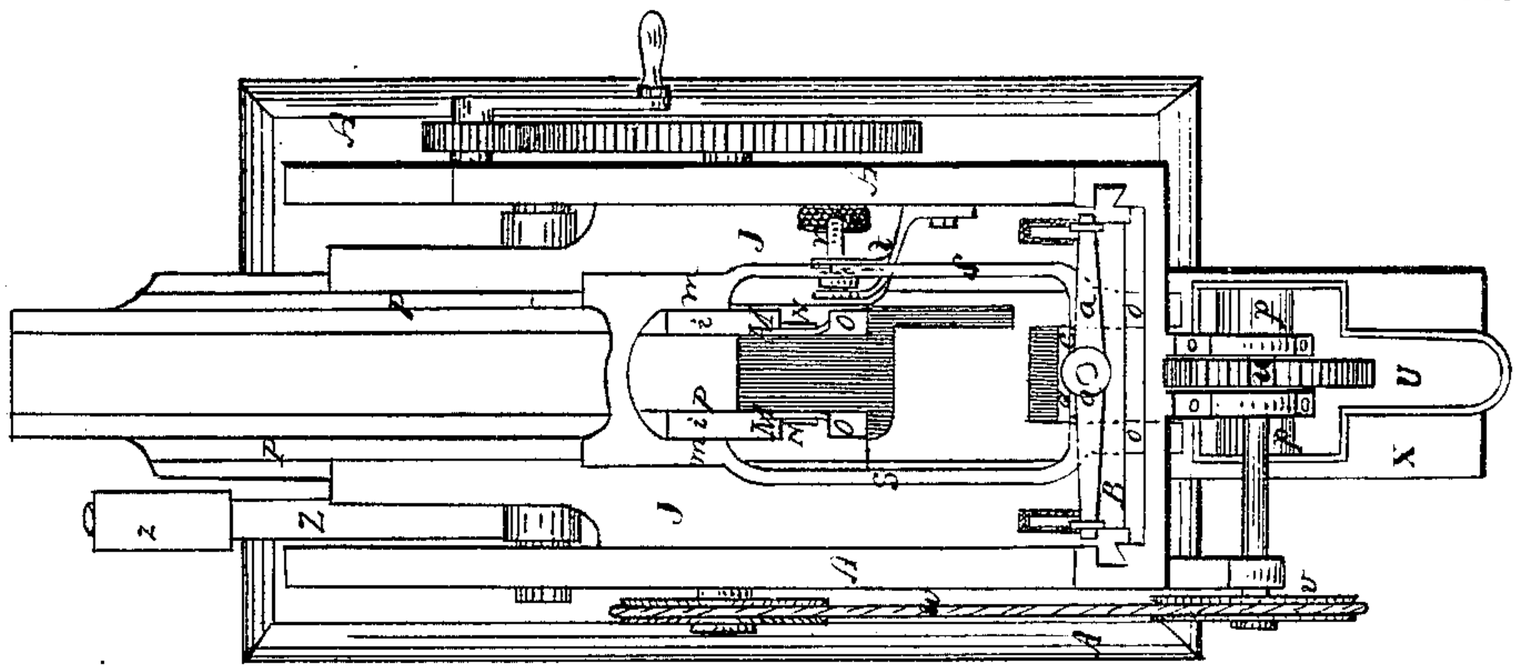


Fig. 2.

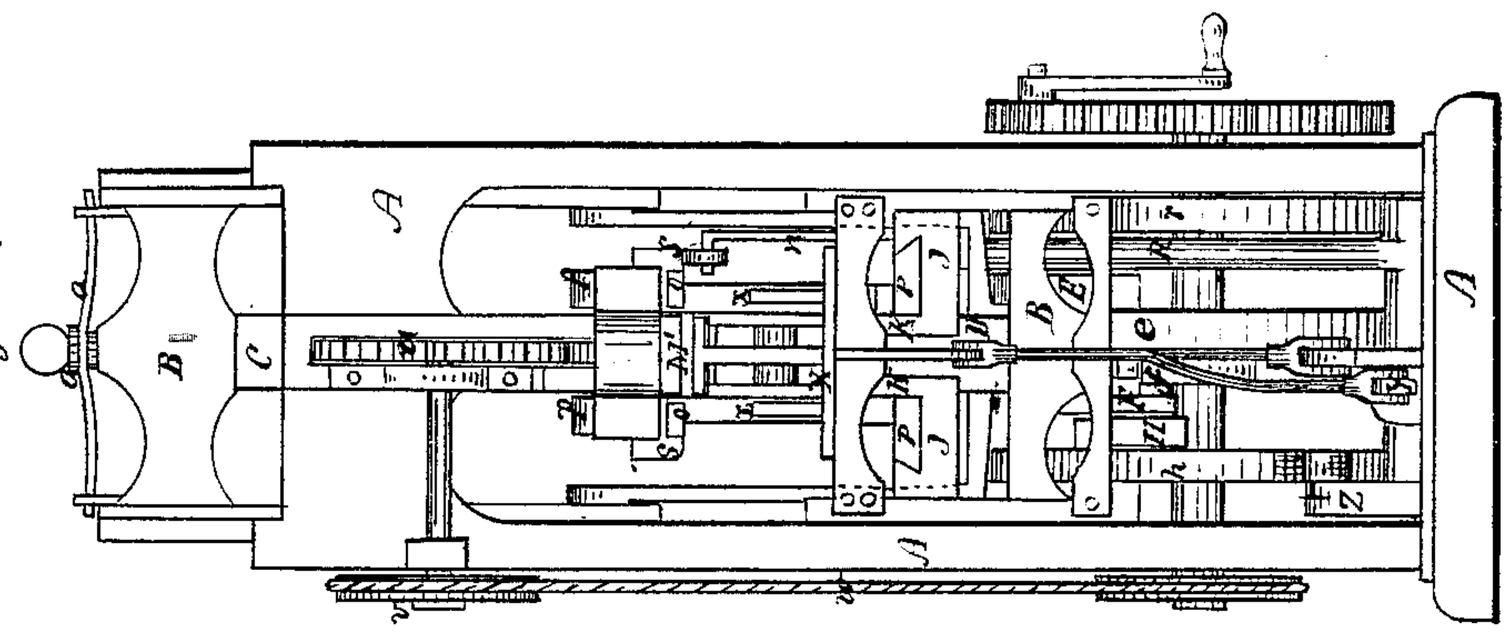
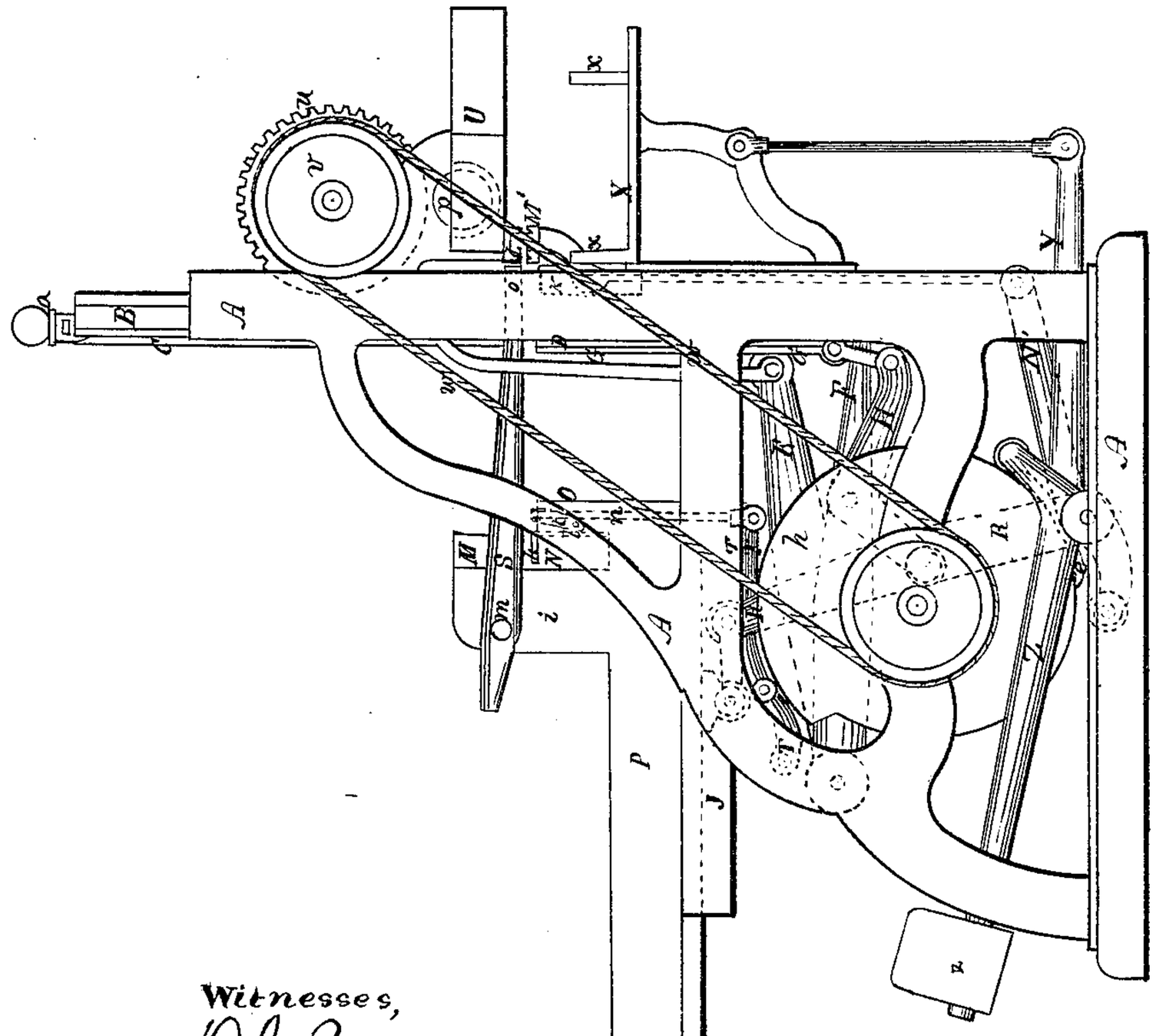


Fig. 1.



Witnesses,
D. J. Brown
R. D. Smith

George R. Clarke,
by his attorney,
D. J. Brown.

4 Sheets--Sheet 2.

G. R. CLARKE.

Paper-Box Machine.

No. 126,378. Patented May 7, 1872.

Fig. 4.

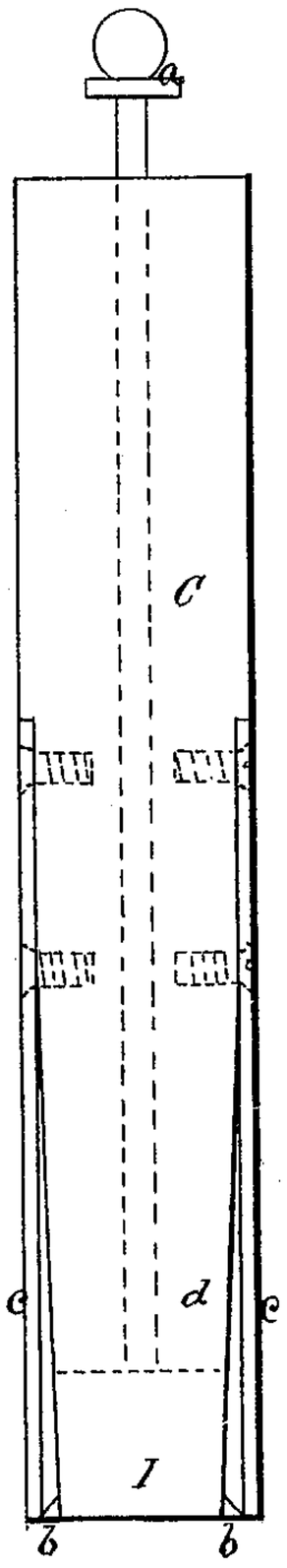


Fig. 5.

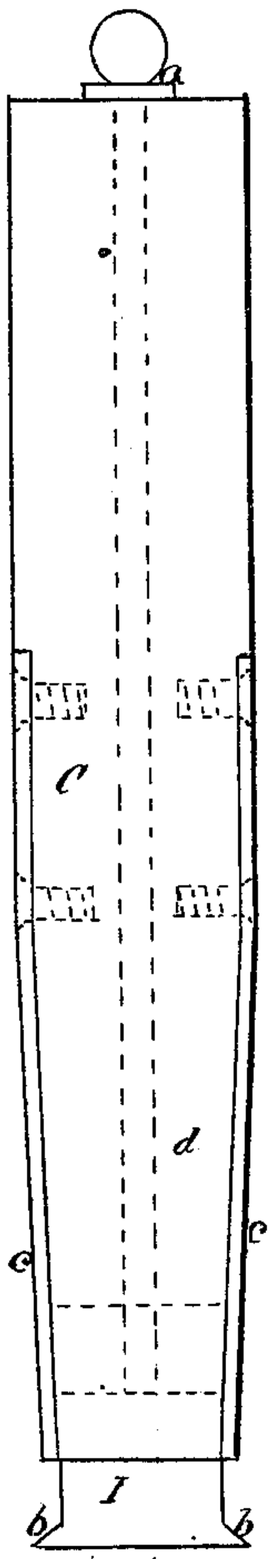
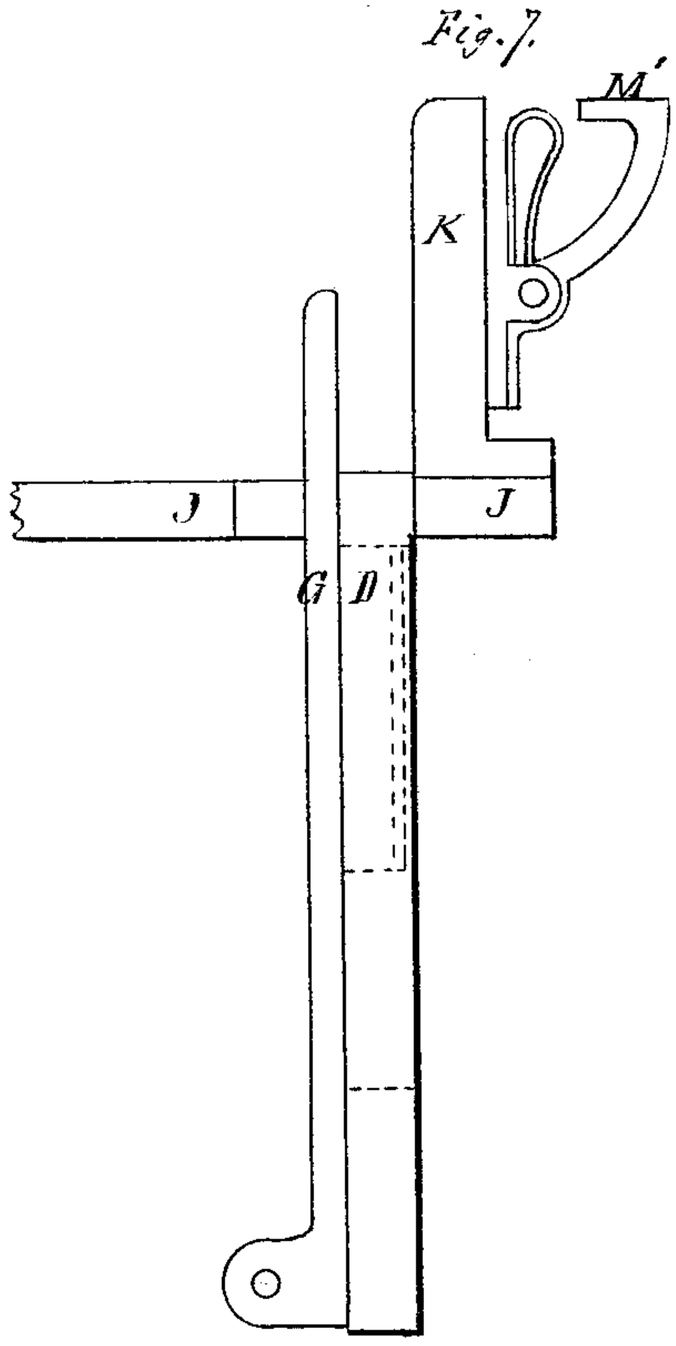
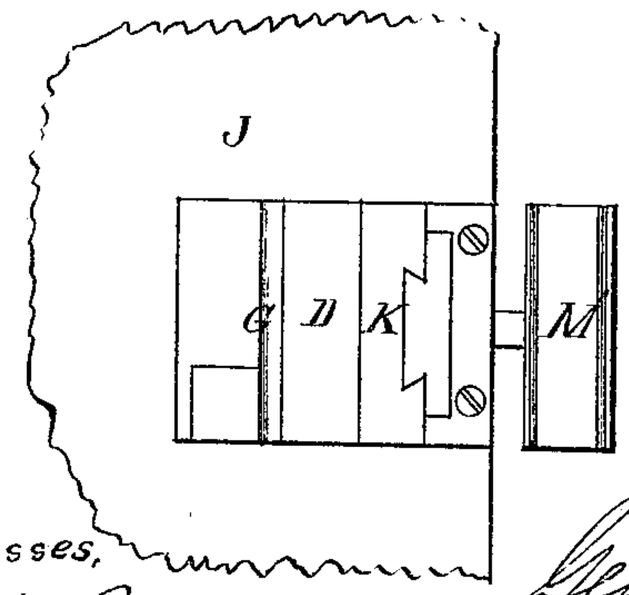


Fig. 6.

Fig. 7.





Witnesses,
D. J. Brown
R. D. Schmidt

George R. Clarke,
By his attorney,
J. S. Brown.

4 Sheets--Sheet 3.

G. R. CLARKE.

Paper-Box Machine.

No. 126,378. Patented May 7, 1872.

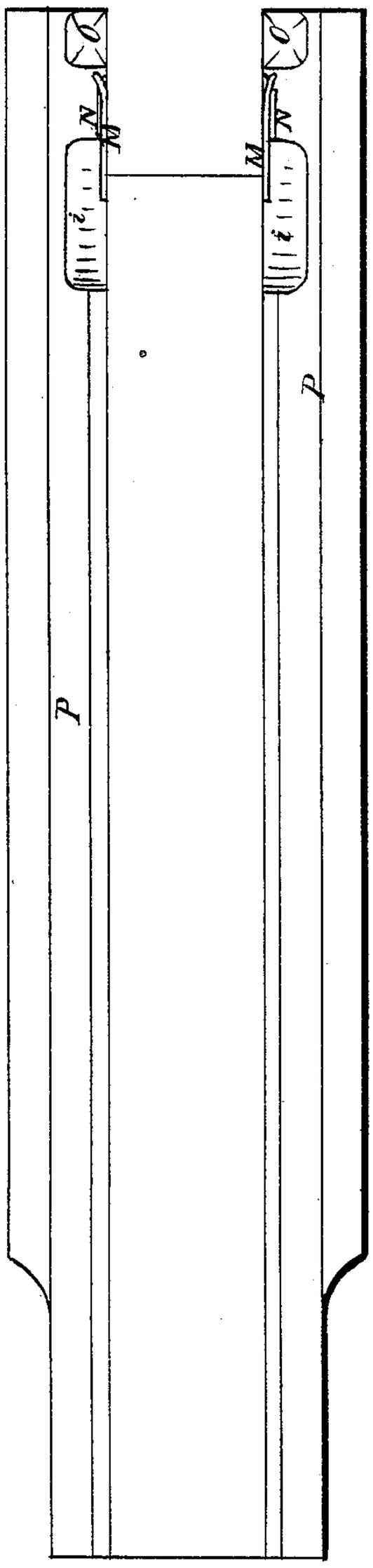


Fig. 8.

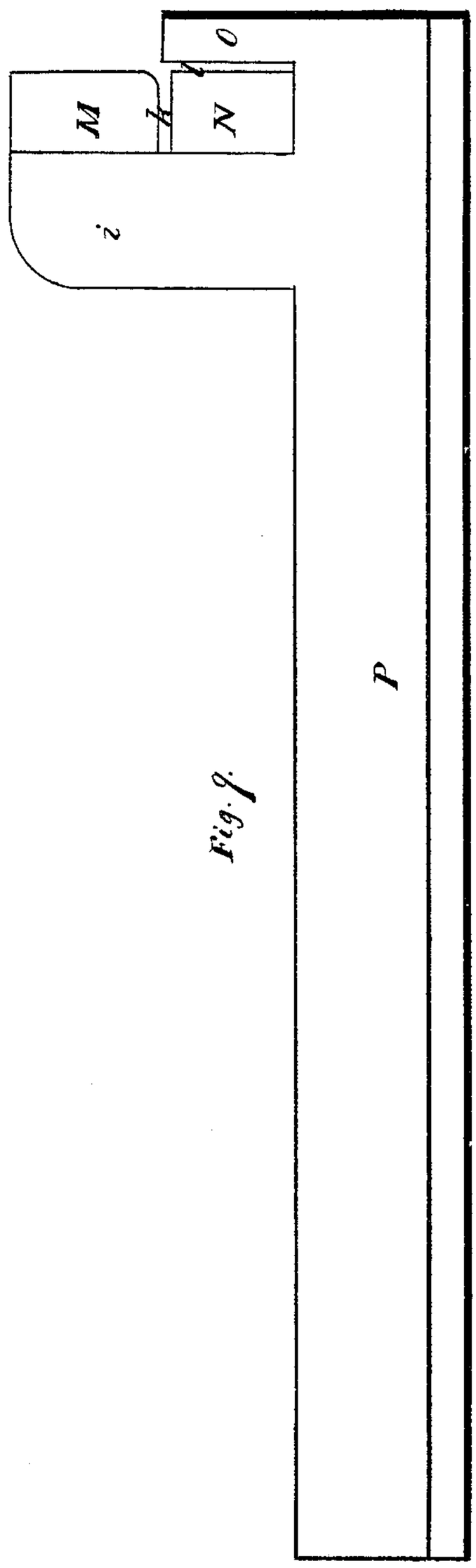


Fig. 9.

Witnesses,
D. J. Brown
R. D. Smith

George R. Clarke,
By his attorney,
D. J. Brown.

4 Sheets--Sheet 4.

G. R. CLARKE.

Paper-Box Machine.

No. 126,378. Patented May 7, 1872.

Fig. 14.

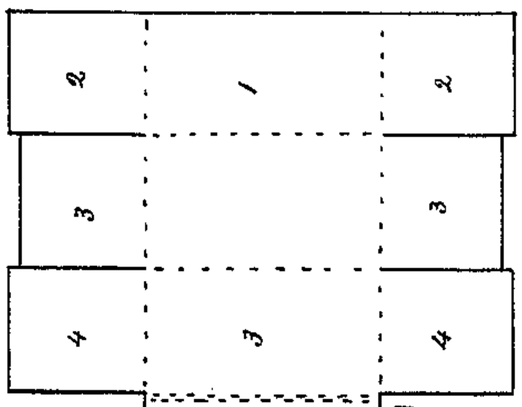


Fig. 15.

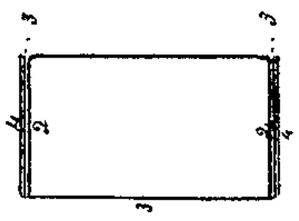


Fig. 11.

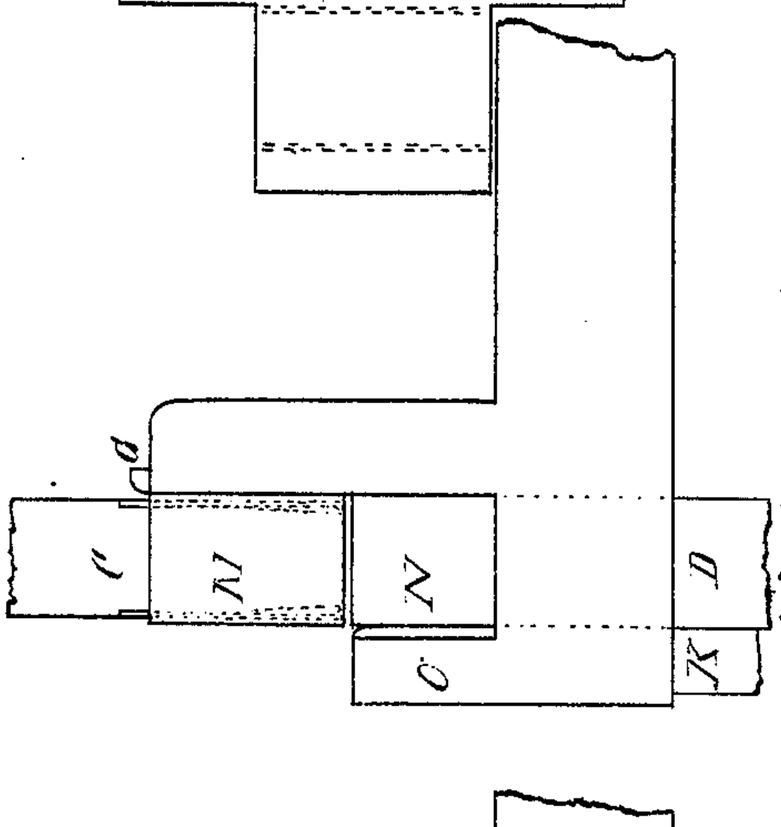


Fig. 13.

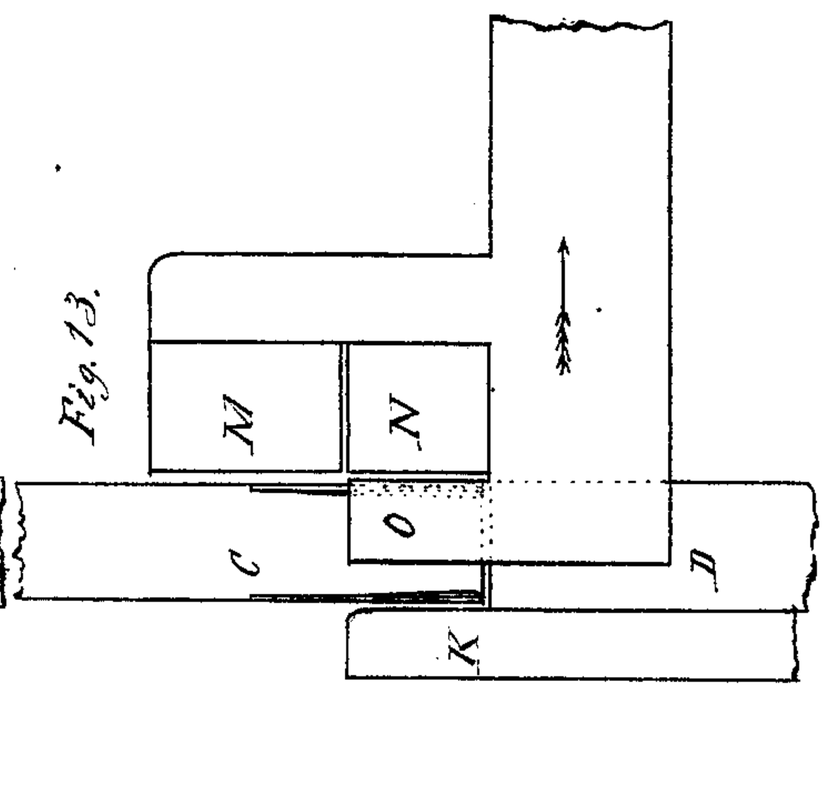


Fig. 10.

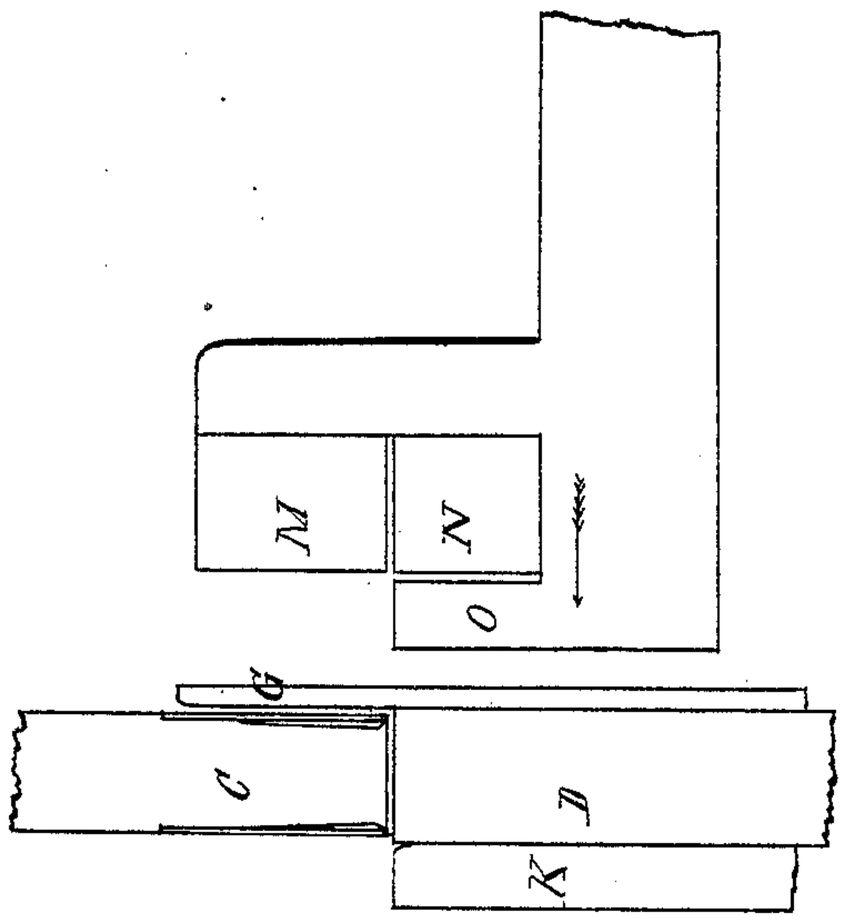
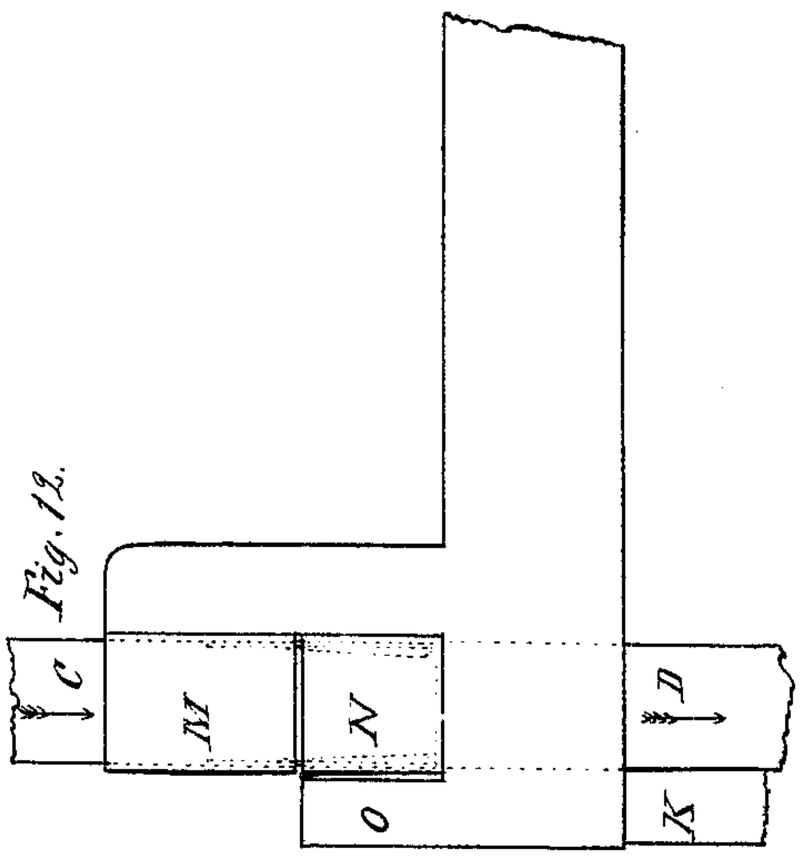


Fig. 12.



Witnesses,

Stephen W. Wood

R. O. Smith

George R. Clarke,

By his attorney,

J. A. Brown

126,378

UNITED STATES PATENT OFFICE.

GEORGE R. CLARKE, OF POMPTON, NEW JERSEY, ASSIGNOR TO PETER V. HUSTED, OF NEW YORK CITY.

IMPROVEMENT IN PAPER-BOX MACHINES.

Specification forming part of Letters Patent No. 126,378, dated May 7, 1872.

To all whom it may concern:

Be it known that I, GEORGE R. CLARKE, of Pompton, in the county of Passaic and State of New Jersey, have invented an Improved Machine for Making Paper-Boxes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making part of this specification—

Figure 1 being a side elevation of the machine; Fig. 2, an end elevation of the same; Fig. 3, a plan of the machine; Figs. 4 and 5, views, on an enlarged scale, of one of the parts detached, showing, respectively, its arrangement in different periods of its action; Figs. 6 and 7, respectively, top and side views, on an enlarged scale, of another part detached; Figs. 8 and 9, respectively, a plan and side view, on an enlarged scale, of another part detached; Figs. 10, 11, 12, and 13, views, in detail, showing the successive positions of the folders in folding different parts of the boxes; Fig. 14, a view of one of the blanks from which the boxes are made; Fig. 15, a top view of the complete box.

Like letters designate corresponding parts in all of the figures.

The frame A is of proper form in which to mount the working parts of the machine. It has vertical ways at one end, in which two guides or cross-heads, B B, bearing, respectively, plungers C D, move upward and downward, as required. The vertically-reciprocating movements of these plungers are produced by means of levers E F, pivoted to the frame A at one end, connected with the respective plungers at their movable ends, and vibrated by cams *e f*, of proper shape, on the driving-shaft. The two plungers C D work in the same line, one directly over the other, and their functions are to hold the paper-blanks while forming the boxes, to move the position of the boxes, as required, in folding the sides thereof, and to furnish the form around which the boxes are shaped. The paper-blanks are held by clamping them between the plungers. The movement of the position of the boxes, while forming them, is produced by the simultaneous descent of the two plungers, and the boxes are formed around the lower end of the upper plunger C. The upper plunger C is constructed or provided with a peculiar device for withdrawing it from the finished boxes. It consists of a discharging-piston or discharger, I, at the lower end of the plunger, fitting within side plates *c c* and *d d*, which project downward from the plunger, so as to be inclosed therein when the plunger is in position for forming the boxes, as indicated in Fig. 4. This discharger has a straight stem extending longitudinally up through a hole in the plunger, and being of sufficient length to allow the discharger to be driven out of and below the side plates *c c* and *d d*, as indicated in Fig. 5. It is held down in this position, when the plunger is left free, by the action of a cross-spring and stop, *a*, on the upper cross-head or guide B; but when upward pressure is applied against the lower end of the discharger the spring *a* yields, and allows it to be driven up within the side plates *c c* and *d d*. This spring also holds the paper-blanks pressed down between the discharger and the lower plunger D. The two opposite side plates *c c* are themselves springs, or are made to spring inward against the sides of the discharger I, which, as well as the sides of the plunger immediately over them, taper somewhat toward the bottom, as shown in Figs. 4 and 5, so that, unless prevented, the spring plates *c c* may press inward in converging positions, as in Fig. 5; but there are inclined or bevel lips *b b* on the lower end of the discharger, at the bevel sides, having the proper width or extent of lateral projection to bear against and press outward the spring plates *c c* into parallel positions when the discharger is forced within the said plates, as in Fig. 4. Thus, the boxes having been formed around the plunger C, when the discharger I is driven up between the spring-plates *c c*, on allowing the discharger to descend below the said plates the plunger becomes so reduced in size or width by the springing inward of the plates that it is easily withdrawn from the finished boxes. The upper end of the lower plunger D is of the same size, and located precisely under the bottom of the boxes formed around the lower end of the plunger C, and the movements of the two plungers are in harmony with each other. One side of each box is folded upward against the side of the upper plunger C by means of a

folder, G, which slides up and down in the lower plunger D, and has its sliding movements produced by means of a lever, H, pivoted, near the middle, to the lever F, which moves the plunger D, connected with the said folder at one movable end, and vibrated by a cam-groove on the inner face of the cam *h*, revolving on the cam-driving shaft, and acting on the other movable end of the lever, so as to produce the required motions. The opposite side of each box is folded upward against the side of the plunger C by means of a stationary folder, K, located close to the adjacent side of the plunger D, the two plungers C D descending simultaneously, at the proper moment, the length or height of the box, to effect the folding therewith. The other two sides of each box are formed by the overlapping of flaps projecting from the adjacent edges of the bottom, and of the two sides previously folded by the folders G and K. Three pairs of folders, M M, N N, and O O, are employed to fold these flaps, as shown fully in Figs. 8 and 9, and they are attached to a movable carriage, P, which has a reciprocating movement in horizontal ways J J, secured to or forming part of the frame A of the machine. The carriage P receives its reciprocating movement by means of a lever, R, pivoted to the frame at its lower end, connected, at its upper end, with the carriage, and vibrated by a revolving cam, *r*, of the proper form to produce the required motions.

The folders M M and N N are of thin sheet-metal, attached to upward projections *i i* of the sides of the carriage P. The folders M M are situated directly over the folders N N, with narrow spaces *k k* between them, respectively, for the flaps of the box bottoms to enter when folding the side flaps with the upper folders M M. The folders O O project upward from the sides of the carriage P, and are situated directly forward from the lower folders N N, with narrow spaces *l l*, respectively, between them for the remaining side flaps to pass into when folding the bottom flaps with the said folders O O. The upper folders M M fold the flaps of the side of the box held between the plunger C and folder G, thus lapping the flaps laterally against the sides of the plunger. The plungers C D, descending together a distance equal to the length or the height of the box, fold the flaps on the bottom of the box against the folders N N held stationary at the time. The folders O O, by the receding motion of the carriage P, fold the flaps projecting from the side of the box folded by the side folder K. The folders M M and N N are made thin, so that the successive flaps may fold over them; and they are finally withdrawn from between the folded flaps in the succeeding movements of the plungers and of the carriage P. The last folders O O do not require to be thin.

The paper-blanks are fed to the forming-and-folding apparatus above described, by means of a device which, at the same time, gums the proper flaps for pasting the parts of the boxes together. The principal instrument of this device is termed the "picker" S. It consists of two arms, joined together at the rear end, and pivoted, at *m m*, to the projections *i i* of the carriage P; and it projects forward horizontally therefrom to the required extent. In addition to the horizontal reciprocating movement imparted to the picker by the carriage P it has a vertical vibratory motion upon its pivots *m m*, communicated to it by means of a lever, T, pivoted to the frame A at one end, and of a vibratory bent arm or crank, *t*, also pivoted to the frame A, and connected, by a rod, *n*, with the movable end of the said lever T, which is vibrated by a cam projection on the periphery of the revolving cam *r*, that moves the carriage P. The arm *t*, thus vibrated and having a friction-roller on its upper end, moves in contact with the lower side of one of the arms of the picker; and the combined movements thereof and of the carriage P, together with the shape of the said lower surface of the picker-arm, produce the required vibratory motions of the picker at the proper times. The forward ends of the picker-arms terminate in gumming-plates *o o*, which are first gummed on their lower surfaces, and then are brought in contact with the flaps to be gummed of the paper-blanks, they being of the right size and shape for the purpose. The gum or mucilage box U is secured at the front end of the machine in the proper position; and the gum is raised therefrom, for gumming the lower surfaces of the gum-plates *o o* of the picker, by means of gumming-rollers *p p*, mounted in the gum-box U, (widened at the rear end to receive them,) so as to dip into the gum therein, and to reach a little higher than the upper edges of the gum-box. The gum-rollers are revolved by means of a pinion on their shaft, into which gears a cog-wheel, *u*, on the same shaft as pulley *v*, that receives a band, *w*, driven by a pulley on the driving or cam shaft. When the picker S is driven forward by the movement of the carriage P it is vibrated upward by the means above described or its equivalent, so that its gum-plates *o o* pass over and in contact with the gum-rollers, receiving thereby the gum for pasting the boxes. It then continues forward till the gum-plates reach entirely beyond the widened part of the gum-box; and then it is vibrated downward, clearing the sides of the gum-box in that position, till the gum-plates are entirely below the gum-box. Then the picker begins to recede with the first return movement of the carriage P, till the gum-plates are directly over the paper-blanks placed ready to be fed into the machine in the precise position required for gumming the proper flaps of the blanks. In that position of the picker the gum-plates *o o* are or may be partially under the widened bottom of the gum-box, so as to be held thereby against up-

ward pressure. While the picker remains in the last-named position the paper-holder X brings the paper-blank up to it. This paper-holder consists of a horizontal table or shelf having guides *x x* thereon to retain the pile of blanks accurately in the right position. It is attached to a carriage or cross-head, which slides vertically in ways of the frame A. It is drawn down and held in its stationary position, as represented, by means of a lever, Y, pivoted to the frame A, connected at its movable end with the paper-holder, and depressed by the periphery of the rotating cam *h*, acting on a projecting arm on the shaft of the lever. From the same shaft a counter-lever, Z, with a weight, *z*, thereon extends, and suddenly raises the paper-holder, the cam *h*, having a depression in its periphery to allow the descent of the lever. This sudden ascent of the paper-holder with some force brings the upper paper-blank on the pile in contact with the lower gummed surfaces of the gum-plates *o o* of the picker. The paper-holder is then drawn downward out of the way, leaving the upper blank adhering to the picker. The picker then moves backward in a horizontal direction, carrying with it the paper-blank, and places the same between the two plungers C D, which are at the time separated somewhat, to allow the insertion of the blank. They then come together, compressing between them that part of the blank which is to form the bottom of the box. At the same time the flap of the blank which is to form the loose top or the cover of the box is clamped in the creaser, consisting of a creased plate, M′, that is pressed upward against a stationary part, L, which has two projecting edges precisely opposite to and fitting the creases or grooves of the plate M′. This plate is attached to a slide, which moves up and down in the stationary folder K, Figs. 6 and 7, being pivoted or jointed to the slide so that it may be turned inward toward the folder by the action of the table X in its upward motion against a spring that ordinarily holds it back in a horizontal position, as represented. The slide is moved up and down at the proper times by a lever, N′, pivoted to the frame connected with the slide at one movable end, and vibrated at the other end by a peripheral projection on the cam *e*. The creases formed by this creaser in the cover of the box are for determining its subsequent foldings to close the box. The creasing-plate is turned inward on its pivot to get out of the way of the paper-holder X as the latter ascends. This creaser, closing upward against the flap of the blank in front of the picker-plates *o o*, while the bottom part of the blank is clamped between the plungers, holds the blank accurately and firmly in place, and enables the picker to be separated from it without disturbing its position. This is done by the rising of the picker therefrom at the begining of its next forward movement for gumming and seizing another blank.

The successive steps in folding the sides of the boxes are as follows: The blank for the box having been placed in position and held between the two plungers C D, first, the folder G slides upward by the side of the plunger C, as indicated in Fig. 10, thus folding one side of the box upward between it and the said plunger. Then the folders M M, together with the folders N N and O O, move horizontally in the direction indicated by the arrow in Fig. 10 till they reach a position beside the plunger C, as indicated in Fig. 11, thereby folding the two side flaps of the box side just folded upward around against the adjacent sides of the said plunger. Then the plungers C D descend with the box a distance equal to the depth of the box, or of the folders N N, into the position indicated in Fig. 12, thereby folding against the stationary folder K the side of the box opposite to the first side folded, and also folding against the folders N N, held stationary during the time, the other two sides or flaps on the bottom of the box. Finally, the folders O O, together with the folders M M and N N, recede horizontally in the direction indicated and to the position shown in Fig. 13, thereby folding the flaps on the side of the box just previously folded against the folder K laterally over the flaps folded from the opposite side and from the bottom of the box. This completes the formation of the box; and the last flaps folded, being gummed, paste and hold the flaps or lapping sides together.

Fig. 14 shows the blank before folding. The full dividing lines show the cuts therein, and the dotted lines show where the foldings take place. The parts to be folded are numbered in the order of successive folding. The projecting flap on the left-hand edge is to form the cover of the box and is left unfolded. The double-dotted lines indicate the creases previously formed, which serve as a guide and assistance in folding down the cover of the box and to keep it in its closed position. Fig. 15 shows a top view of the finished box, the lines representing the edges of the paper; and the numbers show the order in which the sides are folded.

After all the folding has been completed the folders on the carriage P remain a short time at rest while the plungers C D descend some distance further, the folder G having also descended even with the lower plunger D. The box is thereby brought into the front end of a drying-trough, which is formed longitudinally in the middle of the carriage P, being open at the top and ends, and its sides being just far enough apart to receive the boxes and hold them in place at its inner end by the spring pressure of the boxes against its sides. Then the plunger C rises while the plunger D remains stationary, and the rising of the plunger C thus releases the discharger I, which descends from between the side-plates *c c* and *d d*, thereby allowing the lower end of the plunger to contract in size so that it with-

draws itself freely from the box, which is left in the front end of the drying-trough. The succeeding forward movement of the carriage P shoves the box back in the drying-trough, out of the way of the next box; and the successive boxes push further along in the trough the preceding boxes, which are sufficiently dried to handle when they reach the rear end of the drying-box.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The side-folder G, arranged and operating in combination with the plungers C D, substantially as specified.

2. I also claim the flap-folders M M, N N, and O O on the carriage P, arranged and operating in combination with the plungers C D, substantially as specified.

3. I also claim the discharger I and springs *c c*, constructed and arranged in connection with the plunger C and operating in combination with the plunger D, substantially as and for the purpose herein specified.

4. I also claim the reciprocating drying-trough P, operating in combination with the plungers C D and discharger I, substantially as and for the purpose herein specified.

5. I also claim the combination of the picker S, gumming-box U, gumming-rollers *p p*, and paper-blank holder X, arranged as described, the picker passing over the rollers to be gummed, and then under the box to receive the upward blow or pressure of the holder, substantially as herein specified.

6. I also claim the combination of the creaser L M′ with the picker S and plungers C D, so that the paper blanks are held conjointly by the said creaser and plungers while the picker releases itself therefrom, substantially as herein specified.

GEO. R. CLARKE.

Witnesses:
JOHN P. HUNT, Jr.,
JONATHAN MARSHALL.