

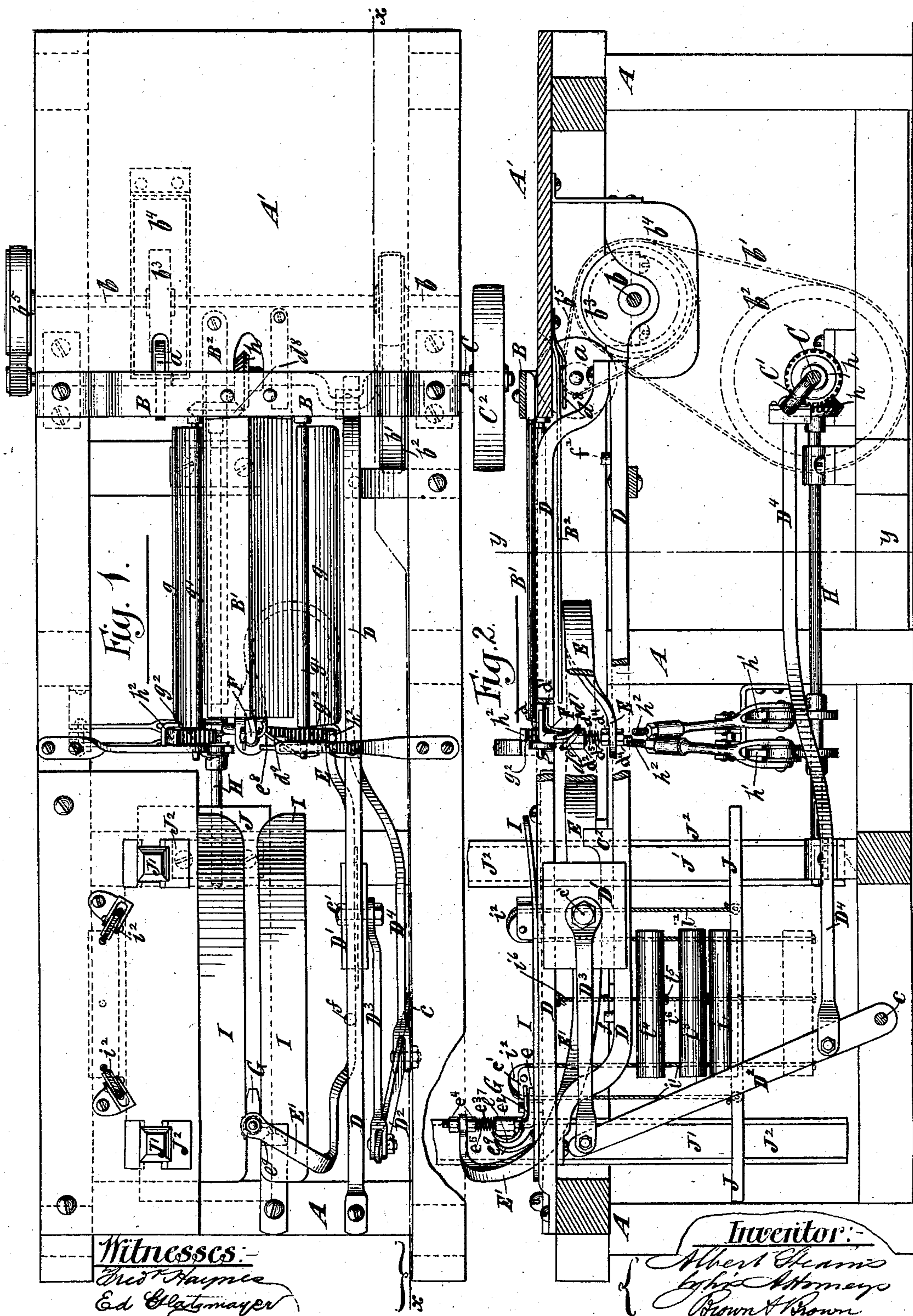
(No Model.)

2 Sheets—Sheet 1.

A. STEARNS.  
PAPER BOX MACHINE.

No. 258,819.

Patented May 30, 1882.



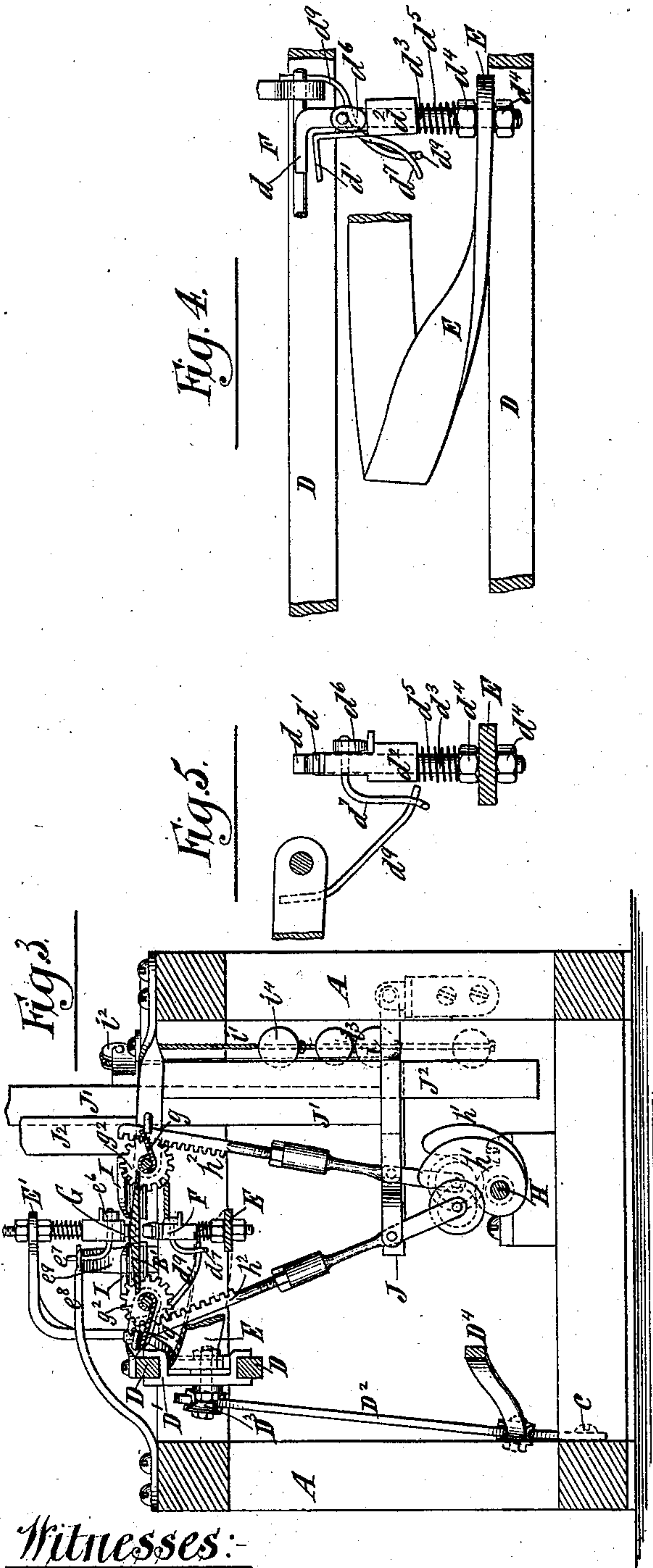
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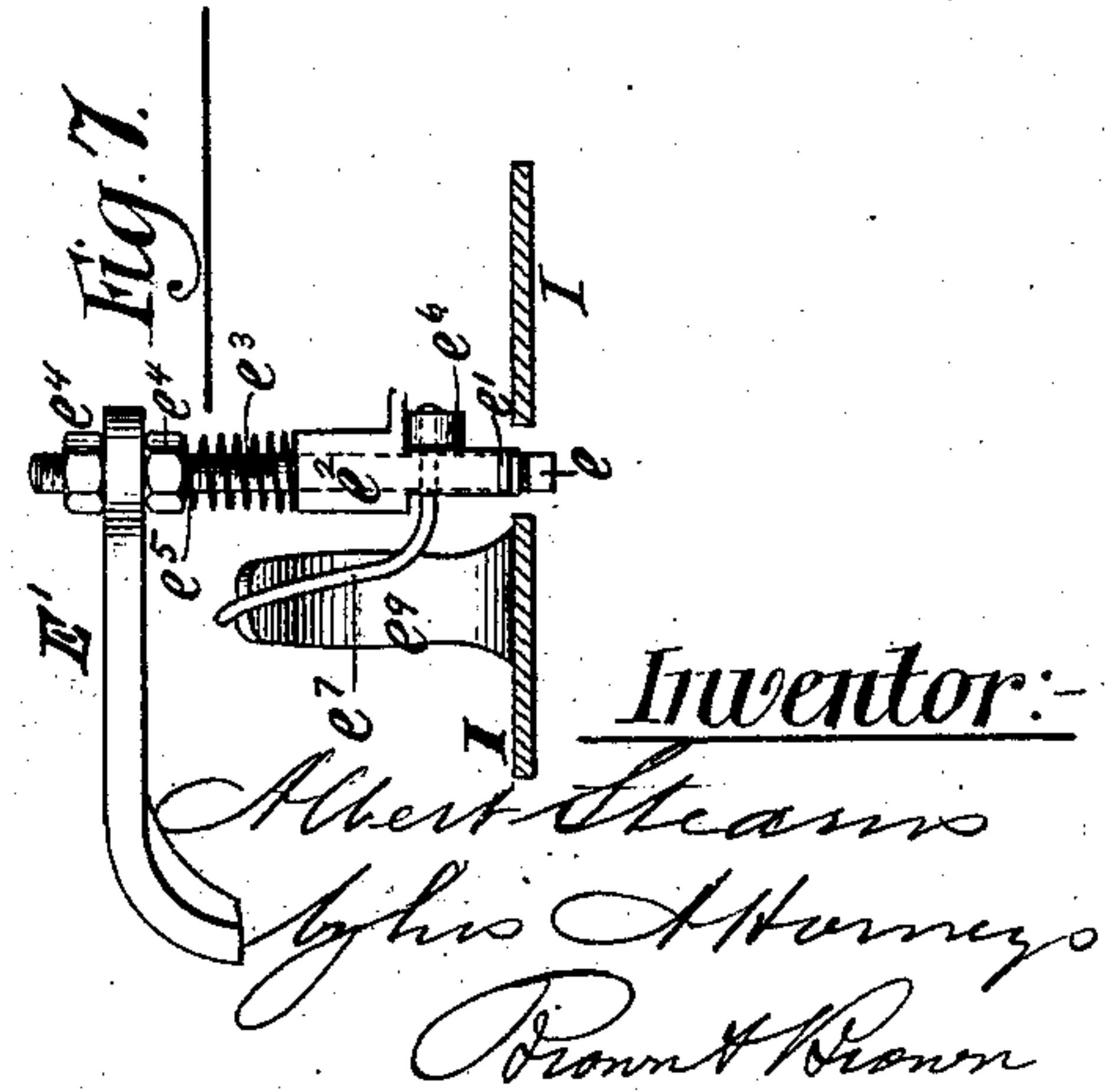
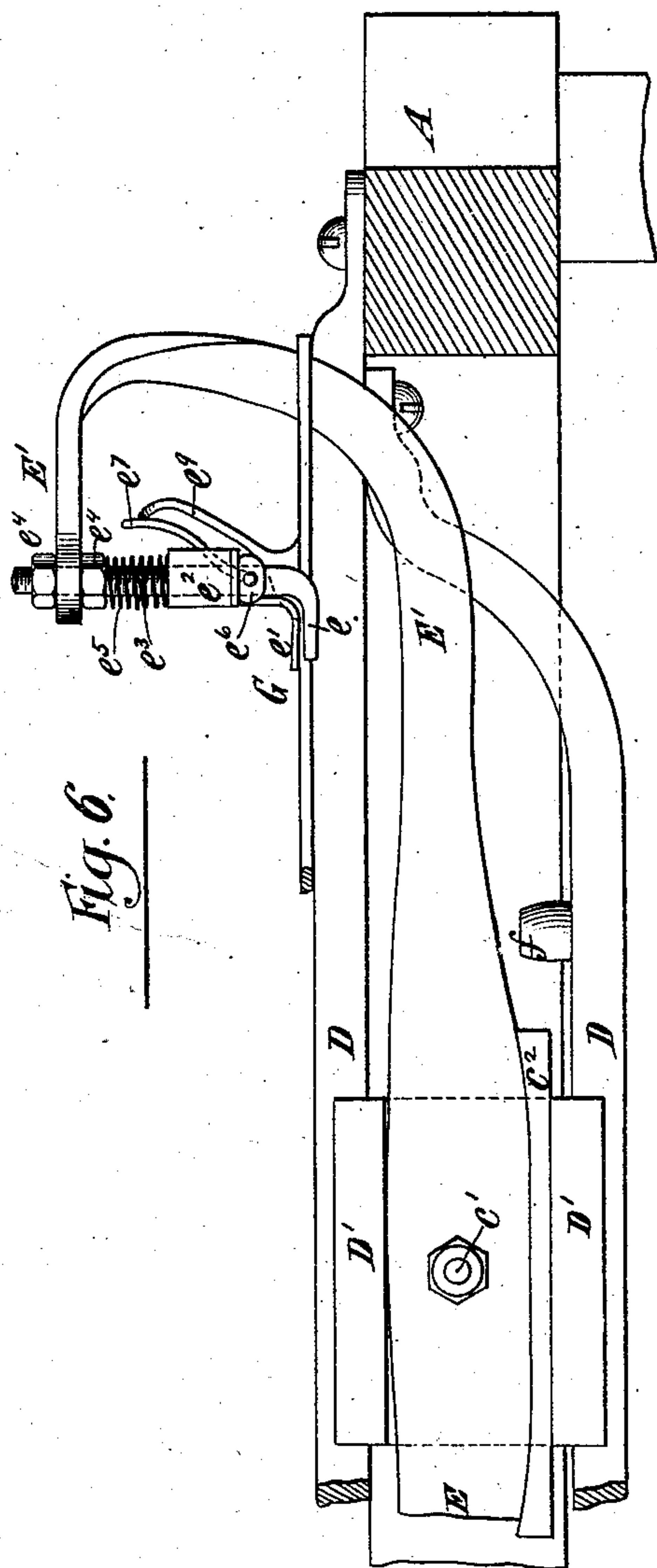
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PAPER BOX MACHINE.

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Witnesses:-  
Fred Wagner  
Ed Platzmayer





# UNITED STATES PATENT OFFICE.

ALBERT STEARNS, OF BROOKLYN, NEW YORK.

## PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 258,819, dated May 30, 1882.

Application filed December 19, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT STEARNS, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Paper-Box Machines, of which the following is a specification.

Skeleton boxes consisting simply of four sides without ends are commonly made by scoring a strip of pasteboard and then folding and pasting it to form a tube, which is subsequently cut into proper lengths to form boxes.

The object of my invention is to provide a desirable machine for taking the strips which have been previously scored and gluing and folding them so as to form tubes, and then pressing such tubes so as to insure the proper joining of the pasted edges.

My improved machine comprises a glue-wheel, a former, traveling grippers for drawing the strips of pasteboard into proximity to the former, folders for folding over the edges of the strip upon the former to form a tube, other traveling grippers, which draw the tube from the former, and a press, into which the tubes are drawn, and wherein they are pressed to insure the proper union of the edges of the strips.

The invention consists in certain novel features in the construction of the above-mentioned parts of the machine, in their combination with each other, and in combination with them of mechanism whereby they are operated, all as more fully hereinafter described.

In the accompanying drawings, Figure 1 represents a plan of my improved machine. Fig. 2 represents a longitudinal section on the dotted line *x x*, Fig. 1, certain other portions of the machine being broken away to illustrate parts which would otherwise be hidden. Fig. 3 represents a transverse section on the dotted line *y y*, Fig. 2. Fig. 4 represents a side view of the grippers which draw the strip of pasteboard under the former and portions of the devices which operate them upon a larger scale. Fig. 5 represents an edge or front view of such grippers and parts of their operating mechanism. Fig. 6 represents a side view of the grippers which draw the tube from the former, together with portions of their op-

erating mechanism on the same scale as Figs. 4 and 5; and Fig. 7 represents an edge or front view of such grippers and operating mechanism upon the same scale.

Similar letters of reference designate corresponding parts in all the figures.

A designates the frame-work of the machine, which may be of any construction adapted to properly support the several mechanisms; and A' designates a feed-table located at one end of the machine, and from which the strips of pasteboard are fed forward. The strips before being introduced to this machine are scored at four points to form the corners of the tube.

B designates a strip or bar extending across the front of the table A', and B' represents a former projecting forward from the bar B, and over which the strip of pasteboard is folded to form the tube. As the strip of pasteboard passes from the table A' one edge passes over and in contact with a gluing-wheel, *a*, which projects through an opening in the table A' and above or flush with the upper surface thereof, as seen in Figs. 1 and 2. Below the table A' is a counter-shaft, *b*, which is rotated by means of a belt, *b'*, from a pulley, *b<sup>2</sup>*, on the main shaft C of the machine, and upon the counter-shaft *b* is a glue-feeding wheel, *b<sup>3</sup>*, which runs in a glue-pot, *b<sup>4</sup>*, attached to the under side of the table A'. The glue-feeding wheel *b<sup>3</sup>* is in contact with the gluing-wheel *a*, and the latter is rotated positively by means of a belt, *b<sup>5</sup>*, from the counter-shaft *b*.

I will now describe the mechanism for drawing the strips of pasteboard forward under the former B'.

Parallel with the former B', and extending along the side and forward thereof, is a slide-way composed of parallel guide-bars D, to which is fitted a sliding block or slide, D', which is gibbed to engage with the bars, as seen clearly in Fig. 3. The slide D', which may be termed a "carrier-slide," is reciprocated upon the guide-bars D by means of a vibrating lever, D<sup>2</sup>, which is fulcrumed at *c*, and is connected with the slide by a rod, D<sup>3</sup>, and said lever is vibrated or swung back and forth by a connecting-rod, D<sup>4</sup>, receiving motion from a crank, C', on the main shaft C. The said main shaft may be operated by a belt upon the pul-



ley C<sup>2</sup>, (shown in Fig. 1,) or by any other suitable gearing, and the mechanism through which the carrier-slide D' is operated may be varied as desired. The inner face of the carrier-slide D' is recessed, as seen in Fig. 3, and in such recess is arranged a carrier-bar of peculiar shape. (Shown clearly in Figs. 1 and 2.) This bar is pivoted at c' to the carrier-slide D', and rests upon a gib or piece, c<sup>2</sup>, which conforms in shape to its under side, as seen in Fig. 6, and is adapted to be moved longitudinally to tilt the bar upon its pivot, for a purpose hereinafter described.

E designates the portion of the carrier-bar which projects from the carrier-slide D' in the direction of the former B', or toward the front of the machine, and E' designates the portion of said bar which projects in the opposite direction or toward the delivery end of the machine. Although the two portions E E' are made in one piece, they need not be so made, and they will be hereinafter referred to as two carriers. The end of the carrier E is bent into a semicircular shape, as seen in dotted lines in Fig. 1, and the extreme end thereof is twisted so as to stand horizontally, as seen in Fig. 2, and carries a pair of grippers, F. (Best shown in Figs. 4 and 5.) The grippers F consist of a fixed jaw, d, and a movable jaw, d', comprising a socket or collar, d<sup>2</sup>, adapted to slide on the shank d<sup>3</sup> of the fixed jaw d. The shank d<sup>3</sup> is secured in a proper position in the carrier E by means of nuts d<sup>4</sup>, which provide for adjusting it as to height, and the movable jaw d' is held in contact with the fixed jaw d by means of a spiral spring, d<sup>5</sup>. Inserted transversely through the shank d<sup>3</sup> is a short shaft or pin, on one end of which is fixed a cam, d<sup>6</sup>, and from the other end of which projects an arm, d<sup>7</sup>, and by moving said arm in either direction the cam d<sup>6</sup> is caused to act on the collar or socket d<sup>2</sup>, and thereby move and hold the movable jaw away from the fixed jaw. The end of the carrier E' is bent upward and over so as to stand horizontally, and carries a pair of grippers, G, which are best shown in Figs. 6 and 7. Said grippers consist of a fixed jaw, e, and a movable jaw, e', having a collar, e<sup>2</sup>, fitting and adapted to slide on the shank e<sup>3</sup> of the fixed jaw. The shank e<sup>3</sup> of the fixed jaw e is secured in the carrier E' by means of nuts e<sup>4</sup>, which provide for adjusting it up or down so that it will stand at the proper height, and the movable jaw is held in contact with the fixed jaw e by means of a spiral spring, e<sup>5</sup>, bearing on the socket or collar e<sup>2</sup>. Inserted transversely through the shank e<sup>3</sup> is a short shaft or pin, on one end of which is fixed a cam, e<sup>6</sup>, and from the opposite end there projects an arm, e<sup>7</sup>, and by moving said arm in either direction the cam e<sup>6</sup> is caused to act on the collar or socket e<sup>2</sup>, and thereby move and hold the movable jaw away from the fixed jaw.

On the lower guide-bar, D, near the back or delivery end of the machine, is a projection, f, and as the carrier-slide D' and its attached car-

riers approach the end of their forward movement the end of the gib c<sup>2</sup> strikes against this projection, and the gib is thereby moved longitudinally and raises the pair of grippers G, and at the same time lowers the pair of grippers F. When the carrier-slide D' and its carriers approach the end of the backward movement—that is, their movement toward the front end of the machine—the opposite end of the piece c<sup>2</sup> strikes against a stationary stop, f', and is thereby moved longitudinally to raise the carrier E with its grippers F, and depresses the carrier E' with its grippers G. The necessity of this up and down adjustment or movement at each end of their reciprocating movements will be evident from the description following. As the carrier-slide D' and the carrier E with its grippers reach the end of their reciprocation opposite to the position shown in the drawings, the arm d<sup>7</sup> of the grippers F strikes against a fixed stop, d<sup>8</sup>, (see Figs. 1 and 2,) and thereby the movable jaw d' is released, and is caused to grip the pasteboard in connection with the fixed jaw d. The strip being placed by the operator or attendant in proper position to be taken by the jaws as soon as said jaws commence their forward movement, the arm d<sup>7</sup> leaves the stop d<sup>8</sup>, and the strip is grasped tightly by the spring d<sup>5</sup> pressing the movable jaw against the strip. The carrier E, with the grippers F, then moves forward, carrying or drawing the strip under the former B'. As the grippers F approach the end of their forward movement, the arm d<sup>7</sup> strikes against a stationary stop, d<sup>9</sup>, (shown in Figs. 1, 2, 3, 4, and 5,) and the grippers are thereby opened and held open, releasing the strip and moving beyond it, so as to leave it entirely free and supported by a strip or finger, B<sup>2</sup>. (See Fig. 2.) At the completion of such movement the piece or gib c<sup>2</sup> strikes against the stop f, and the carrier E and grippers F are thereby lowered slightly. This lowering of the grippers is necessary to cause them to pass back under the strip, which is on the former when they make their return movement, as if they moved back in the same plane as they move forward the strip just drawn forward would of course be shoved back. The grippers F are open during their whole return movement.

Upon opposite sides of the former B', and parallel therewith, are folders g, which are secured to oscillating shafts g', and upon the ends of such shafts are fixed pinions g<sup>2</sup>.

Below the machine is a counter-shaft, H, extending at right angles to and deriving motion from the main shaft C by means of bevel-gear wheels h, and upon the shaft H are cams h', which impart a reciprocating motion to rack-bars h<sup>2</sup>, which engage with the pinions g<sup>2</sup> on the shaft g' of the folders g. By the folders g the two edges of the strip of pasteboard are lapped over each other upon the former, and are held by the paste or glue applied by the wheel a. After the folders have performed



their operation the carriers E E', with their grippers F G, commence their backward movement, and the grippers F return under the tube just formed and grasp a new strip in the manner previously described. As the grippers G complete their backward movement the arm  $e^7$  strikes against a stationary stop,  $e^8$ , (shown in Figs. 1 and 3,) thereby releasing the movable jaw  $e'$ , so that the two jaws pass on opposite sides of and grip the tube last formed, and as the grippers G make a second forward movement they draw the said tube off the former and permit a second strip to be drawn forward under the former to take the place of said tube.

In order to insure the firm adhesion of the two ends of the strip which are secured by the paste or glue, it is desirable to subject the tube to a subsequent pressing, and this I accomplish in the following manner: In front of and slightly above the former B' are arranged two plates, I I, which are fixed at a sufficient distance apart to allow the grippers G to pass between them, and which form, in effect, the head of the press. Below these plates is a platen, J, which is fixed to the lower ends of bars J', that are adapted to slide vertically in suitable ways, J<sup>2</sup>, as clearly seen in Fig. 2. In its normal position, and before any tubes are drawn into the press, the platen J is held up tightly against the plates I by means of a weight,  $i$ , which is suspended by chains or cords  $i'$ , which pass over pulleys  $i^2$ , and are attached to the platen. Hence any downward movement of the platen will be resisted by the weight. It will be understood that the tube, as formed, is not rectangular, but is "knocked down"—that is, as it is drawn off the former B' the two widest sides lie close together and the narrow sides lie upon the wide sides, in a manner easily understood. The ends of the plates I which are adjacent to the former are flared or inclined upward, so that the tube drawn by the grippers G can enter easily between the plates and the platen J. As the grippers G complete their movement the arm  $e^7$  strikes a stationary stop,  $e^9$ , (shown clearly in Fig. 1,) and the grippers are thereby opened sufficiently to release the sheet and to allow them to pass beyond it, and are held open during their return movement; and as the grippers continue to move the gib or piece  $e^2$  strikes the stop  $f$ , as previously described, and thereby raises the grippers G up between the plates I, so that they are free to pass backward and take hold of a new tube over the top of the tube just drawn into the press. This raising of the grippers before they commence their return or backward movement is necessary, because otherwise they would move back in the plane of their forward movement and would push out the tube just drawn into the press. As the machine continues its operation each tube is drawn into the press on top of or above those already therein, and consequently the platen J is forced down, raising the weight  $i$ ; but as the number of tubes in

the press is increased the amount of weight acting thereon should also be proportionately increased and properly press the tubes. To accomplish this I provide supplemental weights  $i^3$   $i^4$ , which are held by stops  $i^5$  on a central cord or chain,  $i^6$ , which is attached at its upper end to the frame of the machine, and the cords or chains  $i'$  pass freely through these supplemental weights and the platen is not affected by them. When the platen is in its highest position the weight  $i$  is in the position shown in dotted lines in Fig. 2, and as the platen descends of course the said weight rises. When the platen has descended to the position shown in Fig. 2 the weight  $i$  has been raised to the position shown and has picked up the first supplemental weight  $i^3$ , and the tubes in the press are therefore subjected to the action of the two weights  $i$  and  $i^3$ . As the platen descends the two weights will pick up the third weight  $i^4$ , and the platen will then be acted upon by all three weights, and the pile of tubes in the press will therefore be subjected to the action of all three weights. The tubes, after being withdrawn from the press, are cut off to the desired length, and when wrappers are put around the skeleton-boxes thus formed they are readily made to assume a rectangular form.

It is obvious that the details of the mechanism employed to produce the proper operation of the several parts of the machine may be modified considerably without departing from my invention.

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

1. In a paper-box machine, the combination, with a former and folders arranged on opposite sides thereof, of grippers for drawing the strips forward under said former, and other grippers for drawing the tubes from said former, substantially as specified.

2. In a paper-box machine, the combination, with a former and folders arranged on opposite sides thereof, of a carrier-slide and mechanism, substantially such as described, for reciprocating it, carriers attached to said slide, and two pairs of grippers attached to said carriers and reciprocated together to draw the strips under said former and to draw the tubes from said former, substantially as specified.

3. In a paper-box machine, the combination, with a former and folders arranged on opposite sides thereof, of grippers for drawing the strips under said former, grippers for drawing the tubes from said former, and mechanism, substantially such as described, for reciprocating said grippers and for giving them a rising and falling movement at the termination of their reciprocating movement, substantially as specified.

4. The combination of the former B' and folders  $g$ , the carrier-slide D', and guide-bars D, the bar pivoted to said slide and comprising the carriers E E', the sliding gib  $e^2$ , the stops  $f$   $f'$ , and the pairs of grippers F G, substantially as specified.



5. The combination, with the former B' and two pairs of reciprocating grippers, F and G—one pair for drawing strips under the former and the other pair for drawing tubes therefrom—  
5 of the folders  $g$ , pinions  $g^2$  on the shafts of said folders, the cam-shaft H, and the rack-bars  $h^2$ , engaging with the cams on said shaft and gearing with said pinions, substantially as specified.

6. The combination of the former B', the carrier-slide D', the gripper-carriers E E', the grippers F, for drawing strips under said former, the grippers G, for drawing tubes from said former, the lever D<sup>2</sup> and link D<sup>3</sup>, the connecting-rod D<sup>4</sup>, and the crank-shaft C, all substantially as specified.  
15

7. In a paper-box machine, the combination, with a former and folders on opposite sides thereof, of a pair of reciprocating grippers for drawing strips under said former, a second pair  
20 of reciprocating grippers for drawing the tubes

from the former, and a press into which the tubes are drawn by the last-mentioned grippers, substantially as specified.

8. In a paper-box machine, the combination, with a former, folders on opposite sides thereof, and reciprocating grippers for drawing the strips under said former, and for drawing the tubes from the former, of the pieces I, flared or inclined at the ends, and the weighted platen J, substantially as specified.  
25 30

9. The combination of the pieces I, forming the head of the press, the platen J, a weight or weights for acting upon said platen, and the supplemental weights, which are taken up as the number of tubes in the press increases,  
35 substantially as specified.

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Witnesses:

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