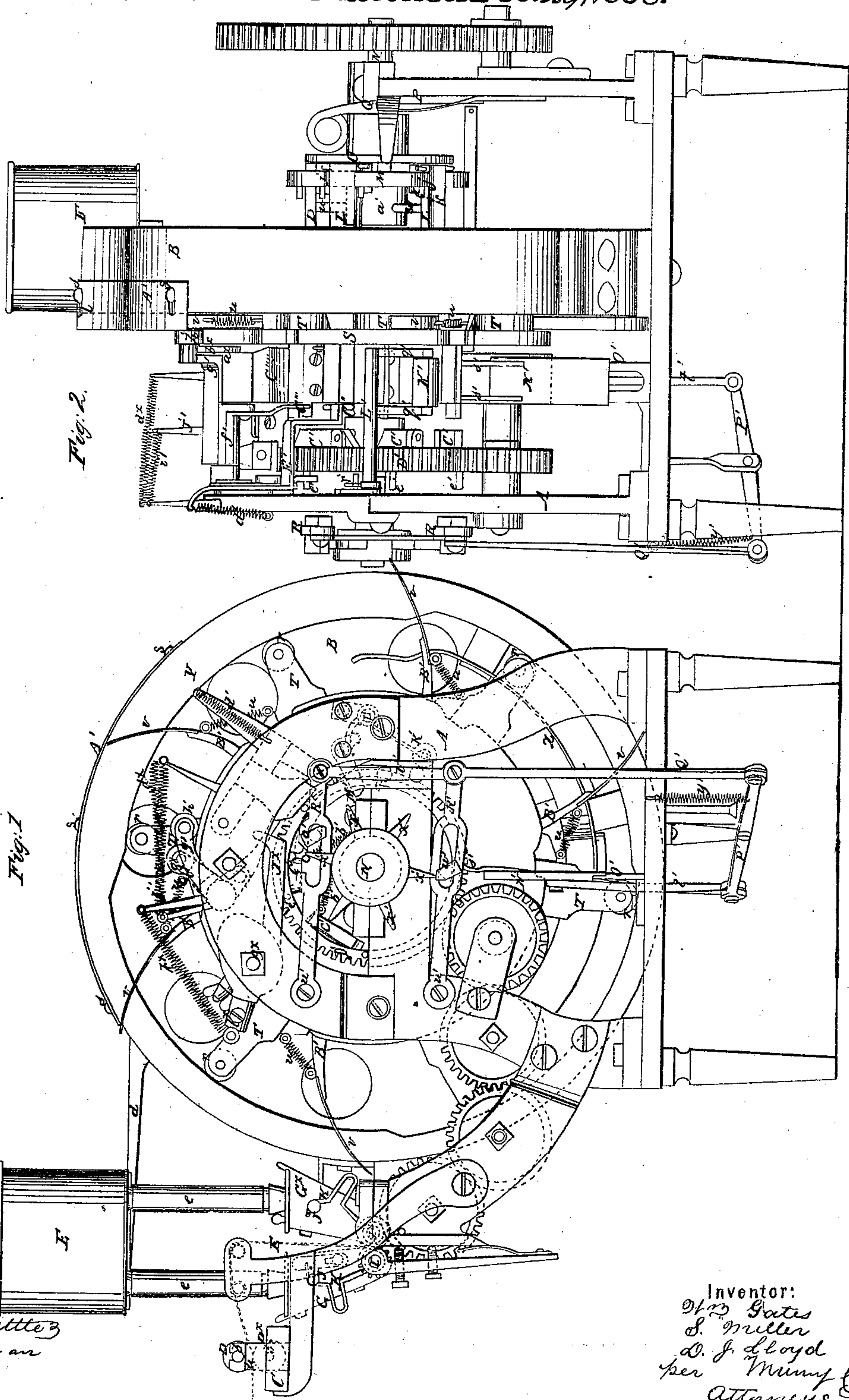


Sheet 1.3 Sheets.
Gates, Miller & Lloyd.
Paper Box Mach.
 No 85,301. Patented Dec. 29, 1868.



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Inventor:

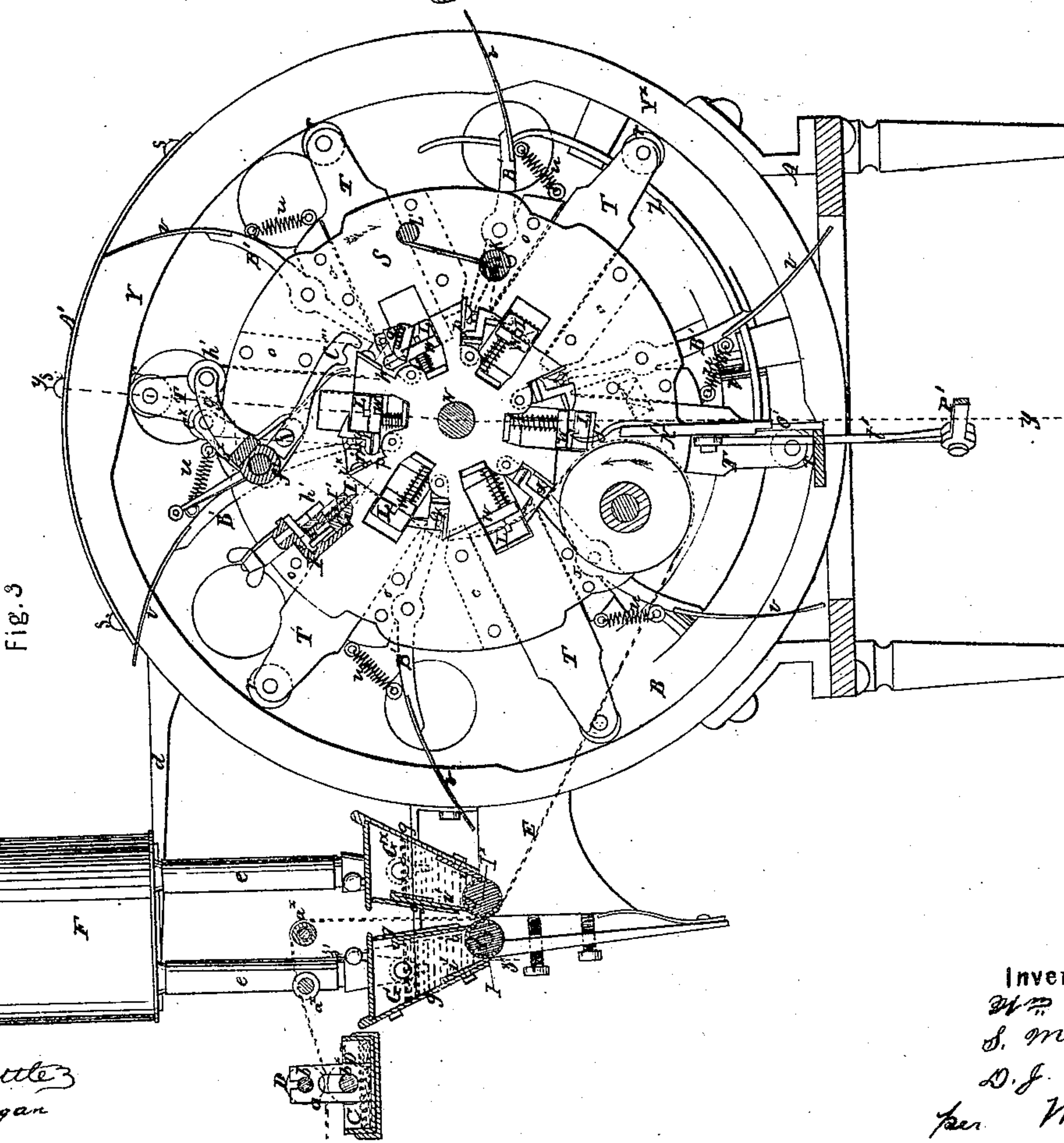
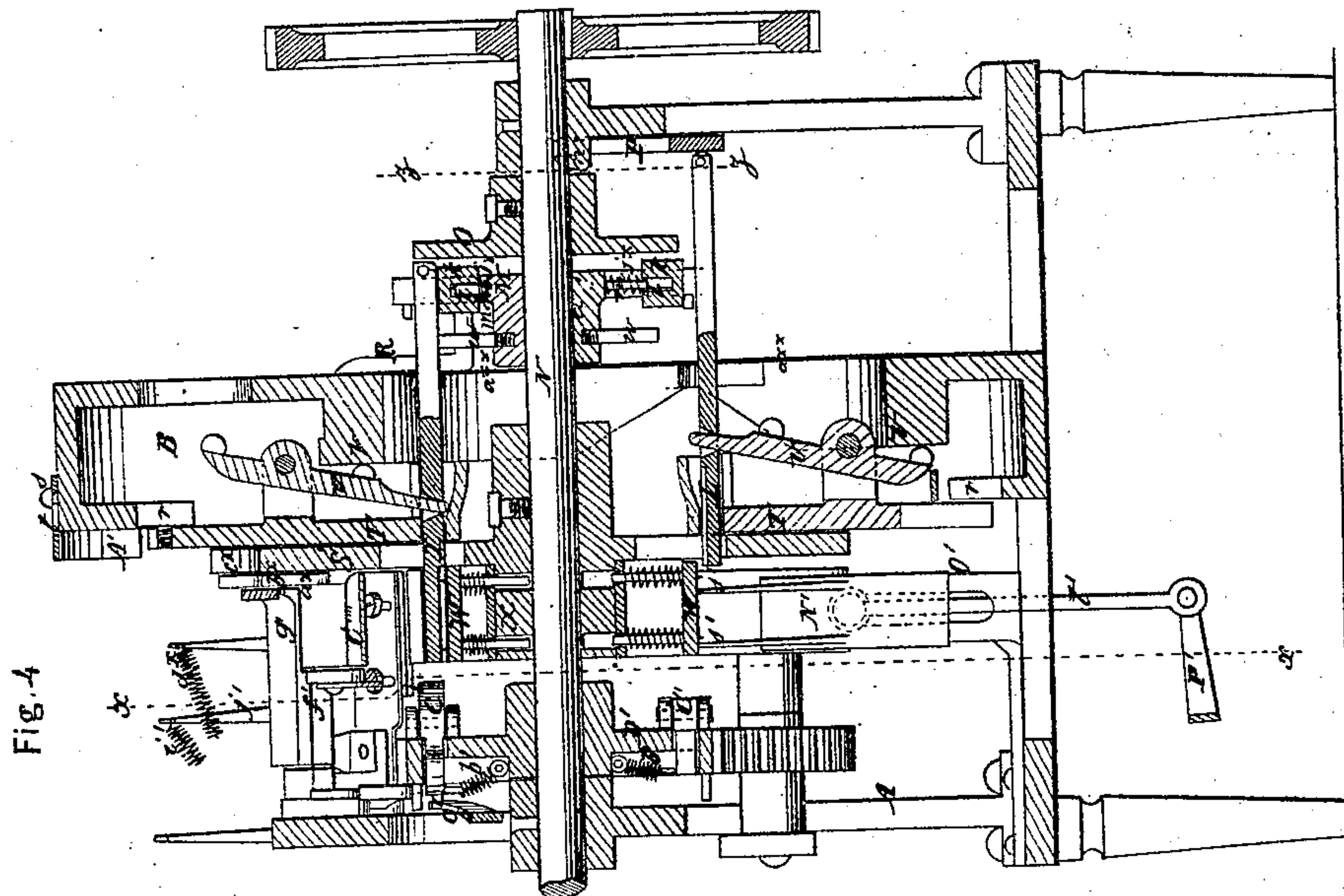
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Paper Box Mach.

N^o 85,301.

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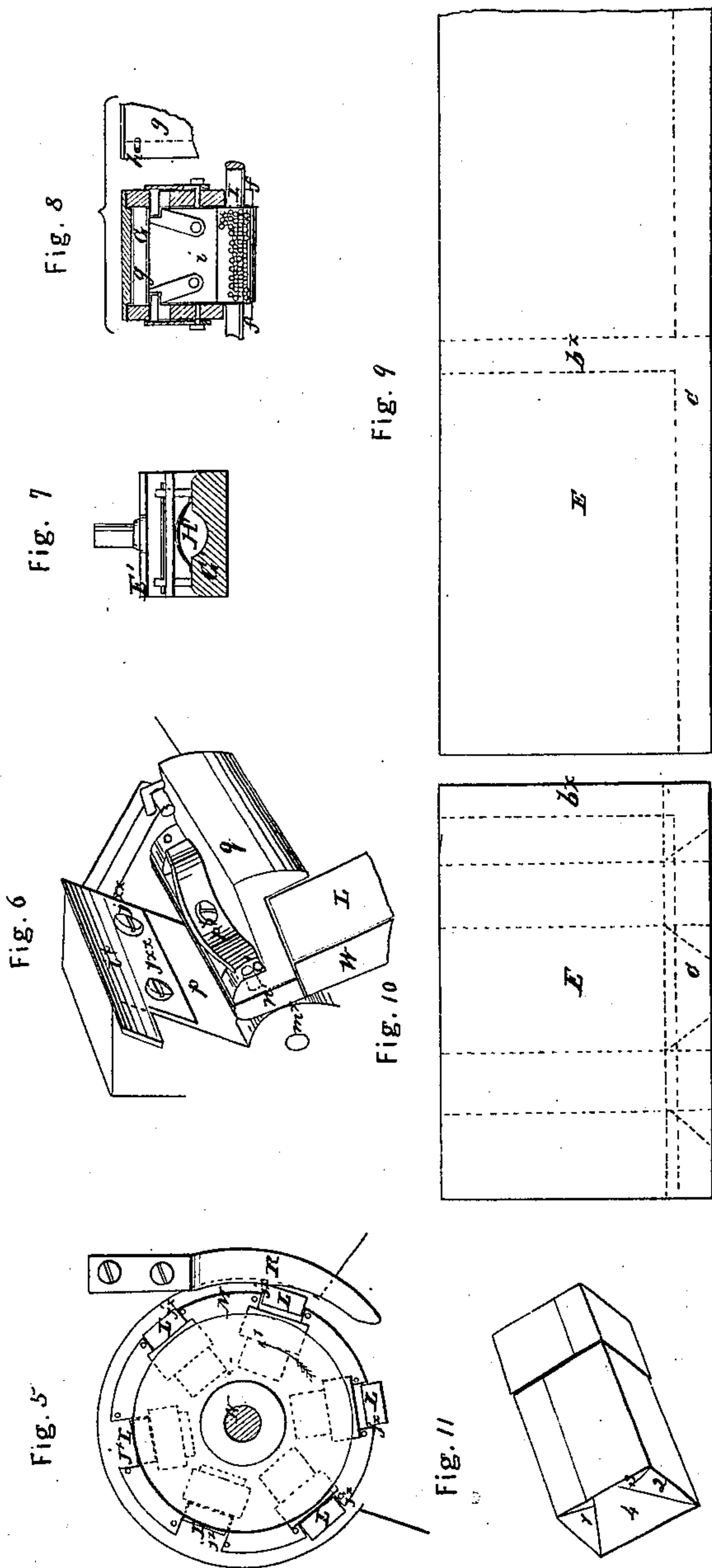
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Sheet 3, of 5 Sheets.

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UNITED STATES PATENT OFFICE.

WILLIAM GATES AND DAVID J. LLOYD, OF FRANKFORT, AND SAMUEL MILLER, OF SOUTH HAMMOND, N. Y., ASSIGNORS TO WM. GATES.

IMPROVEMENT IN MACHINES FOR MAKING PAPER BOXES.

Specification forming part of Letters Patent No. **85,301**, dated December 29, 1868.

To all whom it may concern:

Be it known that we, WILLIAM GATES and DAVID J. LLOYD, both of Frankfort, in the county of Herkimer and State of New York, and SAMUEL MILLER, of South Hammond, in the county of Jefferson and State of New York, have invented a new and Improved Machine for Making Paper Boxes; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new and improved machine for making paper boxes, such as are of square or rectangular form in their transverse section, and is an improvement on a machine for the same purpose patented by R. L. Hawes, April 24, 1855; and the object of the present invention is to obviate several difficulties attending the operation of the original machine, a practical use of which for a number of years having suggested a number of improvements, all of which are hereinafter fully shown and described.

In the accompanying sheet of drawings, Figure 1, Sheet No. 1, is a side elevation of our invention; Fig. 2, an end elevation of the same; Fig. 3, Sheet No. 2, a side sectional view of the same, taken in the line *xx*, Fig. 4; Fig. 4, a transverse section of the same, taken in the line *yy*, Fig. 3; Fig. 5, Sheet No. 3, a section of a portion of the same, taken in the line *zz*, Fig. 4; Fig. 6, a detached perspective view of certain parts pertaining to the same; Fig. 7, a detached face view of a cutter pertaining to the same; Fig. 8, a section of a paste-box pertaining to the same, taken in the line *z'z'*, Fig. 3; Fig. 9, an enlarged face view of a portion of the paper strip from which the boxes are made, showing how the paste is applied; Fig. 10, an enlarged face view of a portion of the same, cut off the required length to form a box; Fig. 11, a detached enlarged perspective view of a paper box.

Similar letters of reference indicate the same parts in all the figures.

A represents the frame of the machine, which may be constructed in any proper manner to support the working parts, and B represents

a drum or hollow cylinder, technically termed the "back," and within which a large portion of the working parts of the device is placed. C represents a box containing water, which rests upon an elevated portion of the frame A, and in which box there are secured two standards, *a*, to serve as bearings for the shafts *b b**, placed one above the other in the same axial plane, and having rollers D D* on their inner ends, said rollers being in contact with each other when the paper of which the boxes are made is not passing between them.

The lower roller D* of the lower shaft *b** is made of wood or other suitable material, which is somewhat absorbent, and this roller D* works in and is kept moist by the water in the box C, and moistens one edge of the strip of paper as it passes into the machine, said edge being designated by *c* in Figs. 9 and 10, Sheet No. 3.

The paper strip, being designated by E, and, besides, being shown separately in Figs. 9 and 10, is shown in its passage from a continuous roll into or through the machine in Figs. 1 and 3. This portion or edge *c* of the paper strip which is thus moistened, is the part of which the bottoms of the boxes are made, and the object of moistening it is to facilitate the folding and insure that portion of the work being performed in a smooth and neat manner.

F represents a fountain, which is attached to or rests upon an arm, *d*, attached to the upper part of the back B. This fountain is elevated above all the working parts of the machine, and it supplies, by means of the tubes *e e*, flexible or otherwise, paste or mucilage to the two paste-boxes G G*. This fountain may be made of quite large capacity, much larger than the two paste-boxes combined, as the former may be sufficiently elevated as to be entirely out of the way, and made of any convenient size, whereas the capacity of the paste-boxes is restricted, owing to their necessary close proximity to the working parts of the machine.

By this arrangement, therefore, the paste-boxes may be kept supplied a long time with paste or mucilage, and the trouble and inconvenience of frequently replenishing the paste-boxes avoided.

The paste-boxes G G* are placed on the

machine, one in front of the other, as shown in Fig. 3, and have inclined sides, in order that they may contract in breadth from their upper to their lower ends.

The ends of these boxes are thicker than the sides, and the former extend down below the latter, and are notched or have recesses made in them, as shown at *f*, to receive shafts *I I*^{*}, on which they are supported, (see Fig. 8,) a box being on each shaft. On these shafts *I I*^{*} there are placed, respectively, rollers *J J*^{*}, which are within the lower ends of the boxes, the ends *f* of the boxes resting upon the shafts *I I*^{*} at the ends of the rollers *J J*^{*}, and in contact therewith.

The sides *g* of the boxes *G G*^{*} are secured to the ends *f* by means of screws *h*, which pass through oblong slots in the sides *g* into the ends *f*, and admit of said ends being adjusted to compensate for wear, so that they may always be kept snugly in contact with the ends of the rollers *J J*^{*}, and the escape of paste or mucilage prevented. To the inner surfaces of the sides *g* of the paste-boxes there are applied adjustable plates *i*, which prevent the escape of paste or mucilage around the rollers *J J*^{*}.

The paste-boxes are secured on the shafts *I I*^{*} by means of spring-catchers *K* fitted on the shafts *I I*^{*}, and catching over pins *j*, or any other fixture at the ends of the boxes. (See Fig. 1.) This arrangement admits, when necessary, of the ready detachment of the paste-boxes from the machine.

The drum or back *B* has openings in its side which faces the driving-gear, the largest of which is at the center, and of irregular circular form, as shown at *a*^{*}, Fig. 4, to admit of a certain portion of the working parts extending through the back, so that said parts may be removed with facility for the purpose of cleaning, repairing, &c. This part of the invention will be fully understood by referring to Fig. 2, the parts referred to being what are termed "plungers," and designated by *L*.

In the original machine these parts are all inclosed within the back, and the removing of them, when necessary, attended with considerable trouble.

The ends of the plungers *L* are fitted and work in radial recesses *J*^{*} made in a circular plate, *M*, keyed on the driving-shaft *N* of the machine, which passes centrally through the back *B*. The rear ends of the plungers work on blocks *k* fitted in the recesses *j*, and these blocks are provided with holes to receive the pins *l* at the bottoms of the recesses in the plate *M*, each pin *l* having a spiral spring, *m*, upon it. (See Fig. 4.) These springs *m* serve to balance or counterpoise the plungers.

O is a circular plate keyed on the driving-shaft *N* at the outer side of the plate *M*, and quite near thereto. (See Fig. 4.) This plate keeps the plungers in place, preventing them working or being casually thrown back when they are in operation or at work, and their rear ends forced down in the recesses *J*^{*}.

P is a stop composed of a curved or semi-circular bar, pivoted at one end to the frame of the machine, as shown at *n* in Fig. 4, and secured at its opposite end by a spring-catch, *Q*, Fig. 2. This bar, when secured by said catch, has a position concentric with the plate *M*, and in line with the ends of the plungers *L*, which are below the driving-shaft *N*. This stop prevents the plungers *L* being casually moved too far back, they, in the prosecution of their work, being moved in this direction when passing underneath the shaft *N*.

By releasing the end of the bar or stop *P*, which is held by the catch *Q*, the former may be lowered out of the way when it is desired to withdraw the plungers *L*.

R, Fig. 5, is a stationary cam attached to the rear side of the back *B*, and extending down in the same plane with the plate *M*, and curved so that its upper part will be concentric with and quite near to the plate *M*, its lower part extending a little out from the plate. This cam *R*, as the plate *M* rotates in the direction indicated by arrow 1, causes the the rear ends of the plungers *L* to be pressed inward toward the center of *M*, and the front ends of the plungers to be moved correspondently outward. The plungers *L* rest in the recesses of the plate *M*, and pass through a plate, *S*, Figs. 2, 3, and 4, keyed on the shaft *N* at the front side of the back *B*, and also pass through slides *T*, which have a radial position, and are fitted between suitable guides *o* at the inner side of the plate *S*, each plunger passing through a slide. To each slide *T* there is connected a lever, *U*, and the inner ends of these levers pass through holes in the plungers. These levers *U*, as the plate *S* rotates, are actuated by fixed cams *V V* within the back *B*, and give the longitudinal sliding movement to the plungers. This is effected by giving the plungers *L* an outward movement from the platens or tables *W*, which are fitted in recesses in the hub *X*, which projects out concentrically from the plate *S*, each platen or table having a solid or fixed surface or wall, *p*, at one side, and a pivoted folding jaw, *q*, at the opposite side. (See Fig. 3.)

The plungers *L* are pressed downward upon the platens or tables, forcing the latter downward or inward, in consequence of wheels *r* on the outer ends of the slides *T* coming in contact with a wide portion, *Y*, of a rim of the back *B*, (see Fig. 3,) and the plungers are drawn outward from the platens or tables *W* by a fixed curved bar, *Z*, which, as the wheels *r* pass off from the lower end of *Y*, forces the wheels *r* against the narrow part *Y*^{*} of the rim, and consequently the slides *T* and plungers *L* will be drawn outward.

On the top of the back *B* there is attached, by set-screws *s*, a curved plate, *A'*, the screws *s* passing through oblong transverse slots *t* in the plate *A'*, to admit of its being adjusted laterally. This plate *A'* forms the principal part of the actuating mechanism of the folding jaws *q*. Each one of these jaws has the

inner end of a lever, B', connected with it, said levers being pivoted to the inner side of the plate S, and each having a spiral spring, *u*, attached to it, which springs have a tendency to keep the jaws *q* off from the plungers L when the machine is at work, and which effect this end after flat springs *v* at the outer ends of the levers B' pass the plate A', said plate A', when adjusted so as to project over or beyond the edge of the back B, being in the path of the rotation of the levers B' and springs *v*, and the latter being of such a length that they will be forced backward in order to pass underneath plate A', and thereby actuate the levers B', so as to cause the jaws *q* to project over the plungers L.

By adjusting the plate A' backward, so that it will not project beyond the edge of the back B, and be out of the path of the rotation of the springs *v* of the levers B', the jaws *q* will be rendered inoperative. By this simple adjustment of the plate A' the platens W are preserved from injury when the shaft N and plates M S are rotated for the purpose of removing the plungers from the machine.

Hitherto the platens W were very frequently injured by the jaws *q* coming in contact with them after the plunger above it had been removed, no means having been devised in the original machine to render the jaws inoperative when the machine was not at work, and the driving-shaft turned in order to remove the plungers for the purpose of cleaning, repairing, &c.

The plungers L having been described as having an inward movement at their rear ends caused by the stationary or fixed cam R, Fig. 5, it is necessary to limit this inward movement; and this part of the invention refers to means to effect that end, which consist of stops *w*, (see Fig. 4,) which are simply set-screws inserted in a hub, *a'*, projecting radially from the inner side of the plate M.

C' C'' C''' C'''' represent folders which operate against the bottoms of the boxes, folding the paper so as to form the boxes. The folders C' are pivoted in or to a spur-wheel, D', on the driving-shaft N, the outer ends of said folders having each a spiral spring, *b'*, attached, which springs have a tendency to keep the folders C' in contact with the inner side of the wheel D', (see Fig. 4,) said folders being forced out from the wheel D' as they come in contact with a fixture, *c'*, attached to the frame of the machine. (See Fig. 4.)

There is only one folder C'', and this is at the lower end of a lever, E', which is attached to the frame, and is operated by a spiral spring, *d'*, and projecting pins *e'* at the outer side of the wheel D'. (See Fig. 2.)

There is also but one folder C''', and this projects from a tube, *f'*, Figs. 3, 2, and 1, on a shaft in the upper part of the framing, said tube *f'* having an arm, *g'*, extending from it, with a roller, *h'*, at its outer end, said roller being made to bear on the periphery of the plate S, which performs the office of a cam by

means of a spiral spring, *i'*, connected to an upright, *j'*, on tube *f'*.

There is also but one folder C''''', and this is attached to a tube, *a''*, which is fitted loosely on the same shaft as the tube *f'*, to which the folder C''' is attached, said folder C'''' being in line with or directly over the platens W. This folder is raised by an arm, *b''*, having a roller, *c''*, on its ends, which is made to bear upon the periphery of S by means of a spiral spring, *d''*.

F, Figs. 3 and 7, represents a box or case, which is attached to a shaft, *g''*, in the framing, and has within it a guard, G, Figs. 3 and 7, upon which a spring, H', bears.

At the rear of this guard G' a knife or cutter, I, is placed, which is secured in position by a plate, I', and set-screws *h'*. This guard holds the paper down while being cut between the cutter I and a cutter, *i''*, which is secured by screws *j''* to each wall or surface *p*, the cutter I having a slight movement while effecting its cut, in consequence of a spiral spring, *k''*, which is connected to an upright arm, *l'*, on shaft *g''*, Fig. 1, throwing back the cutter after being raised by the pins *e'*, Fig. 2, of wheel D' coming in contact with an arm, J'', Fig. 1, which extends from the shaft *g''*.

The folding-jaws *q*, Fig. 6, have their pivots on shafts *m''*, the lower ends of the jaws resting on bearings *n'* on the shaft, and having guide-pins *o'* passing through them, and the lower ends of the jaws have a spring, *p'*, resting on them.

The object of these springs is to admit of the folding-jaws rising to accommodate themselves to the different thicknesses of paper being folded over the plungers, and in case two thicknesses of paper should accidentally pass into the machine.

K' represents a finishing-roller, which works over the lapped edges of the folded paper on the outer side of the plungers as the latter are moved out from the platens or tables W. This roller is fitted between two spring or elastic arms, *q' q'*, (see Fig. 2,) which extend from a shaft, L', in the framing, said shaft having an arm, *r'*, projecting from one end of it, which has a bent lever, M', in contact with it, and this lever is actuated at the proper time by the pins *e'* of the wheel D', so as to throw the roller K' in contact with the lapped surface of the paper on the plungers, the roller smoothing said surfaces and giving them a finished appearance.

The springs or elastic arms *q' q'* admit of the roller yielding or giving to any irregularity of surface over which it may pass.

N' represents a slide, which is fitted on a vertical guide, O', in the framing, and is allowed to work freely up and down thereon. This slide has two curved rods, *s' s'*, attached to its upper end, and an arm, *t'*, is pivoted to it, which arm extends down and is pivoted at its lower end to one end of a lever, P', the outer end of the latter being pivoted to an upright rod, Q', the upper end of which is pivoted to

the lower of two parallel levers, $R' R'$, (see Fig. 1,) said levers being pivoted at one end to the framing of the machine, as shown at w' , and the opposite ends connected by a bar, v' . These levers have each an inclined projection, w' , attached to or fitted in them in any suitable way, against which radial rods x' , fitted in or attached to a hub, S' , on the shaft N , act, said rods and projections, in connection with a spring, y' , connected to lever P' , the levers $R' R'$, and the means by which they are connected to the slide N' giving an up-and-down movement to the slide N' , the curved rods $s' s'$ on the top of which, as they descend, insuring the discharge of the finished boxes from the machine.

Having thus described the several parts which constitute our improvements in the paper-box-making machine patented by R. L. Hawes, and previously alluded to, we will proceed to describe the operation of the whole with more especial reference to those parts which are novel, and comprise the subject-matter of this specification. The endless roll of paper E passes between the rollers $D D^x$, which moisten the edge c , then passes over guide-rollers $a^x a^x$ and down between the rollers $J J$, where the moistened edge c is pasted, and strips b^x , which extend transversely across the paper, (see Fig. 9,) the pasted strips b^x being at equal distances apart. The paper is cut at one edge of each pasted strip b^x , (see Fig. 10,) which shows the length required for the folding of a box. The cuts are effected by the cutter I as each cutter i^x passes underneath it, the guard G' holding the paper while it is being cut, and preventing the paper being folded back while being cut. The paper, during this cutting process, is between the plungers L and the tables or platens W ; and, to facilitate the passage of the plungers over the paper while the plungers are being moved forward under the action of the levers U and the fixed cams $V V$, the outer ends of the plungers are raised in consequence of the rear ends of the same coming in contact with the fixed cam R , as previously alluded to.

After each strip of paper is cut, the plunger directly over it is forced down in consequence of its slide T being pressed down by its roller r coming in contact with the wide portion Y of the rim of the back B , the platen or table W underneath the plunger being, of course, pressed down. The folding-jaw q is then moved in consequence of the spring v of its lever B' coming in contact with the curved plate A' , and the folders C''' then fold down the pasted edge b^x , which laps over the other edge folded down upon the plunger L by the jaw q .

The bottom of the box, Fig. 11, is folded by the folders C' , which turn over one end, 1, of

the same, the folder C'' , which turns over or back the other end, 2, the folder C''' , which turns down the flap 3, and the folder C'' , which by one upward movement turns up the flap 4. The lapped surfaces of the paper are then rolled by the roller K' , which is moved off from the box at the proper time, the plunger L previously moving outward toward the roller. The plunger L is then drawn back under the influence of its lever U , actuated by the cam V , and the descent of the slide N' with the rods s' attached insures the discharge of the finished box from the machine.

The operation of each of the plungers is precisely the same as the one described.

We would remark that the covers of the boxes are made in precisely the same way as the bodies or main portions, the difference between the two consisting only of dimensions.

We claim as new and desire to secure by Letters Patent—

1. The moistening of one edge, c , of the continuous paper roll E by means of a wooden and a metal roller, $D D^x$, applied to a paper box, substantially as shown and described.
2. The elevated paste-fountain F , arranged in connection with the paste-boxes $G G^x$, substantially in the manner as and for the purpose set forth.
3. The plate M , provided with the radial recesses j^x , block k , guide-pins l , and springs m , all arranged as shown, for the purpose of balancing the plungers, as set forth.
4. The plate O , in combination with the plate M , for the purpose of keeping the plungers in place during their operation, or when forced down in the recesses j^x of the plate M .
5. The adjustable stop P , arranged in relation with the plungers L , substantially in the manner as and for the purpose set forth.
6. The stationary cam R , placed relatively with the plate M , for the purpose of regulating the movement of the plungers, as set forth.
7. The adjustable stops w in the hub a' of plate M , for the purpose of limiting the inward movement of the plungers, as specified.
8. The application of the springs p' to the folding-jaws q , substantially in the manner as and for the purpose set forth.
9. The finishing or pressure roller K' , when arranged or applied in the manner substantially as and for the purpose set forth.
10. The discharging fork or slide N' , provided with the rods $s' s'$, and operated in the manner substantially as and for the purpose set forth.

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