

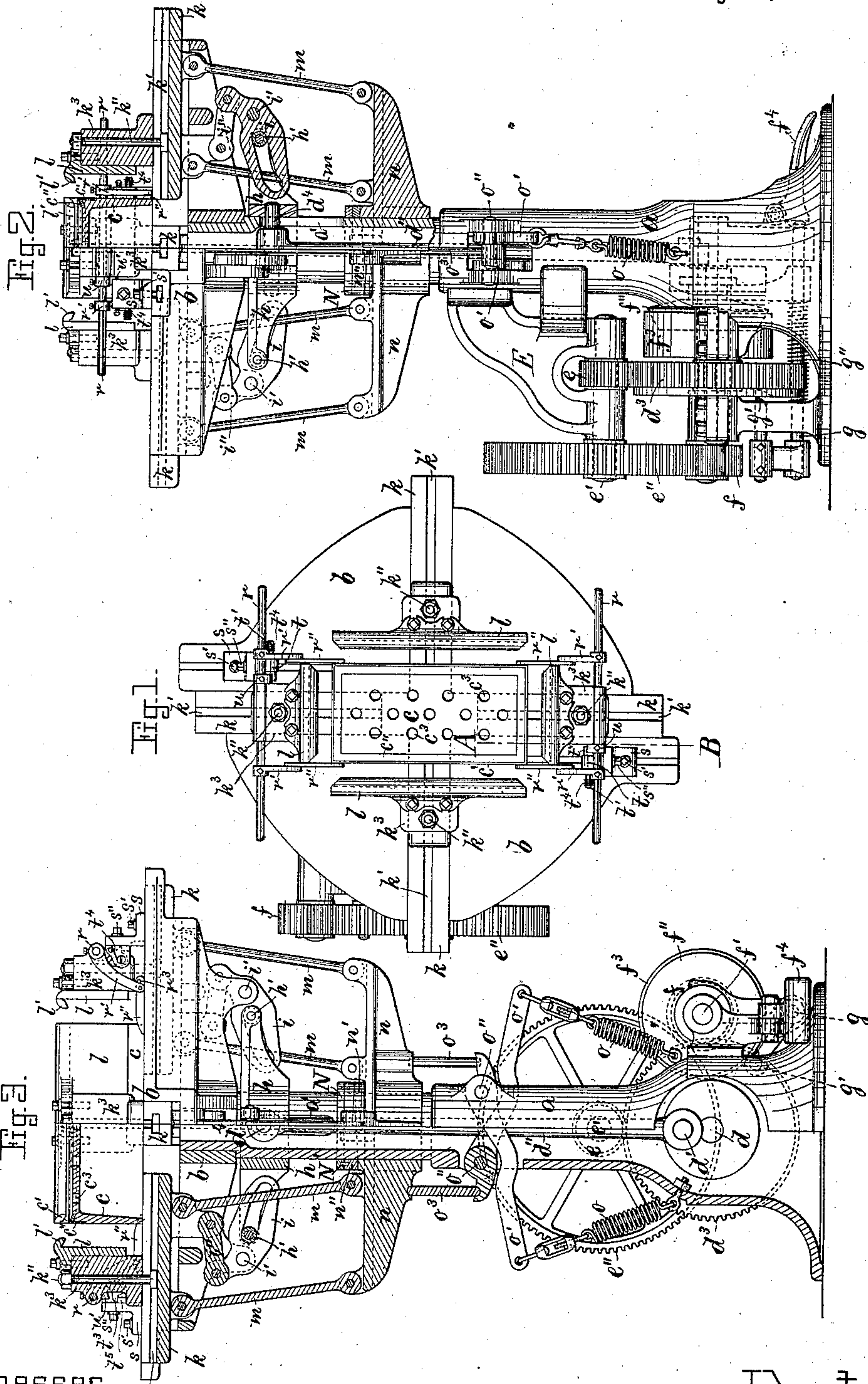
(No Model.)

2 Sheets—Sheet 1.

F. L. STONE.
PAPER BOX MACHINE.

No. 365,879.

Patented July 5, 1887.



Witnesses
Henry Chadbourne,
John H. Foster,

Inventor
Florentine L. Stone,
by *Alvan Audrain, atty*

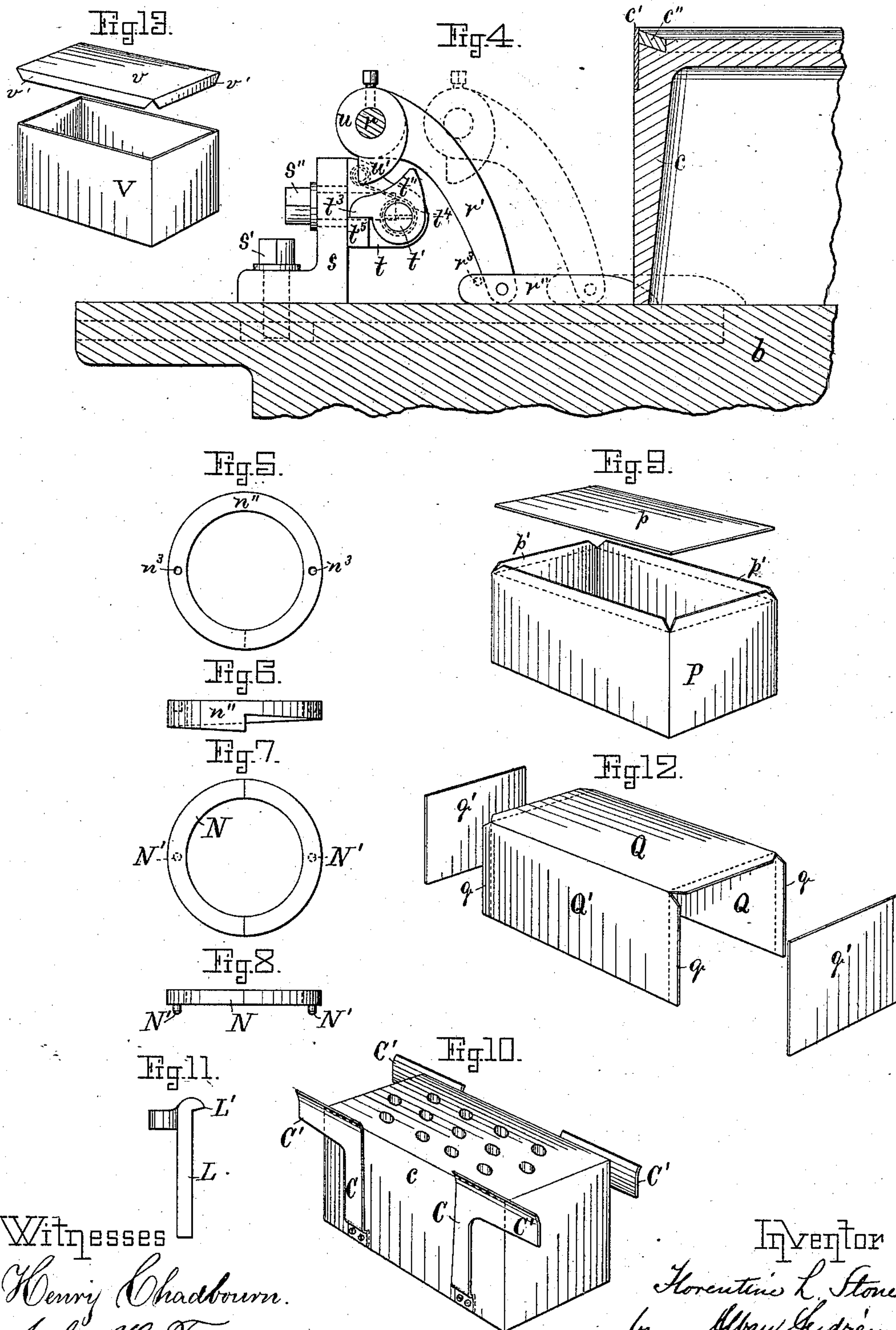
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UNITED STATES PATENT OFFICE.

FLORENTINE L. STONE, OF BROCKTON, MASSACHUSETTS, ASSIGNOR TO J. ARTHUR NELSON, OF SAME PLACE.

PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,879, dated July 5, 1887.

Application filed April 6, 1885. Serial No. 161,387. (No model.)

To all whom it may concern:

Be it known that I, FLORENTINE L. STONE, a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Paper-Box Machines; and I do hereby declare that the same are fully described in the following specification, and illustrated in the accompanying drawings.

This invention relates to improvements in power-machines for making paper boxes; and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a plan view of the improved machine. Fig. 2 represents a sectional side elevation, one half being shown in section and the other half in elevation. Fig. 3 represents a sectional front elevation, one half being shown in section and the other half in elevation. Fig. 4 represents a detail view of the box-raising mechanism, said view being an enlarged cross-section on the line A B, shown in Fig. 1. Figs. 5 and 6 represent in plan and side elevation the adjustable cam or screw-ring for regulating the downward pressure of the clamping-jaws. Figs. 7 and 8 represent in plan and side elevation the divided detachable ring used on the standard for obtaining the downward pressure on the clamping-jaws when the machine is used for securing the bottom of a box to its sides and ends. Fig. 9 represents in perspective the sides and ends of a box united together with the bottom piece made separate from such sides and ends. Fig. 10 represents a perspective view of the box-former with its side springs as used for securing the end pieces (or side pieces) to the other portion of the box, and Fig. 11 represents an end view of the clamping-jaws used for this purpose. Fig. 12 represents in perspective the bottom and sides (or ends) of the box as made in one piece with the ends (or sides) separate and in position to be secured to the other portions of the box. Fig. 13 represents a modified form of making boxes with my improved machine.

Similar letters refer to similar parts wherever they occur on the drawings.

a in Figs. 2 and 3 is the hollow standard, to the upper end of which is secured the plate or table *b*, upon which rests the hollow inverted

metal box-former *c*, which is temporarily secured in any suitable manner to the top of table *b*, and removable therefrom if a change in the size of the box is to be made. The top of box-former *c* is provided with perforations *c'*, to facilitate the removal of the box when finished. The box-former *c* is preferably made with a sharp corner, *c'*, on its upper edge at the junction with the top portion of said box-former, and there provided with a yielding bed, *c''*, preferably made of wood, as shown in Fig. 4, and this is done for the purpose of permitting the edges of the box to be bent by correspondingly-shaped clamping-jaws beyond a right angle while the sides of the box are being united to its bottom. The edges of the box so pressed together are found in practice to hold together more firmly, as compared with boxes made on machines having right-angle clamping-jaws and box-former.

In bearings in the lower part of standard *a* is located the crank-shaft *d*, provided with crank *d'*, jointed to the upwardly-projecting connecting-rod *d''*. (Shown in Figs. 2 and 3.) The shaft *d* is set in a rotary motion by means of belt and gears in any of the usual manners, and in the drawings I have shown for this purpose a gear, *d'*, secured to one end of shaft *d*, such gear meshing into the pinion *e*, secured to shaft *e'*, located in bearings in the bracket *E*, secured to standard *a*, as shown in Fig. 2. To shaft *e'* is further secured the gear-wheel *e''*, meshing into the pinion *f*, secured to driving-shaft *f'*, the latter having also secured to it the longitudinally-adjustable friction-clutch *f''*, that is pressed against the loosely-mounted pulley *f'* on shaft *f'* by means of the treadle-lever *f'*, or other well-known friction or clutch mechanism.

It is desirable that the machine should always come to a stop with the crank *d'* in its highest position, as shown in Fig. 3, to enable the finished box to be freely removed from its former, and for this purpose at the same time as the friction-clutch *f''* is pressed by lever *f'* against pulley *f'* it also acts on a rod, *g*, to which a tooth, *g'*, is attached, so as to release the latter from a corresponding locking-notch in the side of gear-wheel *d'*, as shown in Fig. 2, such tooth *g'* being caused to enter the locking-notch on wheel *d'* by the influence of a suit-

able spring, g'' , or weight, when the wheel d^3 has made one complete revolution.

To the upper end of the connecting rod d'' is secured the horizontal pin d^4 , that passes through the slotted perforations $a' a'$ in the sides of standard a , and enters annular hub of the vertically-movable block h , by means of which the clamping-jaws of the machine are operated to and from the box-former c . The block h is in the form of a cross with four arms, each one provided in its outer end with a pin and roll, h' , located in the slotted lever i , each such slotted lever being hung at i' to the table b , and having hinged to its upper end the link i'' , the inner end of which is hinged to a projection on the under side of the horizontally and vertically adjustable clamping-jaw support k , as shown in Figs. 2 and 3.

Each clamp-support k has a \perp -groove, k' , on its upper side, and by means of the \perp -headed bolt k'' is secured to said support k , in an adjustable manner, the clamp-block k^3 , to the inside of which is secured the box-clamping jaw l , having a downwardly-projecting lip, l' , in its upper end, corresponding in angle to the upper edge of the box-former c , for the purpose set forth. $m m$ are links hinged in their upper ends to the clamp-supports k , and in their lower ends to the vertically-movable block n , the hub of which is guided on the outside of standard a , as shown in Figs. 2 and 3. The block n is normally held in its highest position by means of springs $o o$, acting on levers $o' o'$, that are hinged to the standard a at $o'' o''$, and provided with rods $o^3 o^3$, or similar devices interposed between the outer ends of spring-pressed levers $o' o'$ and under side of block n , as shown in Figs. 2 and 3.

By means of the crank-shaft d and its connecting mechanism, as above described, to the clamping-jaws $l l$ the latter are positively operated to and from the box-former c , and when the jaws $l l$ have reached the limit of their inward motion it is essential that they should be forced downward to unite the glued edges of the bottom piece, p , to the upwardly-projecting edges $p' p'$ of the box-body P , (shown in Fig. 9;) and it is also requisite that such downward pressure of the jaws l on the inverted box held on the former c should be adjustable, to compensate for variations in the thickness of the material of which the box is made, and for this purpose I provide the central portion of the block n with an annular projection, n' , the upper face of which is made inclined, cam shaped, or helical, and on top of which rests the annular ring n'' , (shown in detail in Figs. 5 and 6,) the under side of which is made inclined, cam-shaped, or helical, to correspond with the upper side of projection n' ; and it will be seen that said ring n'' can be vertically adjusted simply by turning it around its axis while it rests on the ring n' , and after being so adjusted, for the purpose set forth, it may be secured to the latter by means of a set-screw, pin, spring, or similar retaining device.

On top of the adjustable ring n'' rests loosely

the divided annular ring N , (that is made in two semicircular parts, as shown in Figs. 7 and 8,) and to retain said ring N in position on top of ring n'' , I provide the upper side of the latter with recesses $n^3 n^3$, into which the projections $N' N'$ on the under side of ring N are made to rest, and thus preventing the semicircular parts of the divided ring N from dropping off the ring n'' . The desired downward pressure of clamping-jaws $l l$ is thus obtained by the under side of the block n striking on top of ring N , by which the block n is forced downward against the influence of springs $o o$ until the lips $l' l'$ of the clamping-jaws l are brought hard up against the edges of the box that is being made.

The description of the machine so far relates to its use for securing the pasted or glued edges of the bottom of a box to its sides and ends of the kind shown in Fig. 9.

In Fig. 12 Q represents the bottom of a box, and $Q' Q'$ its sides (or ends) made in one piece, to the edges $q q$ of which are to be glued the ends (or sides) $q' q'$, and for this purpose I use a box-former, c , as shown in Fig. 10, which is preferably made flat on top, and to its sides (or ends) I attach yielding guide-springs $C C$, with curved or flaring upper edges, to permit the sides (or ends) $Q' Q'$ of the box-body to be inserted and guided between the box-former and said springs, the latter having end projections, $C' C'$, to serve as guides for the ends (or sides) $q' q'$ while in the act of being forced by the clamping-jaws against the body portion of the box. In making boxes of this kind it will readily be understood that no downward pressure of the clamping-jaws $l l$ is needed, and therefore I remove the divided ring N from its supporting-ring n'' , by which removal the block h is permitted to descend to the end of its stroke without causing any downward motion on the block n . It will also be understood that instead of four laterally-movable clamping-jaws I need only use two diametrically-opposite ones, and therefore I disconnect two of such jaws and their blocks from their respective supports. In making this kind of boxes with my improved machine I use clamping-jaws L of the kind shown in Fig. 11, having an obtuse lip, L' , to aid in bending the projecting edge of the body of the box against the inside of the end (or side) pieces as they are laterally compressed against the stationary former c during the operation of making a box of the kind shown in Fig. 12.

It is sometimes desirable to make boxes of the form shown in Fig. 13, in which the bottom v has lips $v' v'$, to be glued to the body V , for which purpose I use a box-former, as shown in Fig. 10, without its guide-springs $C C'$, and use four clamping-jaws, $L L'$, of the form shown in Fig. 11, which are simultaneously forced against the box-body to unite it to the glued lips $v' v'$.

Whether the box is made in the manner shown in Figs. 9, 12, or 13, it is desirable that it should be automatically removed from the

former *c* after it is put together, and for this purpose I construct the following releasing mechanism:

In two opposite clamp blocks, *k*³, are loosely journaled the horizontal spindles *r r*, as shown in Figs. 1, 2, 3, and 4. To each of such spindles are secured the laterally-adjustable levers *r' r'*, the lower ends of which are hinged to the feet or box-lifters *r'' r''*. (Shown in detail in Fig. 4.) Back of the lower end of each lever *r'* is secured a pin or projection, *r*³, (shown in dotted lines in Fig. 4,) to the foot *r''*, by means of which the foot *r''* and its lever *r'* are locked together when the latter is swung upward or forward in the direction toward the box-former *c* and permitted to slide horizontally on the table *b* when the lever *r'* is swung in the opposite direction. For the purpose of automatically operating said levers *r'*, I secure to the table *b* the bracket *s*—one for each spindle *r*—such brackets being made horizontally adjustable to and from the box-former *c*, according to the size of the latter, by means of set-screws *s' s'*. (Shown in Figs. 1, 2, 3, and 4.) To each bracket *s* is secured, by means of set-screw *s''*, the vertically-adjustable bearing *t*, having a horizontal pin, screw, or spindle, *t'*, on which is journaled the cam *t''*, having a stop projection, *t*³, normally held to rest against the stationary stop projection *t*⁵ on the bearing *t*, as shown in Fig. 4, and it is so held by the influence of a yielding spring, *t*⁴. (Shown in dotted lines in Fig. 4 and in full lines in Figs. 1 and 2.) To the spindle *r* is secured the hub *u*, having a cam or projection, *u'*, on its under side, as shown in Fig. 4.

The operation is as follows: As the clamp-block *k*³ is in the act of moving toward the box-former *c* the cam projection *u'* comes in contact with the yielding cam *t''*, causing the latter to turn on its axis sufficiently to allow the projection *u'* to pass by it, and as soon as said projection *u'* has passed by the cam *t''* the latter is returned to its normal position (shown in Fig. 4) by the influence of its yielding spring *t*⁴. After the box has been set and compressed between the box-former *c* and the clamping-jaws *l l'*, the latter are first raised to release the downward pressure on the box, and afterward moved horizontally away from the sides of the box-former *c*, and during such outward motion of the clamping-jaws the projection *u'* on cam *u* comes in contact with the cam *t''* on spindle *t'*, causing the rod *r* to be rocked and the lever *r'*, with its foot *r''*, to be raised, causing the now finished box to be raised upward by the feet *r'' r''* sufficiently to be easily removed from the box-former.

The operation of the machine for making boxes of the construction shown in Fig. 9 is as follows: We will suppose the clamping-jaws *l l'* to be in their upper and outer portions, as shown in Figs. 1, 2, and 3. The box-body *P* is then placed around the box-former *c*, the upper edges, *p' p'*, projecting above the upper edge of the box-former. The previously gummed or glued bottom piece, *p*, is then laid

on top of box-former *c*, within the projecting flaps *p'* of the box-body *P*. The machine is then set in operation by depressing the treadle *f*⁴, causing the clamping-jaws *l l l l'* first to move horizontally against the outside of the box-body *P*, after which they are caused to descend by the automatic mechanism, as described, and during such descent the lips *l' l'* of the jaws *l l* cause the flaps *p' p'* to be turned over and pressed firmly against the glued edges of the bottom piece, *p*, by which the latter is made to adhere to the box-body. During the continuation of the rotation of crank-shaft *d* the jaws *l l* are first caused to rise vertically and afterward to expand laterally until they reach their original positions, (shown in Figs. 1, 2, and 3,) when the machine is automatically brought to a stop by the lock projection *g'* dropping into the recess on the side of gear-wheel *d*³, as hereinabove described. During the lateral expansive movement of the clamping-jaws *l l* the now finished box is automatically removed from the box-former *c* by the automatic lifters *r' r''*, hereinbefore fully described.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In a paper-box machine, the folder-lips *l'*, made at an angle less than a right angle with the face of the folder *l*, in combination with the beveled former *c*, substantially as and for the purpose described.

2. In a paper-box machine, the stationary box-former *c*, in combination with the laterally and vertically movable clamping-jaws *l l'*, as and for the purpose set forth.

3. In a paper-box machine, the stationary box-former *c* and laterally-movable clamping-jaws *l l'*, in combination with vertically-movable block *h*, its pin and rolls *h'*, slotted levers *i i*, links *i''*, sliding clamp-supports *k k*, and laterally-adjustable clamp-blocks *k*³, as and for the purpose set forth.

4. In a paper-box machine, the stationary box-former *c* and vertically-movable clamping-jaws *l l'*, in combination with the vertically-movable block *h*, the vertically-yielding block *n*, and links *m m*, jointed in their lower ends to said block *n*, and in their upper ends to the clamp-supports *k k*, as and for the purpose set forth.

5. In an organized paper-box machine, the vertically-movable block *h* and its connecting mechanism to the clamping-jaws, and the vertically-yielding block *n*, having helical or cam support *n'*, in combination with the adjustable helical or cam-ring *n''*, for the purpose of regulating the downward pressure of the clamping-jaws *l l'*, as set forth.

6. In a paper-box machine, the herein-described box-releasing mechanism, consisting of the spindle *r*, having attached to it the cam *u'* and lever *r'*, with its hinged foot *r''*, in combination with the laterally-adjustable bracket *s*, the stop *t*³, and yielding pawl *t''*, with its stop *t*³, as and for the purpose set forth.

7. In a paper-box machine, the vertically-

movable block *h*, for imparting a lateral motion to the clamping-jaws *l l'*, and vertically-movable block *n*, for imparting a vertical motion to such jaws, in combination with the interposed detachable divided ring *N*, as and for the purpose set forth.

8. In a paper-box machine, the clamp-supports *k k*, links *m m*, and block *n*, in combination with rods *o³ o³*, levers *o' o'*, and springs *o o*, as and for the purpose set forth.

9. In a paper-box machine, the box-former *c*, in combination with the guide-springs *C C*, having ends or wings *C' C'*, projecting beyond the box-former in a lateral direction, as and for the purpose set forth.

10. In a paper-box machine, the rotary shaft *d*, its crank *d'*, and connecting-rod *d''*, in combination with block *h* and connecting mechanism to the clamping-jaws *l l'*, as described, and block *n*, with its connecting mechanism to said jaws, as described, in a manner and for the purpose as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

FLORENTINE L. STONE.

Witnesses:

CHARLES W. SUMNER,
HERBERT H. CHASE.