4 Sheets—Sheet 1.

E. M. THOMPSON.

Paper-Box Machine.

No. 214,325. Patented April 15, 1879.

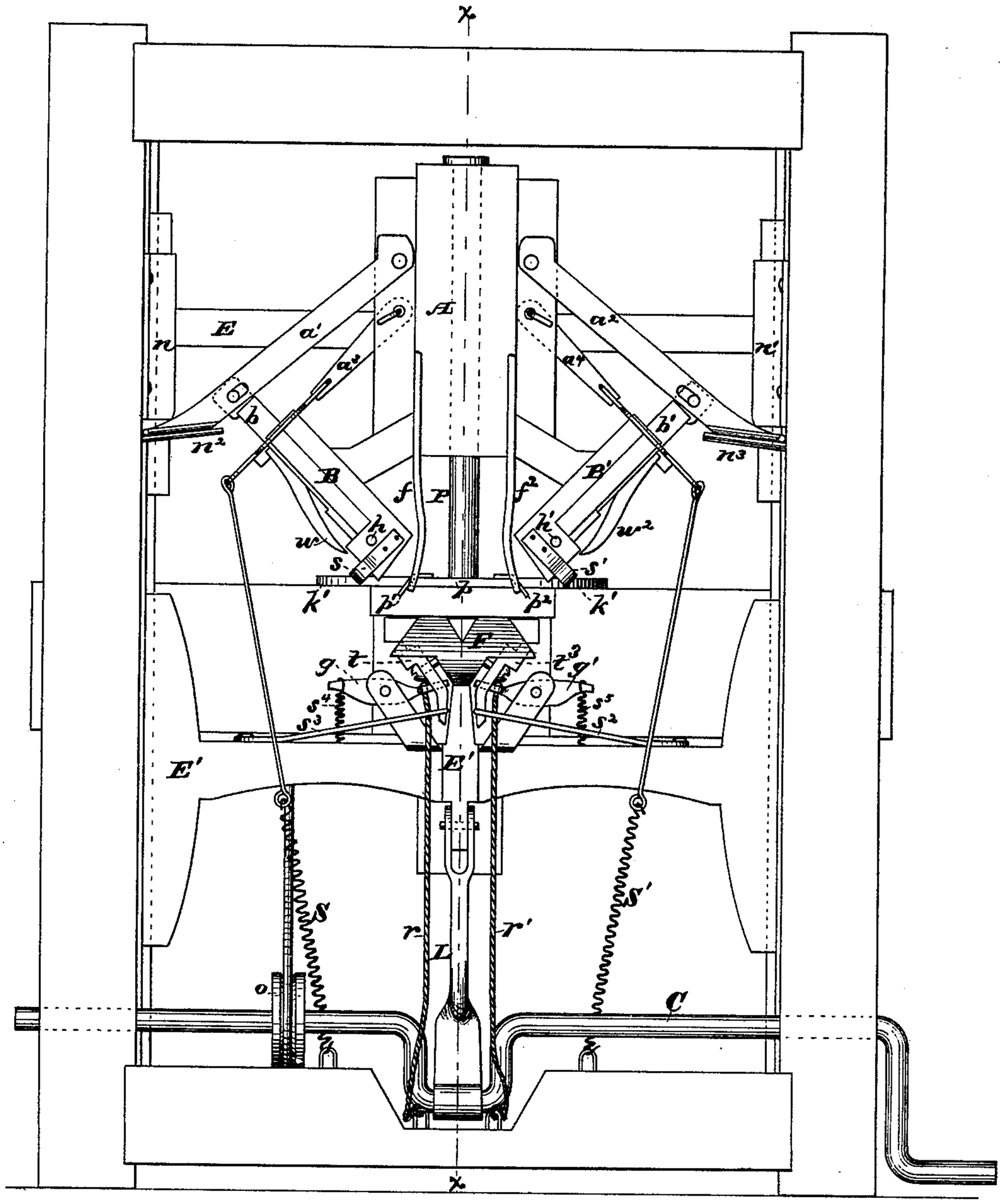


Fig. 1

Attest:

William Neil

W. F. Baker

INVENTOR:

Everl M Thompson

4 Sheets—Sheet 2.

E. M. THOMPSON.

Paper-Box Machine.

No. 214,325. Patented April 15, 1879.

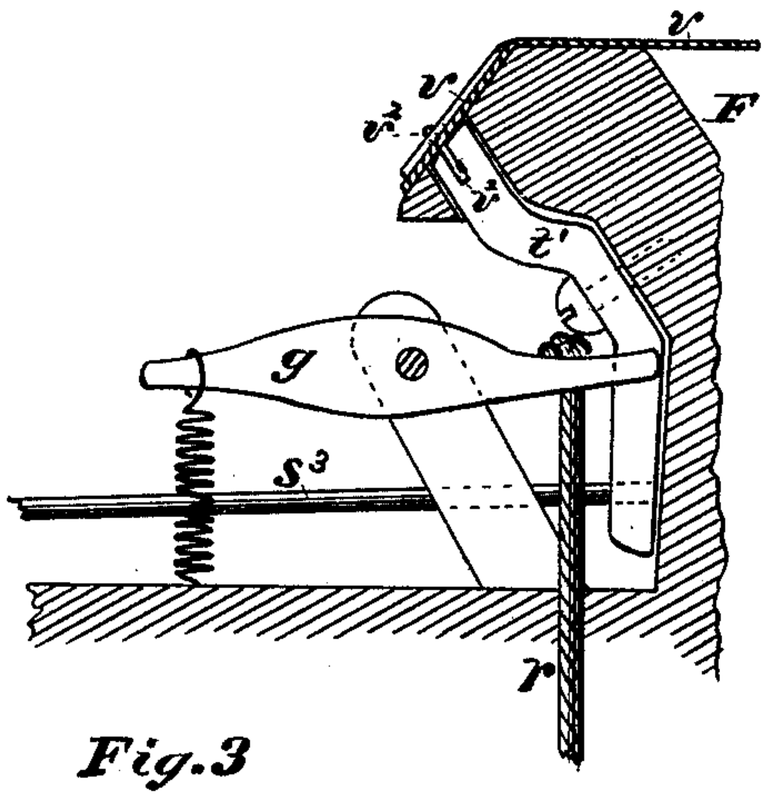


Fig. 3

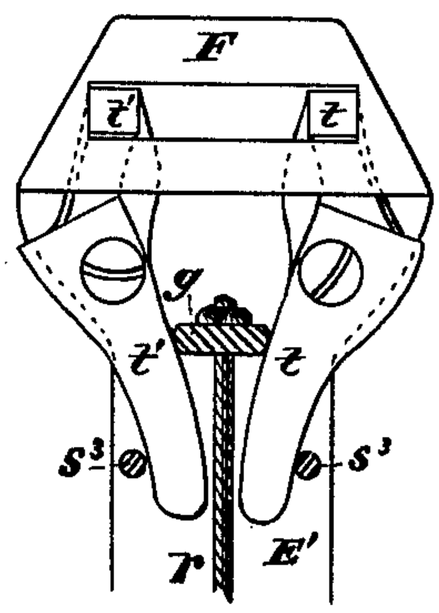


Fig. 4

Fig. 2

Attest:

William Neil

W. L. Baker

INVENTOR:

Evert M. Thompson

4 Sheets—Sheet 3.

E. M. THOMPSON.

Paper-Box Machine.

No. 214,325. Patented April 15, 1879.

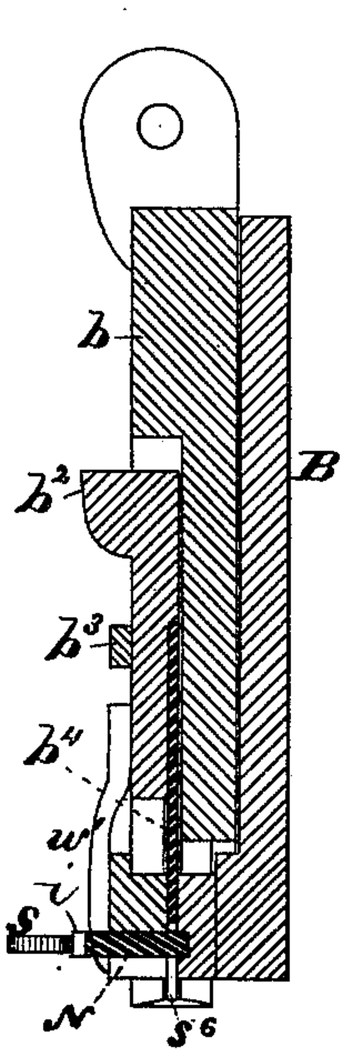


Fig. 8

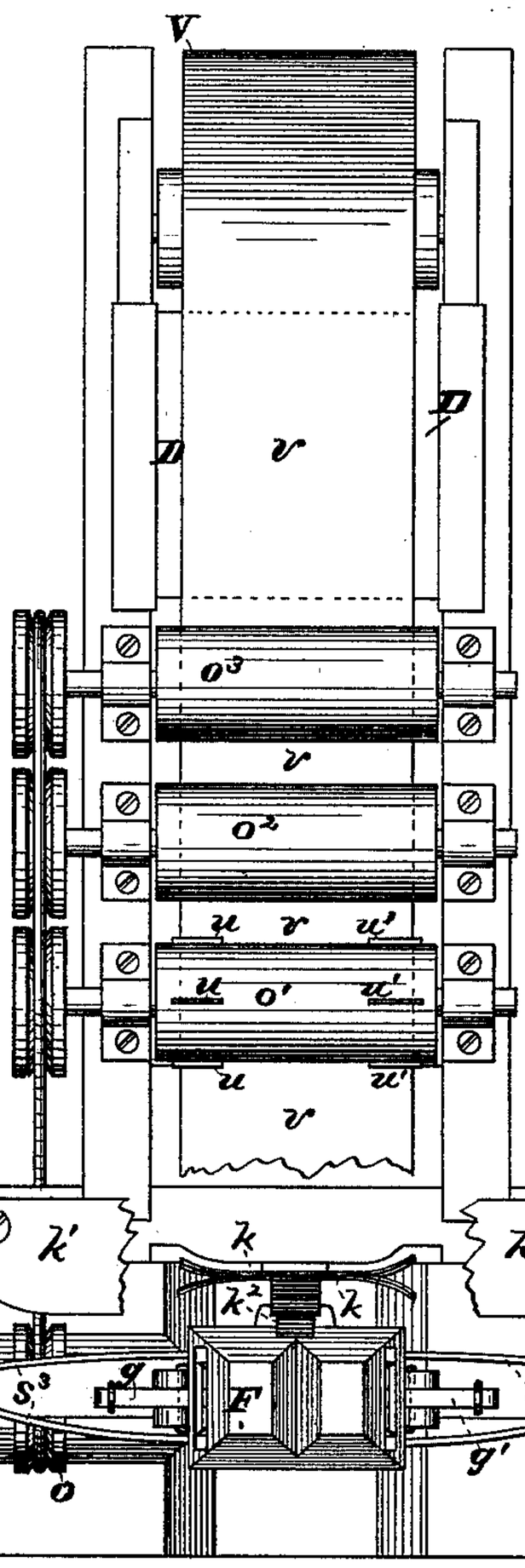


Fig. 5

Fig. 6

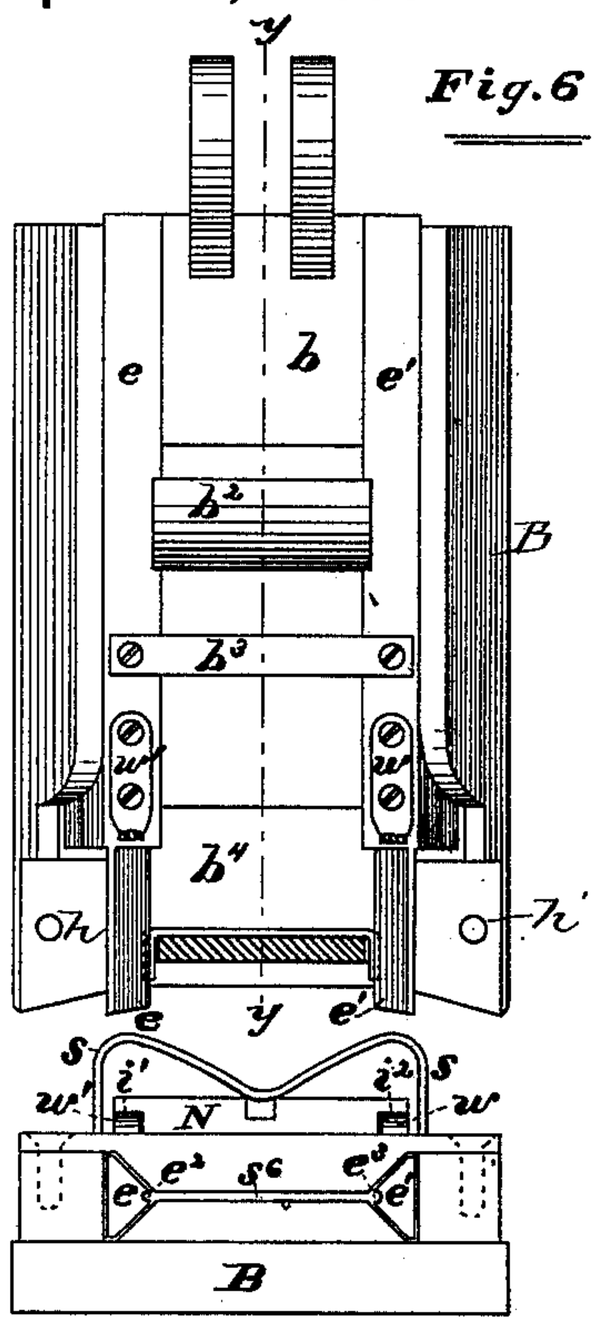


Fig. 7

Attest:

William Neil

W. L. Baker

INVENTOR:

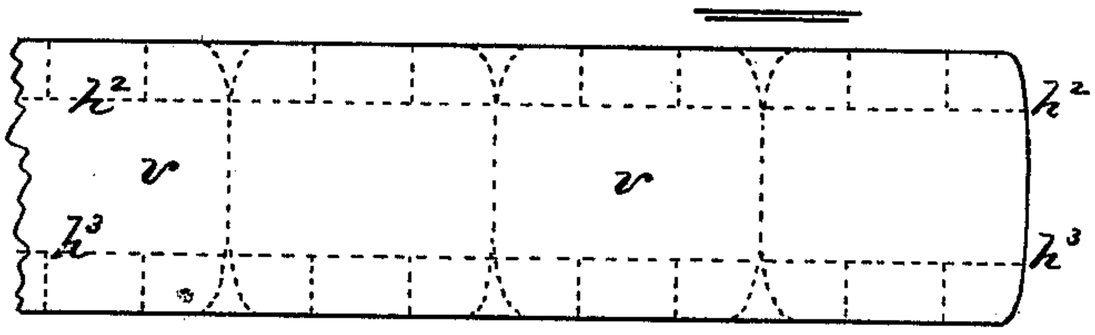
Evert M. Thompson

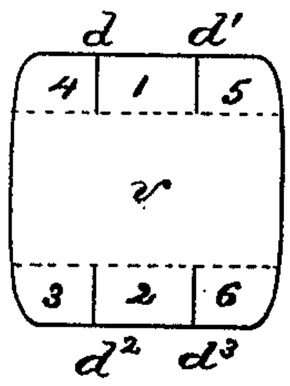
4 Sheets—Sheet 4.

E. M. THOMPSON.
Paper-Box Machine.

No. 214,325. Patented April 15, 1879.

Fig. 10





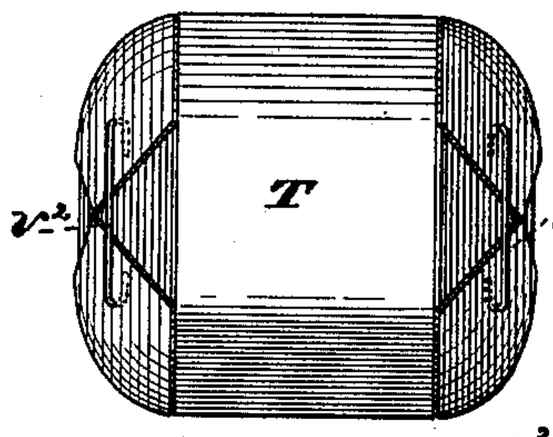
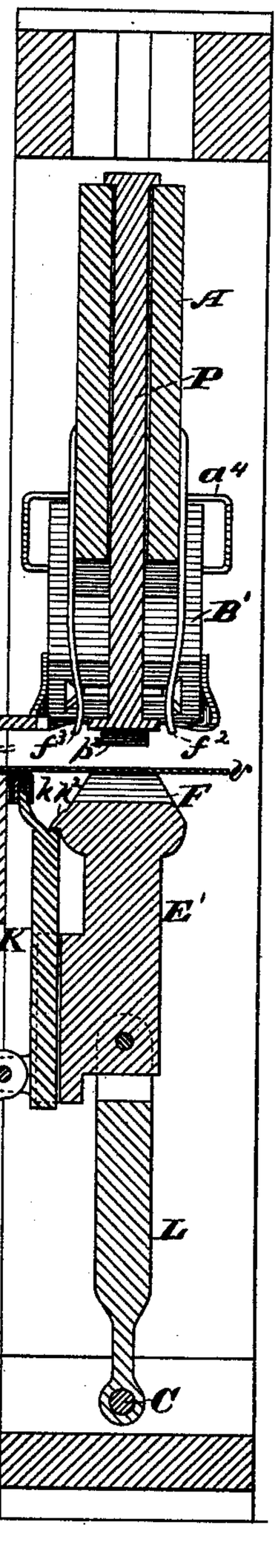


Fig. 11



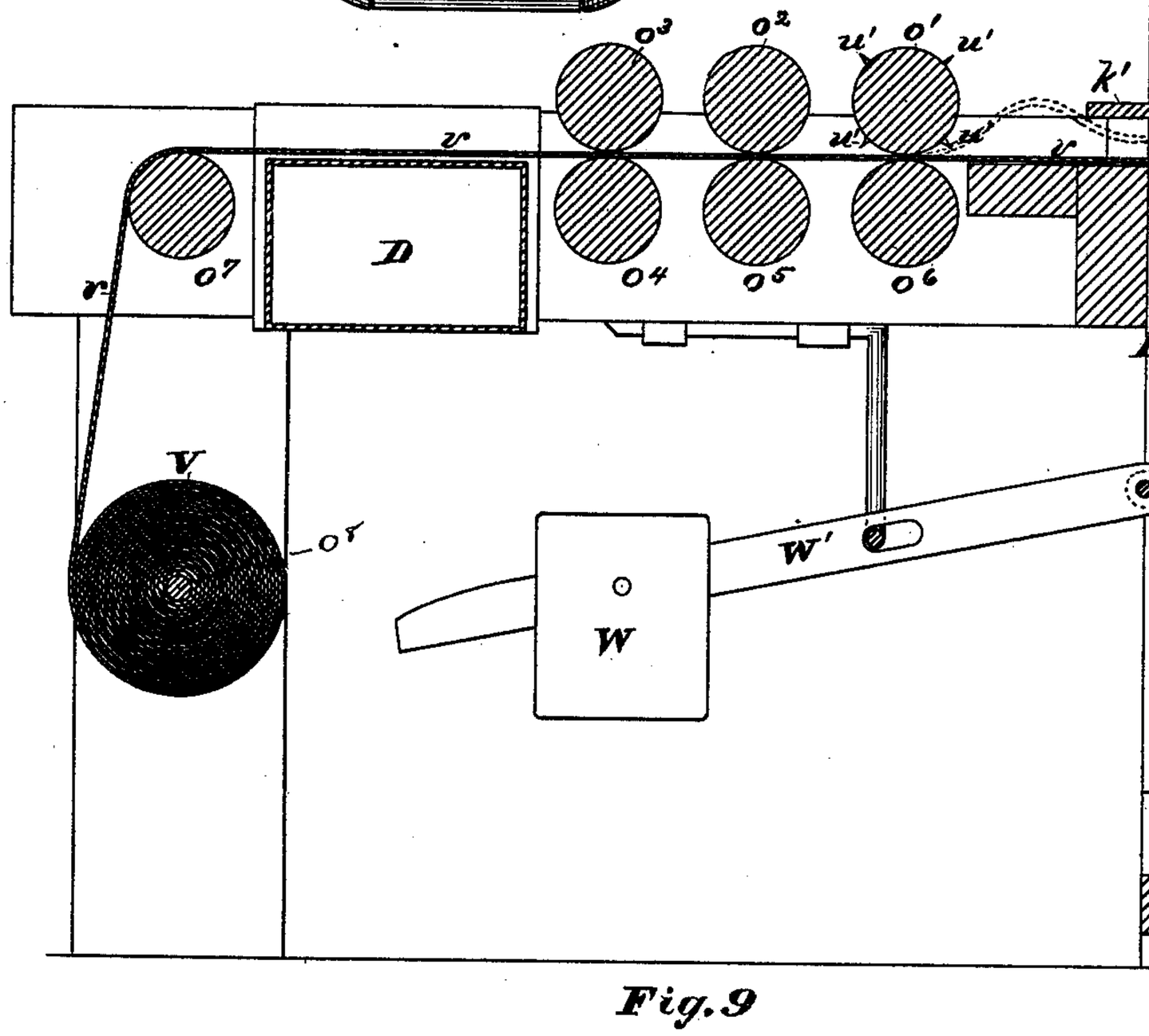


Fig. 9

Attest:

William Keil

W^m. L. Baker^2

INVENTOR:

Evert M. Thompson

UNITED STATES PATENT OFFICE

EVERT M. THOMPSON, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN PAPER-BOX MACHINES.

Specification forming part of Letters Patent No. **214,325,** dated April 15, 1879; application filed October 29, 1878.

To all whom it may concern:

Be it known that I, EVERT M. THOMPSON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Box-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a front elevation. Fig. 2 is a side elevation with parts of the frame removed. Fig. 3 is a sectional view through the line *z z*, Fig. 2, illustrating the clinching device. Fig. 4 is an enlarged view, also illustrating the clinching device. Fig. 5 is a plan view of my invention, with the head A, Fig. 1, its immediate attachments, and the upper part of frame removed. Fig. 6 is an enlarged front view of the case B and parts working within it, having the face-plate, spring *s*, and wedges *w* w^1, Fig. 1, removed, and showing a vertical section of the anvil N, Fig. 8. Fig. 7 is an end view of Fig. 6. Fig. 8 is a vertical section through the line *y y*, Fig. 6. Fig. 9 is a vertical section through the line *x x*, Fig. 1. Fig. 10 shows the form in which blanks are cut from the veneer. Fig. 11 shows a blank formed up making a tray or flaring box. The whole comprises four sheets of drawings.

My invention relates to that class of machines employed for making boxes of wood veneer or straw-board, and is automatic in its operations.

A, Fig. 1, is a head, supported by the cross-head E, and moving perpendicularly on guides supported by the frame. This head is limited in its descent by the resistance of the bearings n^2 n^3 against the levers a^1 a^2.

b b^1 are slides that move in the cases B B′. (*Vide* Figs. 6 and 8.) The slide *b* fits nicely in case B, and is properly constructed of the two parts *e e′*, made of steel, and having their lower ends triangular in shape, Fig. 7, and the body of any substantial material.

In the slide *b* moves another slide, b^2, limited in its downward movement by the bar b^3. The slide b^2 carries a blade, b^4, which extends to the lower ends of the parts *e e′* when the shoulder on b^2 rests on the bar b^3.

w w^1 are projections from the parts *e e′*, which act as wedges to raise the anvil N against the spring *s* by pressing under the shoulder i^1 i^2, Fig. 7, when the slide *b* descends, so that just when the ends of the formers or parts *e e′* reach the bottom of the case B the blade b^4 may pass behind the anvil N down through the space s^6, Figs. 7 and 8.

Motion is imparted to the slides *b* b^1, Fig. 1, through the levers a^1 a^2, and to the slides b^2 in each case B B′ by the levers a^3 a^4.

The guide P moves through the head A, limited in its descent by a cap on its upper end resting on A. Its downward motion, like that of the head A, is derived from its own weight.

C, Fig. 1, is a shaft, having a crank at its middle, carrying the pitman L, which drives the cross-head E′, guided by guides on the frame, which, in turn, supports the former F, with its attachments.

g g′, Fig. 1, are levers, so constructed and arranged as, when operating, to throw the upper ends of the clinchers t^1 *t*, Figs. 3 and 4, toward each other.

The former F is so shaped as to give any desired shape to the box formed on it, and all working parts are arranged accordingly.

On the shaft C is also a pulley, *o*, that imparts motion to the rollers o^1 o^2, &c., Figs. 2 and 5. One of these rollers—say o^1—is a feed-roller, having such bearings and points of friction as will positively feed the material to and over the former F, Figs. 2 and 5. Another—say o^2—carries types for making a printed impression on the material. Another carries points of contact for transferring cement to the material, so that when the blank is formed up the laps are cemented together, Fig. 11.

Any of the rollers may carry knives to cut the slits *d* d^1 d^2 d^3 in the material as it passes beneath. Each of these rollers has counter-rollers against which to bear.

For the sake of a steady draft upon the roll V, and for simplicity, I use rollers in preference to vibrating devices for transferring the cement for printing and feeding, and would regard an ordinary device, as a stamp for ce-

menting and printing, or a feed on the common sewing-machine-feed principle, as an equivalent device of inferior merit.

One roller may be made to feed, print, transfer, cement, and slit; but for convenience I use two or more. Printing-ink and cement may be supplied to the rollers by any of the usual devices for that purpose.

o^8 is a shaft supporting the roll of material V. D, Fig. 9, is a heater for heating the material. W is a weight supported on the lever W′, which drives the slide K, Figs. 9 and 2, carrying the knife k, Fig. 5. k^1 is an abutment, against which the knife k presses the material when cutting. The knife k is so constructed that at one operation it finishes the shape of one blank and shapes one side of the forthcoming blank. Its two ends are generally two-parted; but it may be so constructed as to give any peculiar shape desired.

The operations of my invention may be summarized as follows, (and in this description I shall use thin wood veneer to produce a wood-veneer tray or flaring box:) The veneer, being shaved from the section of a log and scored on the lines h^2 h^3 across the grain, is rolled up and placed on the shaft o^8, Fig. 2. Being brought up over the roller o^7 and started under the rollers o^3 o^2 o^1, the machine is put in motion. The feed-roller—say o^1—then draws it from the roll V, and forces it over the former F. As it passes over the heater D it is partially dried. From the glue or cement roller it receives glue in such places as to cement the flaps when formed up. From the printing-roller it receives any desired printed impression, and the little knives u w′, Figs. 9 and 5, cut the slits d d^1 d^2 d^3, Fig. 10, forming the middle flaps, 1 and 2, and the corner flaps, 3, 4, 5, and 6. The rollers are so timed with reference to the motion of the former F that when it first presses the veneer against the presser p, Figs. 1 and 2, the blank is in its proper place; but at that instant the knife k, which ascends with the former F, driven by the weight W, cuts off the blank and rests against the abutment k^1, the former F passing on up in its movement; but before the blank v is cut off it is evident that it is caught and held against the presser p, its two middle flaps, 1 and 2, at the same time being bent down against the former F by the points p^1 p^2, and the former F, forcing upward through A the guide P, brings the side flaps against the points of resistance f f^1 f^2 f^3, thereby forcing the side flaps down against the former F, and giving its shape to the box. Bringing the ends of the box now formed up against the lower ends of the cases B B′, the head A is forced upward; but, the levers a^1 a^2 bearing against the shoulders n n^1, the slides b b^1 are forced down. The wire being fed into the cases B B′ through the holes h h^1 to the opposite inner sides of the cases, the slide b, Fig. 6, descending, the former or prong e' cuts it off, and the two formers e e' bend it around the anvil N, as shown in Fig. 6, thereby making a staple; but as soon as the ends of the formers e e' touch the ends of the box on former F, the wedges w w^1, Figs. 6 and 8, having just raised the anvil N, the slide b^2, acted upon by the spring s, Fig. 1, is forced down. The blade b^4, thereupon forcing the staple down through the space s^6, Figs. 7 and 8, drives the points of the staple through the flaps of the box just in front of the clinchers t^1 t. (See v^2, Fig. 3.) The ends of the levers a^1 a^2 now sliding up the face of the shoulders n n^1, Fig. 1, the slide b ceases to descend; but instantly the ropes r r', (the head E′ still ascending) restrain the levers g g^1, and the upper ends of the clinchers t^1 t, Figs. 4 and 3, are brought toward each other, thereby bending down or clinching the points of the staple. (See v^2, Figs. 3 and 11.) The former F now descending, the springs s^4 s^5, Fig. 1, restore the levers g g' to their position, and the springs s^3 s^2 restore the clinchers t^1 t to their position of rest. The head A of its own weight follows the former F downward until it reaches its point of rest. The levers a^1 a^2, thereby reversing their motion, restore the parts in and of the cases B B′ to their original positions. The presser p is checked by the cap on the guide P, and the former F still descending, the box on it is left free to be removed by hand, or automatically by a trigger striking one edge and tilting it off. But as the former F descends after the box is relieved from the weight of the presser p, the shoulder k^2, Figs. 2 and 9, forces down the slide K, with its knife k, and the veneer is free to enter for the subsequent operation. During the previous operation, while the knife k rested against the abutment k^1, thereby holding back the veneer which was being forced forward steadily by the rollers o^1, &c., the veneer, having no escape, buckled or warped up in the dotted line shown between the roller and knife in Fig. 9; but on the knife descending it springs out toward and over the former F. To insure rapidity of this action an ordinary device, as a block lifted by a crank and descending of its own weight upon the buckle of the veneer, may be used.

In my machine, now in practical operation, to feed the wire automatically to the cases B B′ I use corrugated steel rollers, supported before the holes h h^1, and driven by a rack attached to presser p, connected to the shafts of the rollers by the usual cogs and clutch. The movement of the presser p affords the right motion at the proper time for feeding the wire, the motion required being intermittent. It is an ordinary mechanism.

For simplicity I prefer the levers g g' and clinchers t^1 t, but am aware that eccentrics, wheels, or slides might be also effectually used to clinch the ends of the staples. I should regard them as equivalent devices of inferior merit. The scores h^2 h^3 cross the grain of the veneer v.

As shown in Fig. 11, the result of the operation described is a flaring thin-wood box, having its flaps cemented together, and additionally held together by the wire staples v^2 v^3. I use a staple, as preferable to a common tack,

inasmuch as the staple prevents the middle flap from splitting between the points through which the two ends of the staple pass—a constant occurrence when ordinary tacks are used. I use the glue, paste, or cement in cementing the side flaps to the middle flaps, first, to render the box water-proof; second, to relieve the hole through which the staples pass of the concentrated, strain when the package is lifted, with contents, by taking hold of the side.

Experience shows that thin wood when thoroughly dry splits very easily, and that though the ends may be fastened with staples, which prevent the middle flaps from splitting, the box is still hardly practicable, owing to its great liability to split in that line of the grain through which the staples pass. To remedy this I cement the entire surfaces of the flaps where they meet in overlapping, securing a greatly-improved box.

My machinery is indispensable in practically producing this box or plate, as the glue, in order to be effectual, must be used while hot, and immediately after being transferred to the blank.

My device provides for immediately forming up after glue is transferred. Moreover, a combined gluing and feeding device must be a part of the machine as a whole, because the blanks could not be practically prepared with the glue and stacked up preparatory to being afterward fed to any machine, as they would stick together. Practically, they must be glued and formed up successively as glued. The exceeding low price at which these boxes are sold exhibits the necessity of continuous, successive, and automatic operations.

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

1. The improvement in the art of making thin-wood plates, trays, or boxes by machinery hereinbefore set forth, which consists in scoring a continuous strip of thin wood in the direction of its length across the grain, cutting the slits to form the flaps, transferring glue or its equivalent to the flaps near the slits, cutting the blank from the strip, bending up and overlapping the flaps, thereby cementing them together, driving the points of wire staples through the overlapping and underlapping flaps, and clinching the same to complete the box, these operations being successively and repeatedly carried out by mechanism substantially as set forth.

2. The printing-rollers o^3 o^4, cementing-rollers o^2 o^5, and feed and slitting rollers o^1 o^6, in combination with the reciprocating knife k, former F, and staple-drivers B B′, substantially as and for the purpose set forth.

3. In a thin-wood-box machine, the head A, movable as described, provided with the two staple formers and drivers B B′, with levers a^1 a^2 a^3 a^4, in combination with the flaring former F, provided with two sets of clinchers, substantially as and for the purpose set forth.

4. The combination, in a box-machine, of the reciprocating head A, presser P, arms f f^1 f^2 f^3, and reciprocating former F, substantially as and for the purpose set forth.

5. The shoulders n^2 n^3, levers a^1 a^2, bifurcated formers b b^1, wedges w w^1 w^2 w^3, and anvils N N, in combination with the slides b^2 b^2 and the levers a^3 a^4, used in a thin-wood-box machine, substantially as and for the purpose set forth.

6. In a box-machine, the reciprocating former F, provided with the clinchers t t^1 and t^2 t^3, moving rigidly with the former F, in combination with the reciprocating head A, provided with presser P, substantially as and for the purpose set forth.

7. In a thin-wood-box machine, the case B, provided with the bifurcated former b, having the wedges w w^1 and the lever a^1, in combination with the anvil N and the driver b^2, having the lever a^3, substantially as and for the purpose set forth.

8. In a thin-wood-box machine, the two staple formers and drivers B B′ on the head A, movable as described, in combination with the two sets of clinchers in the former F, movable as described, substantially as and for the purpose set forth.

9. The arms f f^1 f^2 f^3 on the reciprocating head A, in combination with the reciprocating former F, substantially as and for the purpose set forth.

10. The feed-rollers o^1 o^6 and reciprocating knife k, in combination with the former F, provided with the clinchers t t^1 t^2 t^3 and staple-forming devices B B′, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

EVERT M. THOMPSON.

Witnesses:
TIMOTHY DWIGHT, Jr.,
F. W. WILLIAMS.