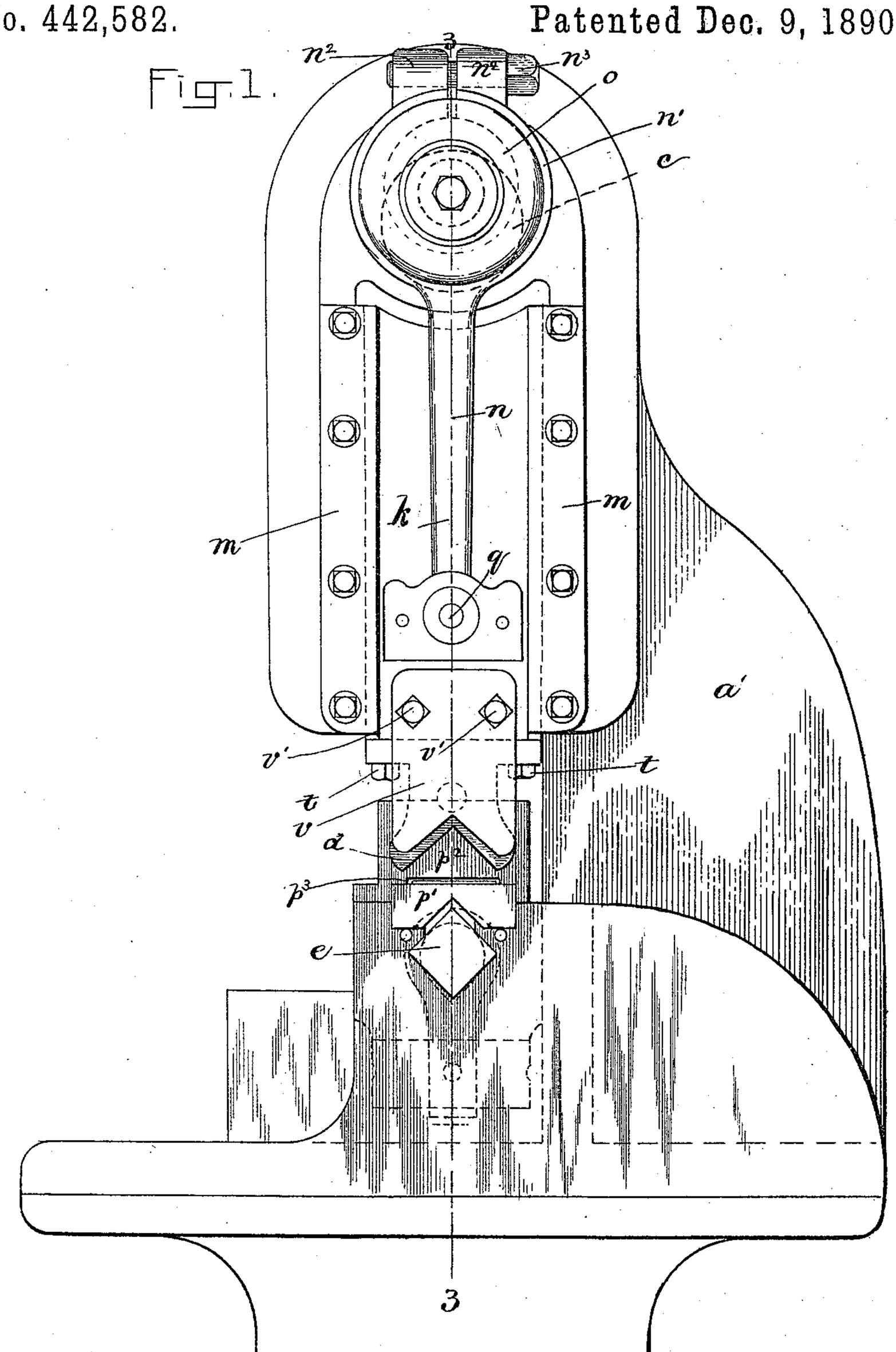
(No Model.) 5 Sheets—Sheet 1.

J. A. HORTON.

BOX STAY MACHINE.

No. 442,582. Patented Dec. 9, 1890.

Fig. 1.



WITNESSES:
A. D. Harrison.
C. G. Bartlett.

INVENTOR:
J. A. Horton
by Wright Brown Quinby & Atty's.

(No Model.)

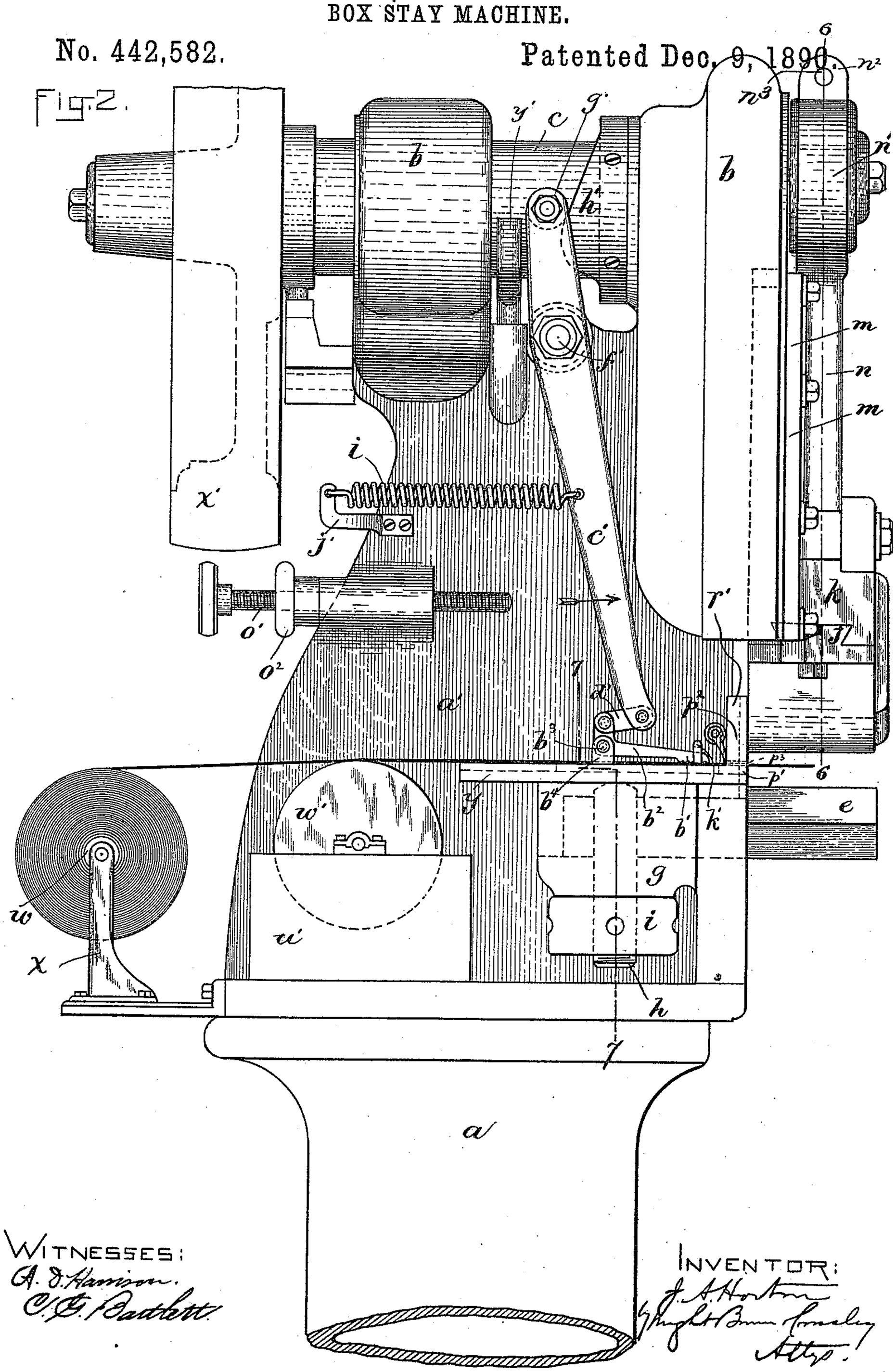
5 Sheets—Sheet 2.

J. A. HORTON.

BOX STAY MACHINE.

No. 442,582. Patented Dec. 9, 1890.

Fig. 2.



WITNESSES:
A. D. Harrison.
C. E. Bartlett.

INVENTOR:
J. A. Horton
by Wright Brown Quinby & Atty's.

(No Model.)

5 Sheets—Sheet 3.

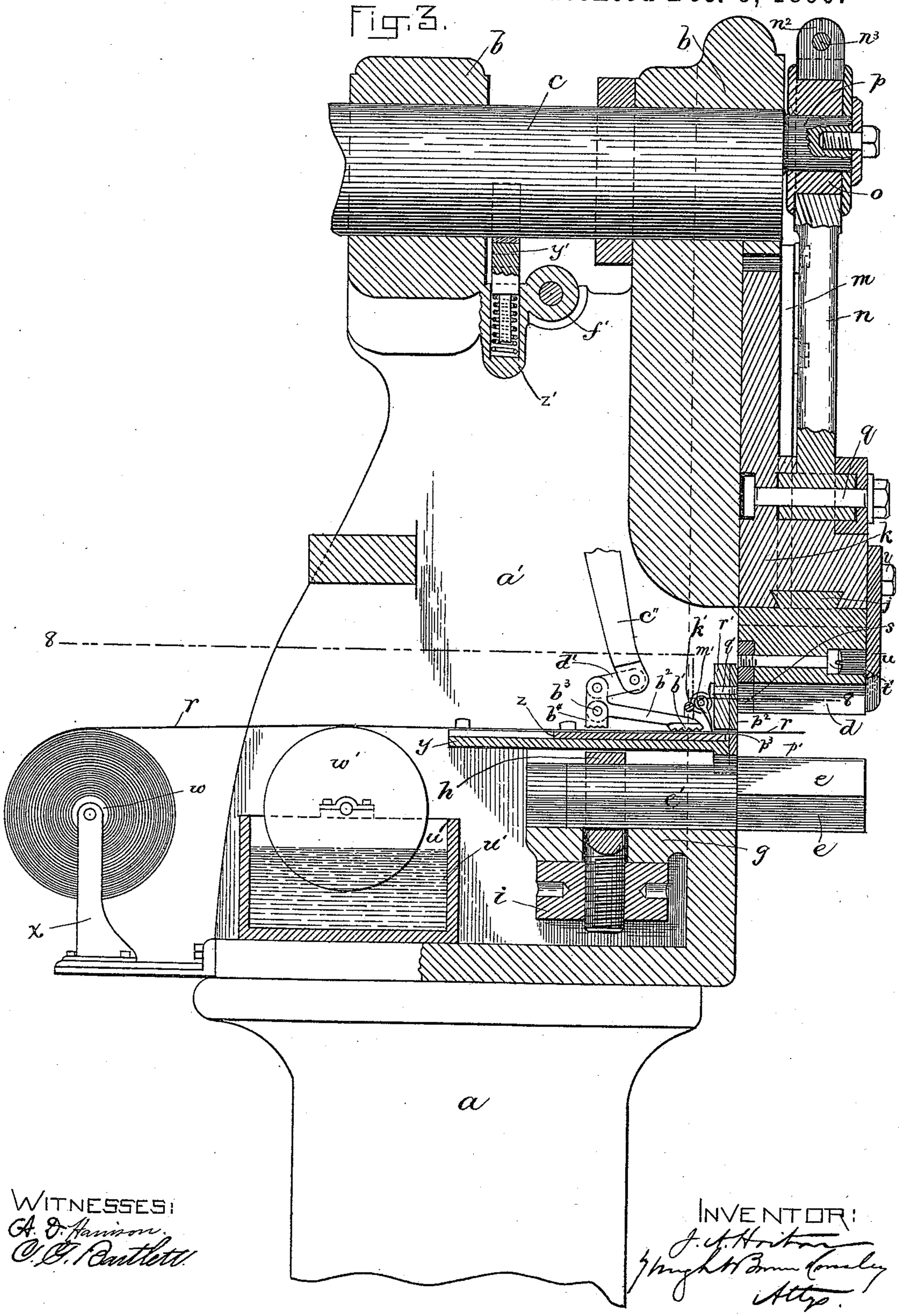
J. A. HORTON.

BOX STAY MACHINE.

No. 442,582.

Patented Dec. 9, 1890.

Fig. 3.



WITNESSES:
A. D. Harrison.
C. G. Bartlett.

INVENTOR:
J. A. Horton
by Wright Brown Quinby & Atty.

(No Model.)

5 Sheets—Sheet 4.

J. A. HORTON.

BOX STAY MACHINE.

No. 442,582. Patented Dec. 9, 1890.

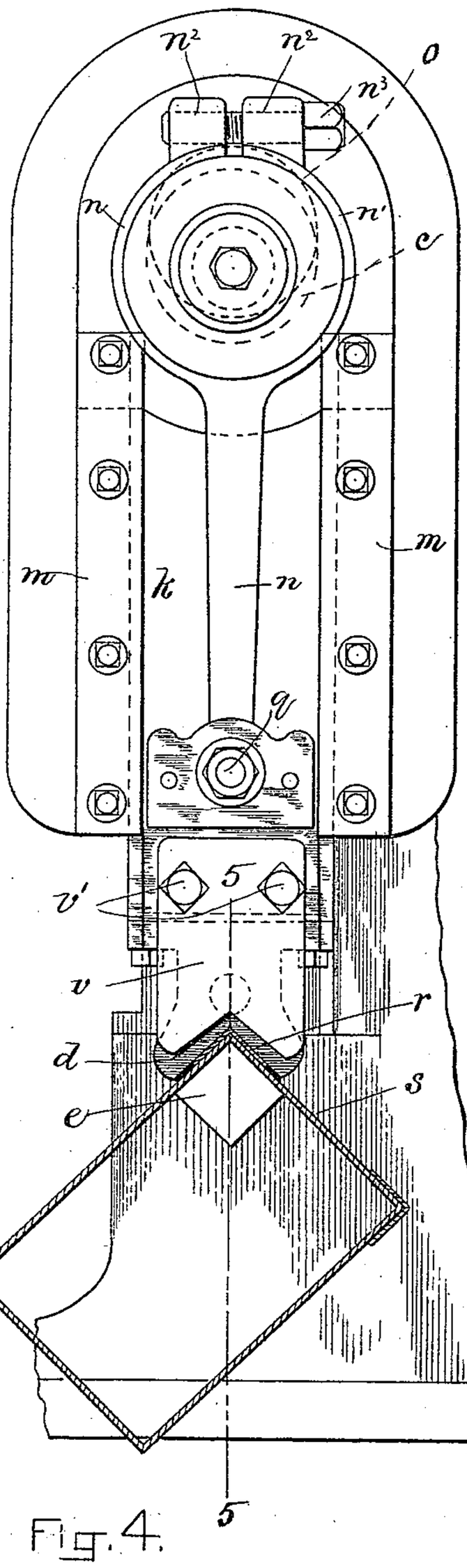


Fig. 4.

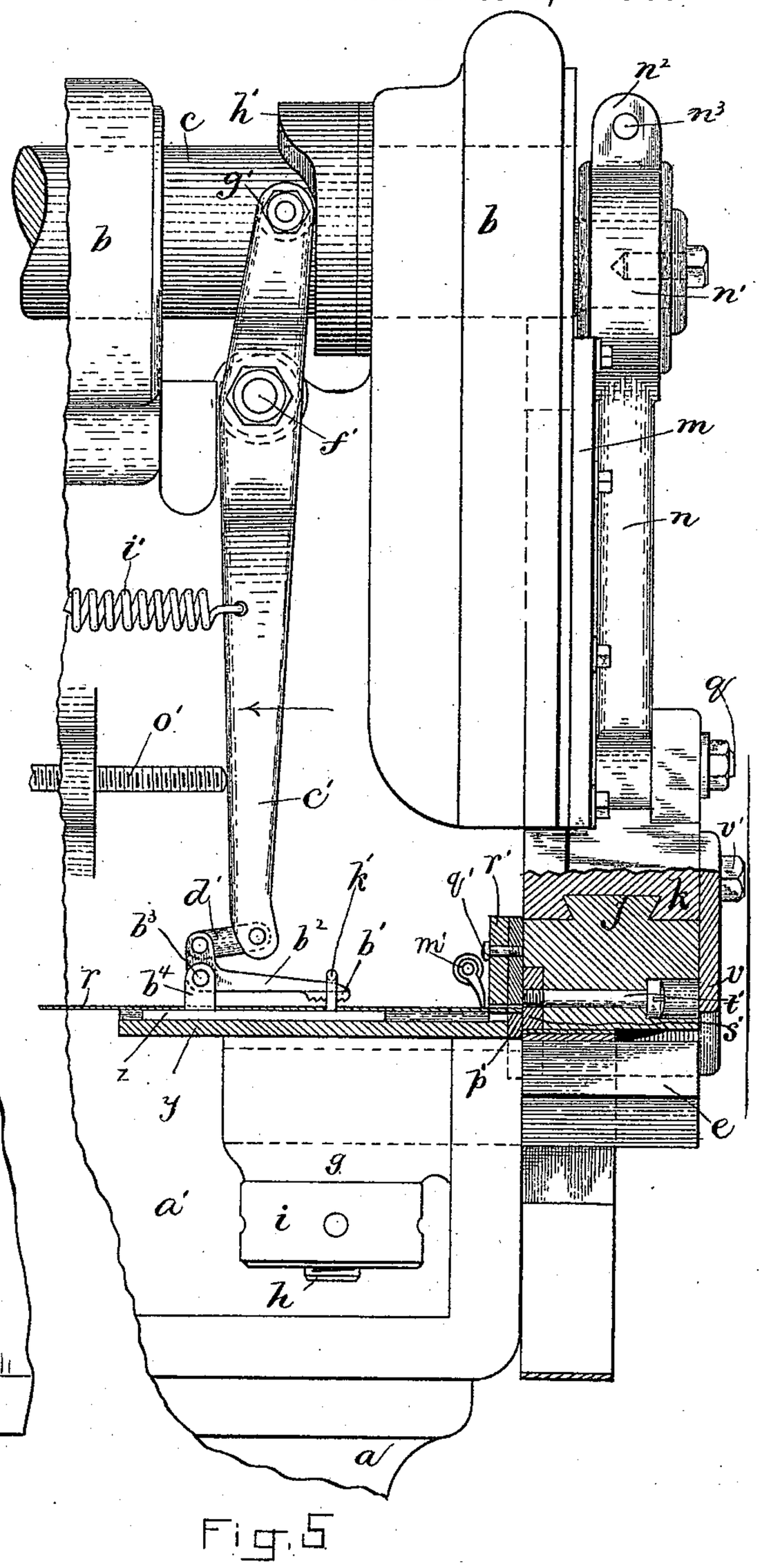


Fig. 5.

WITNESSES:
A. D. Harrison.
C. E. Bartlett.

INVENTOR:
J. A. Horton
by Wright Brown Quinby & Otis
Attys.

(No Model.)

5 Sheets—Sheet 5.

J. A. HORTON.

BOX STAY MACHINE.

No. 442,582. Patented Dec. 9, 1890.

Fig. 6.

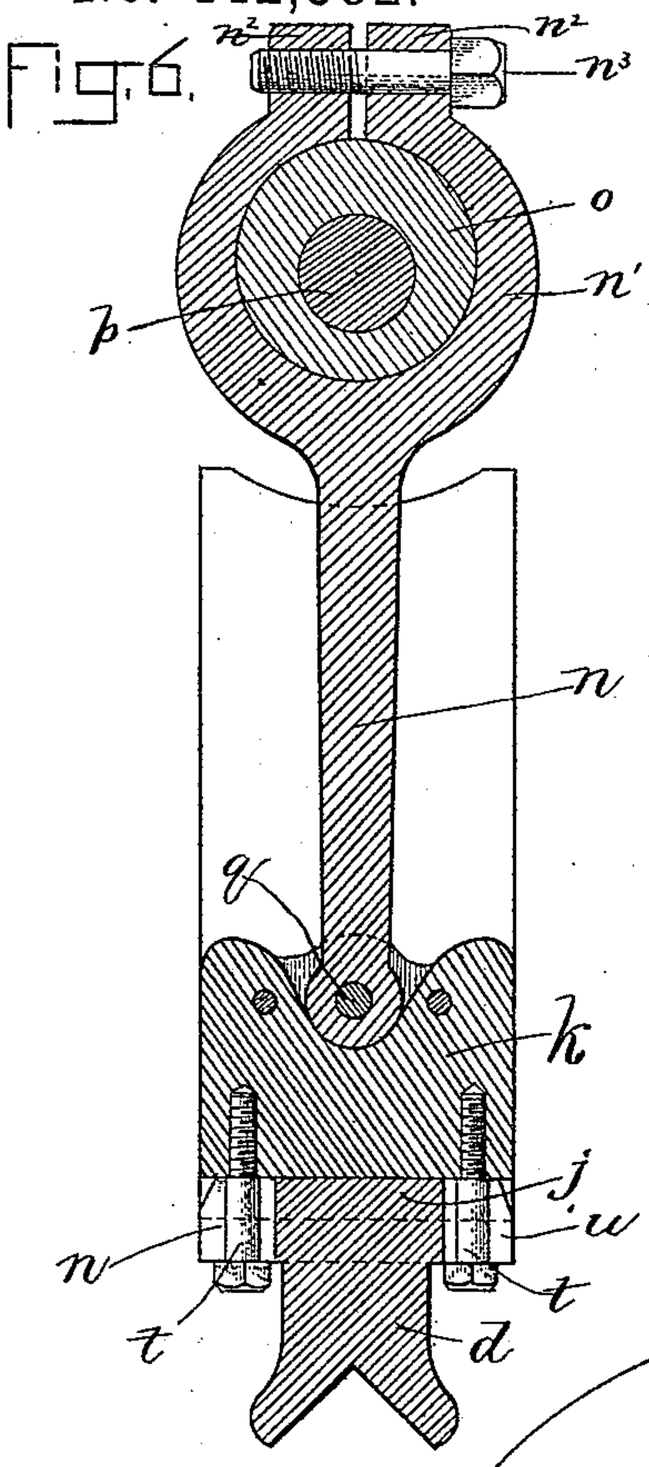


Fig. 7.

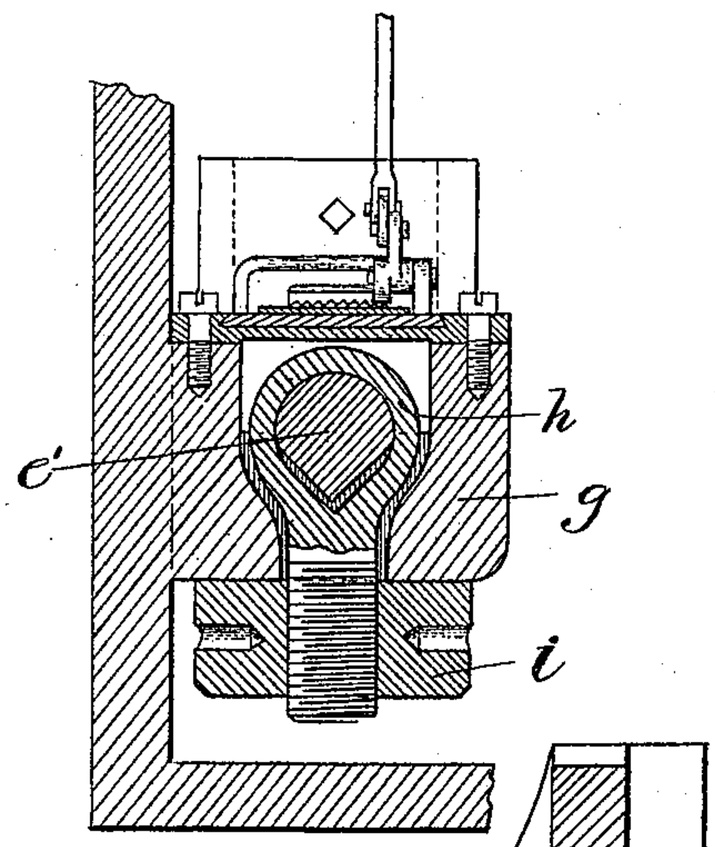
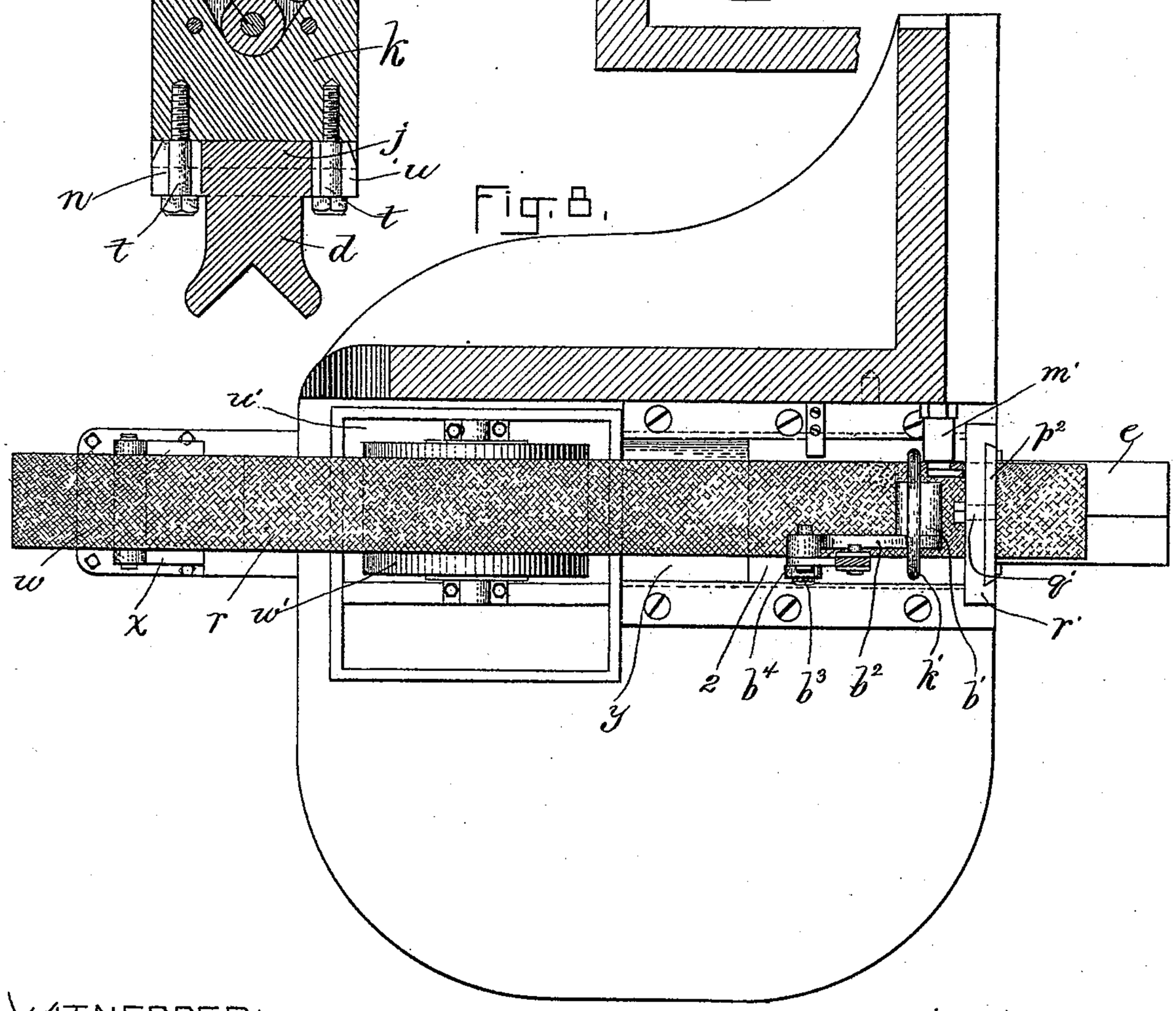


Fig. 8.



WITNESSES:
A. D. Harrison
C. E. Bartlett

INVENTOR:
J. A. Horton
by Geo. H. Strong & Co.
Attys

UNITED STATES PATENT OFFICE.

JAMES A. HORTON, OF READING, MASSACHUSETTS.

BOX-STAY MACHINE.

SPECIFICATION forming part of Letters Patent No. 442,582, dated December 9, 1890.

Application filed March 28, 1890. Serial No. 345,710. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. HORTON, of Reading, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Box-Stay Machines, of which the following is a specification.

This invention relates to that class of machines for applying stays to the corners of boxes and box-covers, in which a rectangular mandrel is employed to support the box or cover internally, while a reciprocating plunger having a re-entrant angle in its operating-face descends and bends the stay into angular form and presses it upon the corner of the box body or cover while the same is supported by the mandrel.

The invention has for its object to provide a simple, efficient, and rapidly-operating machine of this class; and it consists in the several improvements which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of a box-staying machine embodying my improvement. Fig. 2 represents a side elevation of the same. Fig. 3 represents a section on line 3 3, Fig. 1. Fig. 4 represents a front elevation showing the stay-forming plunger depressed and in the operation of conforming the stay to the corner of the box. Fig. 5 represents a vertical section on line 5 5, Fig. 4, and a side elevation of that portion of the machine which is above said line. Fig. 6 represents a section on line 6 6, Fig. 2. Fig. 7 represents a section on line 7 7, Fig. 2, looking toward the right. Fig. 8 represents a horizontal section on line 8 8, Fig. 3, and a plan view of the parts of the machine below said line.

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

In the drawings, *a* represents a supporting-pedestal, and *a'* a head or frame supported thereby, said head having bearings *b b* for the driving-shaft *c*, that gives motion, through the devices presently described, to the stay-former or plunger *d*.

e represents the mandrel or former, which is made square or rectangular in cross-section, and is provided with a shank *e'*, which rests on a seat or bearing *g*, formed on the head *a'*, and is secured to said bearing by a clamp *h*, which is formed, as best shown in Figs. 3 and 7, to surround the shank *e'*, its lower portion being screw-threaded and passing through an orifice in the seat *g*, and provided below said seat with a binding-nut *i*, which when turned to a bearing on the under side of the seat *g* presses the clamp down upon the shank *e'* and causes said clamp to securely hold the shank and the mandrel formed thereon in any desired position, the mandrel being thus adapted to project more or less from the front of the head *a'*, according to the depths of box or box-cover which it is to support.

The plunger or former *d* is a block of metal having a dovetailed rib *j* on its upper side, which is inserted in a corresponding groove in a cross-head *k*, which is fitted to slide vertically between guides *m m* on the head or frame *a'*.

n represents a connecting-rod having its upper end formed as a strap or band *n'*, which is split at its upper portion, as shown in Fig. 2, and there provided with ears n^2 n^2, which are connected by bolt n^3. The strap *n* surrounds an eccentric *o*, which is loosely mounted on an eccentric wrist-pin *p* on one end of the driving-shaft *c*. The lower end of the rod *n* is connected by bolt or pivot *q* with the cross-head *k*. The rotation of the shaft *c* causes the wrist-pin *p*, through the rod *n*, to reciprocate the cross-head *k* and former or plunger *d*. The object of the eccentric *o* is to regulate the height of the former *d* when the latter is at the lowest extreme of its movement, and thereby enable the plunger to be adjusted to the thickness of the box material on the mandrel *e*, said adjustment being effected by loosening the bolt n^3, so that the eccentric *o* can be freely rotated in the strap *n'* until the desired adjustment of the former *d* is effected, and then tightening said bolt, so as to clamp the strap *n'* securely upon the eccentric *o*, and thus practically make said strap and eccentric one.

The former *d* has its lower or acting face formed as a re-entrant angle, as shown in Figs. 1, 4, and 6, to fit the box-supporting faces of the mandrel, the arrangement being such that when the former is depressed it bends the stay-strip *r* into angular form and

presses it upon the corner of the box *s*, as shown in Fig. 4. The said former *d* is secured to the cross-head *k* by means of screws *t t*, Fig. 6, passing through horizontal slots *u u* in the upper portion of the former. Said slots and screws, together with the connection afforded by the dovetailed rib *j* on the former and the groove receiving the same in the cross-head, enable the former to be adjusted horizontally, so that the angle formed by the two sides of its operating-face can be located directly over the salient angle of the mandrel, as it should be when the two sides of the box supported by the mandrel are of equal thickness, or at one side of said salient angle, as it should be when one side of the box is thicker than the adjoining side, as is often the case in consequence of the overlapping of one side of the box upon the adjoining side.

To prevent the possibility of the former working loose or wabbling, I attach to the cross-head *k* by means of screws *v' v'* a plate *v*, which is formed to bear upon the outer side of the former and hold it steadily in position.

The stay-strip *r* is wound in a roll upon a spool *w*, which is mounted to rotate in bearings in standards *x*, affixed to the frame of the machine.

y represents a table or guide, over which the strip *r* passes from the spool to the mandrel.

z represents a slide, which is mounted to move horizontally on the guide or table *y*, its upper surface constituting a bed or support on which the strip *r* bears.

b' represents a feed-dog or foot, which is formed on a lever b^2, pivoted at b^3 on an ear b^4, formed on the slide *z*.

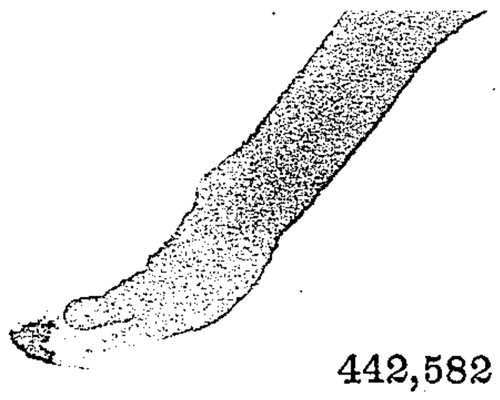
c' represents a lever, which is pivoted at *f'* to the supporting-frame, and is connected at its lower end by a link *d'* to the lever b^2. At the upper end of the lever *c'* is a trundle-roll *g'*, which bears on a cam *h'*, attached to the shaft *c*. A spring *i'*, attached at one end to a bracket *j'* on the supporting-frame and at the other end to the lever *c'*, holds the upper end of said lever in yielding contact with the cam *h'*. The rotation of the cam *h'* oscillates the lever *c'*, causing it to move in the direction indicated by the arrow in Fig. 2. When the lever *c'* is moving in the direction indicated in Fig. 2, it presses the feed-dog *b'* down upon the strip *r* and at the same time moves the slide *z* in the same direction. The strip *r* being clamped between the dog *b'* and the slide *z*, is therefore moved in the same direction as the lever *c'*, the strip being thus fed outwardly over the mandrel *e*. When the lever *c'* is moving in the opposite direction, as indicated in Fig. 5, it raises the dog *b'* from the strip as far as a loop or guard *k'*, secured to the plate *z*, and extending across the dog will permit said guard being formed to permit the dog to be raised out of contact with the strip *r* and to arrest the dog in its upward movement, thus holding the lever b^2 so that the lever *c'* can, acting through the link *d'* and lever b^2, push the slide *z* backwardly, or in the direction indicated by the arrow in Fig. 5.

m' represents a loose dog, which is pivoted to the frame of the machine, and is arranged to engage the strip *r* during the backward movement of the slide *y* and prevent said strip from being carried backwardly by the slide, said dog *m'* yielding when the strip is moved in the opposite direction.

o' represents an adjustable screw mounted in an ear on the frame *a'* and arranged to serve as a stop to limit the backward movement of the lever *c'*, thus determining the length of the feed movement imparted to the strip *r* by the movements of said lever. The screw *o'* is provided with a check-nut o^2 to secure it in any position to which it may be adjusted.

p' represents a fixed shear-blade of hardened steel attached to one end of the table or guide *y* and arranged flush with the upper surface of the slide *z*, so that the strip *r* in being fed forward moves across and bears on the blade *p'*, as shown in Fig. 3. Above said blade is a plate p^2, which is separated from the blade by a narrow slot p^3, as shown in Figs. 1 and 2. The object of said plate p^2 is to guide the strip *r* and confine it against lateral or vertical movement. Said plate p^2 may be a part of the fixed blade *p'*, if preferred; but as the blade *p'* requires renewal on account of the wear to which it is subjected I prefer to make it in a separate piece from the plate p^2 and capable of independent removal. The plate p^2 is here shown as attached by a screw *q'* to a flange *r'*, formed on the bed or guide *y*.

s' represents a hardened-steel shear-blade attached to the inner end of the former *d* and having its cutting-edge formed as a re-entrant angle, the faces of which are flush with the faces that compose the acting portion of the former. The blade *s'* is attached by a screw *t'* to the former, as shown in Figs. 3 and 5, the former having a socket or recess formed in its rear end to receive the blade *s'*. The blade *s'* is arranged to be in close contact with the plate p^2 and fixed blade *p'*, so that in descending it will co-operate with said fixed blade in severing the projected portion of the strip *r*. It will be seen that the angular form of the reciprocating blade *s'* enables it to commence cutting the strip *r* at the edges of the latter, the cutting action progressing inwardly from the edges toward the center, while the severed portion is at the same time being bent by the combined action of the blade *s'* and former *d* into its angular form, so that the piece which is to form the stay is not severed from the main strip until it is bent to such an extent that it will drop to place on the box-body *s* without liability to being misplaced in passing from the cutters to said box-body If the reciprocating blade *s'* were straight, the strip *r* would be severed more quickly and while in a flat condition, so that it would be liable to be dis-



placed in falling from the cutters to the box-body on the mandrel. The strip *r* is gummed on its under side before being rolled upon the spool *w*, the gum coating being in a dry condition.

To moisten the gum coating and thereby adapt the stay to adhere to the box-body, I provide a water-tank *w'*, which is supported by the frame of the machine between the spool *w* and the mandrel *e*, and is provided with a roll *w'*, which is partially submerged in the water, and is arranged so that its upper portion is in contact with the gummed under surface of the strip *r*. Said roll moistens the gum coating so that the stay, severed from the strip as above described and pressed by the former on the box-body, will adhere to the latter.

Power may be applied to the driving-shaft *c* in any suitable way. I prefer to employ a driving-pulley *x'*, which is loose upon the shaft, and is provided with suitable automatic mechanism whereby it may be connected with the shaft to rotate the latter by the depression of a treadle or otherwise and automatically disconnected therefrom at the end of each complete rotation, the arangement being preferably such that the shaft *c* will stop when the cross-head and former are raised high enough to bring the cutter *s'* above the strip-guiding slot, but not to its highest point. The box-body is then placed on the mandrel while the former is at rest, and the machine is then started, the plunger completing its upward movement, then descending to cut off and apply the stay, and then rising and stopping as before.

The object of stopping the former before it reaches the end of its upward movement is to give time for the feeding of the stay-strip after the box is placed on the mandrel, the partial upward movement of the former before its descent giving the desired time. Suitable automatic mechanism for producing this result is shown in Letters Patent of the United States granted to me July 4, 1882, for friction movement, and numbered 260,394.

To prevent the shaft *c* from rotating loosely or by its own momentum, I provide a friction-brake *y'*, which is arranged to bear against the under side of the shaft, and is pressed upwardly thereagainst by a spring *z'*, as shown in Fig. 3.

It will be seen that the strip-feeding devices are arranged to move the stay-strip lengthwise of the mandrel, and that the strip-severing blades are arranged crosswise of or substantially at right angles with the mandrel. As a result of this arrangement, the stay-strip can be adjusted to the height of the box by varying the length of the feed movement, no variation in the width of the strip being required.

Another advantage of the angular cutter *s'* is that by commencing to cut the strip at its edges, instead of cutting entirely across the strip at once, the cutter holds the strip while the feed-dog is being retracted, and therefore aids the dog *m'* in preventing backward movement of the strip.

I claim—

1. In a box-staying machine, the combination, with an angular mandrel formed to support a box-body, of a reciprocating cross-head and a former having a lower re-entrant-angled acting face and adjustably fixed to said cross-head at opposite points, whereby the former is enabled to be adjusted to the differences of position of the corner of a box caused by differences of thickness of the sides forming said corner, substantially as set forth.

2. In a box-staying machine, the combination, with an angular mandrel formed to support the box-body, of a reciprocating cross-head, a former having a re-entrant-angled acting face and slots in its upper horizontal portion, and the screws passed through said slots and secured to said cross-head, substantially as set forth.

3. In a box-staying machine, the combination, with an angular mandrel, of a reciprocating cross-head, a former secured thereto having a lower re-entrant-angled acting face, a re-entrant-angled shear-blade affixed to said former, and the straight fixed shear-blade having a strip-guiding slot, substantially as set forth, whereby a strip is gradually cut from its outer edges, as stated.

4. In a box-staying machine, the combination, with an angular mandrel, of a former, a shear-blade secured thereto, said former and shear-blade having lower re-entrant-angled acting faces, the table or guide *y*, having a straight fixed shear-blade secured thereto, an upper plate p^2, said plate and blade forming the walls of a strip-guiding slot, and the dog *m'*, secured to said plate and designed to hold the strip during the rearward movement of the feeding device, said shear-blades also serving to hold such strip, substantially as set forth.

5. In a box-staying machine, the combination of a supporting-frame having the seat or support *g*, the mandrel having a shank bearing on said seat, the clamp *h*, having an upper portion surrounding the said mandrel-shank, its lower portion being screw-threaded, and the nut screwed thereon and bearing against the under side of said seat or support, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 15th day of March, A. D. 1890.

JAMES A. HORTON.

Witnesses:

C. F. BROWN,

A. D. HARRISON.