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C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

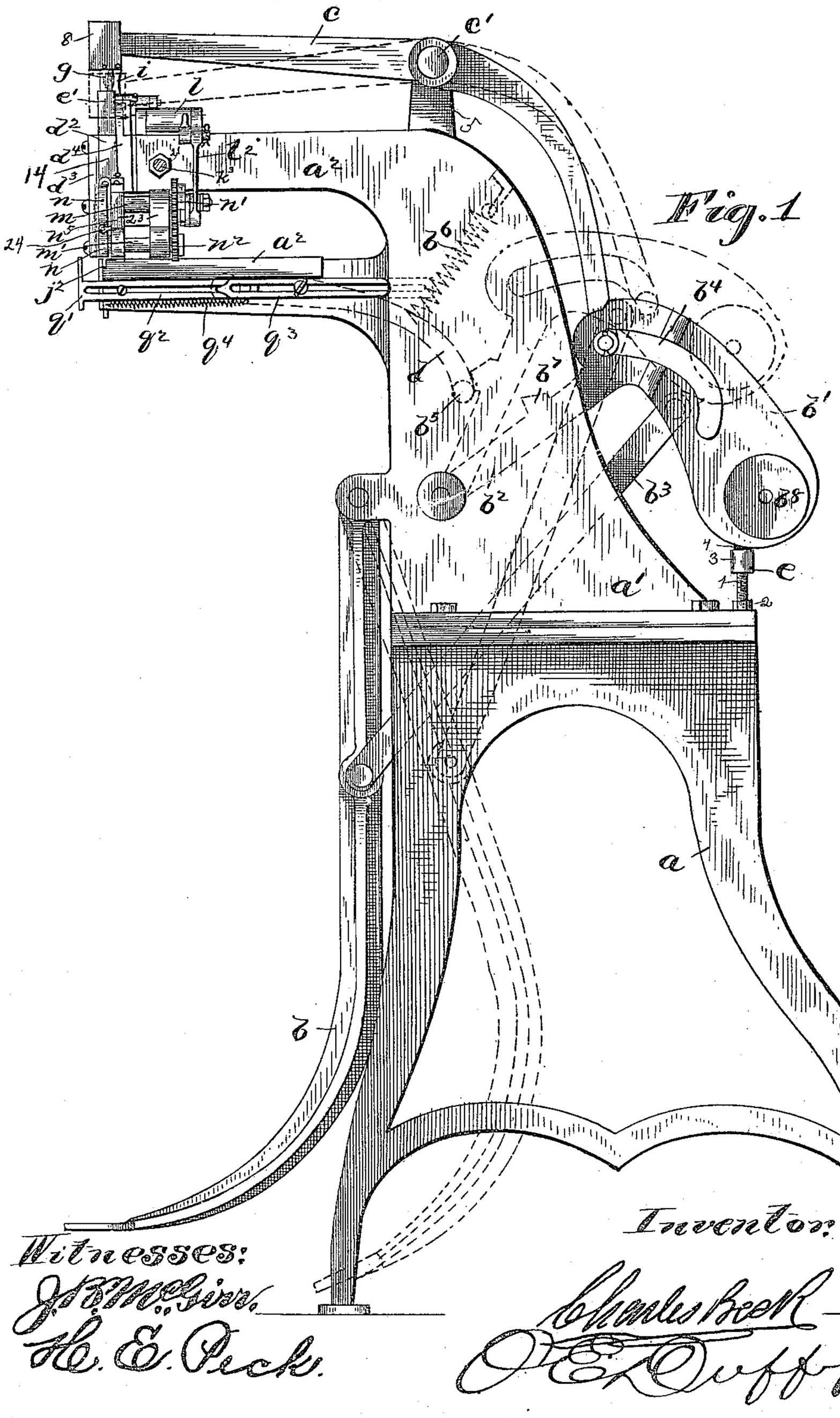

Fig. 1

Witnesses:
J. B. McGinn.
H. E. Peck.

Inventor:
Charles Beck
by E. G. Siggers Atty.

(No Model.) 8 Sheets—Sheet 2.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig. 2.

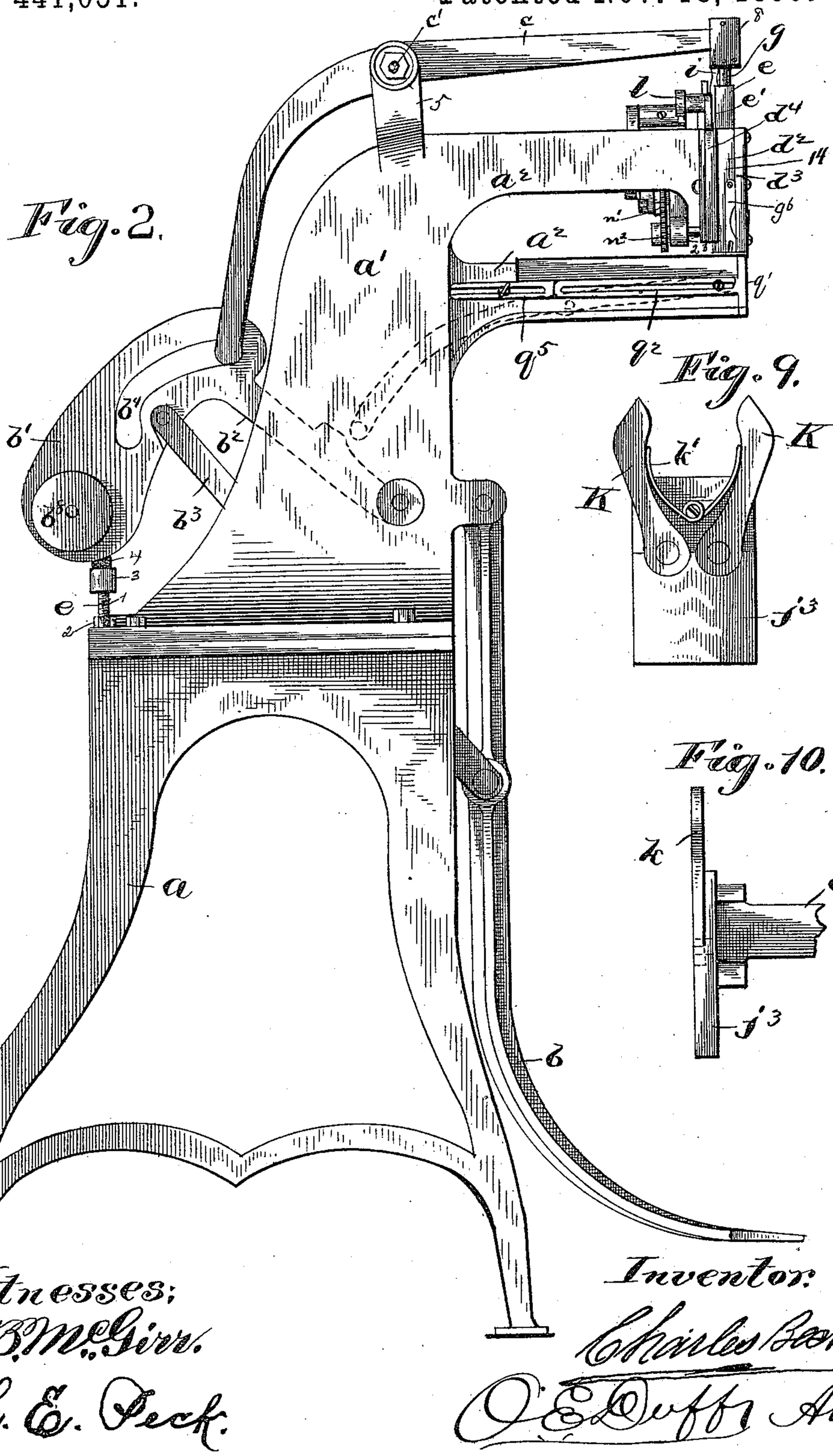

Fig. 9.

Fig. 10.

Witnesses:
J. B. McGirr.
H. E. Peck.

Inventor:
Charles Beck
by E. E. Duffy Atty

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C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig. 6

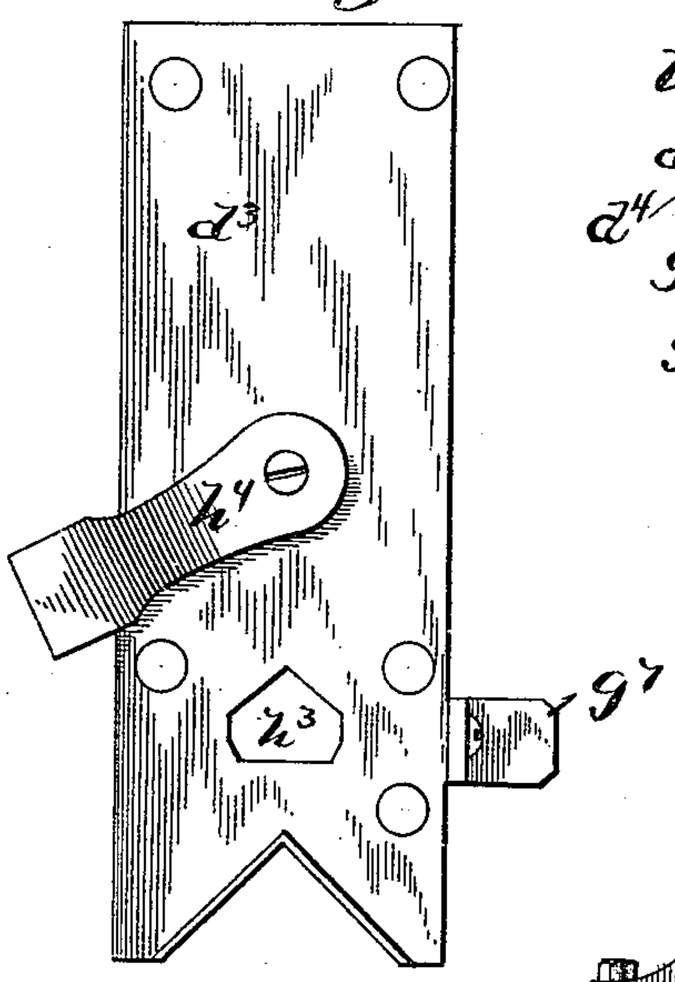


Fig. 3

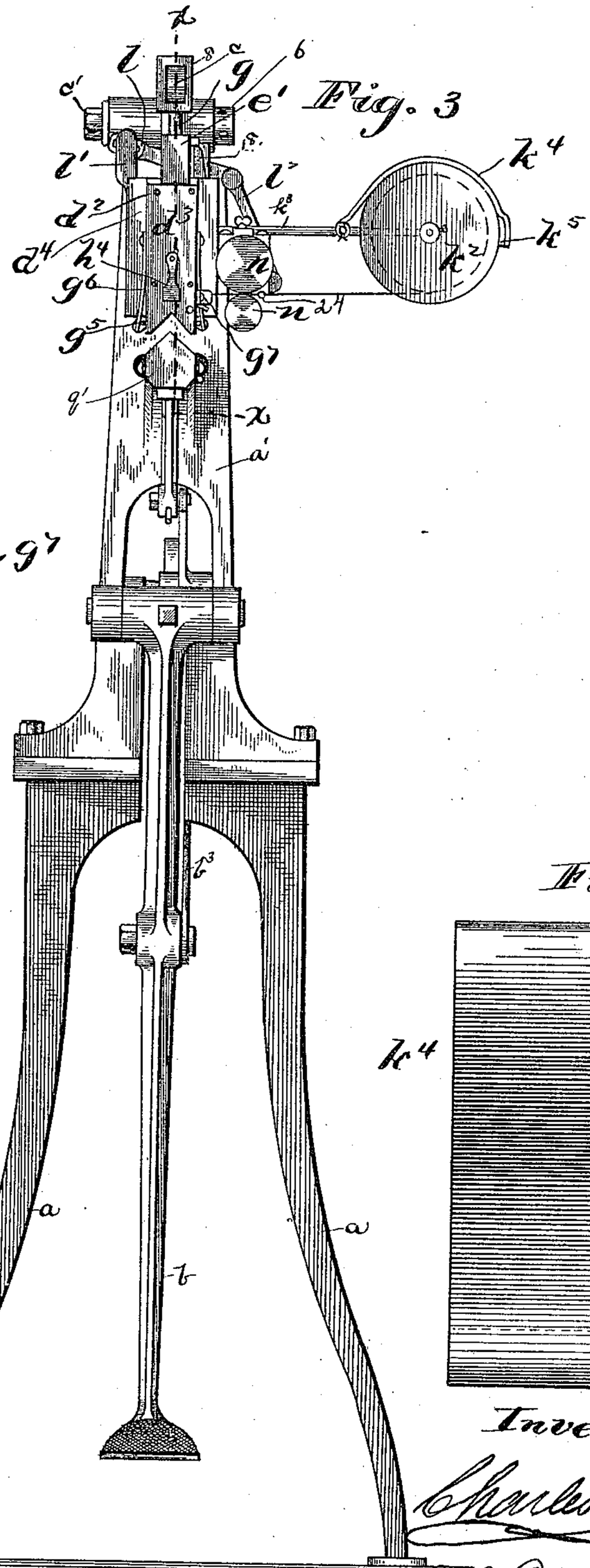


Fig. 13

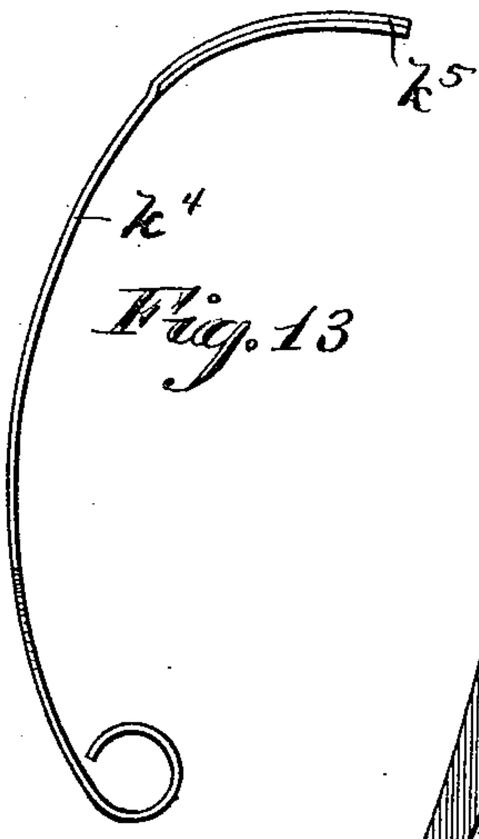


Fig. 14

Witnesses:
J. B. McGirr.
H. E. Peck

Inventor:
Charles Beck
by E. G. Duffy Atty

(No Model.) 8 Sheets—Sheet 4.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig. 4

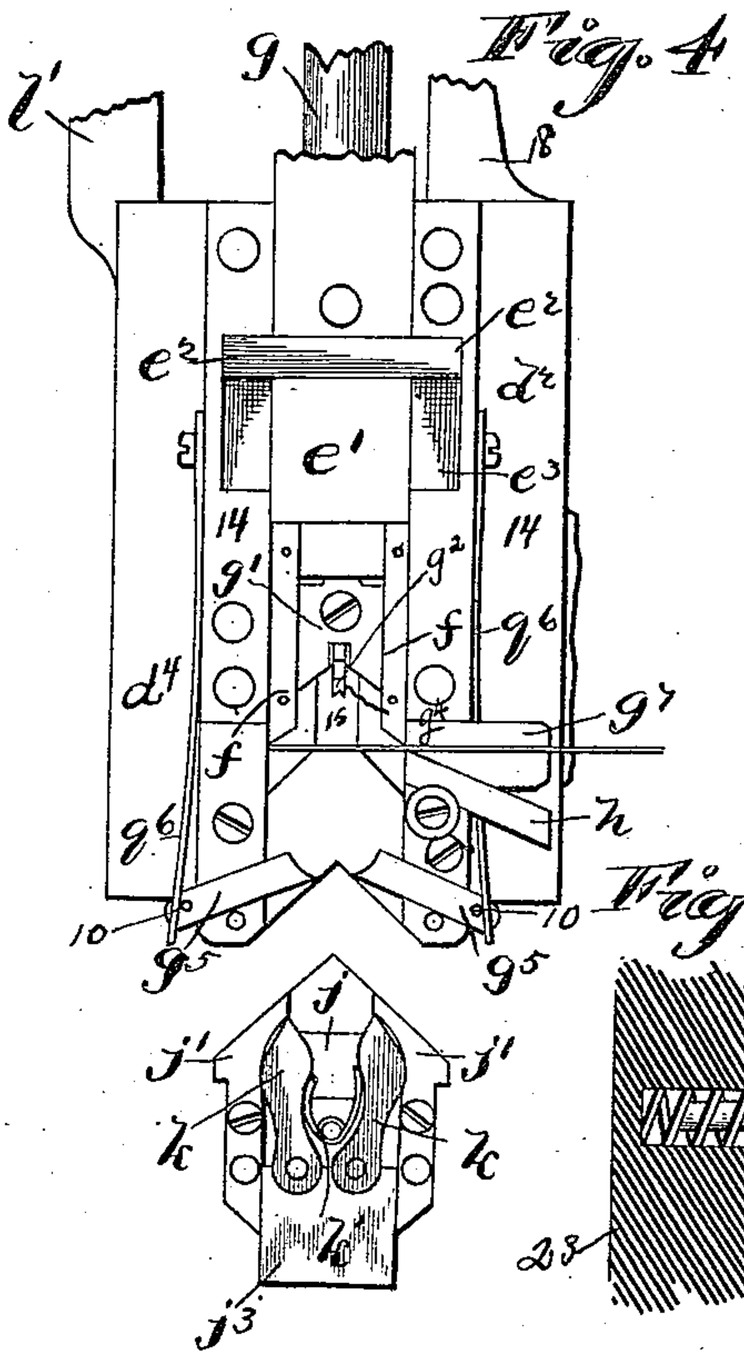


Fig. 5

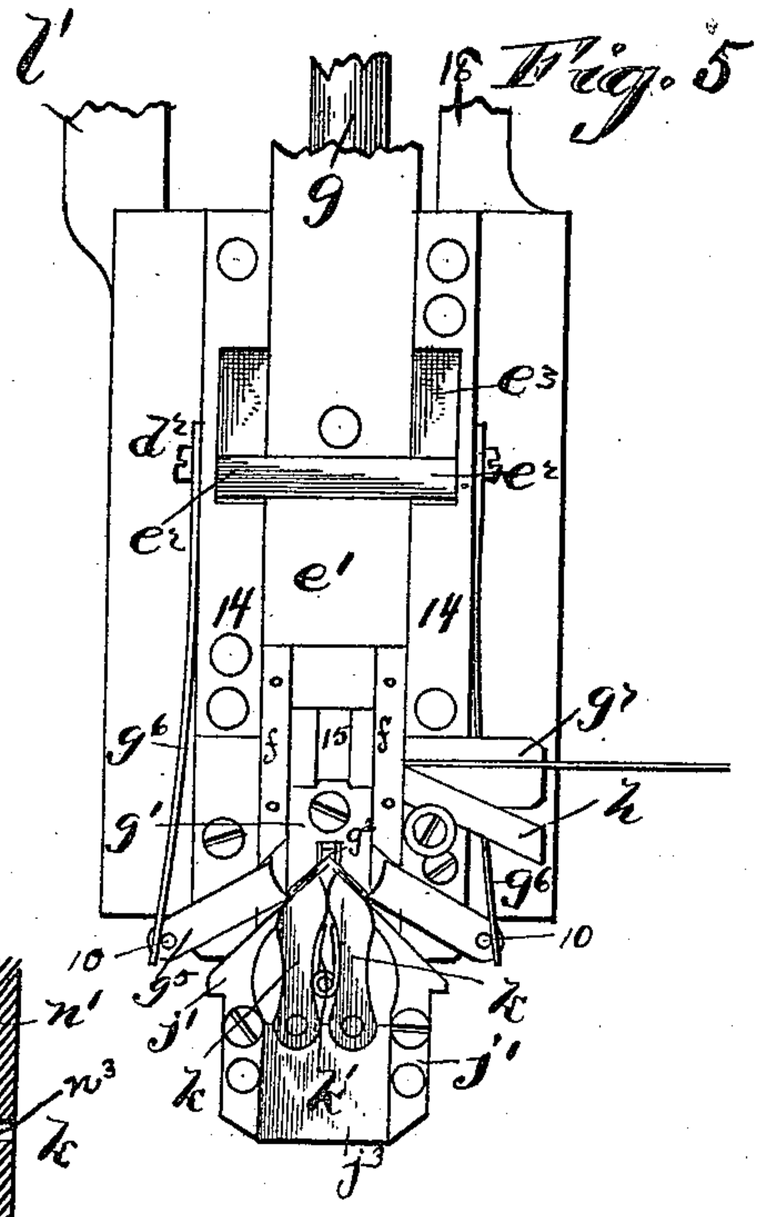


Fig. 16

Fig. 15.

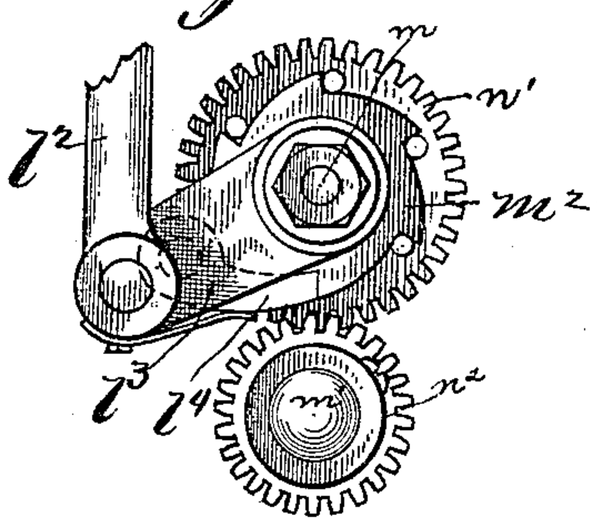
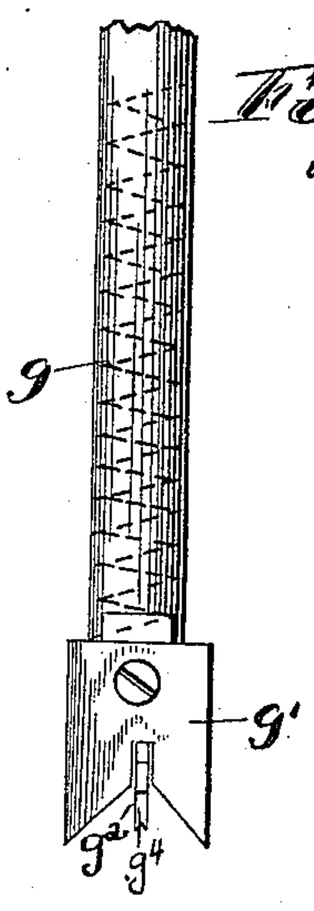


Fig. 11



Witnesses:
J. S. McGirr.
H. E. Peck.

Inventor:
C. Beck
by E. E. Dyer & Atty.

(No Model.) 8 Sheets—Sheet 5.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig 12.

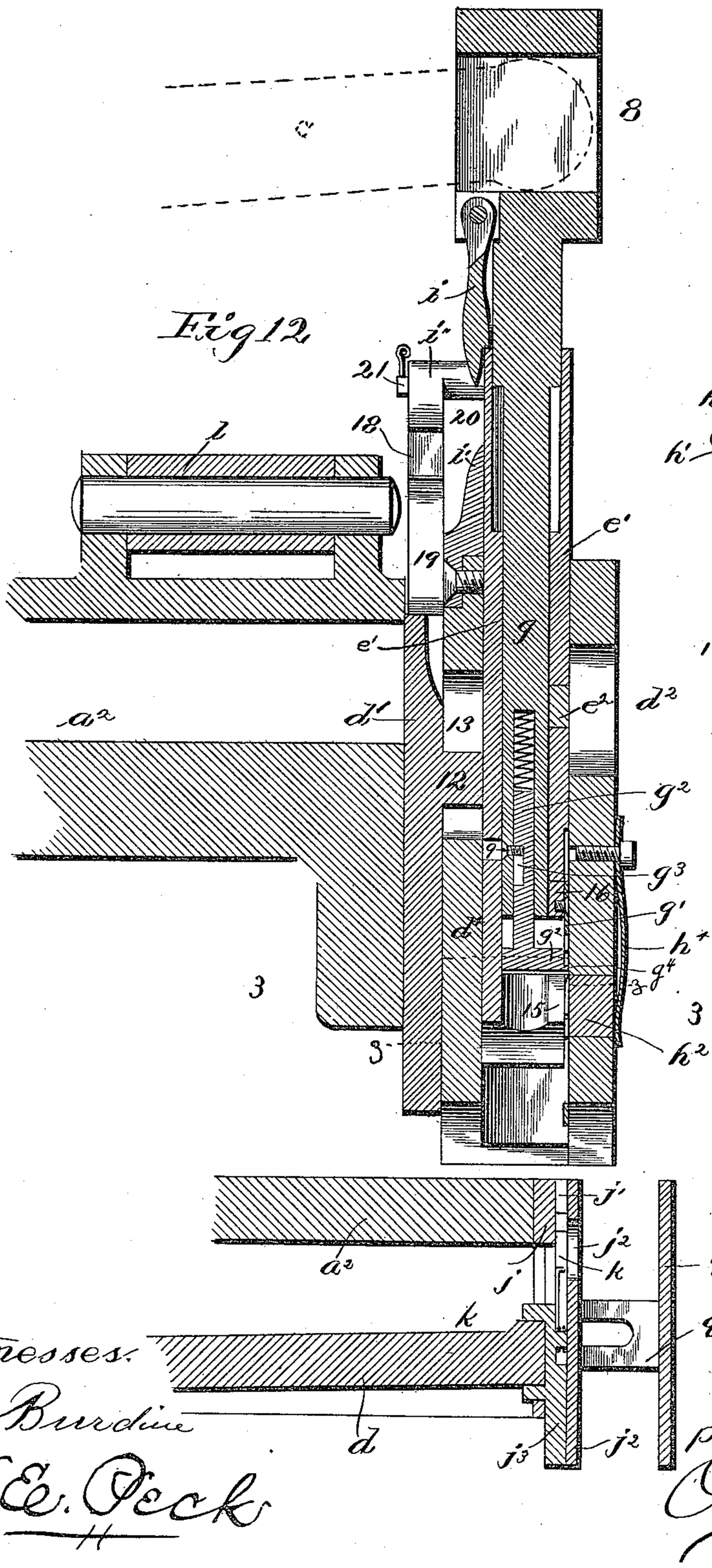


Fig 7.

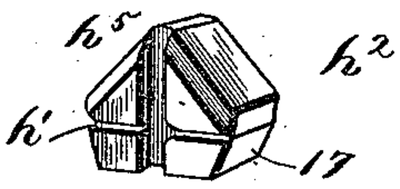


Fig 8.

Witnesses:
C. C. Burdine
H. E. Beck

Inventor
Chas. Beck.
per
O. E. Duffy
Atty.

(No Model.)

8 Sheets—Sheet 6.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig. 18.

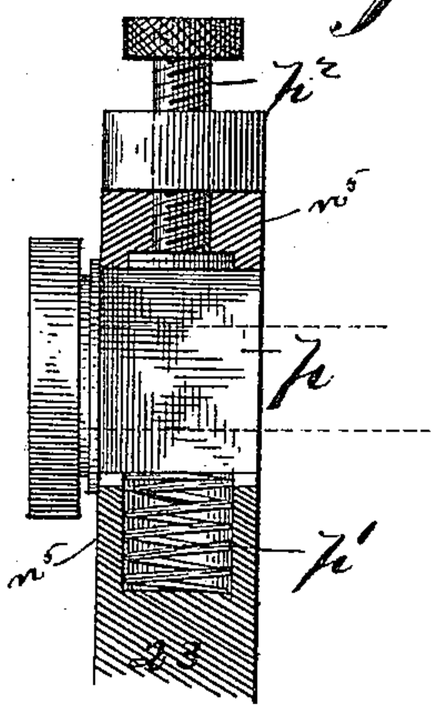


Fig. 17.

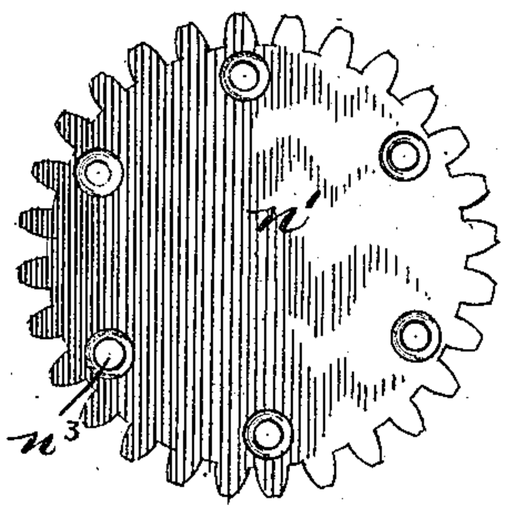


Fig. 21.

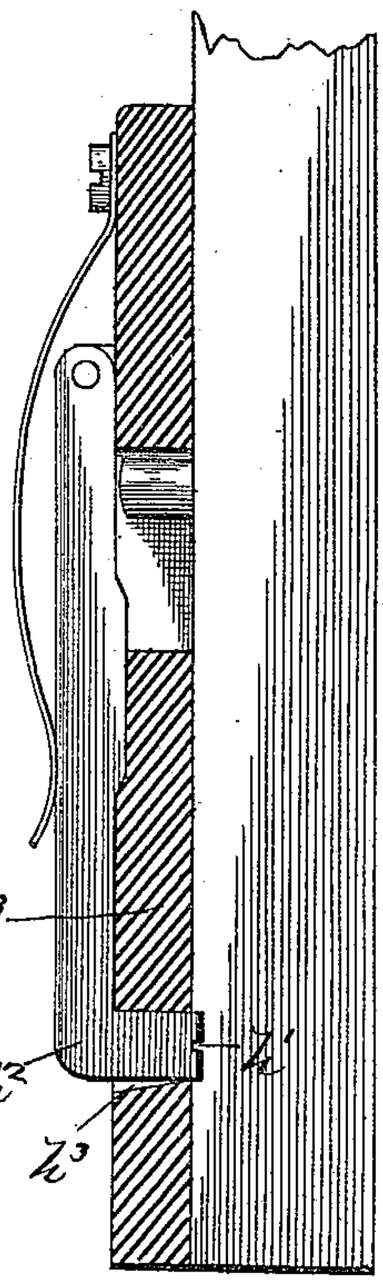
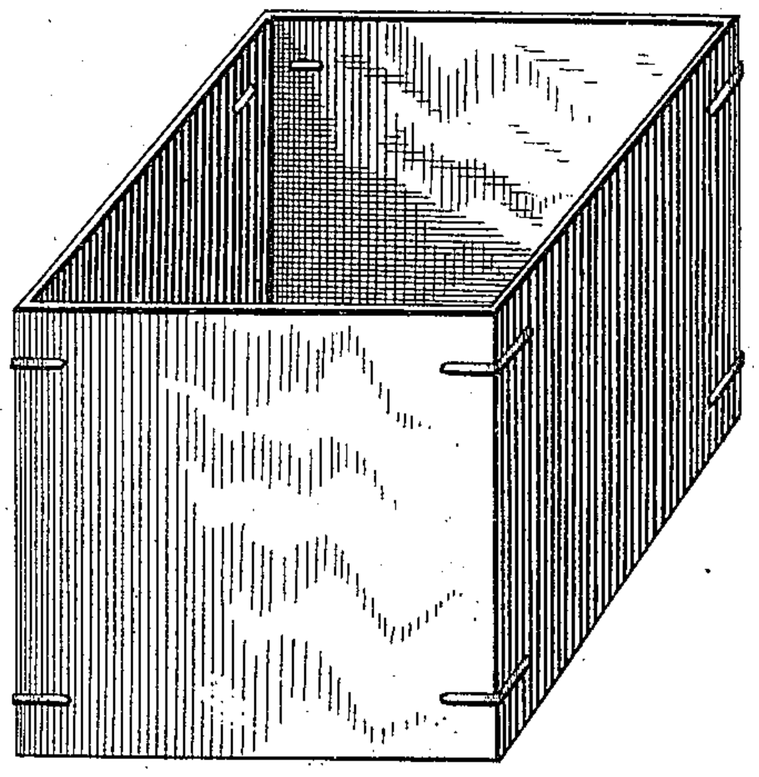


Fig. 22.



Witnesses:
J. B. McGirr.
H. E. Peck.

Inventor:
C. Beck
by Dyer & Duffy Attys

(No Model.) 8 Sheets—Sheet 7.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig 19.

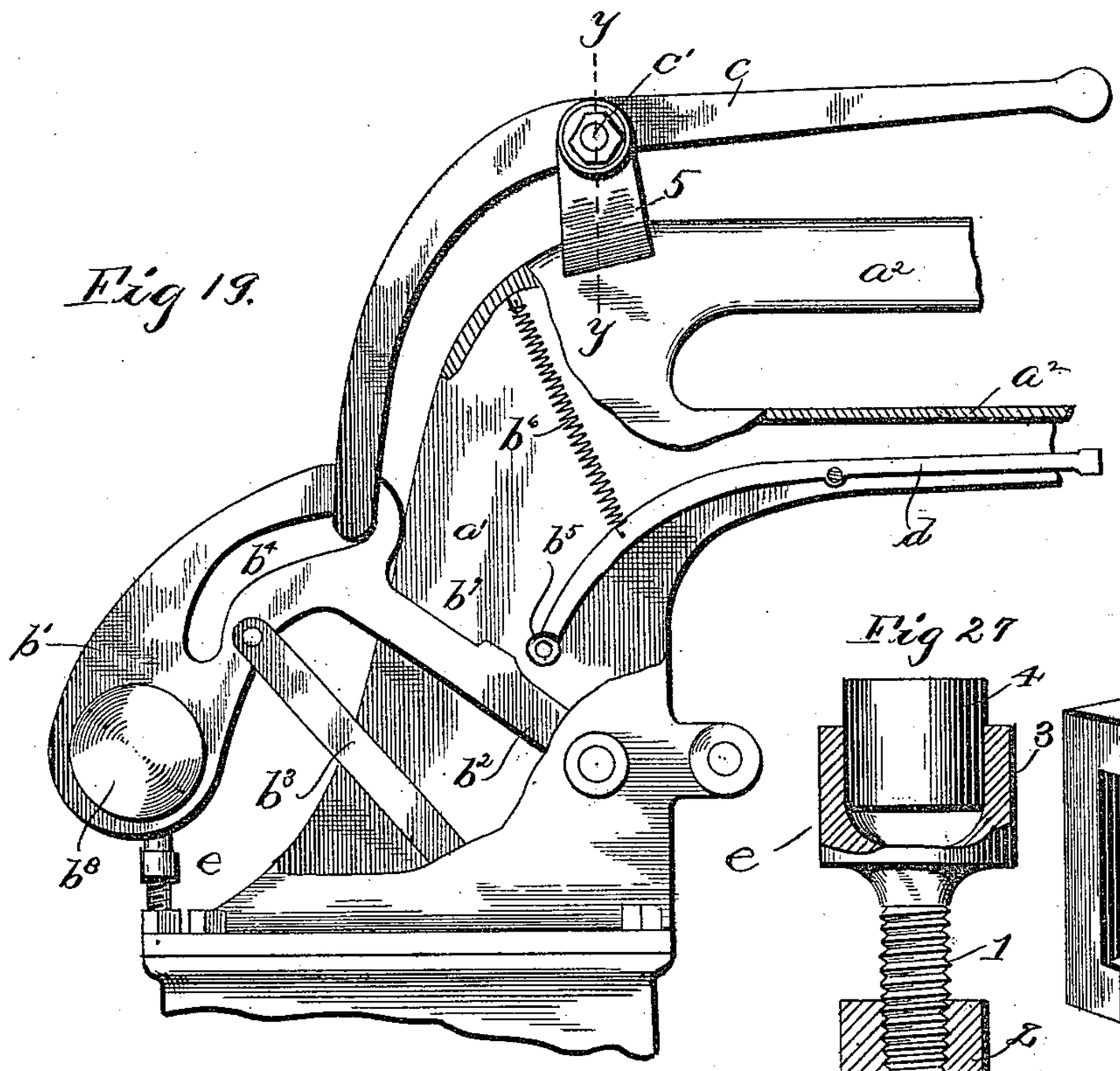


Fig 27

Fig 25

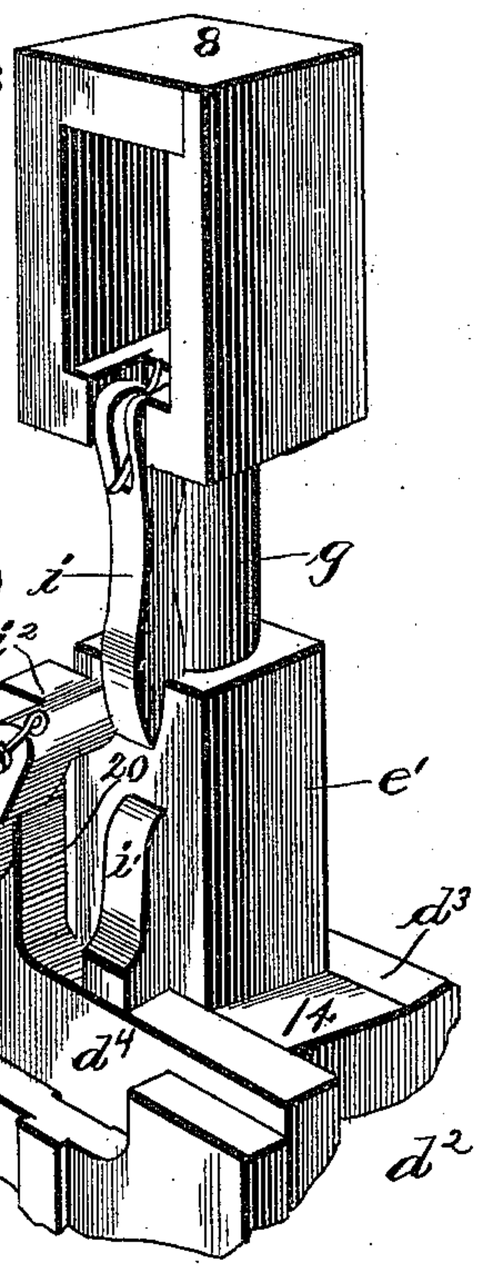
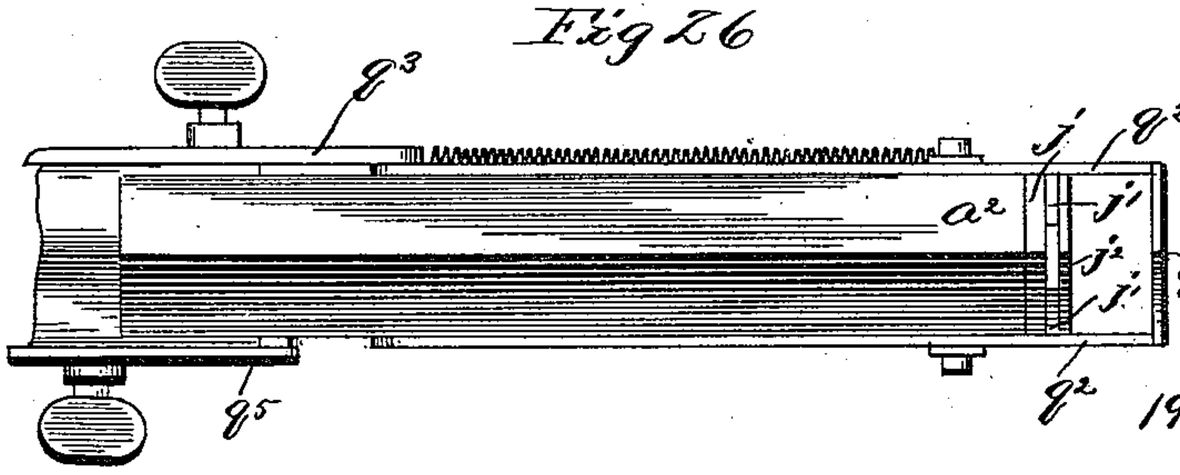


Fig 26



Witnesses
C. C Burdine
H. E. Peck

Inventor
Chas Beck
per O. E. Duff
Atty.

(No Model.) 8 Sheets—Sheet 8.

C. BECK.

BOX STAPLING MACHINE.

No. 441,051. Patented Nov. 18, 1890.

Fig 23.

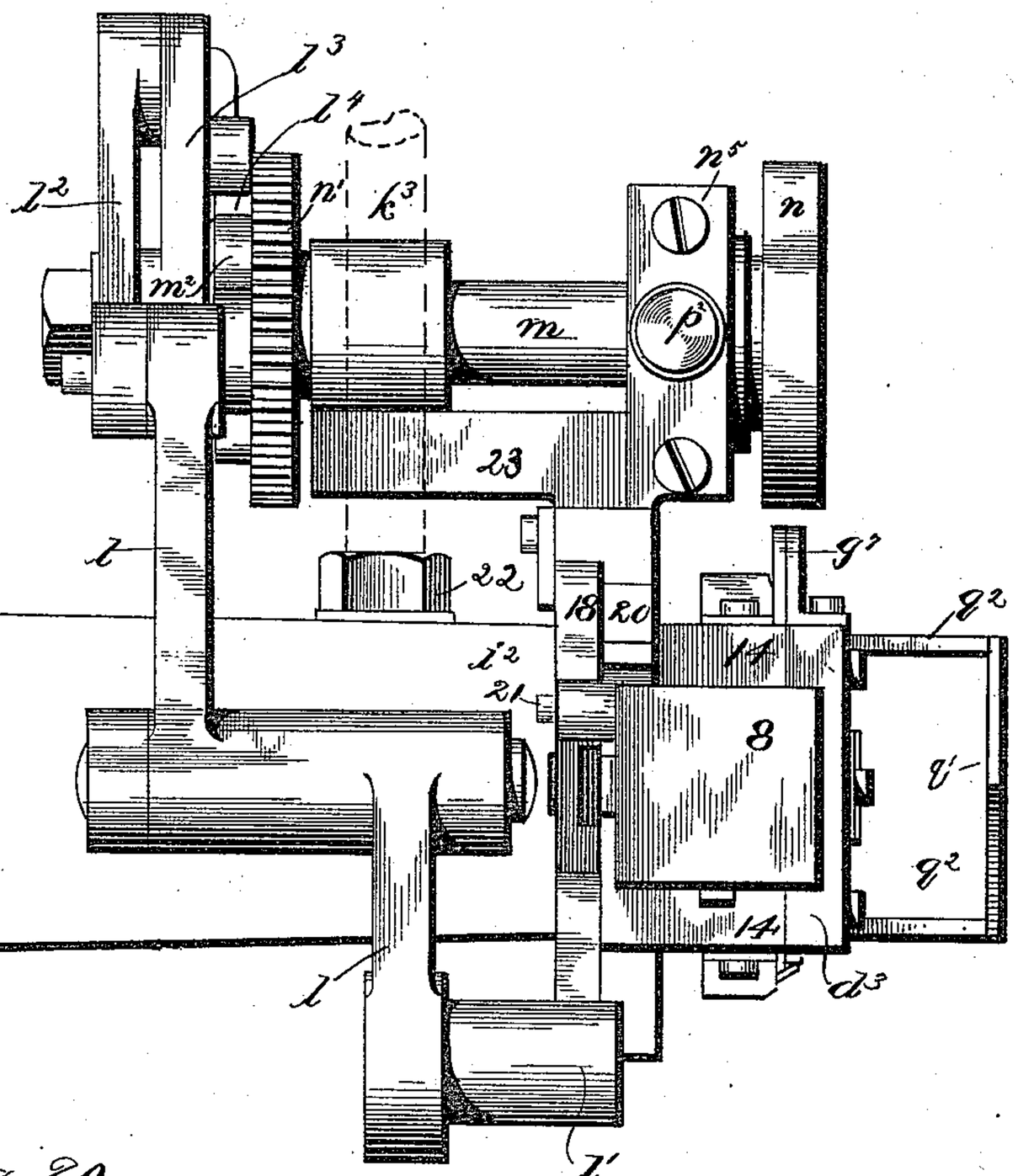


Fig 20

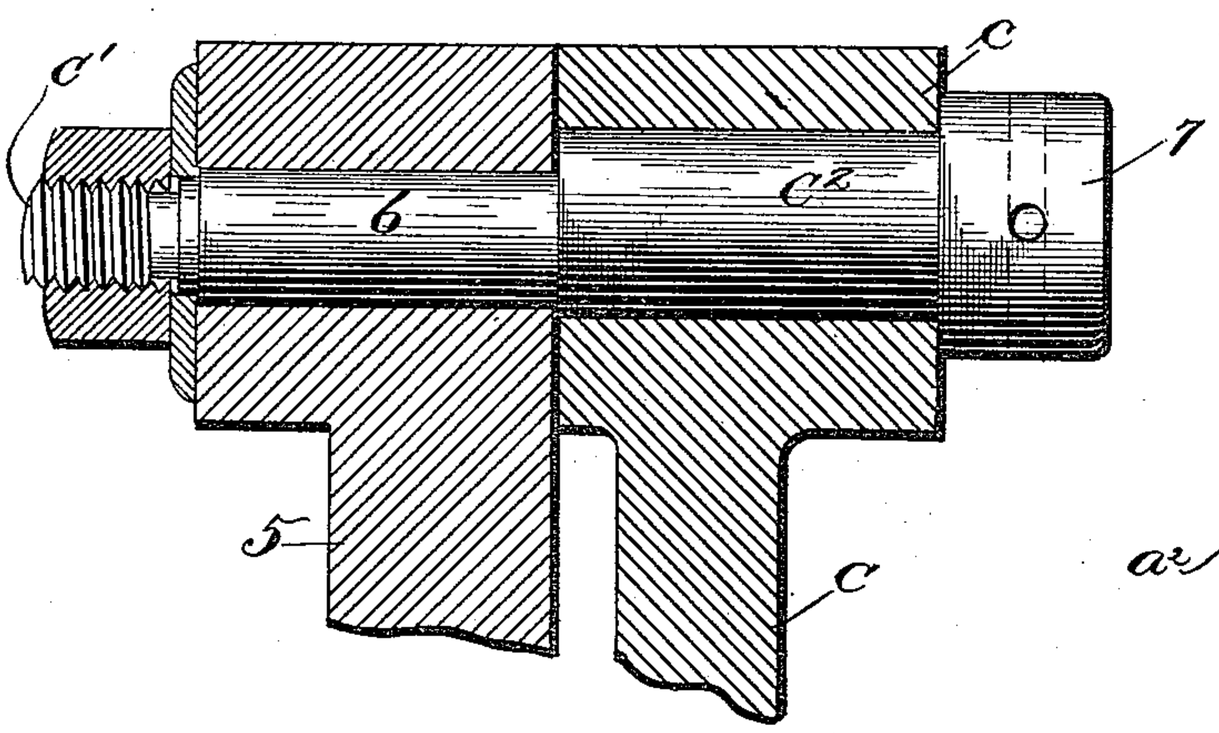
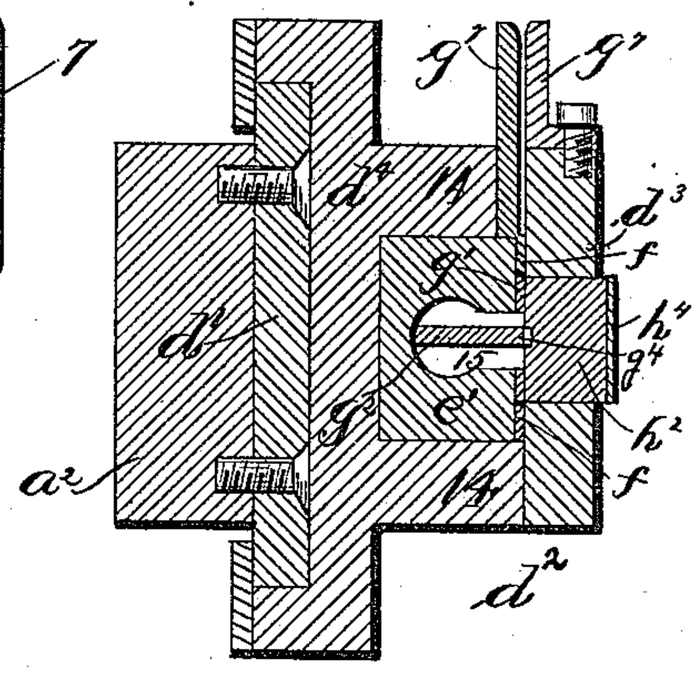


Fig 24.



Witnesses.
C. C. Burdine
H. E. Peck

Inventor:
Chas. Beck.
per O. E. Duff
Atty.

UNITED STATES PATENT OFFICE.

CHARLES BECK, OF PHILADELPHIA, PENNSYLVANIA.

BOX-STAPLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 441,051, dated November 18, 1890.

Application filed June 20, 1889. Serial No. 315,009. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BECK, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Box Stapling 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

My invention relates to an improvement in box-stapling machines; and it consists in certain novel features of construction and combinations of parts more fully described hereinafter, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a side elevation of the complete device, dotted lines showing the position of the parts when the treadle is thrust back, the wire-supply reel being removed. Fig. 2 is a similar view of the same from the opposite side. Fig. 3 is a front elevation of the same, showing the wire-supply reel attached. Figs. 4 and 5 are detail elevations of the staple forming and driving mechanism in different positions, and also of the staple-clinching mechanism in corresponding positions, the front plates of the parts being removed. Fig. 6 is a detail elevation of the plate covering the front face of the staple cutting, forming, and driving mechanism, the spring which holds the staple-forming block or anvil yieldingly in position being swung to one side to show the recess in the plate in which the anvil is located. Figs. 7 and 8 are respectively a detail perspective and an elevation of the inner face of the movable anvil or block which removably holds the wire while being cut, the length of wire while the ends are being bent down to form the legs of the staple being shown in dotted lines in Fig. 8. Fig. 9 is a front detached elevation of the movable spring clinching-jaws of the staple-fastening mechanism. Fig. 10 is an edge view of the same, the operating-lever being shown broken away. Fig. 11 is a detail elevation of the die or plunger which drives the formed staple through the paper or box-corner. Fig. 12 is a central vertical section taken in plane of line $x\,x$, Fig. 3, through the staple forming and driving and staple-clinching mechanism. Figs. 13 and 14 are respectively an edge view and a top view of a spring cover or guard which partially embraces the peripheries of the flanges of the wire-supply reel. Figs. 15, 16, 17, and 18 are detail views of portions of the wire-feed mechanism. Fig. 19 is a side elevation of a portion of the machine, the outer wall of the frame being broken away to show the interior arrangements of the levers. Fig. 20 is a section of the operating-lever of the staple forming and driving mechanism and its pivotal point, taken in the plane of line $y\,y$, Fig. 19. Fig. 21 is a detail view showing the front plate of the staple forming and driving mechanism in section, and a modified construction of movable anvil or block to assist in forming the legs of the staple, and means for automatically operating the same. Fig. 22 is a perspective view of a paper box stapled by this machine. Fig. 23 is a top plan of the mechanism carried by the upper arm of the frame, operating-lever for the staple driving and forming mechanism not being shown and the position of the rod carrying the wire-supply reel being shown by dotted lines. Fig. 24 is a cross-section through the staple forming and driving mechanism, taken in the plane of line $z\,z$, Fig. 12. Fig. 25 is a detail perspective looking at the rear of the upper portions of the staple forming and driving heads, particularly showing the means whereby said heads are locked together and separately released from each other. Fig. 26 is a detail perspective of the lower arm of the frame, showing particularly the box guide and holder or gage. Fig. 27 is a detail section of the stop for the weighted swinging plate which returns the parts to their normal position after a stroke.

In the drawings, the reference-letter a indicates the standards and a' the hollow upper frame or body of the machine supported by the standards. The hollow frame or body is provided with a pair of forwardly-projecting arms $a^2\,a^2$. Upon the outer end of the upper arm a^2 the staple forming and driving mechanism is located, and immediately below the same the staple-fastening mechanism is located upon the lower arm a^2. A treadle b is

pivoted at its upper end to the front portion of the main frame, so that its lower or pedal portion can swing between the standards of the machine.

b' indicates a vertical plate pivoted to swing in a vertical plane at the rear open end of the frame by means of an arm b^2, extending at substantially a right angle from the upper end of the plate into the interior of the frame and pivoted therein. A link b^3 is pivoted at its lower end to the treadle, between the pedal and upper pivotal point thereof, and at its opposite upper end is pivoted to the vertical plate b'.

The staple forming and driving mechanism is operated by a rocking lever c, pivotally mounted to rock in a vertical plane upon an arm 5, extending up from the frame. From its pivotal point the lever extends forwardly to the plunger of the staple-driving mechanism and rearwardly and downwardly to the plate b', and at its lower free end is provided with a lug or arm confined and adapted to slide in a transverse curved slot b^4 in the plate b'.

The staple-fastening mechanism is operated by a rocking lever d, extending from the staple-clinching mechanism through the lower arm a^2 into the main frame and curving down at its free end and ending a short distance above the arm b^2 of the plate b'. The lever is pivoted in the arm a^2 and its lower free end is provided with an anti-friction roller b^5, and is yieldingly held to the limit of its upward movement by a retractive spring b^6 in the frame. The lower free end of the plate b' is weighted at b^8, as shown. It will thus be seen that when the treadle is thrust back the link b^3 will swing the plate b' upwardly upon the pivotal point of the arm b^2, thereby causing the lug of the lever c to slide from one end of the curved slot in the plate b' to the other end and raising the free end and depressing the plunger end of the lever and operating the staple forming and driving mechanism, the parts assuming the positions shown by dotted lines in Fig. 1. The upper edge of the arm b^2 is provided with a projecting lug or teat b^7, which, as the plate b' and arm b^2 are swung upwardly, engages the anti-friction roller upon the free end of the lever d and depresses the same, thereby throwing up the opposite end of the lever and operating the clinching mechanism simultaneously with the finishing of the stroke of the lever c.

When the foot of the operator is released from the treadle, the weighted end of the plate b' will fall to its normal position, drawing down with it the free end of the lever c, confined in the slot b^4, while the lever d will be returned to its normal position by the spring b^6.

Injury and jar to the parts when the weighted end of the plate b' falls is prevented by a stop e, consisting of a screw-bolt 1, vertically adjustable in the frame of the machine, and having a lock-nut 2 to hold it at the desired height, and provided at its upper end with a cup or socket 3, holding a piece of rubber or other elastic material 4, upon which the plate falls and normally rests.

The downward throw of the plunger end of the lever c is regulated for different purposes, Fig. 20, by the pivot-pin c', upon which the lever is mounted, said pin passing through the lever and arm 5, upon which the same is mounted, the portion c^2 of the pin upon which the lever works being eccentric to the portion 6, passing through the lug, so that by rotating said pin the pivotal point of the lever can be raised or lowered. The pin is provided with a head 7, having openings into which an instrument can be inserted for turning the same, and its opposite end is screw-threaded to receive a nut. (See Fig. 20.)

A vertical stationary flat face-plate d' is rigidly secured on the front end of the upper arm a^2. The main hollow head d^2 of the mechanism is confined to vertically reciprocate on the outer face of this plate by means of vertical ways on the rear longitudinal edges of the head embracing the vertical projecting edges of said plate d', as clearly shown in Fig. 24. The vertical movement of this head is limited by a lug 12 on face-plate d', projecting into a vertical slot 13 in the rear wall d^4 of the main head. (See Fig. 12.) The rear wall or back plate d^4 of this main head is wider than the vertical open chamber of the head, said chamber being formed by the side walls 14 14, preferably formed with the back wall d^4 and the front plate d^3, closing the front side of said chamber and rigidly secured to the side walls.

A wire-cutting and staple-forming head e' extends through, snugly fits, and is confined to vertically reciprocate in the chamber of the main hollow head d^2, and is provided with a cross-bar or one or more lugs e^2, extending laterally from the same into one or more short vertical grooves e^3 in the wall of the main hollow head to retain the head e' in the main head and limit its vertical movement.

The lower portion of the front face of the head e' (from its lower end upward) is rabbeted out or reduced in thickness, as clearly shown in Figs. 12 and 24, to leave a narrow space or chamber between the front face of said head e' and the inner face of the front plate d^3 of the main head. The width of this chamber thus formed is just equal to or slightly wider than the thickness of the wire to be used in forming the staples. A pair of thin wire cutting and bending knives $f\,f$ are vertically secured on the sides of the rabbeted face of the head e', and these knives are of a thickness to fill the space between the head e' and front plate d^3. The lower ends of these knives are beveled from their inner edges downwardly and outwardly to form the cutting-edges on the outer edges of the knives and bearing against the opposite sides of the chamber in the main head. These knives are removably secured to the head e', so that they can be removed or interchanged when one be-

comes dull, as the right-hand knife only, Fig. 4, does the cutting. The head *e'* is longitudinally hollow, and at its lower end is provided with a central longitudinal and radial slot or opening 15 through the front side of the head.

A plunger *g* snugly fits and reciprocates in and extends through the wire-cutting and staple-forming head *e'*, and at its upper end has a hollow head 8 open at two sides, in which a curved head on the front end of the main operating-lever *c* loosely fits and is confined. The lower end of this plunger is provided with a forwardly-projecting lug 16, extending through and reciprocating in the slot 15 and limiting the upward movement of the plunger independent of head *e'* and causing the head to move up with the plunger. A flat staple-driving head or die *g'* is secured on the outer end of the lug 16, and is of the same thickness as knives *f* and fits on the outer face of the rabbeted portion of the head *e'* snugly and adapted to slide between said knives *f*. This head extends in a plane below the end of the plunger, and its lower edge is cut V-shaped, as shown, to fit the box-corner, and at the vertex of the V-head is provided with a slot, as shown.

The plunger is provided with a spring-holder or center-piece g^2 to assist the formed staple in its downward movement and to prevent its body bending before being driven home. This holder is located and longitudinally movable in the interior of the plunger and centrally and normally projects below the face of the die, so that its lower edge will be in or slightly above the same plane with the lower edges of the face of said die, and said holder is yieldingly held in this position by a spring in the plunger constantly tending to force the holder to the limit of its downward movement. The holder is confined in the plunger and limited in its movement by a screw or pin 9, extending through the plunger into a slot g^3 in the same. The lower end of the holder projects beyond the front face of the staple-driving die *g'* through said slot at the vertex of the angular face of said die. It should be observed that the normal position of the holder is that shown in Fig. 4, but that when the die is driving the staple through the box the holder is forced up into the plunger out of the way, as seen in Fig. 5.

g^5 g^5 indicate two movable sliding guide blocks or fingers extending through the sides of the main head into the lower end of the interior of the chamber in the same, and these guides are curved inwardly at their inner or guiding ends to throw the legs of the staple inwardly at such angles as to readily and straightly pass through the sides of the box at the corner, as more fully set forth hereinafter. These guides extend through slots in the side of the head, and are confined therein to allow in and out play by suitable stops 10 and by plate-springs g^6, which yieldingly hold the guides extended into the chamber, as shown in Fig. 4, but allow them to be forced outwardly out of the way when the die is driving the staple, as shown in Fig. 5.

The wire from which the staples are formed is fed horizontally into the lower portion of the chamber of the main hollow head through an opening in one side of the same and between stationary guides g^7 g^7, one of which is secured to the edge of the face-plate d^3 (see Fig. 6) and the other to the side wall of the head through which the wire passes. The guide-plate g^7, secured to the side wall of the main head, is let into the same so that its outer face is about flush with the outer edge of said wall, and this plate is provided with a horizontal groove, through which the wire passes. A stationary knife-blade *h* is secured in said side wall of the head with its cutting-edge located at the lower edge of the inner end of said groove, so that the cutting-edge of said knife will mesh with the cutting-edge of the knife *f* on that side of the head. The wire passes in above the cutting-edge of a blade *h* until it engages the opposite side of the chamber, as shown, the width of the chamber being exactly equal to the length of wire required to form a staple. The cutting-edge of the stationary knife engages the cutting-edge of one of the knives *f* when the wire cutting and bending head descends to cut the length of wire off. As the wire extends into the chamber of the main head it passes through a transverse groove *h'* in a movable staple forming or bending block or anvil h^2, the length of said groove or the width of said anvil being equal to the length of the straight or body portion of the staple produced by the machine. This staple-forming anvil is located in an opening h^3 in the front plate d^3 of the main head and normally extends into the chamber of the same, so that its wire-holding groove *h'* will coincide with the opening through which the wire is fed into the chamber, and the anvil is yieldingly held in the openings h^3, bearing against the outer face of the head *e'* by a plate-spring h^4, secured to the outer side of plate d^3, and removably extending over the opening h^3, and constantly tending to spring inwardly against said opening. The groove *h'* extends across the inner side of the block. The upper edge of the block is preferably V-shaped to correspond with the angular face of the driving-die, and the inner portion of said edge is beveled downwardly, as shown, and is provided with a central vertical groove h^5. (See Fig. 7.) The block centrally extends into the chamber, and is of a width slightly less than the space between the two knives *f f*, and the edges 17 17 of the block below the plane of the groove *h'* are preferably vertical or in planes at right angles to the plane of said groove.

i indicates a latch pivoted at its upper end to the plunger or upper head of the same to allow its lower free end a lateral swing, and said lower end is beveled and provided with a shoulder to engage the upper end of the

wire cutting and bending head. Thus it will be seen that as the plunger is forced down the head e' will go down with it, by reason of the latch i engaging the upper end of the same; but when the plunger and head have passed downwardly a certain distance the latch i is disengaged from the head e' by an inclined surface or beveled arm i', extending upwardly from the main head d^2 and bearing against the surface of the head e', so that the lower beveled end of the latch will engage the same, and thus be thrown outwardly from the head and allow the plunger to independently descend. The main head is carried down a certain distance with the head e', and is then released therefrom, and the head e' descends the remainder of the stroke, independent of the main head, until the latch i is released from said head. The face-plate d' at one side of its upper edge is provided with an upwardly-extending arm 18, having its inner edge straight a portion of the distance from the top down said edge, terminating in a recess or offset 19 in the lower portion of said arm. The rear wall d^4 of the main head is provided with an upwardly-extending arm 20, beside and parallel with arm 18, and provided with a flat upper end. The upper end of the head is provided with a rearwardly-extending horizontal spindle 21, upon which is loosely mounted a rocking right-angled lever i^2, consisting of a loose sleeve on said spindle, having two arms formed integral with the sleeve and extending radially from opposite ends thereof and in planes at right angles to each other. These arms of the lever are so arranged that when the parts are in their normal positions the innermost horizontal arm will rest on the top of arm 20 of the main head, while the other and vertical arm of the lever bears against the straight edge of the stationary arm 18. It will thus be seen that when the head e' is forced down the main head will be carried down with it, the vertical arm of the lever i^2 sliding down the straight edge of the stationary arm 18 until it reaches the recess 19, into which the vertical arm swings, thereby swinging the upper horizontal arm of the lever from the upper end of arm 20 of head e' into a vertical position, thus releasing the main head from head e' and allowing head e' to descend independently. When head e' is drawn up, the inner edge of the arm 18 throws the lever i^2 back into its normal position.

A stationary plate j is secured to the front end of the lower arm a^2 immediately below the lower end of the chamber of the main head d^2, and upon the outer face of said plate the guide-plates j' j' are secured, having their inner edges curved upwardly and inwardly toward each other, as seen in Figs. 4 and 5, and the upper ends of the guides are located a distance apart to admit the legs of the staple when forced through the box. A face-plate j^2 is secured over and covers the guides and plates j, and in the space between the said guides and two plates a vertical plate j^3, secured to the end of the lever d, is confined and vertically reciprocates. Upon the face of this plate j^3 the clinching-jaws k k are pivoted at their lower ends to allow their upper ends a movement to and away from each other, and the upper outer edges of said upper ends are curved to correspond to the upper curved portion of the guides j' j', and a spring k' is secured upon a suitable pin between the jaws k and engages the same and constantly tends to force the upper free ends of the jaws apart, as shown in Fig. 9. It will thus be seen that as the free end of the lever d moves upwardly the plate j^3 is carried up between the plates j and j^2 and the free ends of the jaws k are drawn in toward each other beneath the upper ends of guides j'. This construction constitutes the staple clinching or fastening mechanism.

The wire from which the staples are formed is wound upon and automatically fed from a reel or spool k^2, mounted upon a horizontal arm k^3, extending laterally from one side of the front end of the upper arm a^2 of the machine. The wire used is very springy and elastic. Therefore in order to keep the same tightly wound upon the spool when being fed a cover or guard k^4, Figs. 13 and 14, is used. This cover is mounted at one end to a lateral arm from the arm k^3, and from thence extends partially around the periphery of the spool, embracing the side flanges thereof. The free end of the cover is preferably lined with leather k^5 or other suitable material to bear upon the flanges and act as a brake to prevent the spool turning, except as the wire is drawn from it. This arm k^3 is removably screwed into the arm a^2, and is locked therein by the locking-nut 22, and the outer end of said rod or arm is bent at right angles to form a journal or support for the wire-supply reel.

l indicates a vertically-rocking lever extending across and pivoted upon the top of the upper arm a^2 of the machine, and one arm of this lever is slotted, (see Fig. 3,) and a pin secured to an arm l', extending up from the main head d^2, is loosely confined in said slot. A vertical link l^2 is pivoted to the opposite end of said lever on the opposite side of the arm a^2, and to the lower end of link l^2 one end of a short link l^3 is pivoted, the opposite end of the short link being loosely mounted on the outer end of a short shaft m, journaled in a bearing arm or frame 23, secured to or formed with and extending laterally from the side of the main head d^2, said frame having two arms or blocks forming bearings for the opposite ends of said shaft. A counter-shaft m' is journaled at one end in the same arm of the frame and below the shaft m, and at their front ends the shafts m and m' are provided with the friction wire-feed wheels n n, located opposite the wire-feed opening into the main head

l^2. The wire extending from the bottom of the spool into said feed-opening passes between said wheels, which tightly bear upon the same and feed it at the desired time and in the desired quantity into the staple-forming mechanism. The wire is held between the friction feed-rollers by the pin 24, secured to said bearing-frame and having a perforated head, through which the wire passes. The short link l^3 is provided with a spring-actuated pawl l^4, which engages a ratchet-wheel m^2, so that when the link l^2 is drawn up the pawl will run loosely over the teeth of the ratchet-wheel; but when the link is forced down the pawl will rotate the wheel. Said ratchet-wheel is rigidly secured to the face of a gear-wheel n', rigidly secured upon the shaft m and meshing with a gear-wheel n^2, rigidly mounted upon the counter-shaft m'. (See Figs. 1 and 15.)

Upon its inner face the gear-wheel n' is provided with a circular series of equally-spaced counter-sunk holes or openings n^3, (see Figs. 16 and 17,) in which a spring-pin o is adapted to fit. This pin works in a recess in the arm in which the shafts $m\,m'$ are journaled, and is provided with a spring, as shown, which presses it against the gear-wheel. It is obvious that the pin will slip out of the openings n^3 when the wheel is turned, but will fit in the same with sufficient pressure to prevent the same being turned by the jar of the machine and also prevent retrograde movement of the feed-wheels.

The tension of the wire-feeding wheels upon the wire can be increased or diminished to stop the feed or admit the use of wire of different sizes as the shaft m, carrying the upper friction-wheel, is adjustable to or away from the counter-shaft. Near their front ends said parallel shafts are journaled in a block or piece n^5, the lower shaft having a stationary bearing therein, but the upper shaft being journaled in a box or bushing p, located and having a slight vertical movement in a recess in the piece n^5. A spring p' is also located in said piece and bears up against the under surface of the bushing and constantly tends to force the same to the limit of its upward movement in the recess. The position of the box or bushing is adjusted by a thumb or adjusting screw p^2, working through the top of the piece n^5 and bearing upon the top of the box p, and provided with a milled head, by which it can be readily turned.

The lower arm a^2 is provided with a sliding gage or box-holder, upon which the box is placed, and by which it is held in position when being stapled. This adjustable gage consists of an end or cross head q', located in front of the end of the lower arm, and over which the box is placed when being stapled, and the parallel horizontal arms or rods q^2, secured together at their front ends by said cross-head and extending rearwardly and located upon opposite sides of the lower arm a^2. These rods are longitudinally slotted and confined upon the arm of the frame by pins secured to the arm and loosely extending through said slots, so that the cross-head and arm can slide to or away from the stapling mechanism. Upon one side of the arm a^2 the gage is provided with a stop q^3 to limit the outward movement of the arm, said stop consisting of a slotted rod at one end provided with a projection extending into the slot of the arm q^2 on that side, and a clamping-screw extending through the slot of the stop-rod, and by which the same can be adjusted to change the limit of outward movement of the gage, as it is obvious, the gage being limited in its outward movement by the projection of the guide engaging the end of the slot in rod q^2. The gage is provided with a retractive spring q^4, secured at one end to the arm a^2 and at its opposite end to the inner end of one of the rods q^2 and tending to force the gage to its limit of outward movement, as shown in Fig. 1. Upon the opposite side of the lower arm a^2 the box-gage is provided with an adjustable stop to limit its inward movement, said stop consisting of a longitudinally-slotted rod q^5, adjustably clamped to the arm or the frame by a set-screw, the gage being limited in its inward movement by the end of the rod q^2 on that side engaging the end of the rod q^5. The cross-head q' is preferably of about the same size and shape as the front plate j^2, inclosing the staple-clinching mechanism, with its upper edges V-shaped to fit in the corner of the box. In operation it is evident that the box is slipped over the outer end of the gage with the cross-head q' resting against its bottom and with its upper corner resting upon the upper angled edges of the plates j and j^2, beneath the lower open end of the main head of the staple forming and driving mechanism. The upper end of the box is then fastened by a staple and the gage is pressed in against the tension of its spring until that portion of the same corner which it is desired to fasten is in position to receive another staple. After each corner has been sufficiently stapled the box is removed from the holder and another corner placed in position to be stapled, the stops being so adjusted that the staples will be in the same relative position on each corner.

Of course the lower ends of the main head, the cutting and the bending head, and the driving-die are formed angular or V-shaped to fit the corner of the box to be stapled.

Suppose the parts to be in the position shown by full lines in Figs. 1 and 4. When the treadle is thrust back, the operating end of the lever c will force down the plunger and with it the main head and the wire-cutting and staple-forming head, by reason of the latch i and the double-armed lever i^2. The main head moves down upon the corner of the box until the vertical arm of the double-armed lever i^2 swings into the recess 19, thereby re-

leasing the cutting and bending head from the main head. This head and the plunger then move down independently of the main head, the cross-bar e^2 moving in the slots e^3, and as the head e' moves down its knife f upon the same side with the knife h will sever the wire at the feed-opening, leaving the severed length of wire held in the groove h' of the bending block or anvil, and the knives f f will pass down upon each side of the anvil, bending the ends of the wire projecting beyond the sides of the same down upon the straight edges of the anvil at right angles to the portion of the wire in the groove, thus forming the staple. When the staple is formed, the anvil is pushed out of the chamber of the main head to admit the downward passage of the parts by the staple-driving die engaging the beveled edge of the anvil, thereby throwing the same outward against the pressure of spring h^4. The projection g^4 of the spring-holder of the plunger passes through the groove h^5 of the anvil and rests in the same when in the position shown in Fig. 4. When the anvil is pushed out, it leaves the formed staple transversely located in the chamber with the lower ends of the die bearing on the same, the center holder of the die bearing upon the center of the body portion of the staple, and thereby preventing it from bending upward as the die carries the staple down. When the wire-cutting and staple-forming head has moved down and formed the staple, the beveled arm i' throws the latch i from engagement with the wire-cutting and staple-forming head, and the plunger is forced down through head e' and drives the staple through the box, bending its body into a shape conforming to the angle of the box-corner, the spring-holder being forced into the plunger out of the way when the die is pressed down upon the box. As the die forces the staple down upon the box the curved ends of the guide-blocks g^5 g^5 throw the legs of the staple into the box, curving them inwardly to enter the box at a proper angle, and as the die passes downward to securely drive and flatten the staple it engages the upper edges of said guides g^5 and forces them outwardly out of the way, Fig. 5, against the tension of their springs. As soon as the legs of the staple pass through the box the fastening mechanism is operated, as before described, throwing the plate j^3 upwardly, the curved lower edges of the guides j' throwing the clinching-jaws in together, which bend in the legs of the staple tightly upon the card-board and form an anvil to receive the blow of the driving-die. When the main head is forced down, its arm l' and the slotted end of lever l will draw the opposite end of said lever up, thereby drawing up the pawl l^4 and placing the parts in readiness to feed the wire, and when the head is drawn up the lever l will be thrown down, thereby operating the pawl to turn the ratchet and friction wheels and feeding the wire into the chamber of the head.

When the operator's foot is removed from the treadle, the weighted end of the plate b' will throw the parts to their normal position, the die of the plunger drawing up head e' and the cross-bar e^2 drawing up the main head when the same reaches the upper ends of slots e^3. When the various heads, &c., are drawn up to their normal positions, the double lever i^2 will be thrown into its normal position, with one arm resting on arm 20 by the inner edge of arm 18, and the latch i will by reason of its spring automatically engage the upper edge of head e' in readiness to force the same down.

The knives f f are preferably secured to the head e', so that they can be changed when the knife that cuts the wire becomes worn and dull. It is only necessary that one of these knives should have a cutting-edge, as the other knife merely bends the wire to form the leg of a staple, although they are constructed as above set forth.

In Fig. 21 a modified form of bending-anvil is shown, and consists of an arm pivoted at its upper end upon the outer face of the plate d^2, and having its lower end bent inwardly and provided with the wire-receiving groove h', and adapted to extend into the interior of the main head through and opening in the plate d^2, being held normally in this position by a plate-spring, as shown, and being thrown out of the same at the desired moment by a pin secured to head e' and projecting through a slot in the plate d^2, and adapted to engage a projection or incline on the inner surface of the arm, as is clearly evident.

The further operation of the machine will be fully understood from the foregoing description and the drawings, as will also the great utility and advantages of the device.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination of the hollow frame having two arms, the swinging treadle pivoted to said frame, the swinging plate having a rigid arm extending at an angle therefrom and pivoted in the frame, a pivoted link from said treadle to said plate to swing the same, the upper rocking lever pivoted and extending above the upper arm and at its lower end confined in a curved slot in said plate, and a rocking lever pivoted in the frame and extending into the lower arm and having its free end held by a spring and arranged to be engaged and depressed by the arm of said plate.

2. The combination, with the staple forming and driving mechanism and the staple-clinching mechanism, of the vertically-rocking operating-lever connected at one end to the staple forming and driving mechanism, said lever having a vertically-adjustable pivotal point to vary the throw of said forming and driving mechanism, substantially as described.

3. In a box-stapling machine, in combination, an arm of the frame, a main sliding head, staple forming and driving mechanism, substantially as set forth, carried thereby, a bearing-frame rigid with and extending laterally from and moving with said head, a pair of parallel shafts therein, carrying feed-rollers to impinge upon the wire and feed it into said head, gearing connecting said shafts, an operating-lever for said head and staple forming and driving mechanism, and a pawl-and-ratchet mechanism operated by the movement of said lever and operating said shafts, substantially as described.

4. In combination, an arm of the frame, the main sliding head containing the staple forming and driving mechanism, an operating-lever therefor, a wire-supply reel carried by said arm, the wire-feed mechanism, substantially as described, carried by and moving with said head and located between the same and said reel, and the rocking lever fulcrumed on said arm and connecting said head and said wire-feed mechanism to intermittingly operate the same as the head reciprocates, substantially as described.

5. In combination, the staple forming and driving mechanism, substantially as described, the wire-feed mechanism, substantially as described, consisting of the support, the two parallel shafts journaled therein, friction feed-wheels on said shafts to feed the wire, one of said shafts having a movable bearing and adjusting-screw to vary the distance between said wheels, meshing gear-wheels rigid with said shafts, one of said gears having a series of depressions in its face, a spring-pin in the support bearing against said wheel to spring into said depressions and lock the shafts against accidental rotation, and a pawl-and-ratchet mechanism, substantially as described, to operate said shafts.

6. In a box-stapling machine, the combination of the frame having the two parallel upper and lower arms, the staple forming and driving mechanism, substantially as described, carried by the end of the upper arm, the staple-clinching mechanism, substantially as described, carried by the lower arm, and a spring-adjustable sliding-box holder or gage carried by the lower arm and provided with adjustable stops to vary its limits of in-and-out movement.

7. In combination, the main head, the movable bending-block extending thereinto and having the transverse groove into which the wire is fed, the forming-head in said main head having the knives to cut the wire and form the staple on said block, the plunger within said forming-head, having the angular staple-driving die on its front face to carry down and drive the staple after leaving said block and provided with the vertical slot in its front side, and the guide longitudinally movable in said plunger, having its lower end extending forwardly through said slot and centrally into the angular space beneath said die to rest on the body of the formed staple during its downward passage, and a spring to press down said guide.

8. In combination, the arm of the frame, the rocking lever having a vertical plate on its end, the two clinching-jaws at their lower ends pivoted to the front of said plate, a spring between said jaws to yieldingly separate their upper curved ends, the two stationary guides to draw said jaws together to clinch the staple, and the stationary face-plate.

9. In a box-stapling machine, the combination of the arm of the frame, the main sliding head, the wire-cutting and staple-forming head located therein, a double-armed lever pivoted to said forming-head to engage and force down the main head with said forming-head during a portion of its stroke, means, substantially as described, to operate said lever, the plunger and staple-driving die, a latch carried by the plunger to force said forming-head down with the plunger during a portion of the stroke, and the operating-lever attached to said plunger.

10. The arm of the frame, a plate secured to the same, in combination with the main sliding head confined on said plate to reciprocate vertically, the sliding wire-cutting and staple-forming head extending through said main head and provided with one or more lateral lugs extending into vertical elongated slots in the main head, the plunger extending loosely through said forming-head and provided with a portion projecting through a longitudinal slot in said forming-head and carrying the driving-die, substantially as described.

11. In combination, the plate secured on the arm of the frame, provided with a straight bearing-surface having a recess, the main sliding head confined to said plate to reciprocate vertically, the sliding staple-forming head in said main head, the double-armed swinging lever pivoted to said forming-head, so that one end will bear on and force down the main head and the other arm will slide on said surface until the recess is reached and then release the main head, and the plunger extending through the forming-head and provided with the driving-die and with means, substantially as described, to force down said forming-head.

12. The staple-driving plunger having the center holder and the staple-bending knives, in combination with the movable staple-bending block provided with the groove to receive the wire, the front beveled edges, and the central vertical groove, for the purpose set forth.

13. In combination, the main head, the wire-cutting and staple-forming head extending therethrough and reduced on the lower portion of its front face, the two vertical bending-knives secured on said reduced portion, said head having a longitudinal slot between

said knives, the plunger extending through said forming-head and having a portion projecting through said slot, and the staple-driving die secured on said portion and sliding between the knives.

14. In a stapling-machine, the combination of a vertically-swinging pivoted plate to operate the mechanism of the machine, means, substantially as set forth, to swing the plate, and a stop or buffer to break the fall of the plate, comprising an adjustable screw-bolt provided with a lock-nut and having a socket in its upper end to receive a piece of rubber or other elastic material, substantially as described.

15. In combination, the frame, a staple-driving mechanism, a staple-fastening mechanism, substantially as described, a pivoted treadle, a vertical plate provided with an inwardly-extending arm pivoted in the frame to allow the plate a vertical swing, said plate being counterweighted at its lower free end and provided with a curved slot, a link connecting the treadle and the plate, a lever to operate the staple-driving mechanism and having its lower free end confined in the slot in said plate, a rocking lever fulcrumed in said frame to operate the staple-fastening mechanism, provided with a spring to hold it in its normal position, and a teat on the inwardly-extending arm of said plate arranged to engage and depress the inner end of the staple-fastening lever, substantially as described.

16. In a stapling-machine, the combination of a main hollow sliding head into which the wire to form the staples is fed, a wire-cutting and staple-forming head confined and adapted to reciprocate in and to reciprocate said head, a bending block or anvil in the main head upon which the wire is bent by the forming-head, a staple-driving plunger, and operating-mechanism, substantially as described.

17. In a stapling-machine, the combination of a main sliding head, a wire-cutting and staple-forming head to reciprocate the main head and confined in and having a limited sliding movement independent of the same, a staple-driving plunger extending through and reciprocating the forming-head and having a movement through and independent of the same, and an operating-lever secured to the upper end of the plunger to reciprocate the same and the sliding heads, substantially as described.

18. In a stapling-machine, a rocking lever, a reciprocating plunger operated by the same and provided with a staple-driving die, a sliding wire-cutting and staple-forming head through which the plunger extends, a latch carried by the plunger to engage the head and force the same down with the plunger, means, substantially as described, to disengage the latch from the head when the staple is formed and allow the die to descend independent of the head and drive the staple, a main sliding head in which the forming-head operates, and means to connect said forming-head with the main head during a portion of the stroke, substantially as described.

19. In a stapling-machine, a hollow sliding head into which the wire is automatically fed, wire-feeding wheels or rollers connected with and operated by the movement of said head, a wire-cutting and staple-forming head located in and adapted to reciprocate the sliding head, one or more lugs or a cross-bar projecting from the forming-head into vertical slots in the sliding head, whereby the forming-head can reciprocate independent of the sliding head the length of said slots, and a staple-driving head carried by a plunger extending through and adapted to reciprocate the forming-head and secured at its upper end to an operating-lever, substantially as described.

20. In combination, a main hollow sliding head into which the wire to form the staples is fed, an automatic wire-feeding mechanism, substantially as described, operated by said head, a wire-cutting and staple-forming head to reciprocate said sliding head, a staple-driving plunger to reciprocate the forming-head, and a lever to reciprocate the plunger, substantially as described.

21. In a stapling-machine, the combination of a hollow head, a wire-cutting and staple-forming head adapted to reciprocate in the same, a plunger extending through the forming-head and provided with a V-shaped driving-head at its lower end, a movable bending-block removably extending into the path of the driving-head, the wire being fed into the hollow head and through the block, a spring-holder in said plunger having its lower portion extending into the V-recess of said driving-head to engage the body of the staple after being formed on the die and prevent said body bending up during the downward passage of the staple, said block having a vertical groove to admit the passage of said holder, and movable spring-actuated guiding-blocks to guide the legs of the staple into the box-corner, substantially as described.

22. In combination, an arm of the frame, a sliding head of the staple forming and driving mechanism, the wire-feed mechanism, substantially as described, carried by and moving with said head and comprising shafts carrying friction feed-rolls, a pawl-and-ratchet mechanism, substantially as described, to rotate said shafts, and the rocking lever fulcrumed on said arm, at one end loosely connected to an arm of said head to be rocked thereby, at its other end connected by a link to operate said ratchet mechanism.

23. In a stapling-machine, a main hollow head and a staple-driving die reciprocating in the same, in combination with a pair of guide-blocks located in the lower portion of and loosely extending through transverse openings into the opposite sides of the head, and having curved ends to guide the legs of

the staple inwardly into the box-corner, and springs to yieldingly hold them, extending into the head, said blocks having stops at their outer ends, against which said springs bear and which limit the inward movement of the blocks, substantially as described.

24. In a stapling-machine, the combination, with the staple forming and driving mechanism, of a rocking lever adapted to operate said mechanism and connected with the same at one free end, a support therefor, and a rotatively-adjustable pivot-pin having a bearing portion mounted in said support, and a portion eccentric to said bearing portion and upon which the lever is mounted, whereby the limit of downward stroke of its operating end can be varied, substantially as described.

25. In a box-stapling machine, the stapling mechanism, in combination with a holder or gage for the box while being stapled, comprising an end piece adjustable to or away from the stapling mechanism and over which the box is slipped, and longitudinally-slotted arms carrying the end piece and adjustably secured to the frame by pins or screws extending through the slot, substantially as described.

26. The combination, in a stapling-machine, of a main hollow sliding head, a sliding head within and having a movement independent of but adapted to reciprocate the main head, and a lever carried by the inner head to carry down the main head with the inner head during a portion of its stroke, a staple-driving plunger extending loosely through said inner head and secured to the lever, and a latch to connect the plunger and inner head during a portion of the stroke, substantially as described.

27. A main frame having a threaded opening, in combination with a bolt adjustable therein and having a socket on its upper end containing elastic material, and a lock-nut on the bolt, as and for the purpose substantially as set forth.

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

CHARLES BECK.

Witnesses:
CHAS. G. BOEKENKAMP,
THOS. P. KELLY.