

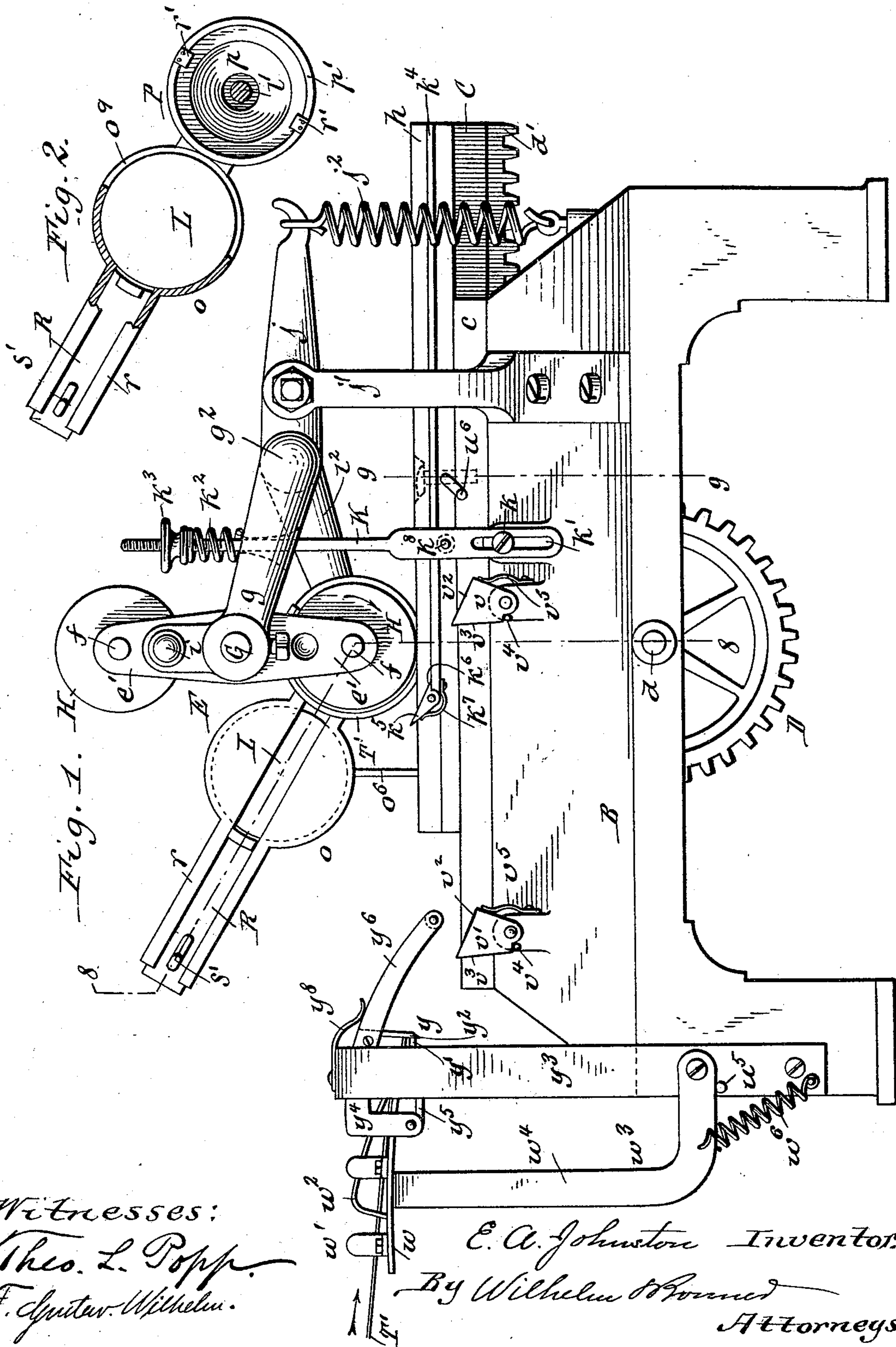
(No Model.)

4 Sheets—Sheet 1.

E. A. JOHNSTON.
MACHINE FOR MAKING PAPER BOXES.

No. 514,149.

Patented Feb. 6, 1894.



Witnesses:
Thos. L. Popp.
F. Spitzer-Wilhelm.

E. A. Johnston Inventor.
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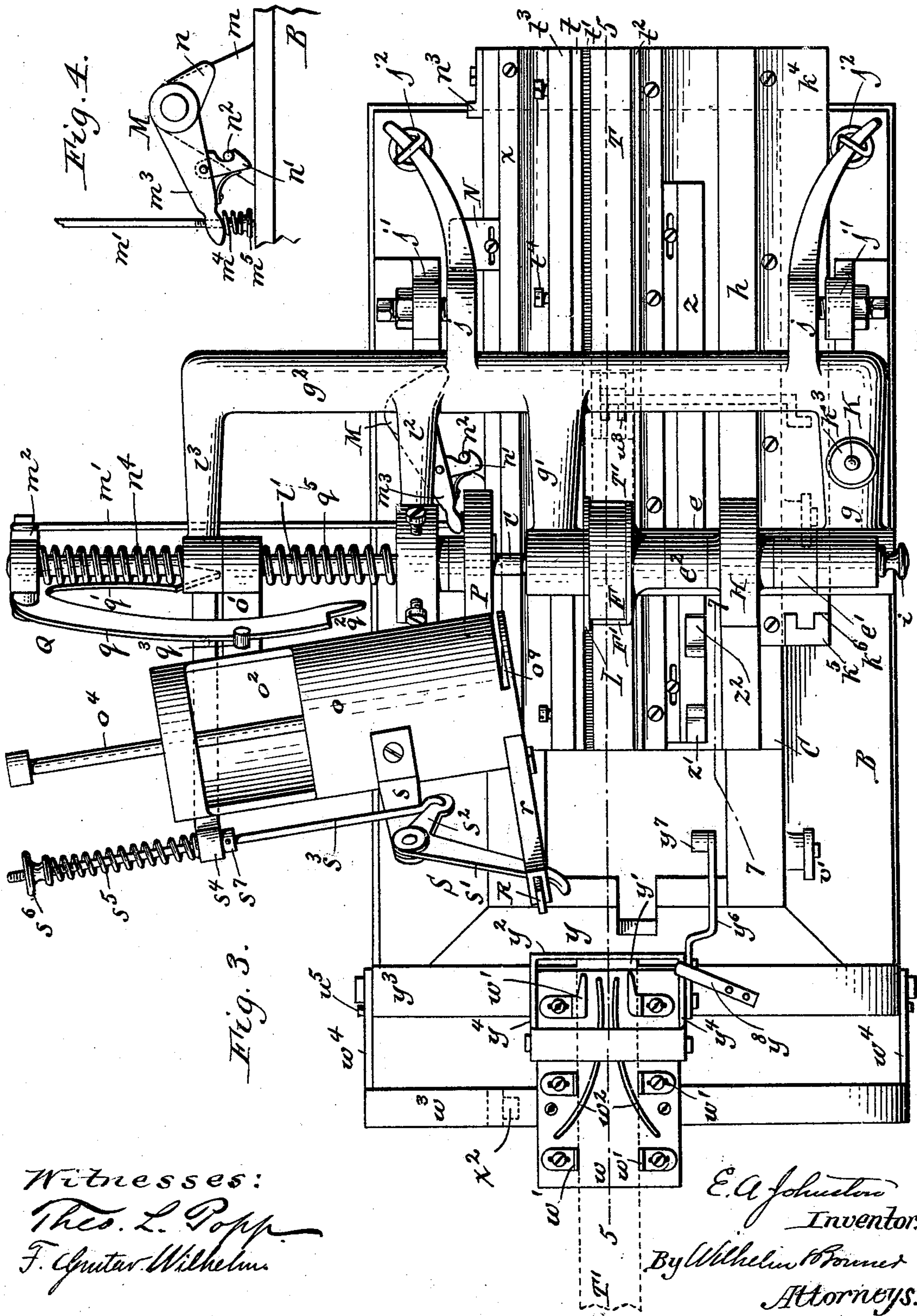
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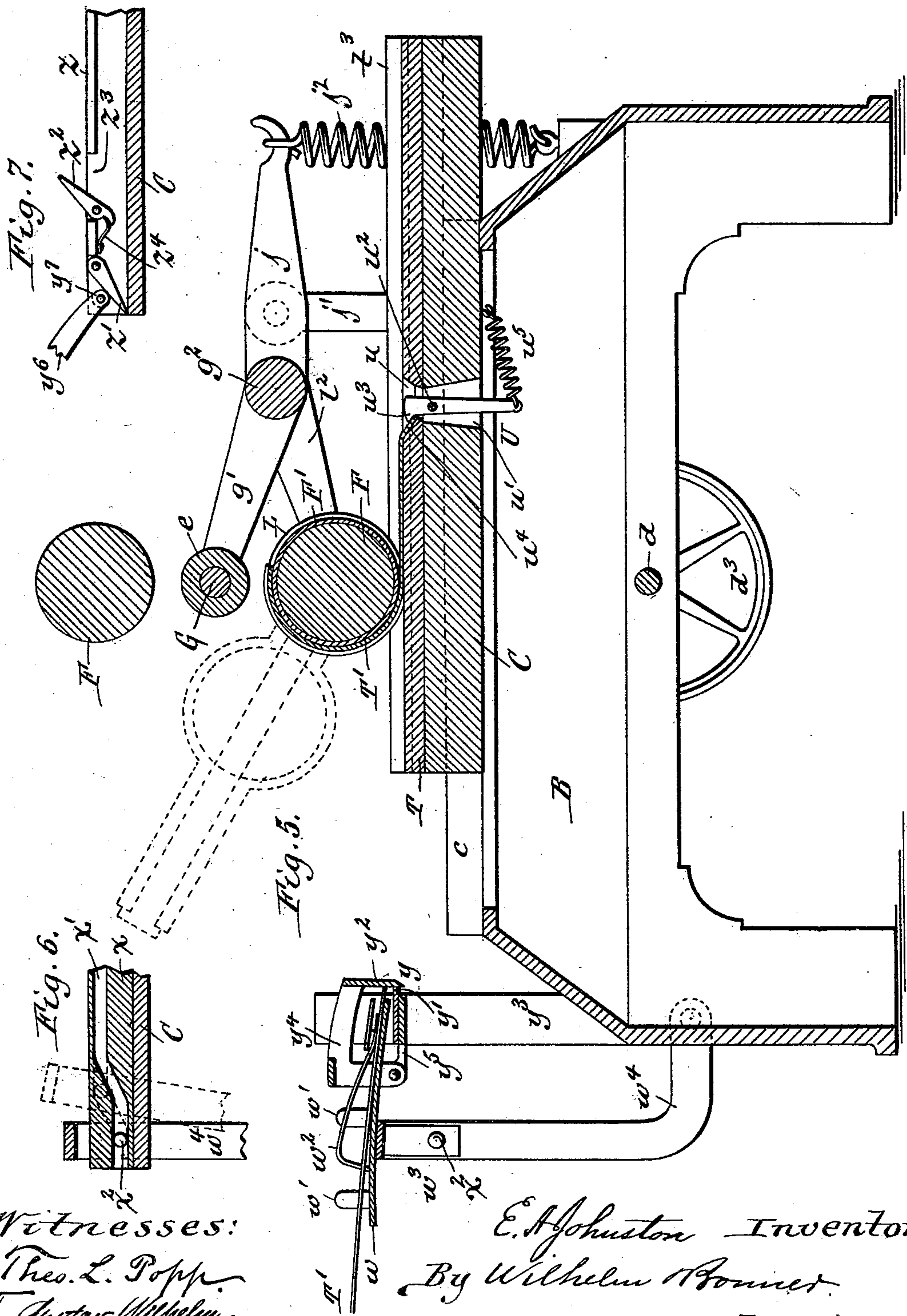
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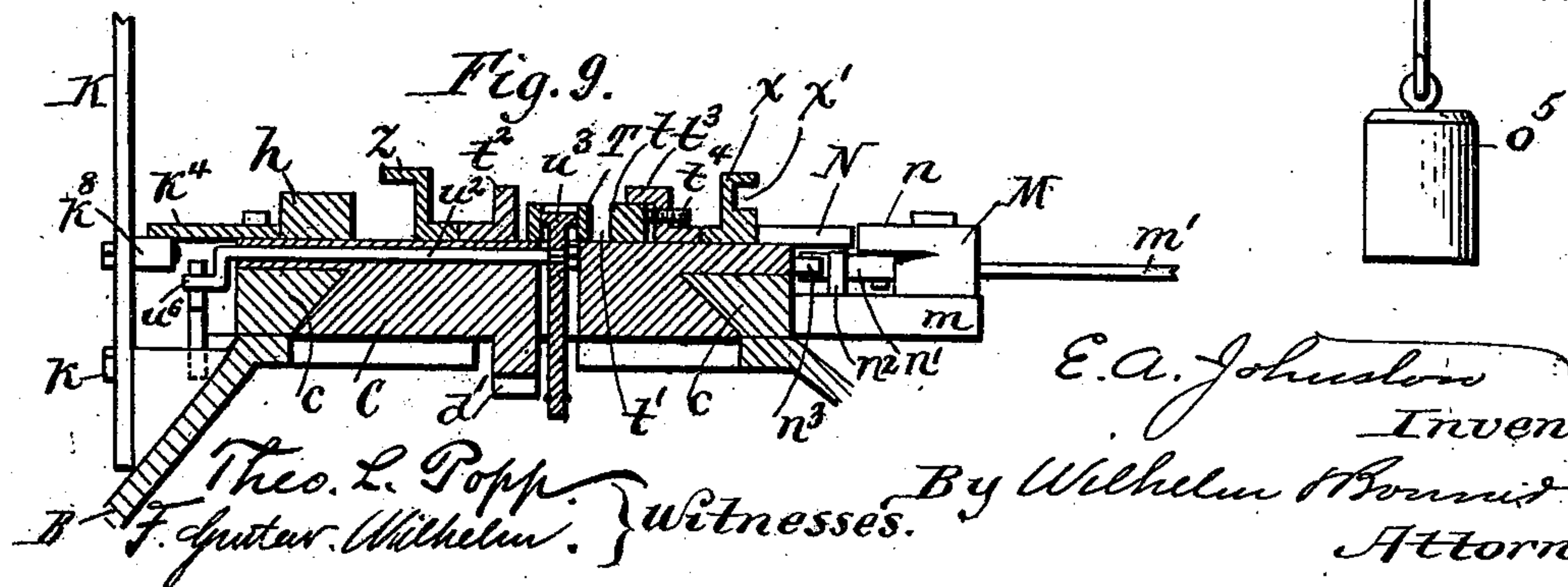
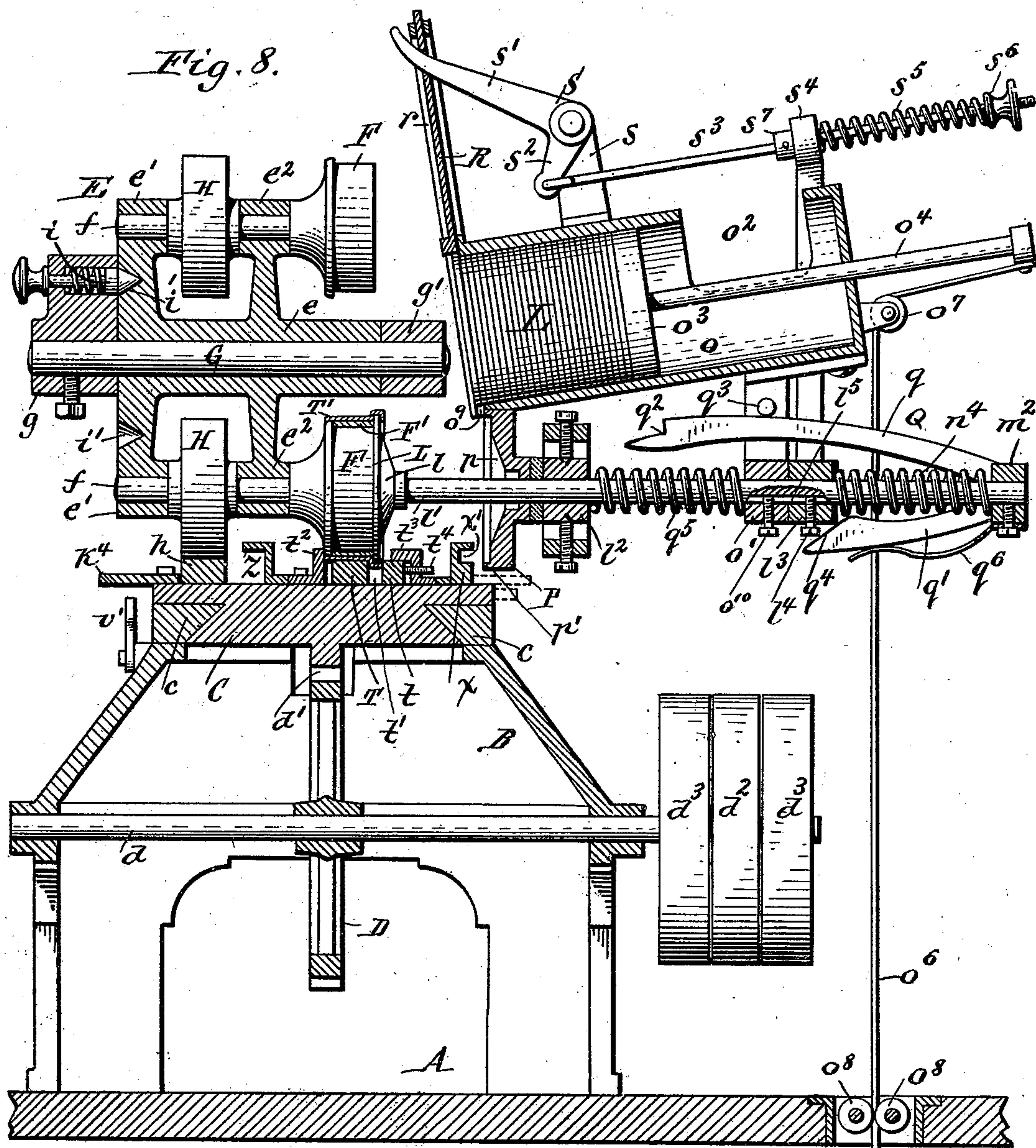
(No Model.)

4 Sheets—Sheet 4.

E. A. JOHNSTON.
MACHINE FOR MAKING PAPER BOXES.

No. 514,149.

Patented Feb. 6, 1894.



THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD A. JOHNSTON, OF BATAVIA, NEW YORK, ASSIGNOR OF ONE-HALF
TO ARTHUR H. MARSHALL, OF SAME PLACE.

MACHINE FOR MAKING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 514,149, dated February 6, 1894.

Application filed May 25, 1893. Serial No. 475,418. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. JOHNSTON, a citizen of the United States, residing at Batavia, in the county of Genesee and State of New York, have invented a new and useful Improvement in Machines for Making Paper Boxes, of which the following is a specification.

This invention relates to a machine for making cylindrical paper boxes composed of a cylindrical body and a bottom head which are united by a band of gummed paper wound around the cylindrical body and the bottom head.

My invention has for its objects to effect the feeding of the bottom heads and the winding of the bands automatically and in an expeditious manner.

In the accompanying drawings consisting of four sheets:—Figure 1 is a side elevation of my improved box making machine. Fig. 2 is a sectional front view of the magazine for holding the box bottoms and connecting parts. Fig. 3 is a top plan view of the machine. Fig. 4 is a similar view of the elbow lever which operates the mechanism for feeding the box bottoms. Fig. 5 is a vertical longitudinal section of the machine in line 5—5, Fig. 3. Fig. 6 is a fragmentary horizontal section showing the cam rail and connecting parts for operating the paper holder. Fig. 7 is a similar view showing the trip rail for operating the paper band cutter, the section being taken in line 7—7, Fig. 3. Figs. 8 and 9 are vertical transverse sections in lines 8—8 and 9—9 Fig. 1, respectively.

Like letters of reference refer to like parts in the several figures.

A represents a stationary table or raised support, and B the bed of the machine having legs which rest on said support.

C represents a horizontally reciprocating table which is guided on ways $c\ c$ arranged lengthwise on the upper portion of the bed.

D represents a gear wheel which is mounted on a transverse shaft d journaled in the bed and which meshes with a longitudinal gear rack d' arranged on the under side of the reciprocating table. The shaft d is provided with tight and loose pulleys d^2, d^3 , around which the driving belt runs and the latter is

automatically shifted on the pulleys by any suitable mechanism for alternating the direction of rotation of the shaft d , whereby a reciprocating movement is imparted to the reciprocating table C.

E represents a mandrel frame arranged over the reciprocating table and consisting of a hub e and two pairs of arms e', e^2 arranged on diametrically opposite sides of the hub.

F represents mandrels upon which the circular bodies F' of the box are placed by the operator. Each of these mandrels is secured to the rear end of a short shaft f , which is journaled in bearings formed in the outer ends of the arms $e' e^2$, as clearly shown in Fig. 8. The hub of the mandrel frame is mounted on a horizontal arbor G which latter is supported at its ends by rock arms $g\ g'$ formed on a vertically swinging rock bar g^2 arranged transversely over the reciprocating table. Upon turning the mandrel frame on the arbor, either of its mandrels can be brought into an operative position over the reciprocating table, which permits the finished box to be removed from the upper or inoperative mandrel and to be supplied with another body blank, while the lower mandrel is in use.

H represents friction wheels secured to the mandrel shafts f between the arms $e' e^2$, and adapted to bear alternately against a friction rail h secured lengthwise on top of the reciprocating table, C, in line with the friction wheels. The mandrel frame is rigidly held in its operative position by a spring bolt i arranged on the rock arm g and engaging in either of two notches i' formed in the outer side of the arms e' of the mandrel frame. The rock bar g^2 is provided on the side opposite the rock arms $g\ g'$ with two pivot arms $j\ j$, which latter are pivoted to the upper ends of standards j' arranged on the bed B on opposite sides of the reciprocating table. During the forward movement of the reciprocating table the mandrel frame is held in its elevated position by springs j^2 , secured with their ends to the bed and the pivot arms j respectively, thereby holding the lower friction wheel out of contact with the friction rail h so that the lower mandrel is not rotated.

K represents a vertical depressing rod

whereby the rock bar is lowered to bring the lower friction wheel of the mandrel frame in contact with the friction rail h . This depressing rod passes with its upper end through the adjacent rock arm g and is guided with its lower end on a horizontal screw k secured to the bed and passing through a vertical slot k' in the depressing rod K.

k^2 represents a spring surrounding the upper end of the depressing rod, and bearing with its ends against the rock arm g and a thumb nut k^3 arranged on the depressing rod.

k^4 represents a hold-down rail whereby the mandrel frame is held in its depressed position for pressing the lower friction wheel against the friction rail h . This hold-down rail is secured lengthwise on the supporting plate and overhangs the front side thereof, and is provided at its front end with a switch plate k^5 which is pivoted with its rear end to the hold-down rail. In its normal position this switch plate inclines upwardly from its rear toward its front end, and is limited in its upward movement by a stop k^6 , but yieldingly held against downward movement by a spring k^7 .

k^8 is a rearwardly projecting pin or stud arranged on the depressing rod K with which the hold-down rail and its switch plate are adapted to engage for depressing the mandrel frame. During the forward movement of the reciprocating table, the stud of the depressing rod stands above the hold-down rail, and during the last portion of this movement the stud strikes the upper side of the switch plate, which latter yields and allows the stud to pass over it. During the first portion of the backward movement of the reciprocating table the inclined lower side of the switch plate rides over the stud of the depressing rod and carries the latter downward underneath the hold-down rail, where it remains during the last portion of the backward movement of the reciprocating table, and holds the lower friction wheel of the mandrel frame upon the friction rail h , thereby rotating the lower mandrel.

The spring k^2 forms a yielding connection between the depressing rod and the rock arm g , which permits the depressing rod to continue its descent when drawn down by the switch plate, after the lower friction wheel rests on the friction rail.

At the end of the backward movement of the reciprocating table, the rear end of the hold-down rail clears the stud of the depressing rod, permitting the mandrel frame to be raised by the springs j^2 .

L represents the circular heads which form the bottoms of the boxes and which are placed against the rear side of the lower mandrel, and bear against the adjacent edge of the circular bodies placed on the mandrels.

l represents a holding disk whereby the bottom heads are held against the lower mandrel preparatory to securing the same to the body of the box. This holding disk is jour-

naled on the front end of a transverse sliding rod l' , which is guided in eyes formed in rock arms l^2 l^3 arranged on the rock bar g^2 in rear of the rock arms g g' . The sliding rod is held against turning but is permitted to move lengthwise by a screw l^4 arranged in the eye of the rock arm l^3 , and engaging with a groove l^5 formed lengthwise in the sliding rod.

M represents a horizontally swinging elbow lever whereby the holding disk and its sliding rod are moved forwardly, and which is pivoted to a bracket m arranged on the rear portion of the bed.

m' represents a connecting rod which is secured with its rear end to a head m^2 arranged on the rear end of this sliding rod, and passing with its front end through the long arm m^3 of the elbow lever.

m^4 is a spring surrounding the connecting rod m' and bearing with its ends against the front side of the long arm m^3 and the thumb nut m^5 arranged on the connecting rod.

N represents a tappet arranged on the rear side of the reciprocating table and adapted to engage with the short arm n of the elbow lever during the forward movement of the reciprocating table, and rock the elbow lever in the proper direction to move the holding disk toward the opposing mandrel. The holding disk is held against this mandrel by a catch n' , which is pivoted to the long arm m^3 of the elbow lever and which, during the last portion of the forward movement of the elbow lever, automatically engages with an upright pin n^2 arranged on the bracket m . The spring m^4 forms a yielding connection between the elbow lever M and the connecting rod m' which permits the elbow lever to continue its movement after the movement of the holding disk has been arrested by bearing against the lower mandrel.

n^3 represents a tappet arranged on the rear side of the reciprocating table below the level of the tappet N and adapted to engage against the catch n' and release the same from the pin n^2 , during the backward movement of the reciprocating table. When the catch n' is released, the holding disk is moved rearwardly away from the lower mandrel by a spring n^4 , surrounding the sliding rod l' and bearing with its ends against the head m^2 of the latter and the eye of the rock arm l^3 .

o represents a cylindrical magazine arranged transversely in rear of the mandrel frame above the level of the lower mandrel and containing a supply of bottom heads. The magazine is provided on the under side of its rear portion with a supporting arm o' which is arranged to slide on the sliding rod l' between the rock arms l^2 l^3 . The bottom heads are introduced into the rear portion of the magazine through an opening o^2 formed in the top thereof.

o^3 represents a follower arranged in the magazine and bearing against the rearmost of the series of bottom heads in the magazine. This follower is provided with a rod o^4 which

passes through the closed rear end of the magazine. A constant pressure is applied to the bottom heads for moving them forwardly in the magazine, by a weight o^5 arranged under the support A and connected with the rear end of the follower rod by a cord o^6 , running over a guide roller o^7 arranged at the rear end of the magazine, and between roller o^8 arranged in an opening formed in said support. The front portion of the magazine is provided in its right hand side with a transverse slot o^9 extending inwardly to about the middle of the magazine, and through which the bottom heads are successively discharged.

The magazine is permitted to move lengthwise on the sliding rod, but is held against turning thereon by a screw o^{10} arranged in the eye of the supporting arm o' , and engaging with the longitudinal groove l^5 of the sliding rod.

P represents a carrying head, which is arranged on the sliding rod l' adjacent to the slot o^9 , and which receives the bottom heads as they are discharged from the magazine. The carrying head is secured with its upper portion to the under side of the magazine so as to move lengthwise therewith. The front side of this carrying head is provided with a socket p in which the holding disk l is adapted to seat itself, and with an annular flange p' which confines the bottom head supported on the carrying head in front of the holding disk. After the holding disk has receded into the socket of the carrying head a bottom head is delivered from the magazine into the carrying head, within its flange p' and the carrying head, magazine and holding disk are then moved forwardly together until the bottom head is pressed against the lower mandrel.

Q, Fig. 8, represents a trip lever whereby the holding disk and carrying head are locked together during their forward movement. This trip lever is pivoted on one side of the head at the rear end of the sliding rod l' and is composed of an upper catch arm q , and a lower trip arm q' . The catch arm is provided with a shoulder q^2 which is adapted to engage with a pin q^3 on the supporting arm o' , and thereby compel the magazine, carrying head and holding disk to move forwardly together.

The lower trip arm of the lever Q is provided with an incline q^4 which engages with the under side of the rock arm l^3 during the last portion of its forward movement, and swings the trip lever downward, so that its shoulder q^2 is released from the pin q^3 on the supporting arm o' . The instant the magazine and carrying head P are released from the trip lever they are moved backwardly by a spring q^5 surrounding the sliding rod l' and bearing with its ends against the supporting arm o' and the bearing of the arm l^3 . The holding disk is not affected by this backward movement of the magazine and the carrying head. During the first portion of the back-

ward movement of the carrying head the bottom head is forced out of the carrying head by the holding disk and held against the lower mandrel. After the circular body and the bottom of the box have been united, the holding disk is again moved backwardly into its socket in the carrying head. At the end of the backward movement of the holding disk, the shoulder of the trip lever Q is again raised into engagement with the pin of the supporting arm o' by a spring q^6 secured to the head of the sliding rod l' and bearing against the trip arm q' .

R represents a feed plate whereby the bottom heads are delivered successively from the magazine, into the carrying head. This feed plate is mounted in a guide r , projecting laterally from the front end of the magazine, and is adapted to move across the front end of the magazine. Every time the feed plate crosses the magazine its lower edge strikes the upper edge of the foremost bottom head in the magazine and pushes the same downwardly through the discharge slot thereof, into the receptacle in the carrying head. In order to facilitate the entrance of the bottom head into the receptacle, the magazine is inclined so that the bottom head, on issuing therefrom, is directed within the flange p' of the carrying head.

r' represents two retaining fingers which are secured to the carrying head on diametrically opposite sides thereof, and which are adapted to hold the bottom head in the carrying head until removed therefrom by the holding disk. These fingers project inwardly just a sufficient distance to retain the bottom head, and the latter is sprung past them when the holding disk advances.

S represents an elbow lever whereby the feed plate is actuated and which is pivoted on a standard s arranged on the magazine. The upper arm s' of this lever engages in an opening in the feed plate, and its lower arm s^2 is attached to the front end of a pull rod s^3 . The rear end of the latter passes through a standard s^4 forming an extension of the arm l^3 .

s^5 represents a spring surrounding the pull rod and bearing with its ends against the rear side of the standard s^4 , and a thumb nut s^6 arranged on the screw threaded rear end of the pull rod. During the first portion of the forward movement of the magazine, the movement of the lower arm of the elbow lever is resisted by the spring s^5 which causes the lever to rock on its pivot and bear downwardly with its upper arm against the feed plate, whereby the latter is moved across the magazine, and caused to discharge the foremost bottom head. After the feed plate has moved across the magazine, its movement is arrested and the continued forward movement of the magazine causes the pull rod to compress the spring s^5 . During the backward movement of the magazine the feed plate is returned to its normal position by a collar s^7 which is secured to the pull rod and

which strikes the standard and thereby shifts the elbow lever.

T represents a band supporting rail which is arranged lengthwise on the reciprocating table in line with the face of the mandrels and upon which is laid the band of paper T', to be wound around the body and the bottom head of the box.

t is a turning rail arranged on the reciprocating table in rear of the band supporting rail parallel therewith, and separated therefrom by a longitudinal groove t' in which the margin of the bottom head runs when the mandrel revolves.

t² represents a raised guide rail arranged along the front side of the band rail, and t³ is a similar rail arranged on the rear side of the turning rail. The rails t² and t³ guide the band of paper as it is delivered upon the supporting rail T and hold the same in place.

As the mandrel carrying the circular body and bottom head of the box rotates in contact with the band lying on the supporting and turning rails T and t, that portion of the band resting on the supporting rail is wound around the body of the box, and that portion extending across the groove t' and resting on the turning rail is turned over the margin of the bottom head and against the under side of the latter so as to connect the body with the bottom head. The rear guide rail t³ overhangs the turning rail and the latter is adjusted with reference to the band rail by screws t⁴ arranged in the rear guide rail and bearing against the rear side of the turning rail, as shown in Fig. 8. The band of paper is wound endlessly upon a feed supply roller, not shown in the drawings, from which a sufficient length to encircle the box is unwound at every forward stroke of the reciprocating table by a gripper U, which is carried by the table and which seizes the end of the band, the portion of the band thus delivered upon the table being severed by a cutter, hereinafter described, preparatory to being wound around the box. This gripper is arranged in vertical openings u u' formed centrally in the supporting rail and reciprocating table and is secured to the inner end of a rock shaft u² which latter is journaled transversely in the reciprocating table. The upper arm of the gripper is provided with a jaw u³ which is adapted to press the front end of the paper band against a gripper face u⁴ formed on the band supporting rail on the front side of the opening u. The gripper jaw is normally held against the gripper face by a spring u⁵ attached with its ends to the lower arm of the gripper and the under side of the reciprocating table. The rock shaft of the gripper is provided outside of the reciprocating table with a trip finger u⁶, as shown in Fig. 1, which is adapted to engage with trip blocks v v', whereby the gripper is opened for receiving and releasing the band of paper. Each of these trip blocks is pivoted with its lower portion to the side of the bed B, so as

to swing vertically and is provided with an inclined front side v² and an abrupt rear side v³. Each trip block is held against rearward movement by a stop v⁴ arranged on the bed and engaging with a shoulder on the block, but is yieldingly held against movement in the opposite direction by a spring v⁵, secured to the bed and bearing against the front side of the block. When the reciprocating table has completed about one half of its backward movement, the trip finger rides over the incline of the trip block v, which releases the end of the band of paper from the gripper and permits the mandrel to wind the same around the body and the bottom head. After the paper band is released from the gripper, the trip finger drops over the abrupt side of the trip block v, and during the last portion of the backward movement of the reciprocating table the trip finger rides over the incline of the trip block v', thereby again opening the gripper for receiving the front end of the roll of paper. The instant the latter is delivered to the gripper, the trip finger drops over the abrupt side of the rear trip block v', and the end of the roll is grasped by the gripper. During the forward movement of the reciprocating table the trip finger engages against the abrupt sides of the trip blocks, and moves the latter out of its way, which permits the gripper to maintain a firm hold on the paper band during its entire forward movement.

w represents a feed table upon which the end of the paper band rests, and which is arranged adjacent to the receiving end of the reciprocating table. The paper band is guided on said table by guides w' secured to the feed table on opposite sides of the band.

w² represents detent springs secured to the upper side of the feed table with their rear ends and pressing with their front ends upon the paper band, whereby the latter is held against backward movement on the feed table.

w³ represents a bifurcated frame which supports the feed table, and which has its arms w⁴ pivoted at their lower ends to the sides of the bed, so as to swing vertically. The feed table is held against backward movement by pins w⁵ (Figs. 1 and 3), arranged on the bed and engaging against the arms of the frame w³, and is yieldingly held against forward movement by a spring w⁶ secured with its ends to the frame w³ and the bed B. The front end of the paper band projects slightly beyond the front end of the feed table when the latter is in its normal backward position. During the last portion of the backward movement of the reciprocating table the feed table is moved forwardly and places the end of the paper band between the gripper jaw and the opposing face u⁴.

x represents a cam rail secured lengthwise to the top of the reciprocating table and provided with a cam groove x' in its rear side. This groove engages with a pin or roller x² on

the bifurcated frame w^3 , as represented in Fig. 6, and the cam portion of this groove is arranged so that it moves the feed table forwardly at the proper time to feed the paper band into the open gripper during the backward movement of the reciprocating table. During the forward movement of the reciprocating table the gripper draws the paper band over the feed table and the band drops on the supporting rail T. The feed table is returned to its former position by the cam groove x' during the forward stroke of the reciprocating table.

y represents a cutter whereby the paper band is cut into proper lengths as the same is drawn over the feed table. This cutter consists of a horizontal shearing plate y' which is arranged underneath the end portion of the paper band, and a vertically movable knife y^2 arranged transversely over the band. The shearing plate is supported on a bifurcated frame y^3 which extends over the bed B and is secured thereto with its arms. The knife is provided with angular arms y^4 which straddle the feed table and which are pivoted to lugs y^5 arranged on the bifurcated frame y^3 .

y^6 is a lifting arm which is secured to one of the angular arms y^4 and which is provided at its free end with a roller y^7 . While the paper band is being drawn over the feed table the knife is raised and when a sufficient length has been withdrawn, the knife is depressed by a spring y^8 secured to the frame y^3 and bearing upon the knife.

z represents a trip rail arranged lengthwise on the reciprocating table in line with the knife roller y^7 and provided with two switches z' z^2 , whereby the movement of the cutter knife is controlled. The front switch z' is hinged with its rear end to the front end of the trip rail z and rests normally with its front end upon the reciprocating table so as to form an incline extending from the reciprocating table upwardly and rearwardly to the front end of the trip rail. The rear switch z^2 is arranged in a recess z^3 formed in the upper horizontal flange of the trip rail in rear of the front switch, and is pivoted with its front end in front of said recess. The rear end of the rear switch is yieldingly held in a raised position by a spring z^4 and forms an incline extending upwardly and rearwardly from the front end of the recess. During the backward movement of the reciprocating table the front switch z' engages against the roller y^7 of the knife and raises the same to the upper surface of the trip rail, whereby the cutter knife is raised to permit the feed table to pass forwardly and deposit the end of the paper band in the gripper. As the roller rides on the trip rail during the backward movement of the reciprocating table it depresses the rear switch z^2 which latter closes the recess z^3 , and supports the roller in passing over the recess. During the forward movement of the reciprocating table the knife remains elevated until the roller y^7 reaches this recess, when the

roller drops through the recess and upon the reciprocating table which causes the knife to descend and cut the paper band. As the reciprocating table continues to move forwardly after the knife has dropped, the roller y^7 lifts the front switch z' in passing underneath the same.

The paper band supplied from the feed roll is gummed on its upper side in the usual manner before it is carried to the feed table.

The operation of the machine is as follows:— During the last portion of the backward movement of the reciprocating table the feed table moves forward and feeds the end of the band of paper into the gripper. The latter is now closed, and during the subsequent forward movement of the reciprocating table, the paper band is drawn upon the latter, and when a sufficient length has been withdrawn the cutter severs the same. This severed portion of the paper band is now carried forwardly until its rear end arrives in line with or in rear of the axis of the mandrel. During this forward movement of the reciprocating table, the operator places a box body on the upper mandrel, and then turns the mandrel frame so that the upper mandrel carrying the body will occupy the operative position of the lower mandrel. The holding disk thereupon moves forward and carries a bottom head against the end of the body and lower mandrel. As soon as the reciprocating table reaches the end of its forward movement the mandrel is lowered upon the band supporting rail. During the subsequent backward movement of the reciprocating table, the body of the box and the bottom head roll over the gummed paper band, thereby picking the same up from the supporting rail, and winding the same around the body and the head. Shortly before the gripper arrives underneath the mandrel, during its backward movement with the reciprocating table, it opens to permit the front end of the band to be withdrawn from the same and to be wound around the body and head of the box. The mandrel is still held upon the band supporting rail after the band has been wholly picked up, which causes the band to be firmly pressed upon the body and the bottom head during the last portion of the backward movement of the reciprocating table whereby they are securely connected. During the operation of winding the band upon the body and head, the operator places a body upon the upper or idle mandrel. At the end of the backward movement of the reciprocating table, the mandrel and holding disk are raised and the latter moves rearwardly away from the mandrel into its socket in the carrying head. The operator now turns the mandrel frame so as to bring the upper mandrel carrying another body, in line with the holding disk, and then removes the united body and head from the upper mandrel. At the same time the feed plate of the magazine carries a bottom head from the magazine into the carrying

head in front of the holding disk. During the subsequent forward movement of the reciprocating table, the carrying head and disk move forwardly together until the bottom head bears against the rear side of the lower mandrel. The carrying head now moves backwardly independent of the holding disk which causes the holding disk to remove the bottom head from the carrying head, and hold the same against the mandrel. At this time, the reciprocating table has arrived at the limit of its forward movement, and the holding disk and mandrel are both depressed, so that the body of the box is brought to bear upon the band supporting rail, and the margin of the bottom head extends into the groove between the supporting and turning rails preparatory to taking up the gummed band during the subsequent backward movement of the supporting table. The holding disk holds the bottom head firmly against the mandrel during the entire backward movement of the reciprocating table, and at the end of this movement the mandrel and holding disk are raised together.

I claim as my invention—

1. The combination with the reciprocating table, of a mandrel adapted to bear against said table, and a movable frame supporting said mandrel, substantially as set forth.

2. The combination with the reciprocating table, of mandrels adapted to bear successively against said table, and a rotary frame provided with arms supporting said mandrels, substantially as set forth.

3. The combination with the reciprocating table, of a mandrel for receiving the body portion of the box, a frame supporting the mandrel and made movable toward and from the table, and a friction wheel mounted on the shaft of the mandrel and running in contact with the table, substantially as set forth.

4. The combination with the reciprocating table having a band supporting rail and a friction rail, of a rotary frame, shafts journaled in said frame and provided with mandrels adapted to bear against said band supporting rail, and friction wheels mounted on said shafts and adapted to bear against said friction rail, substantially as set forth.

5. The combination with the movable table having a band supporting rail, of a rock arm, a supporting frame pivoted on said arm, and mandrels mounted on said frame and adapted to bear against the band rail, substantially as set forth.

6. The combination with the movable table having a band supporting rail, of a rock arm, a frame pivoted on said arm and provided with notches, mandrels mounted on said frame, and a spring bolt arranged on said arm and adapted to engage with said notches, substantially as set forth.

7. The combination with the movable table and the band supporting rail arranged on the same, of a movable frame supporting a mandrel, a depressing rod connected at one end

with said frame, and a hold-down rail arranged on the table and adapted to engage with the other end of said rod, substantially as set forth.

8. The combination with the movable table having a band supporting rail, of a rock arm, a frame pivoted on said arm and provided with a mandrel, a depressing rod connected at its upper end with the rock arm, and a hold-down rail arranged on the table and provided with a switch, adapted to engage with the lower end of said rod and press the mandrel against the band supporting rail, substantially as set forth.

9. The combination with the movable table and the band supporting rail arranged on said table, of a rock arm, a frame mounted on said arm and provided with a mandrel, a depressing rod connected at its upper end with the rock arm, a hold-down rail arranged on the table and provided with a pivoted switch, whereby the mandrel is pressed against the band supporting rail, and a spring whereby the mandrel is raised from the band supporting rail, substantially as set forth.

10. The combination with the movable table and the band supporting rail arranged on said table, of a rock arm, a frame mounted on said arm and provided with a mandrel, a rod yieldingly connected with its upper end to said rock arm, a roller arranged on the lower portion of the rod, and a hold-down rail arranged on the table against which said roller bears, substantially as set forth.

11. The combination with the mandrel and the movable table, of a holding disk movable toward and from the mandrel and adapted to bear against the latter, and intermediate mechanism connecting said movable table with the holding disk, for operating the latter, substantially as set forth.

12. The combination with the mandrel and the movable table, of a sliding rod provided with a holding disk adapted to bear against the mandrel, an elbow lever connected with the sliding rod, and a tappet or projection arranged on the movable table and adapted to engage with the elbow lever, substantially as set forth.

13. The combination with the mandrel and the movable table, of a sliding rod provided with a holding disk adapted to bear against the mandrel, an elbow lever connected with the sliding rod, a tappet or projection arranged on the movable table and adapted to engage with the elbow lever, and a spring whereby the holding disk is retracted, substantially as set forth.

14. The combination of the bed of the machine, the reciprocating table and the mandrel, of a sliding rod provided with a holding disk, adapted to bear against the mandrel, an elbow lever pivoted on the bed and having one of its arms connected with the sliding rod, a tappet arranged on said table and adapted to engage against the other arm of the elbow lever for moving the holding disk

toward the mandrel, a catch whereby the elbow lever is held when the holding disk bears against the mandrel, a tappet arranged on said plate and adapted to release said catch, and a spring whereby the holding disk is moved away from the mandrel when the catch is released, substantially as set forth.

15. The combination with the mandrel, of a carrying head adapted to carry the bottom heads of the box to the mandrel, and a holding disk whereby the bottom head is removed from the carrying head and held against the mandrel, substantially as set forth.

16. The combination with the mandrel and a holding disk movable toward and from the mandrel, of a carrying head also movable toward and from the mandrel, having a socket for receiving the holding disk, and a flange or rim arranged in front of said socket for receiving the bottom head of the box, substantially as set forth.

17. The combination with the mandrel, of a magazine for the bottoms of the boxes movable toward and from the mandrel, a carrying head moving with the magazine and adapted to receive the bottom heads therefrom, and a holding disk whereby the bottom heads are removed from the carrying head and held against the mandrel, substantially as set forth.

18. The combination with the mandrel, of a magazine for the bottoms of the boxes movable toward and from the mandrel, of a carrying head moving with the magazine and adapted to receive the bottom heads therefrom, a holding disk which removes the bottom heads from said carrying head and holds them against the mandrel and a coupling device for connecting the magazine and holding disk, substantially as set forth.

19. The combination with the mandrel and a sliding rod provided with a holding disk adapted to bear against the mandrel, of a rock bar provided with rock arms supporting the mandrel and the sliding rod respectively, a magazine for the bottom heads of the boxes and a carrying head arranged on the sliding rod in rear of the holding disk and adapted to move forward with the magazine, substantially as set forth.

20. The combination with the mandrel, and a sliding rod provided with a holding disk adapted to bear against the mandrel, of a rock bar provided with arms supporting the mandrel and the sliding rod respectively, a magazine for the bottom heads of the boxes having a supporting arm mounted loosely on the sliding rod, a carrying head arranged on the sliding rod in rear of the holding disk, a trip lever pivoted on the sliding rod and provided with a catch arm which engages with the supporting arm of the magazine for coupling the holding disk and the magazine, and with a trip arm which engages with one of the supporting arms of the sliding rod for uncoupling the holding disk from the magazine, and a

spring which retracts the magazine when uncoupled from the holding disk, substantially as set forth.

21. The combination with the mandrel, of the magazine for the bottom heads of the boxes movable toward and from the mandrel and provided with a receiving opening near one end and a discharge slot in the opposite end, a follower arranged in the magazine, a carrying head secured to the magazine adjacent to said slot and adapted to receive the bottom heads from the magazine, and a holding disk adapted to remove the bottom heads from the carrying head and hold them against the mandrel, substantially as set forth.

22. The combination with the mandrel, of the magazine for the bottom heads of the boxes movable toward and from the mandrel and provided with a receiving opening near one end and a discharge slot in the opposite end, a carrying head secured to the magazine adjacent to said slot and adapted to receive the bottom heads from the magazine, a holding disk adapted to remove the bottom heads from the carrying head and hold them against the mandrel, a follower arranged in the magazine and provided with a rod and a cord attached with one end to said follower rod and provided at its other end with a weight, substantially as set forth.

23. The combination with the mandrel and the sliding rod provided with a holding disk adapted to bear against the mandrel, of a magazine for the bottom heads of the boxes provided with a discharge slot, a carrying head arranged on the sliding rod and receiving the bottom heads from the magazine, and a movable feed plate whereby the bottom heads are removed from the magazine, substantially as set forth.

24. The combination with the mandrel and the sliding rod provided with a holding disk adapted to bear against the mandrel, of a magazine for the bottom heads of the boxes provided with a discharge slot, a carrying head arranged on the sliding rod and receiving the bottom heads from the magazine, a transversely movable feed plate guided on the magazine, and an elbow lever which actuates the feed plate, substantially as set forth.

25. The combination with the mandrel and the sliding rod provided with a holding disk adapted to bear against the mandrel, of a magazine for the bottom heads of the boxes provided with a discharge slot, a carrying head arranged on the sliding rod and receiving the bottom heads from the magazine, a transversely movable feed plate, whereby the bottom heads are carried from the magazine into the carrying head, an elbow lever pivoted on the magazine and having one of its arms engaging with the feed plate, a rod connected at one end with the other arm of the elbow lever and passing loosely with its opposite end through a stationary support, a screw nut arranged upon said rod, and a

spring surrounding the rod and bearing with its ends against said support and screw nut, substantially as set forth.

26. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table in line with the mandrel, substantially as set forth.

27. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table, and a turning rail arranged adjacent to the band supporting rail, substantially as set forth.

28. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table, and a turning rail made adjustable toward and from the band supporting rail, substantially as set forth.

29. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table, a turning rail arranged adjacent to the band supporting rail, and guide rails arranged on opposite sides of said turning and band supporting rails, substantially as set forth.

30. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table, and a gripper arranged on said band supporting rail, substantially as set forth.

31. The combination with the reciprocating table and the mandrel, of a band supporting rail arranged on said table, a rock shaft journaled on the table, and provided with a trip finger, a gripper secured to the rock shaft and adapted to seize the band of paper, and a trip block adapted to engage against the finger of the rock shaft for opening the gripper, substantially as set forth.

32. The combination with the bed, the reciprocating table and the mandrel, of a band supporting rail arranged on said table and provided with a gripping face, a rock shaft journaled in said table and provided with a trip finger, a gripper secured to the rock shaft and provided with a jaw, a spring whereby the gripper jaw is held against the gripping face, a trip block pivoted on the bed and provided with inclined and abrupt faces adapted to engage with the trip finger, a stop whereby the trip block is rigidly held against movement in one direction, and a spring whereby the trip block is yieldingly held against movement in the opposite direction, substantially as set forth.

33. The combination with the mandrel and

the reciprocating table provided with a gripper, of a band feeding table movable toward and from the gripper, substantially as set forth.

34. The combination with the mandrel and the reciprocating table provided with a gripper, of a movable feed table provided with a projection and a cam arranged on said reciprocating table and adapted to engage with said projection whereby the feed table is moved toward and from the gripper, substantially as set forth.

35. The combination with the bed, the mandrel and the reciprocating table provided with a gripper, of a feed table provided with a projection, a frame pivoted on the bed and supporting the feed table, a rail arranged on said reciprocating table and provided with a cam groove adapted to engage with said projection for moving the feed table forward toward the gripper, and a spring whereby the feed table is moved backward, substantially as set forth.

36. The combination with the reciprocating table carrying a gripper, of a feed table for delivering the band upon the reciprocating table, a cutter for severing the band, arranged in front of the feed table, and a mandrel running in contact with the reciprocating table, substantially as set forth.

37. The combination with the mandrel and the reciprocating table provided with a gripper, of a feed table, a cutter arranged adjacent to the feed table, and provided with an arm or projection, and a trip rail provided with switches which engage with said arm or projection for operating said cutter, substantially as set forth.

38. The combination with the bed, the mandrel and the reciprocating table provided with a gripper, of a feed table capable of moving toward and from the gripper, a stationary shearing plate supported in front of the feed table, a movable cutter frame, a cutter arranged on said frame and provided with an arm, a trip rail arranged on the reciprocating table and provided with a switch which raises said arm to the upper surface of the trip rail, and a switch which permits said arm to descend below the trip rail substantially as set forth.

Witness my hand this 17th day of May, 1893.

EDWARD A. JOHNSTON.

Witnesses:

THEO. L. POPP,
CARL F. GEYER.