C. HOLLY.

LOOPING MACHINE.

APPLICATION FILED NOV. 27, 1905.

936,898.

Patented Oct. 12, 1909.

4 SHEETS—SHEET 1.

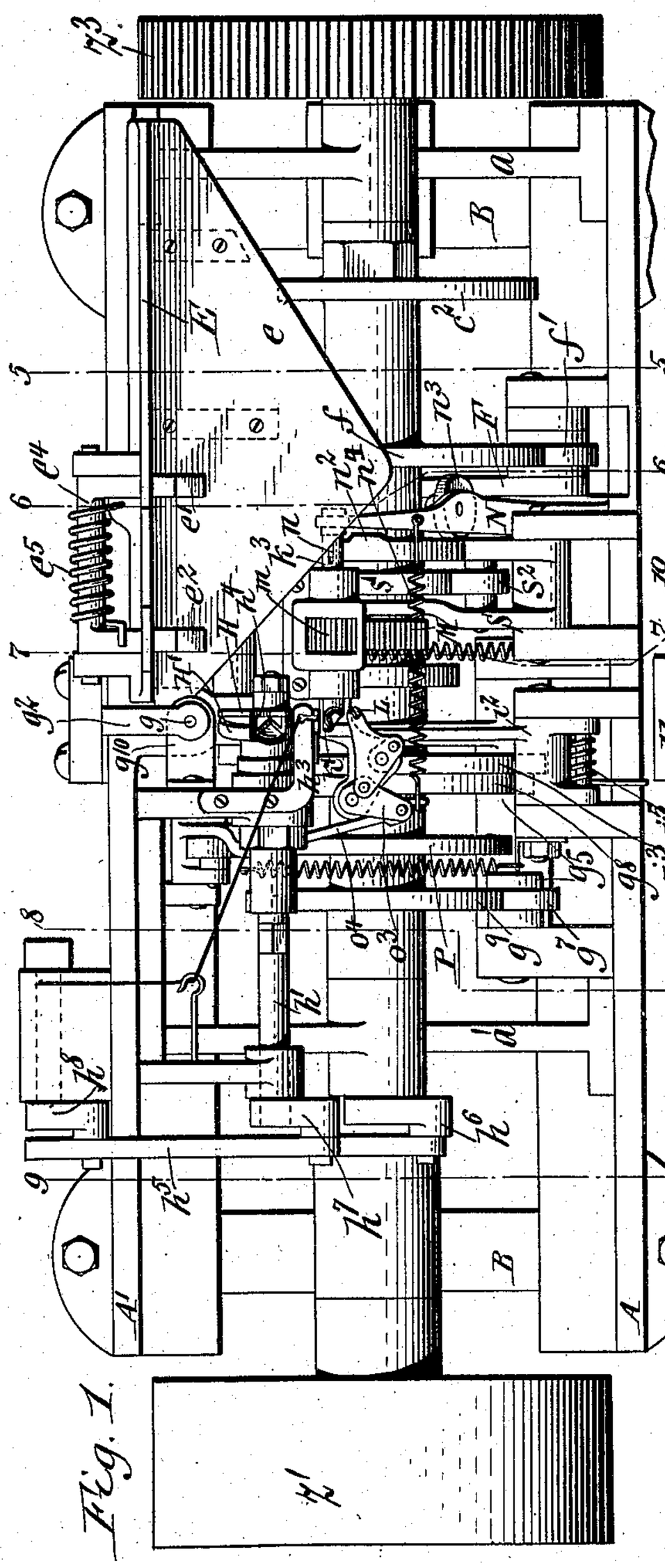

Fig. 1.

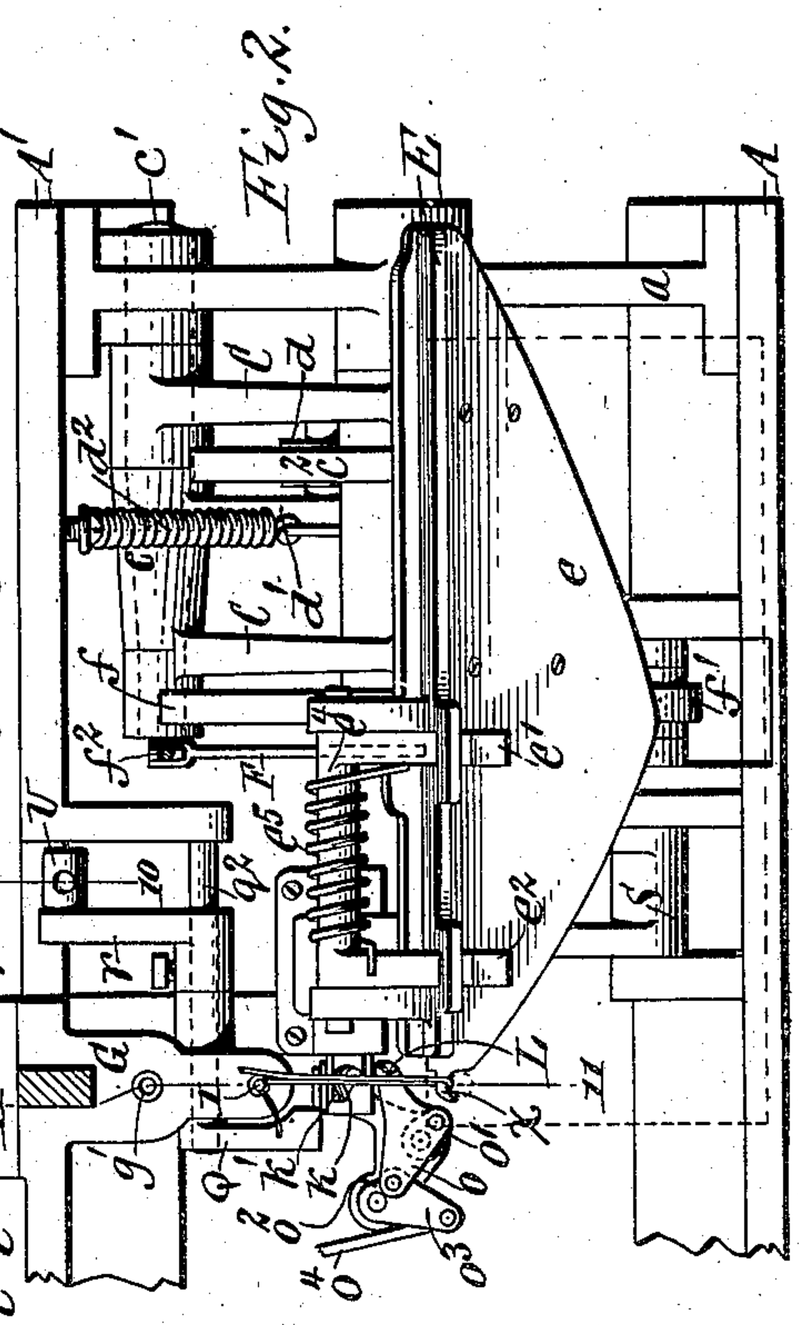

Fig. 2.

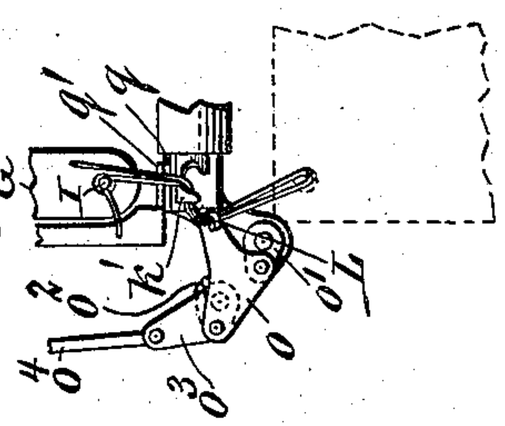

Fig. 3.

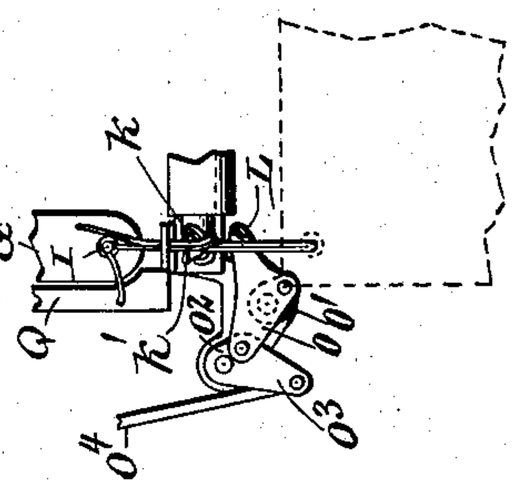

Fig. 4.

Witnesses.
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4 SHEETS—SHEET 2.

Fig. 5.

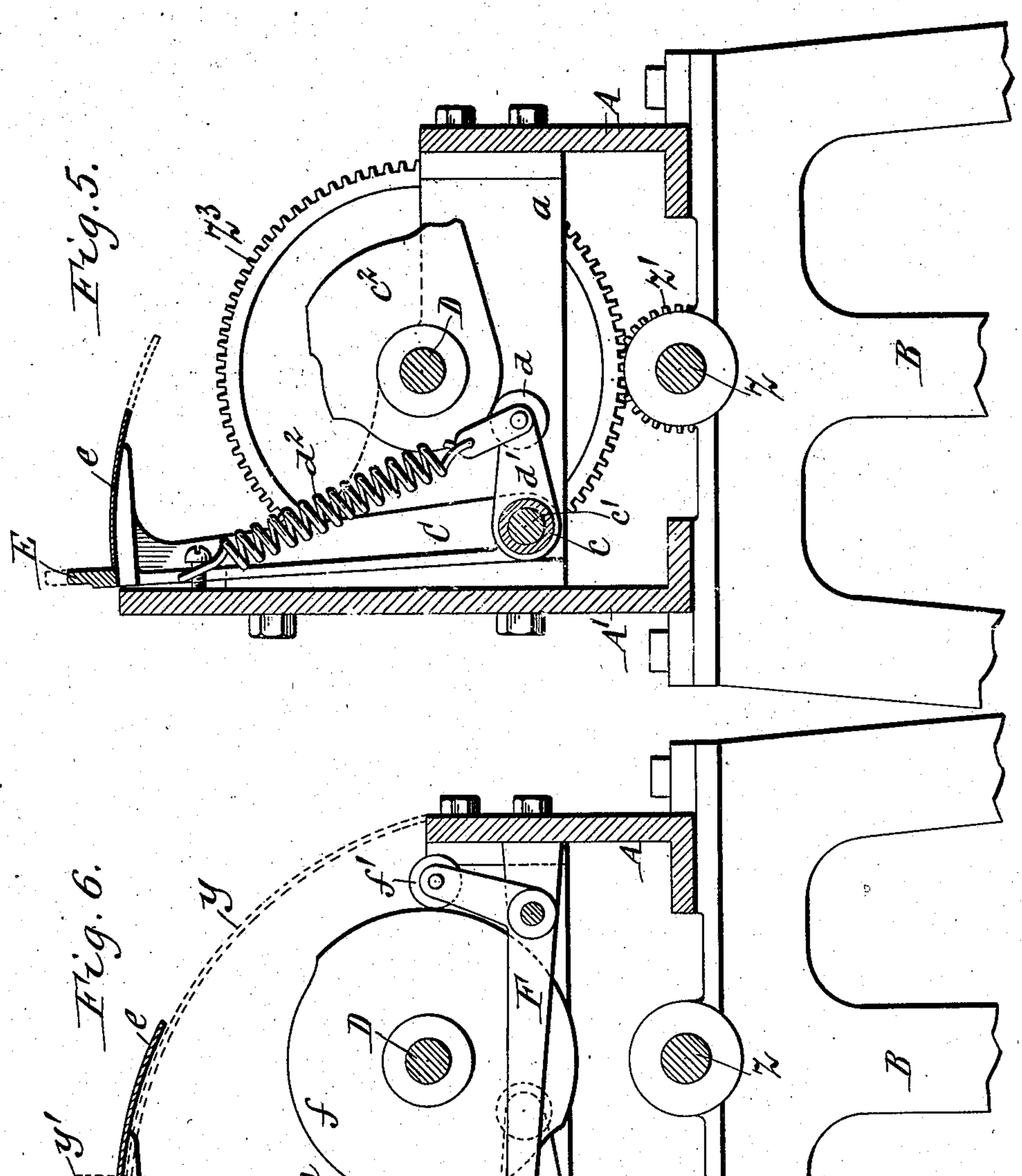

Fig. 6.

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4 SHEETS—SHEET 3.

Fig. 7.

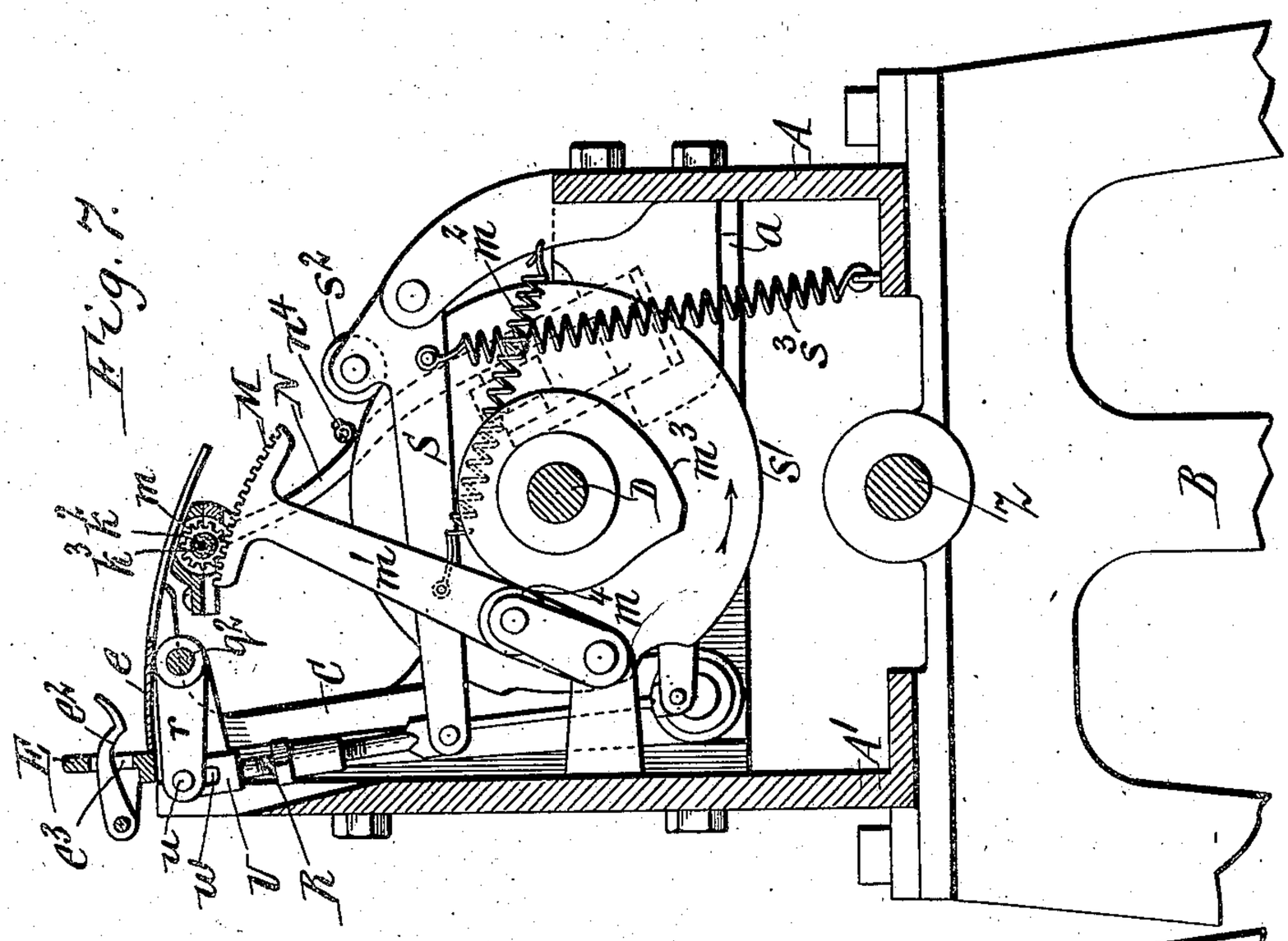


Fig. 8.

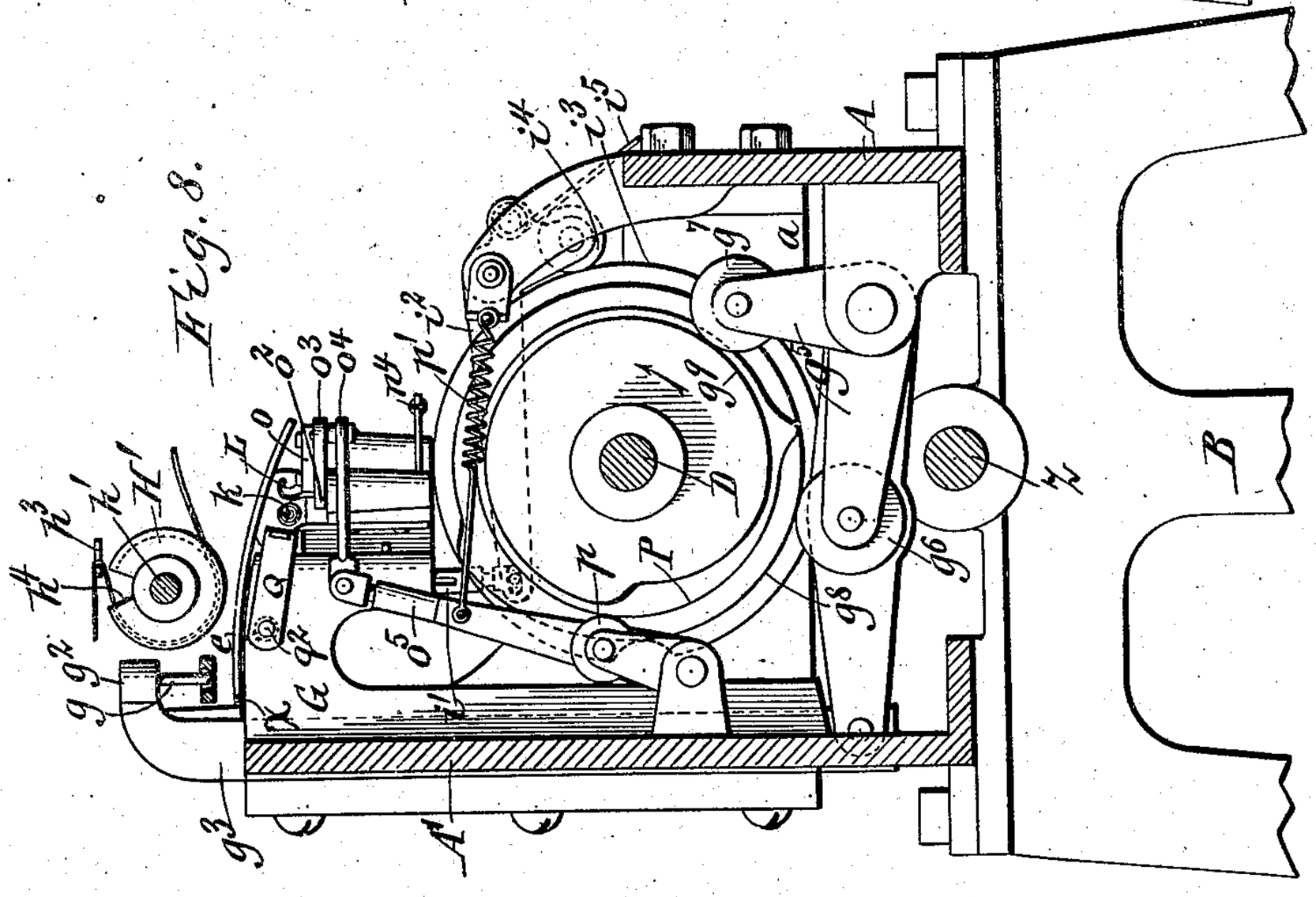
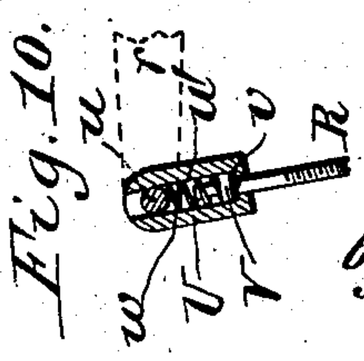


Fig. 10.



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4 SHEETS—SHEET 4.

Fig. 9.

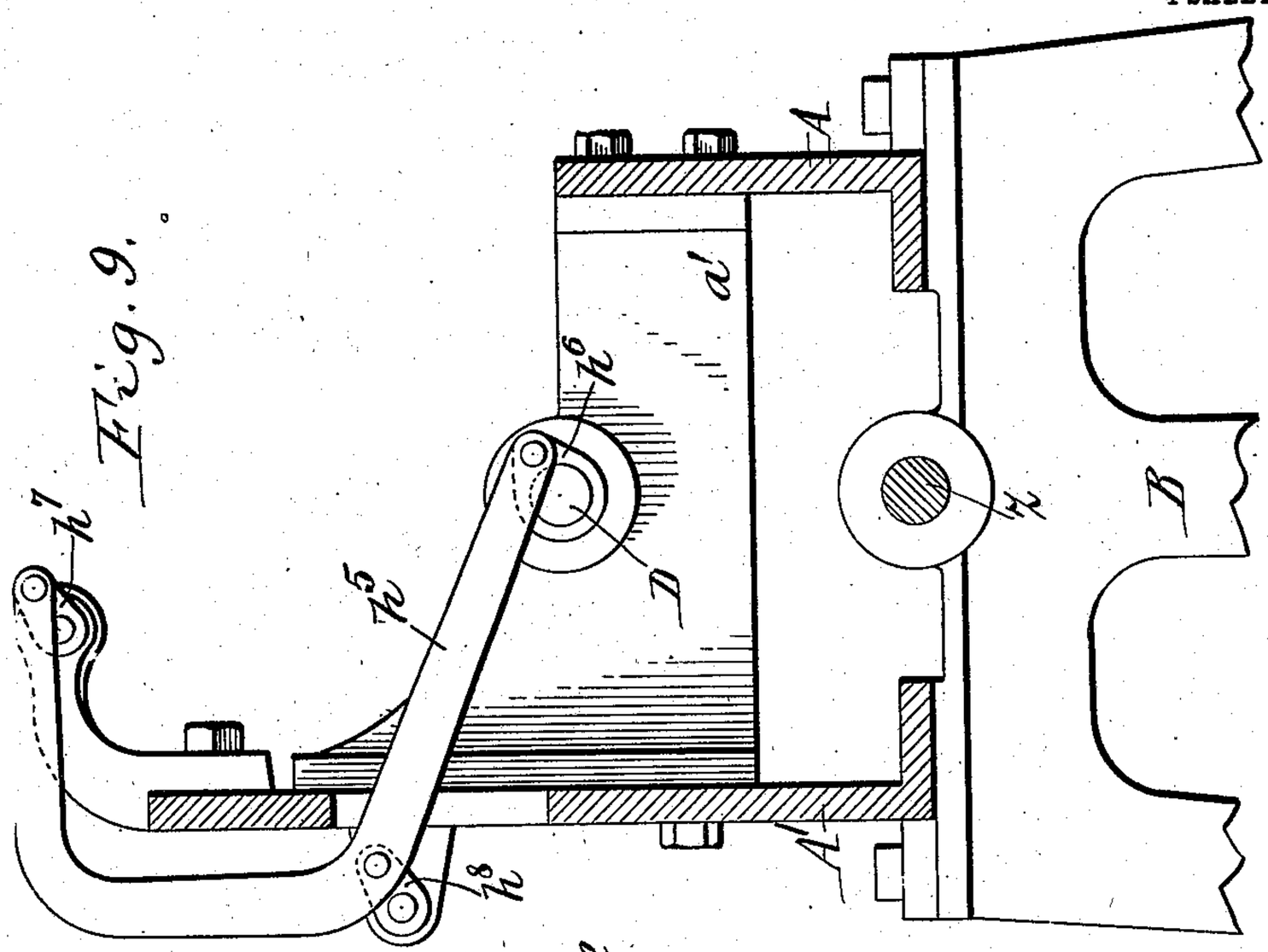


Fig. 13.

Fig. 11.

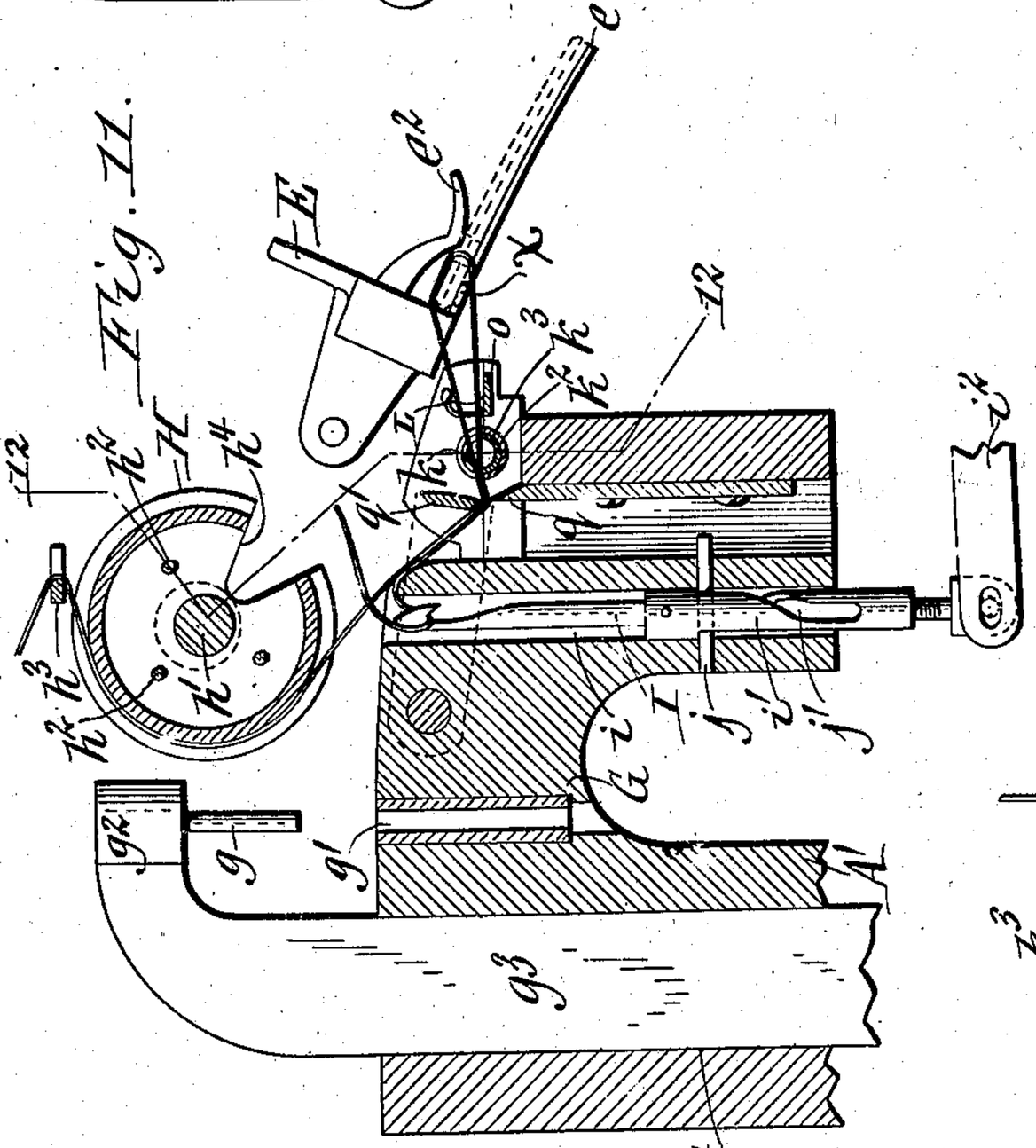
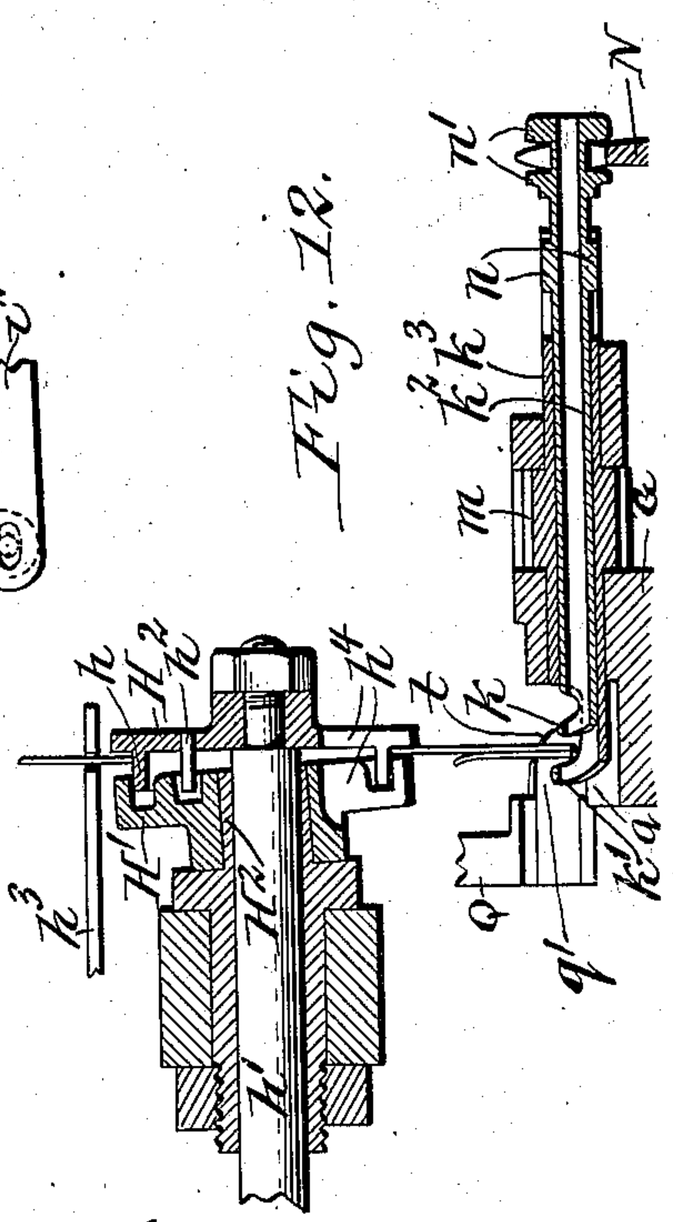


Fig. 12.



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UNITED STATES PATENT OFFICE.

CARLOS HOLLY, OF LOCKPORT, NEW YORK, ASSIGNOR OF ONE-HALF TO JOSEPH A. WARD AND ONE-HALF TO JOHN McLEAN, OF LOCKPORT, NEW YORK.

LOOPING-MACHINE.

936,898. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed November 27, 1905. Serial No. 289,198.

To all whom it may concern:

Be it known that I, CARLOS HOLLY, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented a new and useful Improvement in Looping-Machines, of which the following is a specification.

This invention relates to a machine for applying loops to blanks, pamphlets, almanacs, &c., whereby the latter may be hung up and is a modification of the machine for which I obtained Letters Patent of the United States No. 593,218 on November 9, 1897.

In my former machine the blanks or pamphlets were fed automatically one at a time from a stack or pile to the devices which applied the loops thereto and after the loops were thus applied the blanks or pamphlets were again stacked in piles. By automatically feeding and stacking the pamphlets, the capacity of this machine was very great but the cost thereof restricted its use to printing or binding establishments having a very large output.

The object of the present invention is to provide a machine of this character which applies the loops efficiently to the blanks or pamphlets but which requires the blanks to be fed by hand and does not automatically stack the same, thus materially simplifying the construction of the machine and reducing the cost thereof, and placing the same within the reach of the smaller printers or binders.

In the accompanying drawings consisting of 4 sheets: Figure 1 is a top plan view of my improved looping machine, the parts being shown in position for receiving a blank. Fig. 2 is a fragmentary top plan view thereof, partly in section, showing the position of the parts after the blank has been perforated and carried to the loop applying mechanism. Figs. 3 and 4 are fragmentary top plan views showing different positions of the mechanism whereby a loop is applied to a blank and a knot formed thereon. Figs. 5, 6, 7, 8 and 9 are vertical cross sections in the correspondingly numbered lines in Fig. 1. Fig. 10 is a fragmentary vertical cross section in line 10—10, Fig. 2. Fig. 11 is a fragmentary vertical cross section, on an enlarged scale, in line 11—11, Fig. 2. Fig. 12 is a fragmentary vertical longitudinal section in line 12—12, Fig. 11. Fig. 13 is a detached elevation of one of the cutter blades whereby the twine is severed.

Similar letters of reference indicate corresponding parts throughout the several views.

In its general organization, this machine consists of a main frame, means for perforating the blank, means for supplying twine for the loop and drawing the same through the perforation of the blank, means for tying a knot in the loop and severing the same from the supply twine, and means which grip the blank and carry the same successively to the perforating, twine applying and knotting devices.

The main frame of the machine may be of any suitable construction to support the movable parts of this machine, that shown in the drawings consisting of front and rear longitudinal walls, plates or bars A A^1, cross pieces a a^1 connecting the front and rear walls at or near opposite ends thereof, and legs or standards B B, upon which the walls or plates are secured.

The blank gripping and carrying mechanism may be variously constructed, that shown in the drawings being constructed as follows: C C represent a pair of upright rock arms which are arranged side by side adjacent to the inner side of the rear frame wall and connected at their lower ends by a hub c which is pivoted by means of a horizontal longitudinal stud c^1 on the main frame, so that these arms can swing in a vertical plane transversely of the machine. These carrying arms are moved forwardly by means of a cam c^2 arranged on a horizontal main shaft D and engaging with a roller d which is mounted on arms d^1 projecting forwardly from the hub c of the carrying arms while the backward movement of the arms is effected by means of a spring d^2 connected with the roller arm d^1 and the rear wall of the frame, as shown in Figs. 1, 2 and 5. This cam is so constructed that it holds the blank carrier at rest momentarily in its rearmost position to permit of placing a blank in proper position thereon and perforating the same, then moves the carrier forwardly and comes to rest momentarily in position to permit the twine to be drawn through the perforation of the blank. then

moves the blank carrier forwardly and holds the same at rest a sufficient time to permit of tying a knot in the loop and severing the same from the supply twine, then completes the forward movement of the carrier for drawing the knot tight and discharging the blank thereon forwardly, and then permits the spring d^2 to draw the carrier backwardly into its rearmost position preparatory to receiving another blank. At their upper ends the carrier arms are connected by a horizontal longitudinal bar E the front side of which serves as a gage against which the back longitudinal edge of the blank to be looped is placed in order to register the same properly relatively to the devices which apply the loop thereto. In front of this gage bar the carrier arms are provided with a supporting plate e which is curved concentrically with the pivot of said arms. This plate in addition to supporting the blank which is placed upon the same also serves as the lower jaw of a gripper whereby the blank is held in place on the carrier while being operated upon. The blank is held against this lower jaw by two upper jaws e^1 e^2 which are arranged side by side above the lower jaw and project through openings e^3 formed in the adjacent part of the gage bar E. e^4 represents a horizontal rock shaft or hub connecting the rear ends of the upper gripper jaws and pivoted horizontally on lugs projecting rearwardly from the gage bar so that the front ends of the upper gripper jaws move in a vertical plane toward and from the lower jaw. This rock shaft is turned in the direction for yieldingly holding the upper gripper jaws in contact with the lower jaw by means of a spring e^5 surrounding said shaft and connected at one end with one of the upper jaws while its opposite end is connected with the adjacent part of the blank carrier, as represented in Figs. 1 and 6.

The upper gripper jaws are lifted from the lower jaw into an inoperative position to permit of introducing a blank between the jaws and discharging the same therefrom. The mechanism for this purpose, shown in Figs. 1, 2 and 6, consists of an elbow-shaped rock lever F pivoted on lugs projecting rearwardly from the front wall of the frame, a cam f arranged on the main shaft and engaging with a roller f^1 on the upwardly projecting front arm of the elbow lever and an upright shifting or connecting rod f^2 engaging its upper end with one of the upper gripper jaws and pivotally connected at its lower end with the rear end of the rear arm of said elbow lever F. The shifting rod is guided near its upper end in an opening formed in the gage bar and the pivotal connection between the lower end of the same and the elbow lever swings across or close to the axis of the carrier arms at the inner end of the stud c^1, so that the shifting rod f^2 turns practically concentric with the carrying arms and permits of opening and closing the upper gripper jaws without interfering with the operating mechanism thereof. The gripper opening cam f is so constructed that it raises the upper gripper jaws from the lower gripper jaws while the carrier is in its rearmost position and ready to receive a blank, then the upper gripper jaws are permitted to descend under the action of the spring e^5 for clamping the blank on the carrier. The upper gripper jaws remain in this position and hold the blank firmly in place during nearly the entire forward movement of the carrier during which time the blank is presented successively to the perforating, threading and knotting mechanism. When the carrier nearly reaches its foremost position the upper gripper jaws are elevated and release the blank which latter is thrown forwardly and then remain in this elevated position during the entire backward movement of the carrier and also during the period of rest of the carrier upon reaching its rearmost position, which permits the next blank to be placed between the jaws of the carrier.

The device whereby the blank is perforated is best shown in Figs. 1, 2, 8, and 11 and is constructed as follows: g g^1 represent the coöperating punch and die of the perforator which are arranged adjacent to the left hand side of the blank carrier and a short distance forward of the registering face of the gage bar when the carrier is in its rearmost position. The die of the perforator preferably consists of a steel sleeve or bushing which is placed vertically in a seat formed in a bracket G projecting forwardly from the rear frame wall and the punch is arranged above this die and movable vertically into and out of the same. The punch is secured to a forwardly projecting arm g^2 arranged at the upper end of a vertically movable slide g^3 which is guided in a way g^4 formed on the rear frame wall. The reciprocating movement of the punch carrying slide is produced by means of an elbow-shaped rock lever g^5 pivoted on the front frame wall and having a horizontal bifurcated lower rear arm the members of which carry a roller g^6 and one of which members is connected with the lower end of the punch slide and an upright bifurcated front arm which carries a roller g^7 and cams g^8, g^9 mounted on the main shaft and engaging respectively with the rear and front rollers of the rock lever g^5. The perforator cams g^8, g^9 are so constructed that when the salient part of one engages its respective roller for moving the elbow lever

in one direction, the other cam presents its receding portion to its roller so as to avoid interference of these parts. By this means the punch is positively lowered and raised, whereby sticking of the punch in the blank after perforating the same is prevented, which would be liable to occur and interfere with the looping operation if the downward or effective stroke of the punch were produced by a cam and the upward or return stroke were produced by a spring.

In order to prevent the blank after being perforated from rising with the punch, a stripping finger g^{10} is provided. This finger has an opening through which the punch passes and is secured to the adjacent stationary part of the machine in such a position that its underside is arranged flush with or slightly below the lower end of the punch when the latter is in its elevated position, as shown in Fig. 8. If the blank tends to stick to the punch the same will be stripped off from the punch by the finger against which the blank is lifted and thus prevented from following the punch to its uppermost position. After the blank has been thus perforated the same is moved forward by the carrier one step and presented to the threading devices which draw the loop twine through the perforation of the blank.

The mechanism whereby the twine is supplied and drawn through the perforation of the blank is best shown in Figs. 1, 8, 11 and 12 and is constructed as follows: H H^1 represent two rotary twine feeding disks or wheels which are arranged side by side and one of which, preferably the front disk H, being provided on its inner side with an annular flange h which enters a corresponding groove in the opposing side of the rear disk H^1 so as to bridge the space between the disks and serve as the bottom of a twine groove which is formed between the marginal portions of these disks. These disks are arranged immediately in front of the punch and above the path of the blank to be looped. The front disk H is secured to the front end of a horizontal countershaft h^1 which is journaled lengthwise in bearings arranged on the rear frame wall, as shown in Figs. 1, 9 and 12. The rear disk H^1 is tilted or arranged at an incline relatively to the front disk, so that its lower portion is arranged comparatively close to the lower portion of the front disk while its upper portion is separated a considerable distance from the corresponding portion of the front disk. For this purpose, the rear twine feeding disk is journaled on a stationary bushing H^2 surrounding the countershaft h^1 and having its axis oblique to the axis of said shaft, as shown in Fig. 12. The rear disk is compelled to turn with the front disk by means of pins h^2 formed on the latter and projecting into recesses in the former, as shown in Figs. 11 and 12. The twine is supplied from any suitable source and directed by a guide h^3 into the upper wide part of the groove between the feeding disks and thence passes rearwardly, downwardly and forwardly through the groove between the marginal portions of these disks. As the latter rotate the tilted position of the rear disk relatively to the front disk causes all of the peripheral parts of the disks to successively approach each other as they move downwardly and forwardly to the underside of these disks, and then separate again as they move upwardly and rearwardly toward the upper part of these disks. By this means the groove on the top of the disks is left wide open for the introduction of the twine and on the lower side thereof the groove is contracted causing the twine to be gripped between the opposing lower faces of the disks, whereby all the parts of the disks are engaged with successive portions of the twine for feeding the same forward and then released therefrom to permit of utilizing the twine thus supplied for drawing through the perforation of the blank and forming a loop thereon. h^4 h^4 represent corresponding radial notches formed in the periphery of the twine feeding disks and extending across the flange between the same so as to expose that portion of the twine extending from one side of the notches to the other. The main shaft and the parts mounted thereon make one complete rotation during each cycle of operations of the machine. The twine feeding disks are caused to make one rotation during each rotation of the main shaft by means of an angular connecting rod or bar h^5 having its ends connected with cranks h^6 h^7 on the main shaft and the countershaft, while its intermediate portion is connected with a guide crank h^8 on the main frame, as shown in Fig. 9.

I represents a needle which engages with that portion of the twine which is exposed by the notches of the feeding disks and draws the advancing end of the twine out of engagement with the feeding disks and through the perforation of the blank. This needle is arranged below the feeding disks and is movable vertically in a guide opening i formed in the bracket below the path of the blanks. The mechanism for raising and lowering the needle shown in Figs. 1, 8 and 11, consists of a vertically movable cylindrical holder or slide i^1 guided in the opening i and carrying the needle at its upper end, an elbow-shaped rock lever i^2 pivoted on lugs arranged on the front frame wall and having its rear arm connected with the lower end of said holder, a cam i^3 arranged on the main shaft and engaging with a roller i^4 on the depending front arm of the

rock lever i^2 for lowering the needle, and a spring i^5 interposed between the front arm of the rock lever i^2 and the main frame and operating to turn the rock lever in the direction for raising the needle holder. The parts are so timed that while the notches of the twine feeding disks are on the lower side thereof, the needle rises and passes through the perforation of the blank which latter is in this position at this time and then engages its upper bevel end with the exposed part of the twine and deflects the same until the hook of the needle is above the twine when the latter again springs back to its normal position underneath the hook of the needle. The needle after reaching its uppermost position immediately descends into the guide opening *i* and its hook draws the twine out of engagement from the feeding disks, thence through the opening of the blank and then into the upper portion of the guideway *i* in the bracket for the needle holder. In its elevated position the hook of the needle projects laterally so as to properly deflect the twine in the feeding disks during its upward stroke and engage with the twine during its downward stroke. After the twine has been thus drawn through the perforation of the blank, the latter is carried forwardly another step from the threading position to the position shown in Fig. 11 in which it remains at rest a sufficient time to permit the knotting device to effect its operations. While the blank is thus carried forwardly by the gripper, the twine is drawn partly off from the hook of the needle and partly off from the feeding disks and a forwardly extending loop is formed which extends from the threading device to the blank. The two strands of this loop in being drawn sharply over that portion of the bracket G between the needle guide opening *i* and the rear side of the bracket would be apt to cut each other if permitted to rest one upon the other. This undesirable relation of the two strands would occur if the hook of the needle were permitted to remain continuously in the laterally projecting position which it must necessarily occupy to engage the twine in the feeding disks. Means are therefore provided for causing the two strands of the loop to lie upon the bracket G side by side, as shown in Fig. 2, instead of one on top of the other. This is preferably effected by giving the needle a quarter turn during the latter portion of its downward movement, so as to cause its hook to face forwardly or in the direction which the blank moves, as shown in Fig. 11, whereby the loose end of the twine is deflected sufficiently so that the other strand of the loop which is still connected with the supply twine will not rest upon the same. The means shown in the drawing for turning the needle and cause its hook to project laterally in an elevated position but to project forwardly in its depressed position consists of a pin *j* secured to the bracket and projecting transversely through a spiral or cam slot or groove j^1 in the needle holder, as shown in Fig. 11.

The devices whereby the two strands of the loop are tied into a knot and severed from the supply twine are located between the threading device and the blank carrier when the same stops to permit the knotter and cutter to operate. This mechanism is best shown in Figs. 1, 2, 3, 4, 7, 8, 10, 11, 12, and 13, and is constructed as follows: $K\,K^1$ represent the inner and outer bills of the knotter mechanism which are formed respectively on the inner and outer telescoping knotter shafts K^2 K^3. These shafts are arranged horizontally and lengthwise of the machine so that the two strands of the loop upon being carried forwardly by the blank are laid into the bight or mouth of both bills, as shown in Fig. 2. After the two twine strands of the loop have been thus laid into the mouth of said knotter bills, the latter begin a forward rotation and at the same time those portions of the twine strands between the knotter bills and the blank are pushed underneath the knotter bills by means of a hook shaped deflector L. This deflector hook is arranged on the back side of the strands of twine while the same are laid into the mouth of the knotter bills, as shown in Fig. 2. While the knotter bills are effecting the first portion of their forward rotary movement and the deflector hook is moved forwardly, that portion of the twine strands between the knotter bills and the blank is deflected laterally and underneath the knotter bills, as shown in Fig. 3, in order to enable the points of the knotter bills to make a turn or twist in the strands. After the front ends of the knotter bills have passed around the strands and have nearly made a complete turn or twist in the same, the bills are separated by moving the inner bill and its shaft backwardly, thereby causing the knotter bills during the last portion of their forward rotary movement to straddle the twine strands immediately in rear of the twist, as shown in Fig. 4. The knotter bills having now been placed astride of the two strands in the manner described, the bills are again closed by moving the inner bill forwardly together with its shaft, whereby the trailing end of both twine strands of the loop are firmly grasped by the bills. After the trailing ends of the twine strands have been thus gripped, said strands are severed in rear of the twist, and then the knotter bills are rotated in a reverse direction causing the severed ends of the two strands to be drawn backwardly

through the twist in the strand, producing a knot which reliably connects the same and completes the loop. While the knotter bills are effecting the last portion of their return movement, the carrier begins its forward movement so as to draw on the loop and cause the knot to be tightened. This pull of the blank upon the loop while its ends are still held by the knotter bills is only momentary as the knotter bills are separated immediately after such pull in order to release the loop. The mechanism for thus rotating or oscillating the outer shaft of the knotter is best shown in Fig. 7 and consists of a gear pinion *m* which is secured to the outer knotter shaft between the bearings in which the same is journaled, a gear segment M meshing with said pinion, a rock arm m^1 carrying said segment and pivoted on the rear wall of the main frame, a spring m^2 operating to turn said gear segment in the direction for moving the knotter bills backwardly, and a cam m^3 secured to the main shaft and engaging with a roller m^4 on the segment carrying arm for turning the latter in the direction for moving the knotter bills forwardly. The inner shaft of the knotter is compelled to turn with the outer shaft but is free to move lengthwise thereof by means of one or more splines *n*. The lengthwise movement of the inner knotter shaft is effected by means of a rock lever N pivoted at its lower end on the front wall of the frame and having a fork at its upper end which engages with a grooved collar n^1 at the rear end of the inner knotter shaft, a cam n^2 arranged on the main shaft and engaging with a roller n^3 on the knotter rock lever for moving the inner knotter shaft in the direction for opening the knotter bills, and a spring n^4 connecting the said rock lever with a stationary part of the machine and operating to turn the same in the direction for moving the inner knotter shaft forwardly and closing the bills.

In addition to moving the deflector hook laterally relatively to the direction of the twine loop, it is also desirable to move the same to some extent across the end of the knotter bills in order to reliably retain the twine in engagement with the underside of said bills while producing a twist in the same. For this purpose the deflector hook is mounted on a plate or bar *o* which is pivoted at opposite ends on a pair of like cranks o^1 o^2 which are journaled vertically in bearings arranged on the bracket G. One of these cranks, preferably the outermost one o^2 is provided with an actuating arm o^3 which is connected by a link or rod o^4 with the upper end of a vertically swinging rock arm or lever o^5 which is pivoted at its lower end on the rear wall of the frame. This upright rock-lever, as shown in Fig. 8, is moved rearwardly in the direction for causing the deflector hook to draw the strands of the twine loop laterally around the knotter bills by means of a cam P arranged on the main shaft and engaging with a roller *p* on the rock lever o^5 and this lever is moved in the opposite direction by a spring p^1 for returning the deflector hook to its normal position.

q represents the lower fixed or stationary blade, and q^1 the upper movable blade of the cutter whereby the two strands of the loop are severed immediately in rear of the knot. The lower blade is secured to the adjacent stationary part of the frame and the upper blade is secured to the front end of a vertically swinging rock arm Q which is secured at its rear end to a horizontal rock shaft q^2 journaled in the adjacent part of the bracket G. The rock arm Q is arranged on one side of the path of the twine and its blade projects laterally from the front end of said arm so that upon rocking this arm the blade will cross said path. The rock shaft q^2 is oscillated by means of a link or connecting rod R connected at its upper end with a rearwardly projecting rock arm *r* on the rock shaft q^2, an elbow-shaped rock lever S pivoted on the front wall of the main frame and having its rear arm connected with the lower end of the link R, a cam s^1 arranged on the main shaft and engaging with a roller s^2 on the front arm of the elbow lever S, and a spring s^3 which moves said elbow lever in a direction opposite to that which it receives from the cam s^1.

While the loop of twine is being drawn from the threading device over the knotter and the deflector, it is also drawn over the upper blade of the cutter. After the twine has been thus drawn into a loop, the upper cutter rises and deflects the twine above the same out of the path of the upper cutter blade by means of the beveled upper side *t* of this blade. When this cutter reaches the upper limit of its stroke, its lower cutting edge clears the twine loop and the latter by its resilience springs underneath this edge so that the upper cutter blade which immediately thereafter again descends, presses the trailing ends of the two loop strands against the lower cutter blade. The two blades remain in this relative position for gripping the two twine strands between them without however cutting the strands during the time that the knotter bills and the deflector are moving forwardly for producing a twist in the loop and obtaining control of the rear end of the loop strands, but after the knotter bills have obtained control of the loop strands in rear of the twist then the upper cutter blade completes its downward movement and severs the two strands so as to permit the operation of tying the knot to be completed and the blank with

the loop attached thereto to be carried away. In order to permit of thus grasping and holding the strands of the loop temporarily between the cutter blades without cutting them, the upper cutter blade is yieldingly connected with its actuating mechanism. This yielding connection is preferably effected by connecting the upper end of the link or connecting rod R with the rock arm r in the following manner:—U represents a hollow coupling block which is pivoted to the rear end of the rock arm r by a pin u passing through a longitudinal slot u^1 in the block. V represents a head formed at the upper end of the connecting rod R and arranged in said block. This head is yieldingly held against a shoulder v at the lower end of the coupling blocks a spring w is arranged on the block and bears at its ends against the pivot pin u and head V as shown in Fig. 10. The operation of the cutter cam s^1 and the spring s^3 is such that the upper cutter blade is quickly raised past the twine and then lowered upon the twine which is between the same and the lower cutter, in which last-mentioned position the spring s^3 is slightly strained so as to produce a yielding pressure of the upper blade against the twine resting upon the lower blade but when the loop strands are within the control of the knotter bills the continued upward movement of the connecting rod R under the action of the cutter cam s^1 exhausts the tension of the spring W and produces practically a rigid connection between the same and the upper cutter blade, whereby the last portion of the downward movement of the upper cutter blade is effected positively and results in severing the twine strands between the blades.

In order to avoid clogging the machine with waste twine when the same is running without blanks being fed to the same, a clearing hook or finger x is provided on the lower plate or gripper of the carrier which takes the place of a blank and thus removes the twine loops formed by the machine.

In the drawings the working parts of the machine are exposed but in practice these parts are inclosed by a curved cover and an end gage y^1 is mounted on the cover to facilitate registering the blanks as shown by dotted lines y in Fig. 6.

In my present machine the loops can be applied to the blank at any part along its edge rendering it possible to apply hanging loops at the center of show cards and the like in which respect this machine is superior to that shown in my former patent which latter was capable of applying loops only to the corners of the blanks.

If desired, the main shaft may be driven directly from the source of power but it is preferable to drive the same from a driving shaft l journaled lengthwise in the lower part of the frame and provided at one end with a driving pulley l^1 and at its opposite end with a pinion l^2 which meshes with a gear wheel l^3 on the adjacent end of the main shaft.

I claim as my invention:

1. A looping machine, comprising a perforating device, a threading device and a knotting device, and a single vibrating blank carrier having a forward movement from said perforating device to said threading and knotting devices and then back to said perforating device, substantially as set forth.

2. A looping machine, comprising a perforating device, a threading device and a knotting device, an oscillating carrier, and operating means constructed to move said carrier forward from said perforating device to said threading and knotting devices and then backward to said perforating device, substantially as set forth.

3. A looping machine, comprising a perforating device, a threading device, a knotting device, an oscillating blank carrier movable from said perforating device to said threading and knotting devices and then back to said perforating device, a cam engaging with said carrier for moving the same forward, and a spring for moving said carrier backward, substantially as set forth.

4. A looping machine, comprising a perforating device, a threading device, a knotting device, a single vibrating blank carrier having a forward movement from said perforating device to said threading and knotting devices and then back to said perforating device, and a blank gripper mounted on said carrier, substantially as set forth.

5. A looping machine, comprising a perforating device, a threading device, a knotting device, a rocking carrier which receives the blank at the perforating device and moves the same to said threading and knotting devices, a gage arranged on said support, and blank holding gripper jaws arranged on said carrier in front of said gage, substantially as set forth.

6. A looping machine, comprising a perforating device, a threading device, a knotting device, an oscillating carrier pivoted at its lower end and movable at its upper end from said perforating device past said threading and knotting devices, a gage arranged at the upper end of said carrier, a lower fixed gripper jaw arranged on said carrier in front of said gage, an upper gripper jaw pivoted on said carrier and movable toward and from said fixed jaw, substantially as set forth.

7. A looping machine, comprising a perforating device, a threading device, a knotting device, an oscillating carrier which receives the blank at the perforating device and presents the same successively to said

threading and knotting devices, fixed and movable gripper jaws mounted on said carrier, a rock lever having its free end adjacent to the axis of said carrier, and a connecting rod between the free end of said lever and said movable gripper jaw, substantially as set forth.

8. A looping machine, comprising a perforating device, a threading device, a knotting device, an oscillating carrier which receives the blanks at the perforating device and presents the same successively to said threading and knotting devices, fixed and movable gripper jaws mounted on said carrier, a spring for lowering said movable gripper jaw against said fixed jaw, a rock lever having its free end arranged adjacent to the axis of said carrier, a rod connecting the free end of said rock lever with said movable gripper jaw, and a cam operating to move said lever in the direction for lifting said movable gripper jaw from said fixed jaw, substantially as set forth.

9. A looping machine comprising a blank carrier, a twine feeder arranged on one side of the path of the blank, and adapted to deliver twine lengthwise of said path, a threading needle arranged on the opposite side of said path and having a hook adapted to engage the twine on said feeder and draw the same through said blank, and an operating device for said needle constructed to turn said needle with its hook transversely to said twine upon withdrawing the same from said feeder and to turn the same with its hook in the direction which the blank moves after the same has drawn the twine through said blank, substantially as set forth.

10. A looping machine comprising a blank carrier, a rotary twine feeder arranged on one side of the path of the blank and adapted to deliver the twine lengthwise of said path, a threading needle normally arranged on the opposite side of said path and having a hook adapted to engage the twine on said feeder and draw the same through the blank, a holder for said needle having a reciprocating movement for moving the same toward and from said twine holder, a bracket having an opening in which said holder is guided, and a pin arranged on said bracket and engaging with a cam slot in said holder, said slot being constructed to turn the needle with its hook transversely of the twine upon engaging the same in the feeder and to turn the same with its hook forwardly or in the direction which the blank moves after drawing the twine through the latter, substantially as set forth.

11. A looping machine comprising a knotter having a pair of hook-shaped bills, one of which is movable axially relatively to the other, a twine feeding device whereby the twine is laid into the bight of said bills, and a deflector operating to deflect the twine on one side of said bills toward the outer end of the same, substantially as set forth.

12. A looping machine comprising a twine feeding and threading device, a knotter having a bill, a deflector hook having a movement around the outer end of the bill for pushing the twine laterally under said bill, a bar carrying said hook, a pair of cranks supporting said bar, and means for rocking said cranks, substantially as set forth.

13. A looping machine comprising a twine feeding and threading device, a knotter having a bill, a deflector hook having a movement around the outer end of the bill for pushing the twine laterally under said bill, a bar carrying said hook, a pair of cranks supporting said bar, and means for rocking said cranks consisting of a rock arm formed on one of said cranks, a rock lever connected by a link with said rock arm, a cam for moving said rock lever forwardly, and a spring for moving said rock lever backwardly, substantially as set forth.

14. A looping machine, comprising a blank carrier having a substantially horizontal vibrating movement, a vertically movable threading device for passing twine through the blank, a knotting device for tying a knot in the twine, and a pair of vertically coöperating twine cutting blades which are normally both arranged on the underside of the path of the blank and the twine carried forwardly thereby while the latter is passing the cutting blades, substantially as set forth.

15. A looping machine, comprising a blank carrier having a substantially horizontally vibrating movement, a vertically movable threading device for passing twine through the blank, a knotting device for tying a knot in the twine, and a twine cutting device located between said threading device and knotting device and consisting of a fixed blade which is permanently arranged below the path of the blank and twine and a movable blade which moves vertically across the path of the blank and twine toward and from the fixed blade and which has an inclined or beveled back for deflecting said twine, substantially as set forth.

16. A looping machine comprising a blank carrier, a threading device for passing twine through the blank, a knotting device for tying a knot in said twine, a twine cutting device located between said threading and knotting devices and consisting of a fixed blade and a movable blade, and an operating mechanism for said movable blade yieldingly connected with the latter, substantially as set forth.

17. A looping machine comprising a blank carrier, a threading device for passing twine

through the blank, a knotting device for tying a knot in said twine, a twine cutting device located between said threading and knotting devices and consisting of a fixed blade and a movable blade, a rock shaft having two arms one of which carries said movable blade, a hollow coupling block having a slot which receives a pin on the other arm of said rock shaft, a connecting rod provided at one end with a head which is arranged in said coupling block and bears against a shoulder in the latter, a spring arranged in said block and bearing against said pin and head, a rock lever connected with the other end of said connecting rod, a cam for moving said rock lever in one direction, and a spring for moving said lever in the opposite direction, substantially as set forth.

Witness my hand this 23d day of November, 1905.

CARLOS HOLLY.

Witnesses:

ELIZABETH FLYNN,

M. FRANCES GOGGIN.