

(No Model.)

4 Sheets—Sheet 1.

O. E. DAVIDSON.
ENVELOPE MACHINE.

No. 374,523.

Patented Dec. 6, 1887.

Fig. 11.

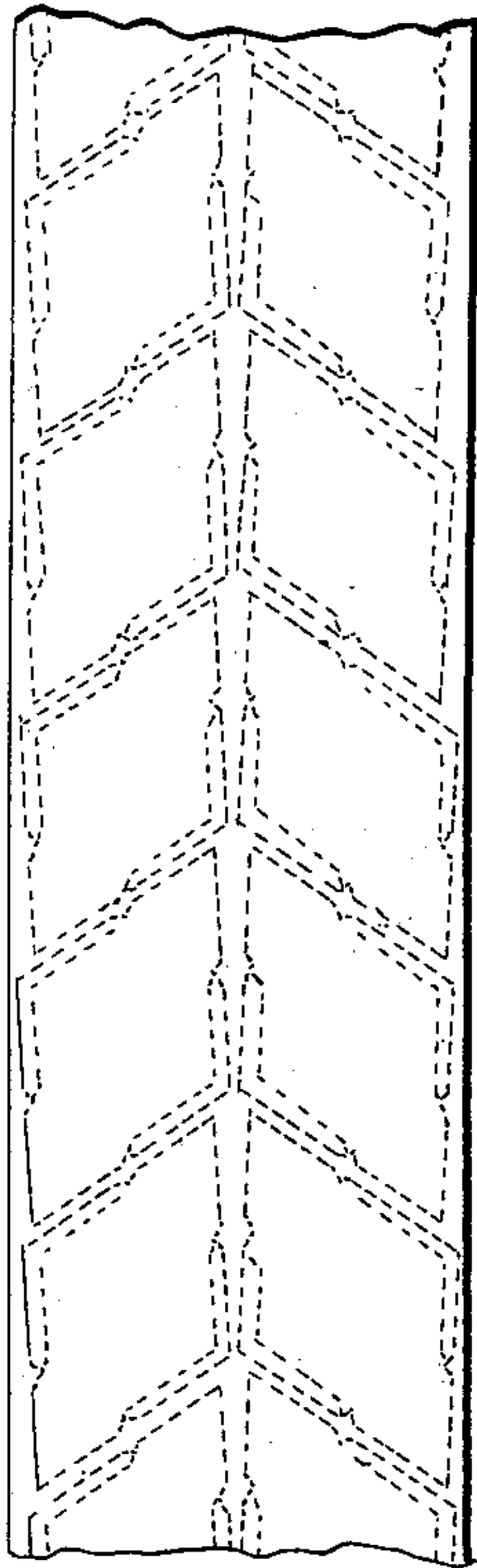
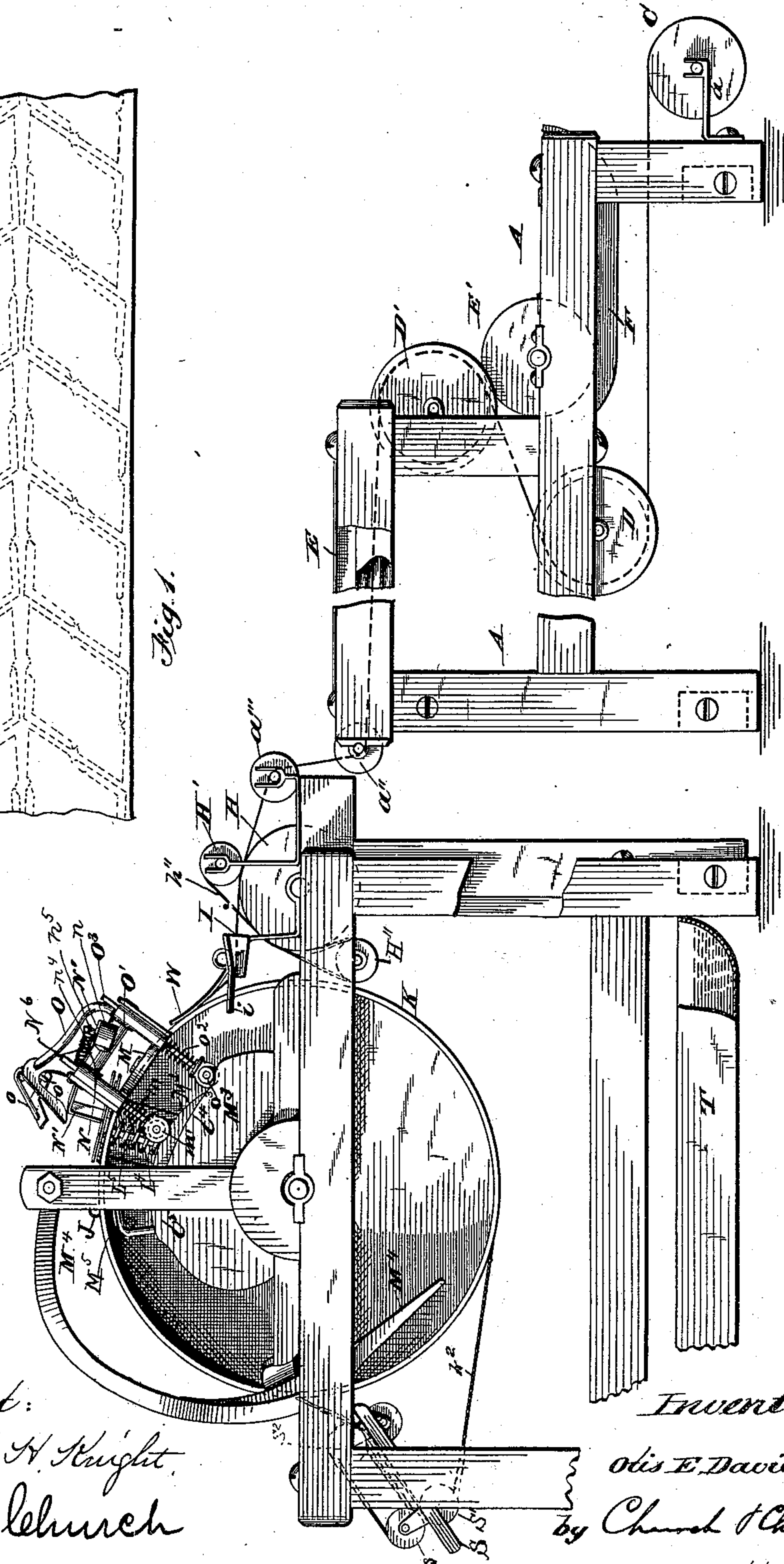


Fig. 1.



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Fig. 2.

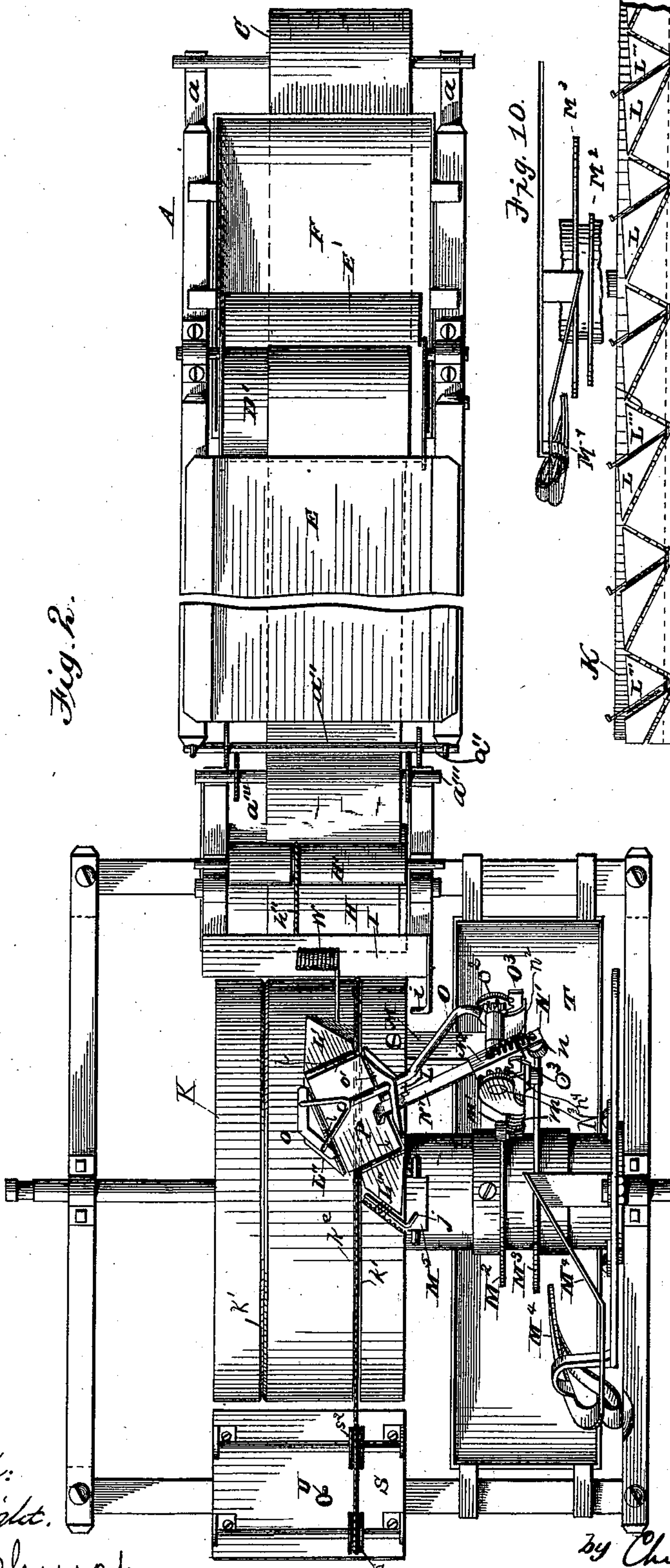
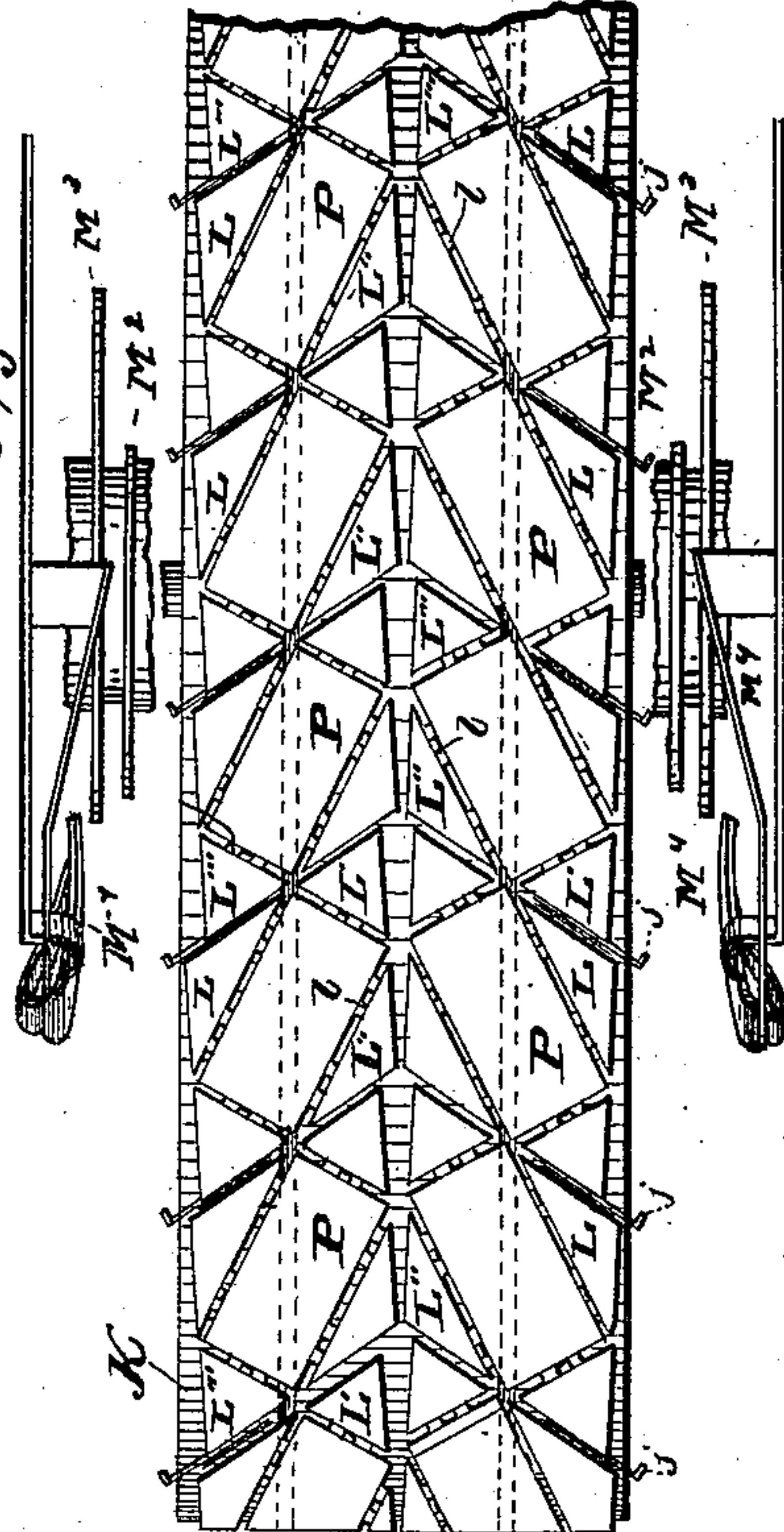


Fig. 10.



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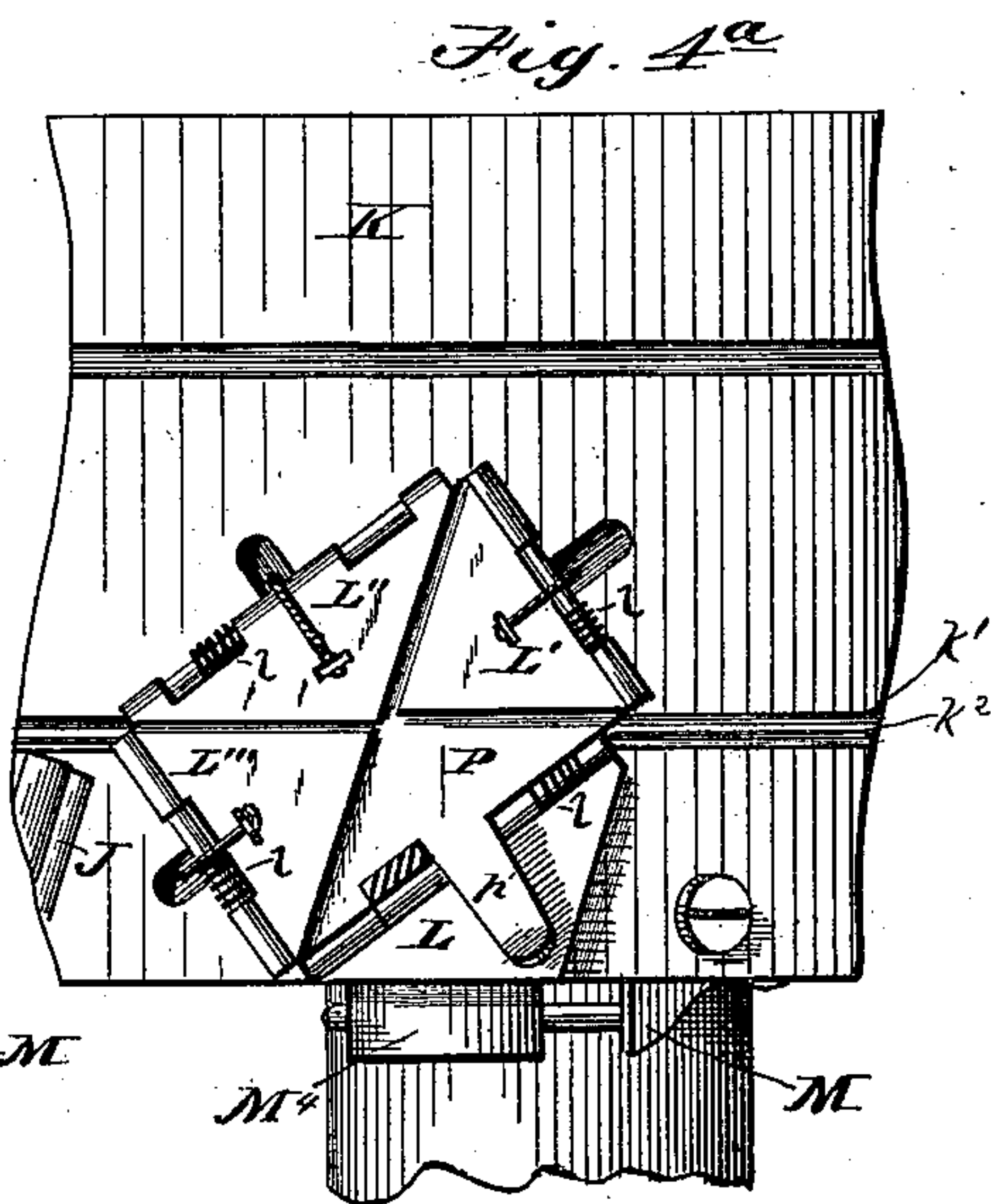
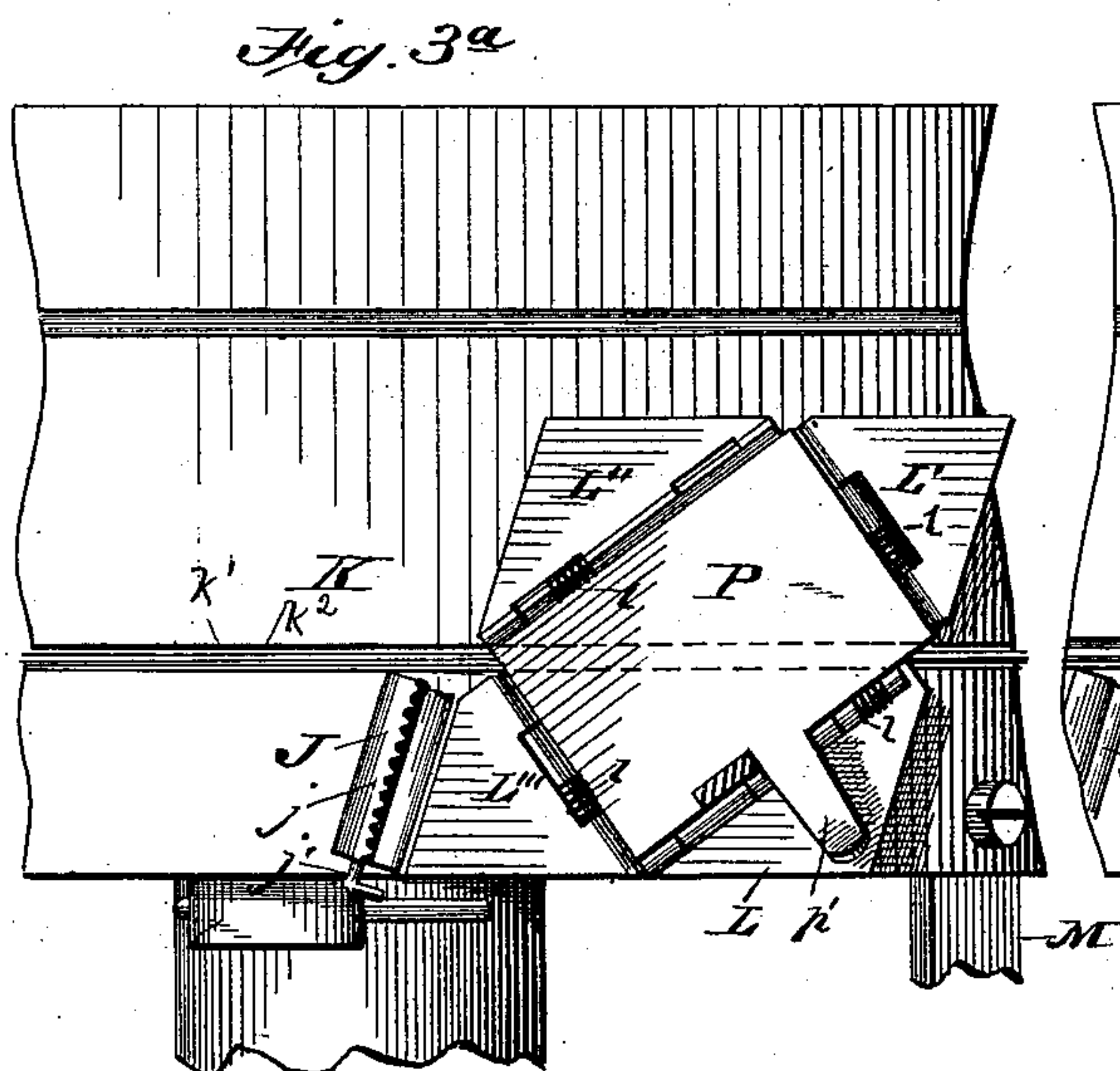
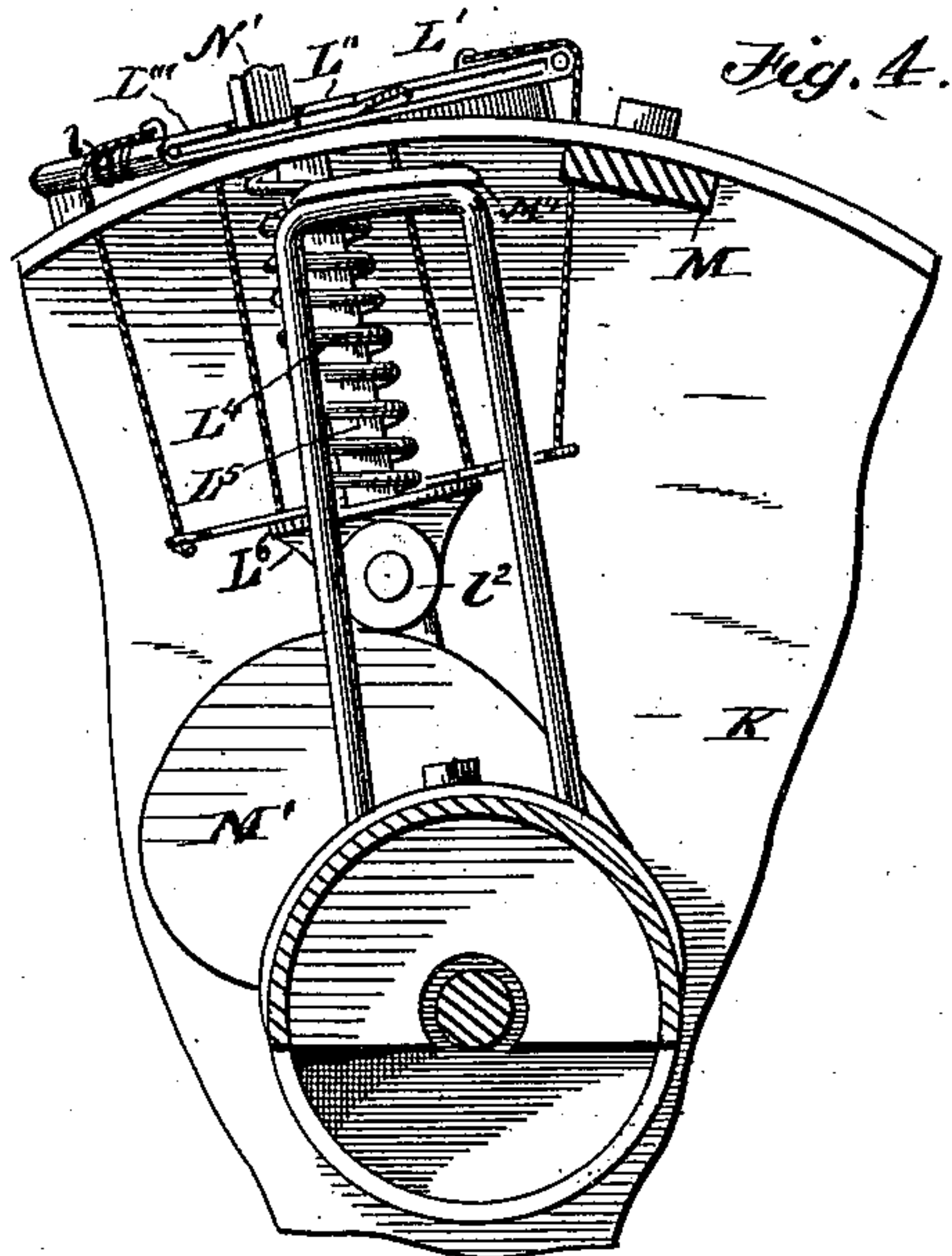
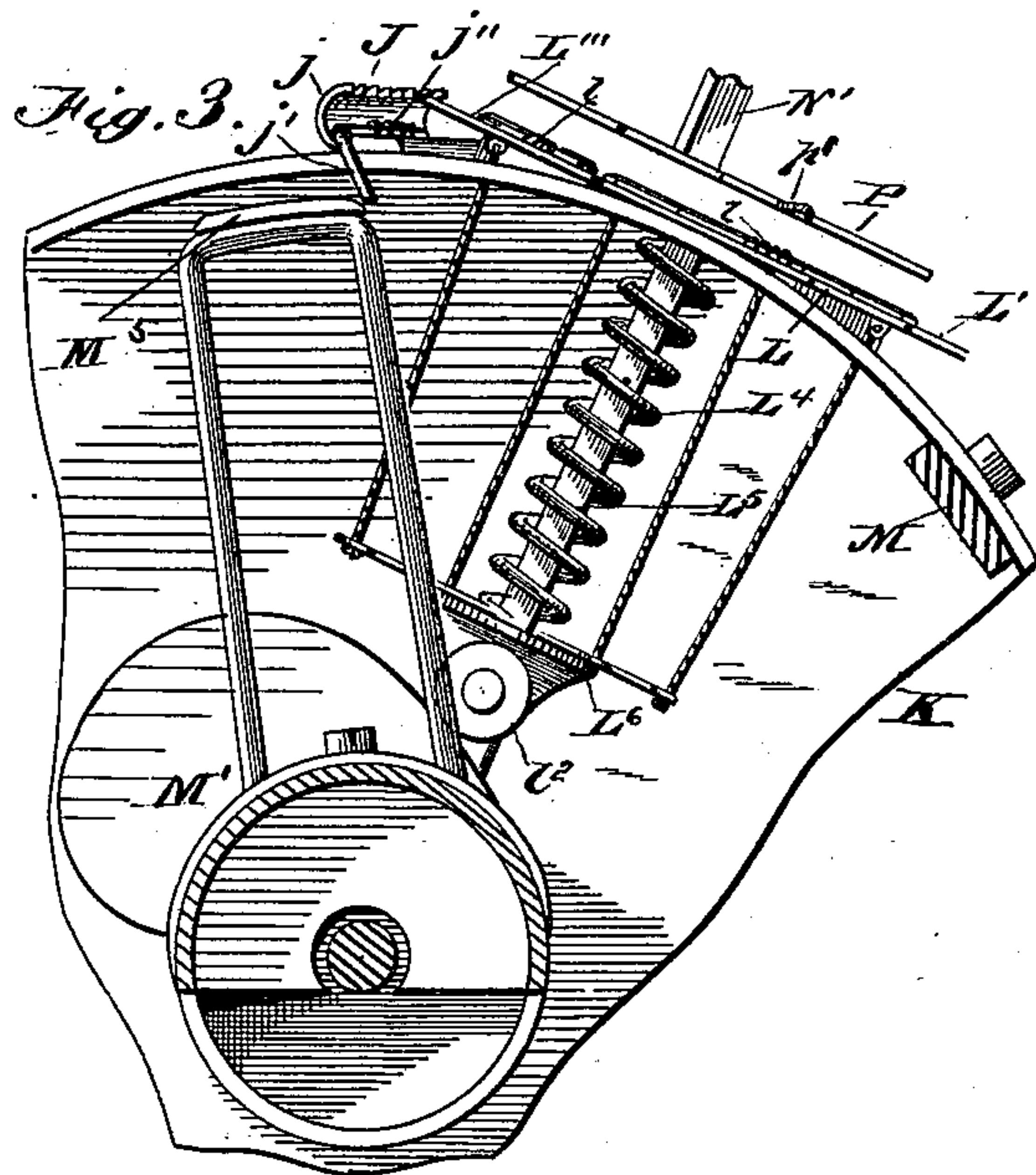
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UNITED STATES PATENT OFFICE

OTIS E. DAVIDSON, OF NASHVILLE, TENNESSEE.

ENVELOPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 374,523, dated December 6, 1887.

Application filed November 22, 1883. Serial No. 112,490. (No model.)

To all whom it may concern:

Be it known that I, OTIS E. DAVIDSON, of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Envelope-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to that class of machines wherein envelopes are automatically formed from a continuous web or strip of paper; and it consists in certain features of construction and combinations of parts, as hereinafter described, and more specifically pointed out in the claims at the end of this specification.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation; Fig. 2, a plan view of the entire machine. Figs. 3 and 4 and 3^a and 4^a are views of the folding mechanism in different positions. Figs. 5 and 6 and 5^a and 6^a illustrate the manner of pasting and cutting the blanks. Figs. 7, 8, and 9 illustrate details. Fig. 10 is a view of a cylinder provided with two sets of folding devices, and Fig. 11 is a view of the paper from which the blanks for the envelopes are cut.

Similar letters of reference in the several figures denote the same parts.

As shown in the drawings, two frames are employed—one for the gumming and drying mechanism and the other for the cutting, folding, and delivering devices; but it is obvious that one or more frames may be employed, as may be found most convenient or otherwise desirable.

The frame A is provided with suitable bearings, *a a*, to receive the journals of the roller carrying the web of paper, C. The paper is carried over two guide-rollers, D D', suitably supported on the frame, through the drying-box E, and under the roller *a''*. Adjacent to the guide-roller D', and working in conjunction therewith, is a roller, E', carrying forms *e e*, adjusted and adapted to the curve of the roller and dipping into the paste or glue contained in the tank or trough F. These forms *e e* are made separate from the roller and are

supported on blocks of rubber, *e' e'*, which act as cushions. They are made of such size and number as to properly "block off" the paper preparatory to the cutting and folding operations. In the machine illustrated they are arranged to gum the strip or web, as shown in Fig. 5; but other arrangements may be employed, the cutting and folding mechanism being correspondingly modified. From the upper roller, D', the paper with the gum applied thereto passes through the drying-chamber E, the walls of which are made double for the passage of steam or hot air. Other suitable means for drying may be employed at this point, the object being to dry the paste or glue on the paper before it enters between the cutting-rolls. As the web of paper emerges from the drying-chamber it is passed under the guide-roller *a''* and over the roller *a'''*, from whence it passes to the cutter.

In the machine shown the cutting mechanism consists of a roller, H, properly recessed for the reception of the cutter *h*, removably secured thereto by means of screws *h²*, whose operating-edges project beyond the face of the roller and operate, in conjunction with a roller, H', to sever the blank from the web. Pivoted upon the face of the cutter *h*, and near the forward or most advanced portion thereof, is a flat spring-pressed plate, *h'*, which operates to raise the front edge of the blank and direct it into the guide I as it passes from under the roller H'. The waste paper is delivered below the cutting-roller by a tape or belt, *h''*, passing over the rollers H' and H''.

The cutting blade or plate *h* and the gumming-forms *e e* are adapted and adjusted to work together. In the present instance the gum is applied as shown at *t t*, Fig. 5, and the cutter is arranged to sever the blank Y on the line *t³*; but other forms may be adopted and the paste or glue applied to the overlapping end of the side flap also, if desired.

As a blank emerges from the guide I, its forward edge is projected under the clamp or gripper J, consisting of a jaw, *j*, pivoted to the face of the cylinder K, and provided with an arm, *j'*, which, as the cylinder is revolved, strikes an arm, *i*, on the guide I, thus raising the jaw to receive the blank. As soon as the arm *j'* passes from under the arm *i*, the jaw is closed by a spring, *j''*, and caused to grip the

edge of the blank. The blank Y, thus held by the gripper J, rests upon the arms or blades L L' L'' L''', and in position to be folded into a complete envelope. This operation is effected

5 in the following manner:

The folding-blades L L' L'' L''' are pivoted upon the cylinder or drum K, and held open against the pressure of springs l, one for each arm, by a spring, L⁴, working upon a shaft or support, L⁵, and against a collar, L⁶. This collar is provided with four arms, from whence chains, cords, or straps extend, and are connected one to each of the folding arms or blades.

15 Upon the collar L⁶ is pivoted a roller, l², that engages with a fixed cam, M', during a portion of the revolution of the cylinder K, thus raising the collar in opposition to the spring L⁴, and permitting the springs l to exert their pressure upon the folding-blades. A spring, W, serves to hold the blanks down upon the folding-blades. An arm, M, fastened to the cylinder K and carried thereby, supports two pivoted arms, N O. The arm N, which carries the former P, over which the side and end flaps of the blank are folded, is made in two sections, N' N². The section N', carrying at one end the former P and on the other a roller, n, slides in socket or guideway n' of the section N², and it is pressed outward toward the cylinder K by a spring, n², one end connected to N' and the other to N². The section N² is provided with a gear, n⁴, a sleeve, n⁵, fitting the spindle N³ and the socket n', before described. A rack-bar, N⁶, supported in suitable guides on the arm M, engages with the teeth of gear n⁴. The spring m, encircling the lower end of the rack-bar, serves to hold the latter down and the arm N' elevated until the roller m' comes in contact with the fixed cam M², by which the rack-bar is raised and the arm depressed toward the cylinder. The roller n on the section N' engages with a fixed cam, M⁴, fastened to the frame, by which the former P is withdrawn from the blank.

45 The arm O carries the moistening plate or pad o and the folding-blade o', slotted to accommodate the arm N'. The arm O is fastened to a sleeve, O', on the spindle N³, and is provided with a segmental pinion, O². The rack-bar O³, supported and working in guides on the arm M, gears with the pinion O², and by its movement raises and lowers the arm O. A spring o, in the lower end of the rack-bar tends to hold the arm O in elevated position, while a fixed cam, M³, operates against the roller o³ and effects the downward movement toward the cylinder.

60 Returning now to the progressive movement of the blank and the operations performed thereon by the folding devices, it will be observed that as the cylinder passes beyond the guide I, with the blank held in the gripper J and over the folding-blades, the rollers m' and o³, coming in contact with the cams M² M³, cause the arms N and O to be depressed. The arm N, carrying the former P, moves slightly in

advance of the arm O and, coming down upon the blank within the four folding-blades, holds it in position. As soon as the former assumes its position on the blank the arm O is brought down until the pad o, which has passed through the tank T and been moistened, is brought down and wets the gum on the bottom flap of the blank. It is then permitted to rise by the depression t⁴ in the cam M³, to clear the folding-blades. The continued revolution of the cylinder K carries the arm j' upon and over the stationary arm or cam M⁵, opening the gripper J and releasing the blank. At the same time the roller l² comes in contact with the cam M', whereby the collar L⁶ is raised, thus releasing the folding-blades L L' L'' L'''.

The former P is provided with a rearwardly-projecting arm or finger, p', which operates, when the former is down, to prevent the closing of the blade L, while the blades L' L'' L''' are closed down upon the former, thus folding two ends and one side of the blank.

The folding-blades L L' L'' L''' do not entirely cover either the former or the blank, sufficient space being left for the lapping of the edges of the blanks. Moreover, the blades L' L''' for folding the end flaps are caused to move slightly in advance of the blade L''. This may be accomplished by attaching the cord to the blade L' at a point more remote from its pivot, or by making the cord for operating said blade shorter than the others and interposing a spring in its length, whereby the release of the blade l'' as the collar is moved inward shall not be begun until after the other blades have begun their inward movements and the tension of the interposed spring neutralized by the movement of the collar. The two end flaps and the gummed flap previously moistened having thus been folded and brought together, the former P is withdrawn, while the folding-blades still continue to press upon the envelope. This operation is effected by means of the cam M⁴ coming in contact with the roller n on the section N' of the arm N, whereby the section N' is caused to slide in the section N², the rack-bar remaining elevated upon cam M². As the former P leaves the folding-blade L, which has heretofore been held open, the arm O is again brought down by a second projection, t² of the cam M³. This motion of the arm O brings the folding-blade o' down upon the blank and assists the blade L in making the final fold, the former being withdrawn from the blade L the moment folding-blade o' strikes the blank. The blank having now been folded, the roller l² passes off from the cam M', the spring L⁴ opens the folding-blades L L' L'' L''', and the completed envelope is delivered onto the table S.

To effect the discharge and delivery of the envelope, a cord, belt, or tape, k², passes around the cylinder lying in a groove, k', crossing the folding devices diagonally, so as not to interfere with the folding-blades. This tape is carried under rollers s²s on the table S and around a lower roller, s'. A tape is also carried around

rollers s and s^2 . The envelopes are taken from the cylinder K by the tape k^2 , and are carried down the table S between the rollers and tapes.

Owing to the diagonal position occupied by the folding devices, the envelopes are delivered cornerwise, and may be received in a proper receptacle in that position; but if it is desired that they should be presented squarely a pin or stud, T, is located in the path traversed by the envelopes as they are carried down by the tapes, which by striking or bearing against their sides will turn them around.

It is obvious that, when necessary or desirable, supplemental rollers or other pressing devices may be located at or near the delivery end of the machine to still further perfect the folds and insure the adhesion of the lower overlapping flap.

I have shown in the drawings but a single pasting, cutting, and folding device; but it is my intention and purpose to duplicate these parts, so as to completely encircle the cylinder K not on one side alone, but on both sides, as shown in Fig. 10. All that is necessary in such case is to duplicate the parts already shown and described. Each folding mechanism is complete in itself, and as the cams are all stationary and properly located to perform the required movements, it is obvious that the number of folding mechanisms operated thereby may be multiplied indefinitely within the capacity of the cylinder to hold them. By employing two sets, one or more on either side of the cylinder, the amount of necessary waste of material is greatly diminished, the blanks being then cut as indicated in Fig. 11.

When folding devices are applied to both sides of the cylinder, the gumming and cutting mechanisms may be duplicates of those shown and arranged upon the same rollers, or separate systems may be employed to prepare and present the blanks.

The construction and arrangements of parts in the machine described are such that the blanks, complete and ready to be folded by the particular folding mechanism, by hand or otherwise, can be made by the use of the gumming and cutting mechanism described, while the folding mechanism is of such character that other devices for forming and delivering the blanks may readily be substituted, and the moistening-pad might be used to apply the paste or glue instead of simply moistening the dried gum.

Having thus described my invention, I claim as new—

1. The herein-described improvement in the art of manufacturing envelopes, which consists in applying to a web of paper the gum for both flaps, then drying the said gum, cutting the blank from the web, moistening the gum on one flap, and folding the blank so as to unite the end flaps by the application and adhesion of the flap previously gummed, dried, and moistened, as set forth.

2. In combination with a rotating cylinder, removable gumming strips or pads mounted

upon cushions and arranged to dip into a glue-tank, substantially as described.

3. In combination with the cutter and its counter-roll, the spring-pressed plate for stripping and directing the forward end of the blank into the guide, substantially as described.

4. In an envelope-machine, and in combination with the blank-forming mechanism, a revolving cylinder provided with folding mechanism, substantially as described.

5. In an envelope-machine, and in combination with blank-feeding mechanism, substantially such as indicated, a revolving cylinder carrying folding-blades, a gripper, and a former, substantially as described.

6. The rotating cylinder carrying the gripping-jaw and folding-blades mounted thereon, in combination with the pivoted former, substantially as described.

7. The folding-blades, in combination with the pivoted former, adapted to be withdrawn after three sides of the blank have been folded, substantially as described.

8. The folding-blades and pivoted former, in combination with the arm bearing a moistening-pad, substantially as described.

9. The folding-blades and pivoted former, in combination with the moistening pad and supplemental folding-blade, substantially as described.

10. In combination with the rotating cylinder carrying the folding-blades, the pivoted arms provided with a former and folding-blade and moistening-pad, respectively, the stationary cams, and connecting mechanism such as indicated for operating the same, substantially as described.

11. The rotary cutter, spring-plate, and guide, in combination with the rotary cylinder carrying the folding-blades, pivoted former, pad and supplemental folding-blade, and the mechanism, substantially as described, for operating the same, as set forth.

12. In an envelope-machine, and in combination with the blank-cutting mechanism, substantially as described, the rotary cylinder provided with folding-blades, a former such as indicated, and a pivoted gripper, whereby as the blanks are delivered from the cutting mechanism they are grasped by the gripper and held upon the cylinder in position to be folded during the rotation of the latter, substantially as described.

13. The spring-operated folding-blades, in combination with the pivoted former adapted to hold one of the blades open and to release the same when withdrawn from the blank, substantially as described.

14. The spring-operating folding-blades and the pivoted and laterally-sliding former, in combination with the supplemental folding-blade to assist in making the final fold after the former is withdrawn, substantially as described.

15. The pivoted lever carrying the former at one end and the roller at the other, in com-

bination with the sliding rack, the sleeve and pinion, and the cams for operating upon the lever and rack, substantially as described.

16. In combination with the rotating cylinder and folding mechanism, substantially such as described, the pivoted moistening-pad dipping into the tank at each revolution of the cylinder, as set forth.

17. In an envelope-machine, the combination of a rotary flanged drum or cylinder, two series of folding devices, substantially as described, arranged in parallel planes and mounted upon said cylinder, and operating mechanism, as described, whereby each separate folding mechanism is independently operated during a complete revolution of the cylinder, substantially as and for the purpose set forth.

18. The combination, in an envelope-machine, of the rotating cylinder K, the two series of independent folding mechanisms, substantially as described, supported wholly upon the said cylinder, and the two independent series of cams, each engaging and operating the folding devices of its particular series, substantially as described.

19. In combination with the rotating cylinder carrying the pivoted folding-blades, as described, the tape encircling the cylinder and lying diagonally between the folding-blades for stripping the envelopes and delivering them upon the table, substantially as described.

20. In combination with the delivery-table, the conducting-rollers and tapes, and the pin for turning the envelopes, substantially as described.

21. In an envelope-machine, the combination of a rotary cylinder, pivoted folding-blades and former mounted upon said cylinder, a fixed shaft provided with stationary cam-surfaces, and intermediate mechanism, substantially as described, for causing the movements of the folding-blades during the rotation of the cylinder, substantially as described.

22. In an envelope-machine, the combination, with a continuously-rotating cylinder carrying folding mechanism mounted upon the periphery thereof and operated from fixed cams, of a blank cutting and delivering mechanism, substantially as described.

23. In an envelope-machine, and in combination with a continuously-rotating blank-cutting roller, a rotary cylinder carrying a series of grippers and a corresponding series of folding-blades, substantially as described.

24. In an envelope-machine, the combination, with a blank cutting and delivering mechanism, such as described, and a rotary cylinder, of a series of diagonally-disposed folding-blades and operating mechanism therefor, substantially as described.

OTIS E. DAVIDSON.

Witnesses:

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