

(No Model.)

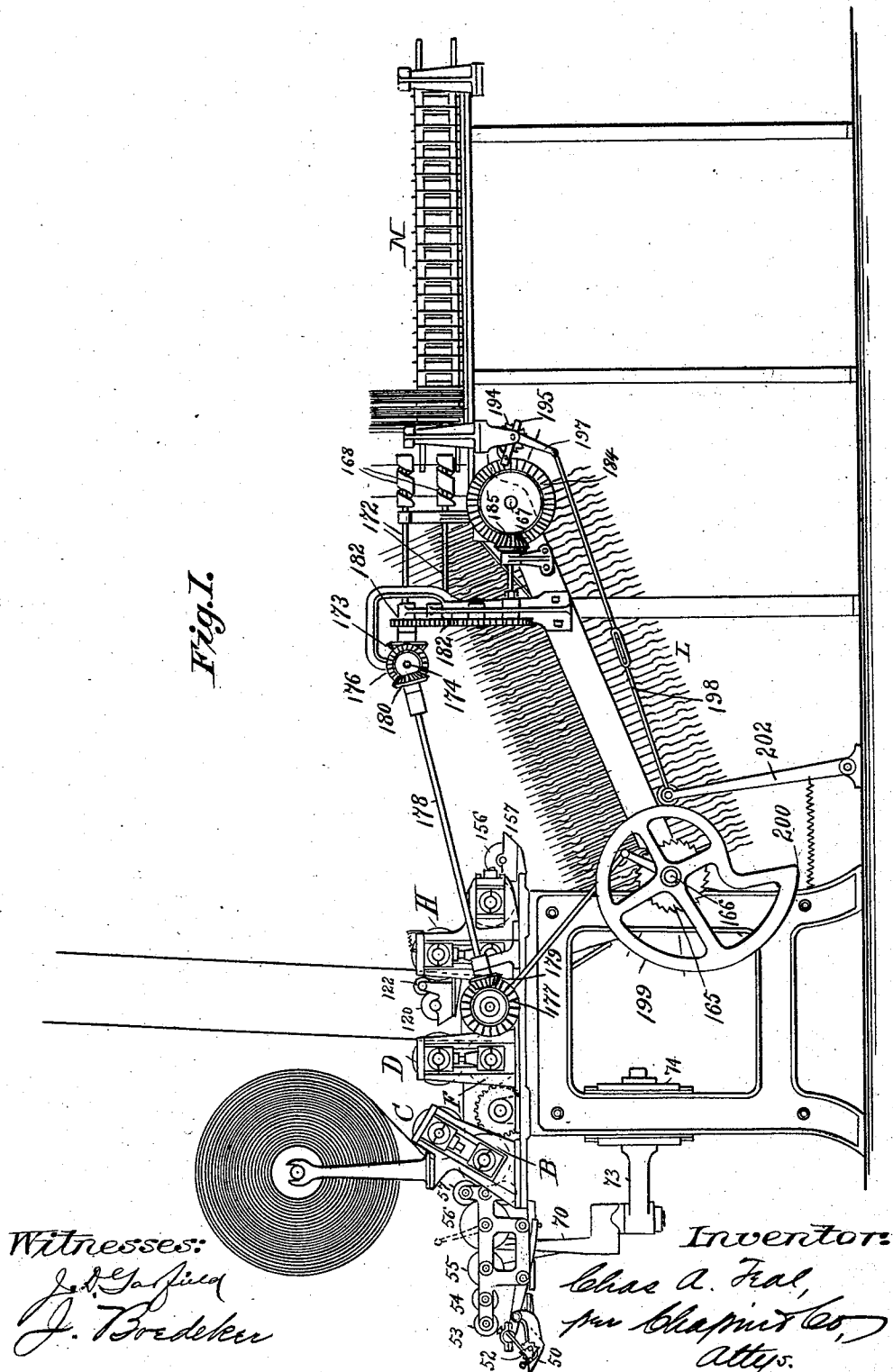
14 Sheets—Sheet 1.

C. A. TEAL.

MACHINE FOR MAKING AND PRINTING ENVELOPES.

No. 524,288.

Patented Aug. 7, 1894.



C. A. TEAL.

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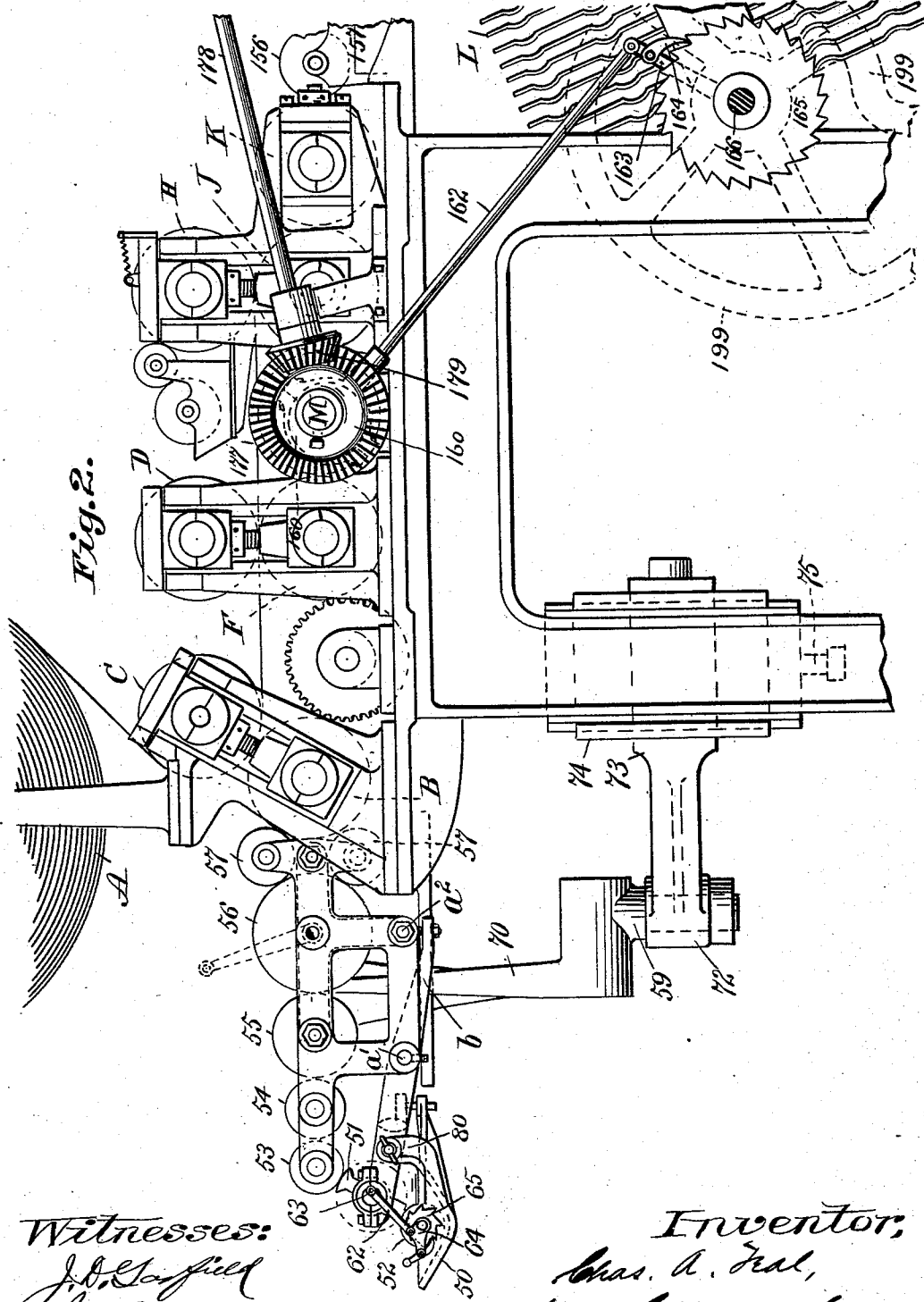


Fig. 2.

Witnesses:
J. D. Sanford
J. Bodeker

Inventor,
Chas. A. Teal,
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(No Model.)

14 Sheets—Sheet 3.

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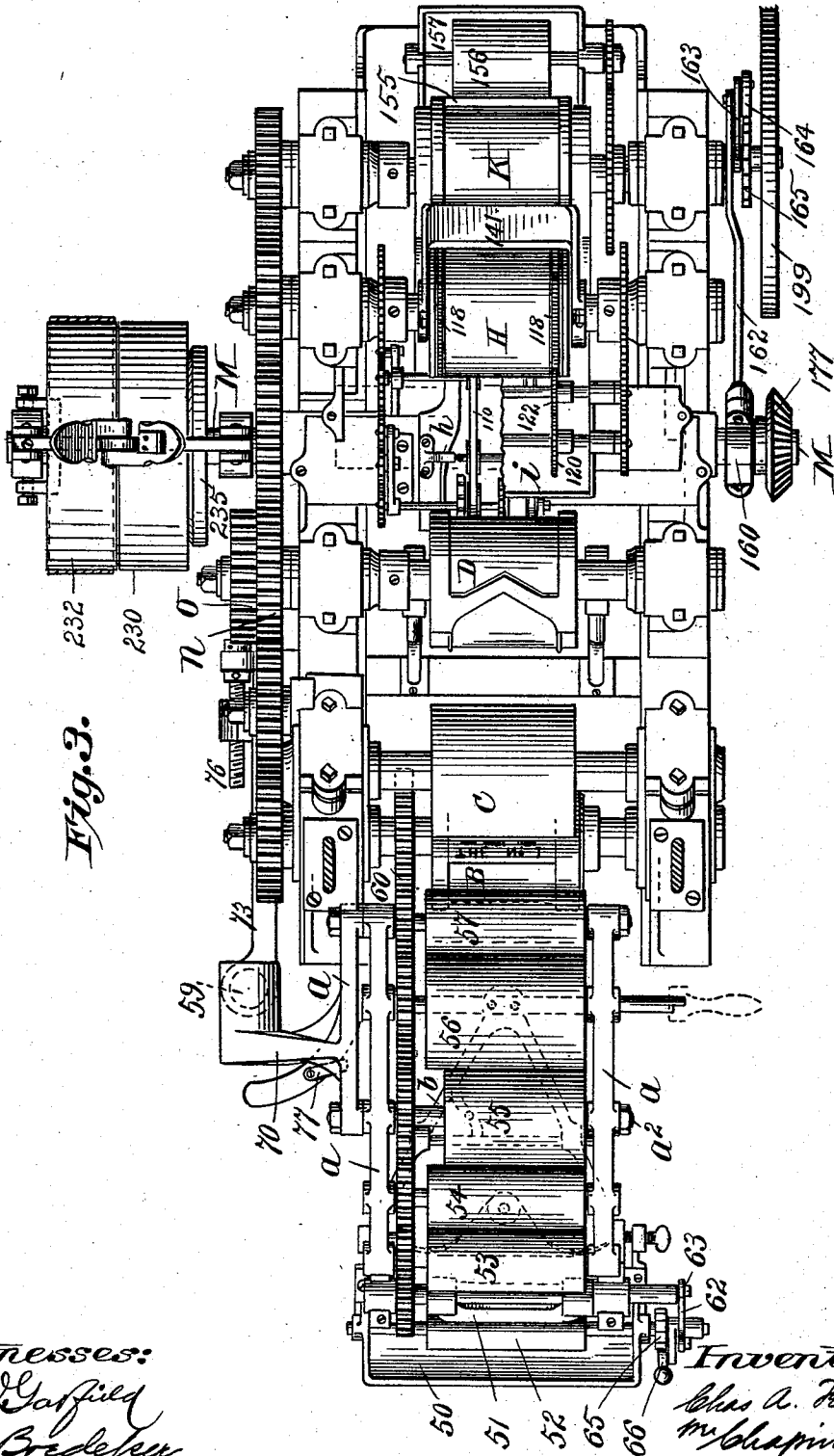


Fig. 3.

Witnesses:
J. DeGardfield
J. Bredeker

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C. A. Teal,
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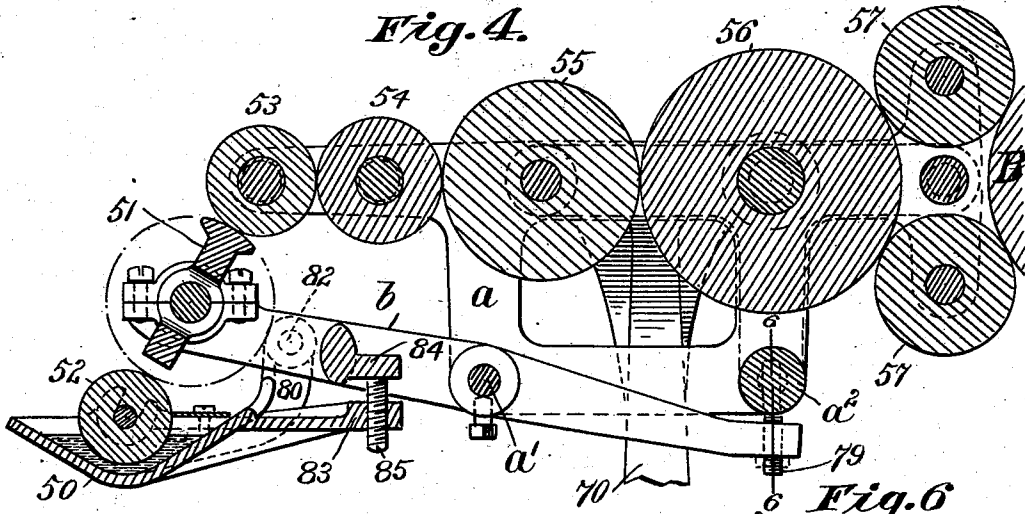


Fig. 5.

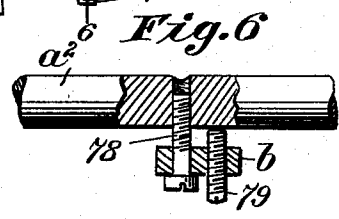
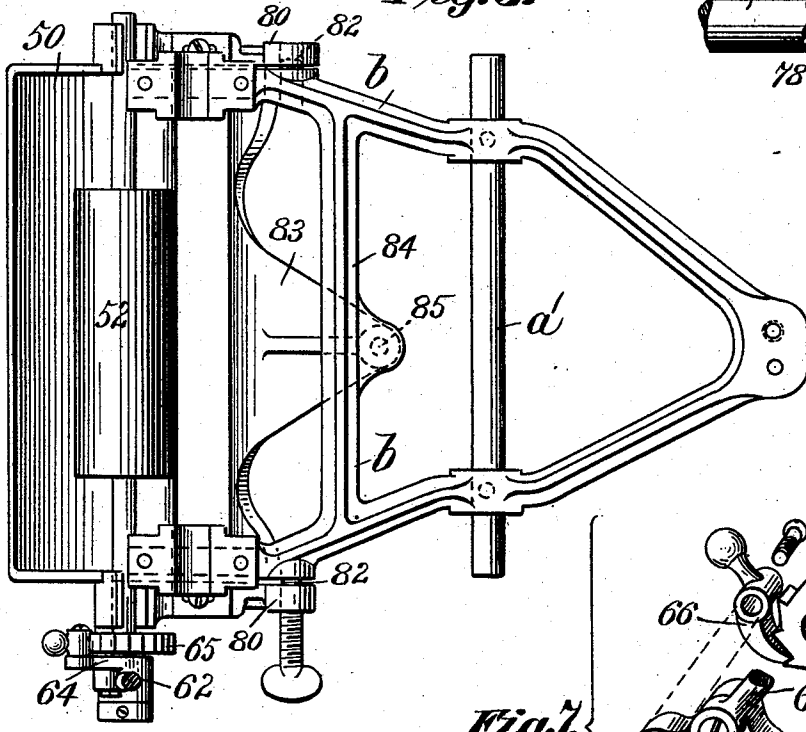
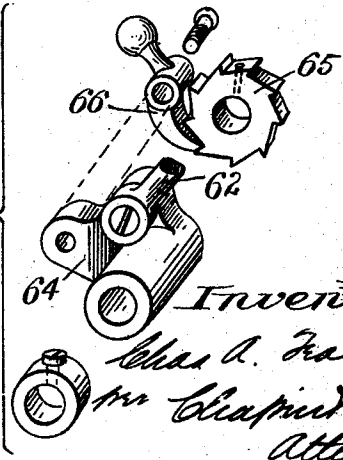


Fig. 6.

Fig. 7.



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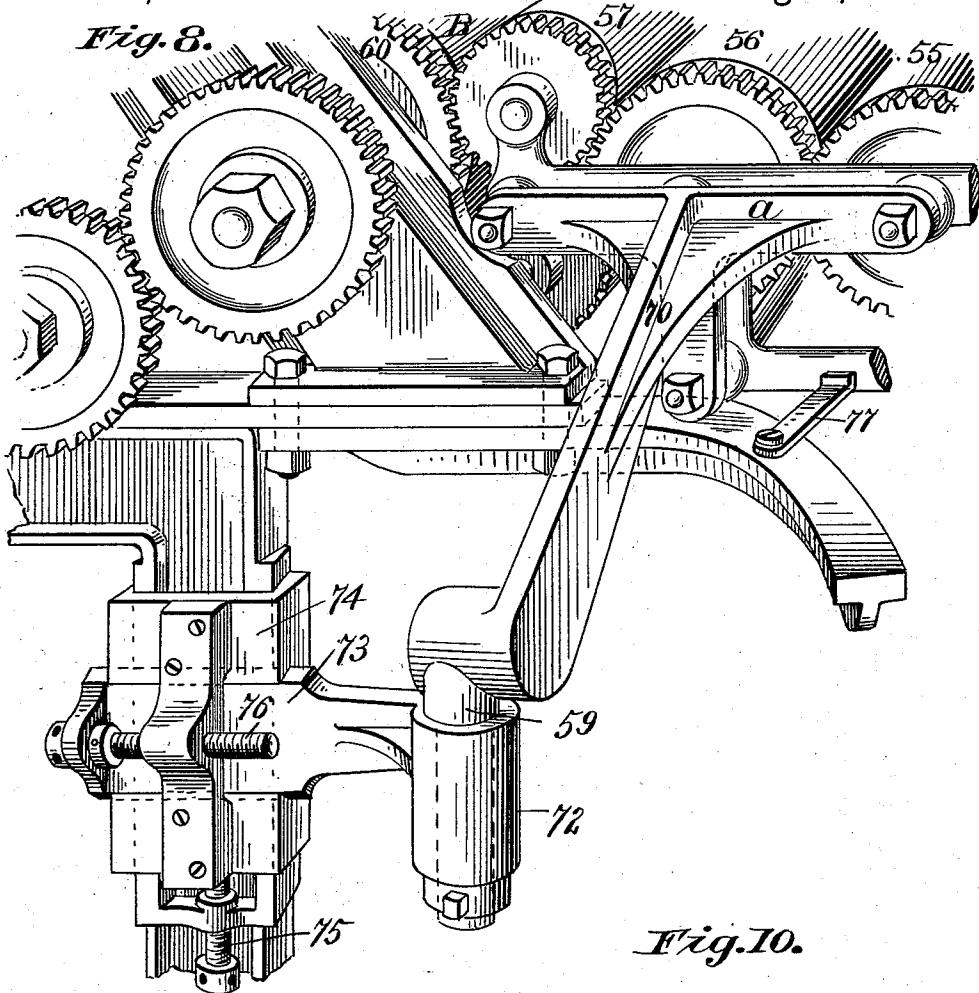
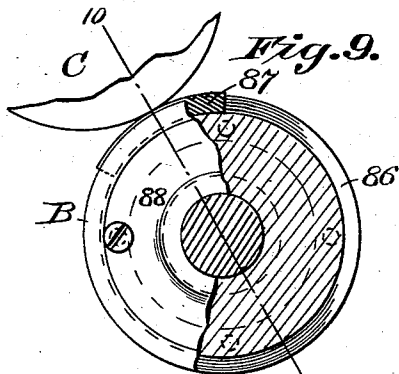
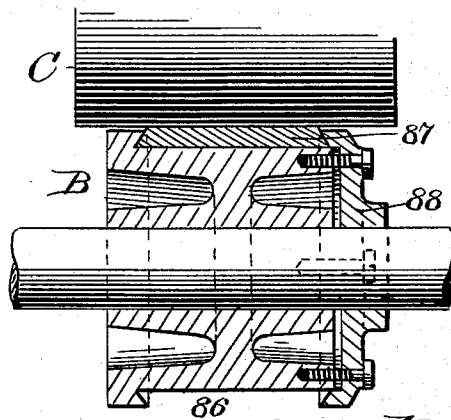


Fig. 10.



Witnesses:
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(No Model.)

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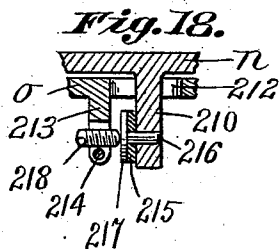
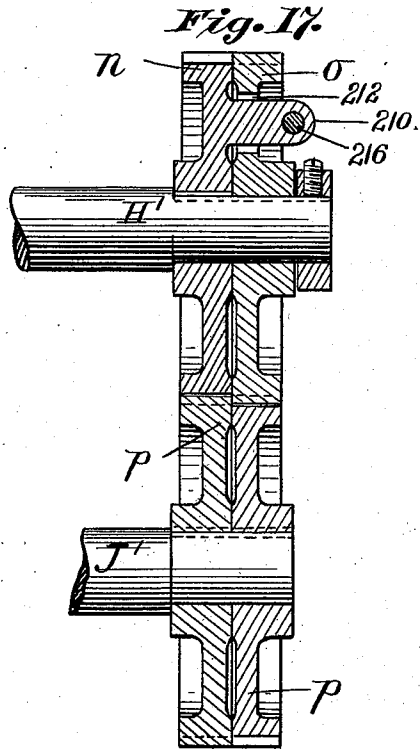
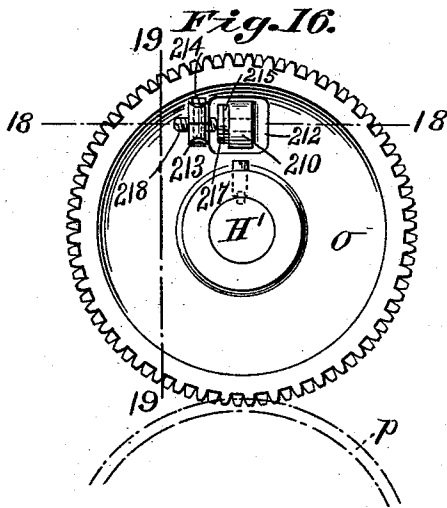
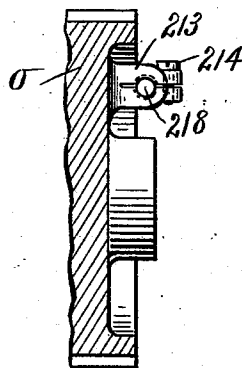


Fig. 19.



Witnesses:
J. D. Garfield
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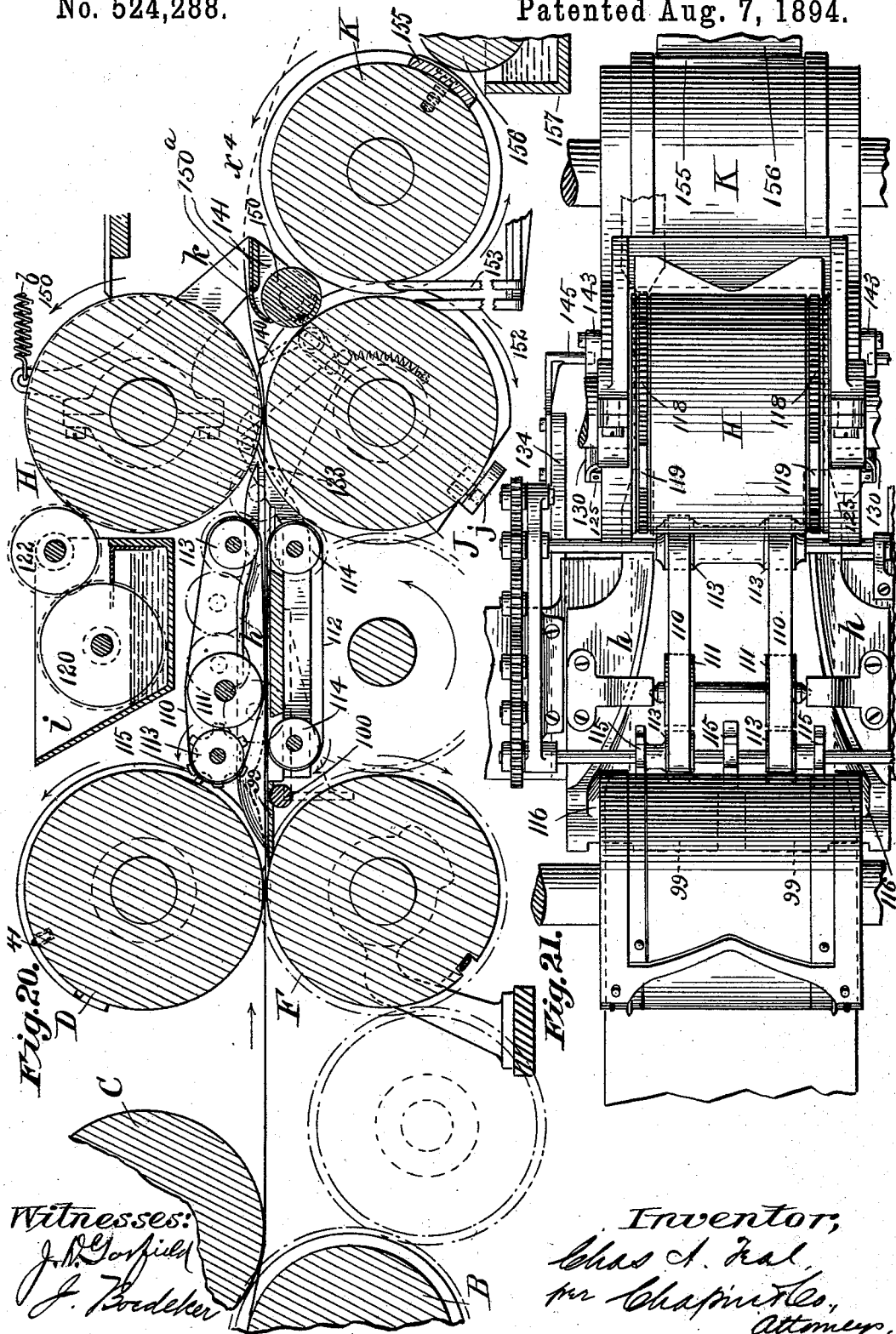
Inventor,
Chas. A. Teal,
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No. 524,288.

Patented Aug. 7, 1894.

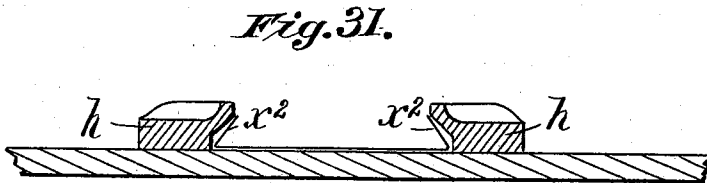
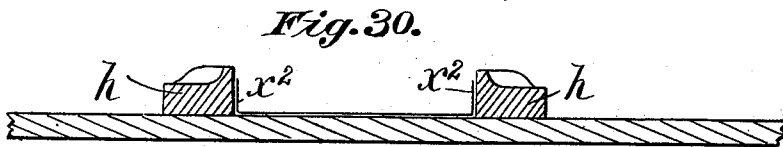
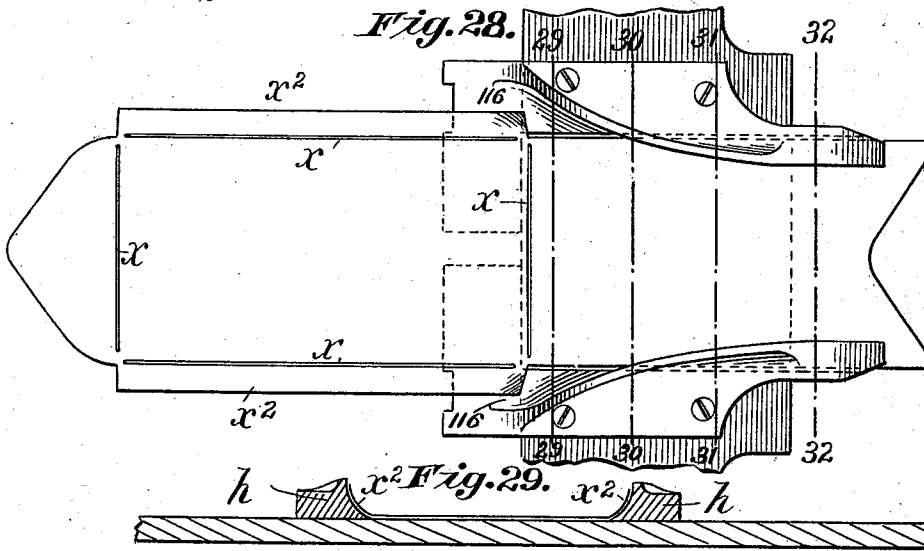
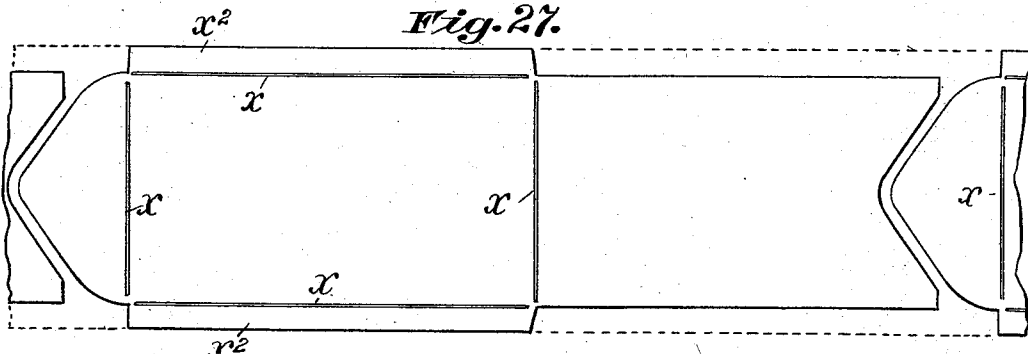


C. A. TEAL.

MACHINE FOR MAKING AND PRINTING ENVELOPES.

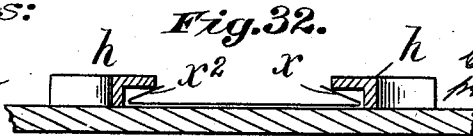
No. 524,288.

Patented Aug. 7, 1894.



Witnesses:

J. W. Garfield
J. Bodeker



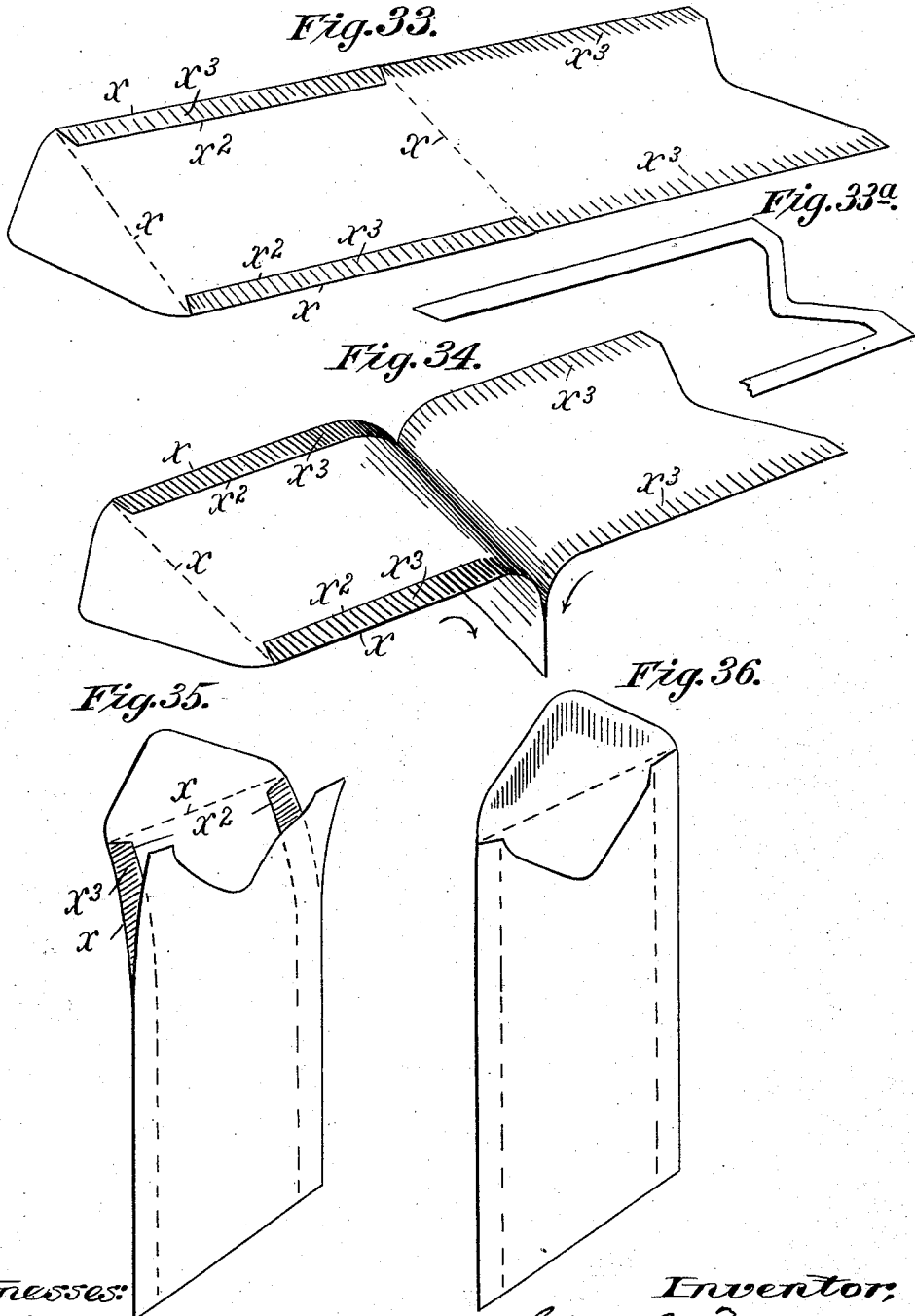
Inventor,
C. A. Teal,
per
Chapman & Co.,
Attys

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MACHINE FOR MAKING AND PRINTING ENVELOPES.

No. 524,288.

Patented Aug. 7, 1894.



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(No Model.)

14 Sheets—Sheet 12.

C. A. TEAL.

MACHINE FOR MAKING AND PRINTING ENVELOPES.

No. 524,288.

Patented Aug. 7, 1894.

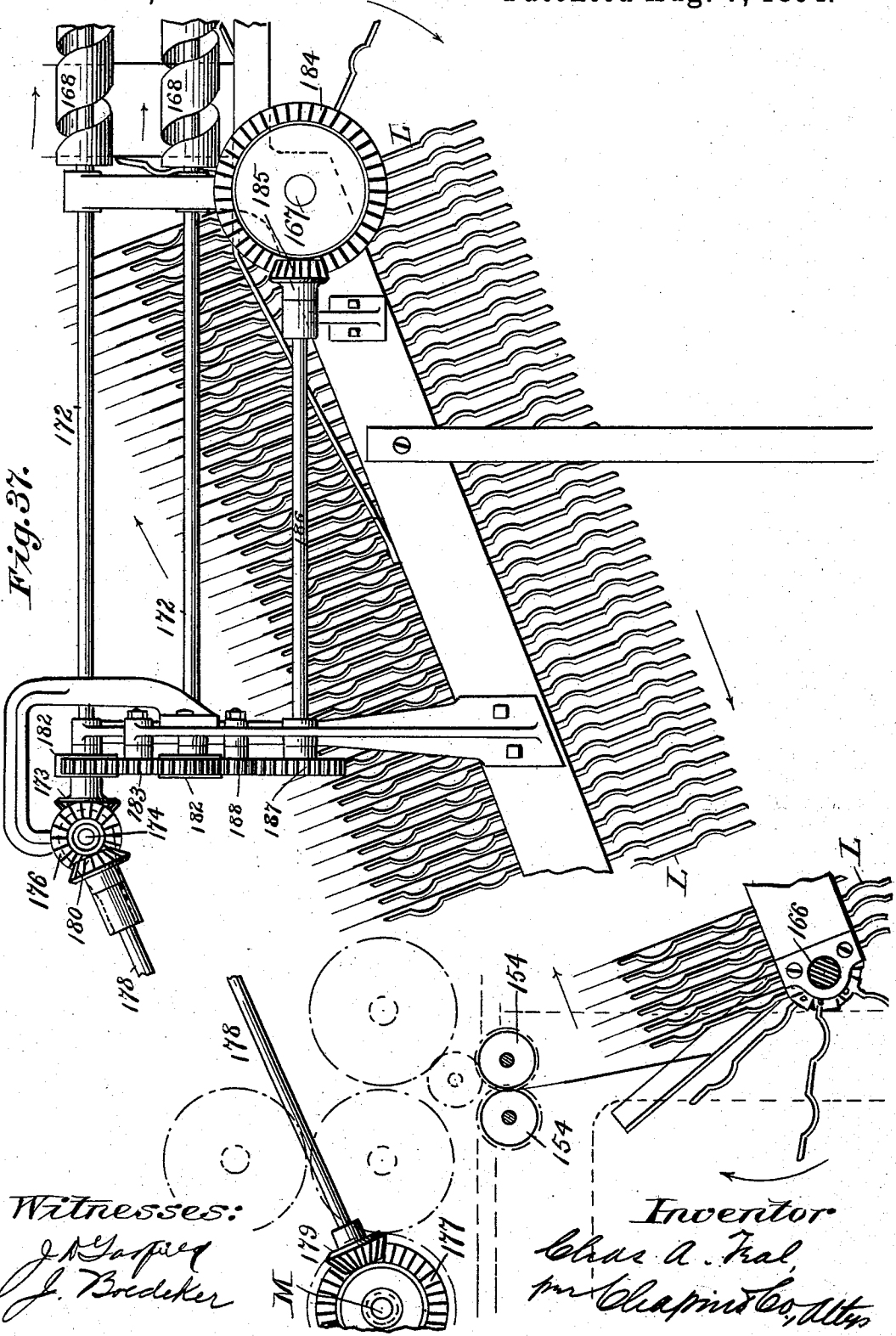


Fig. 37.

Witnesses:
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MACHINE FOR MAKING AND PRINTING ENVELOPES.

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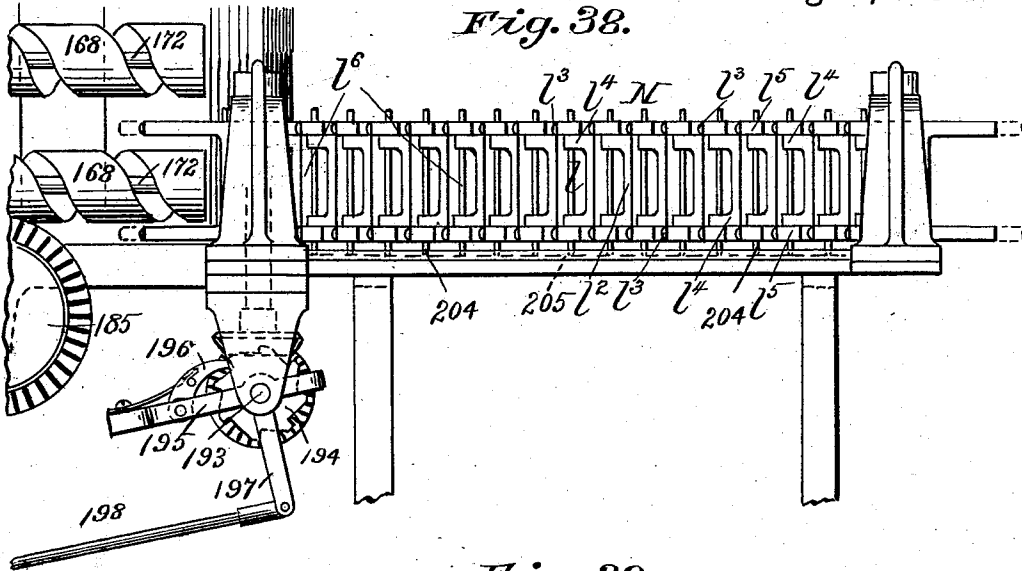


Fig. 39.

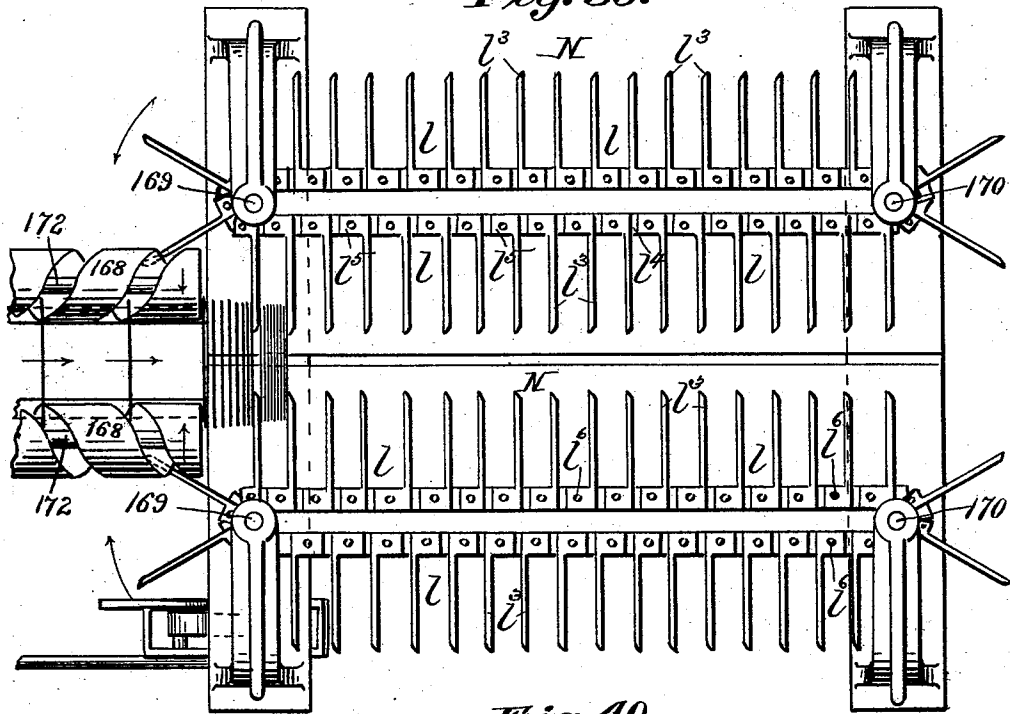
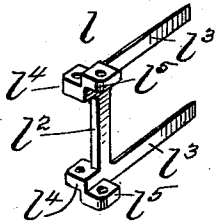


Fig. 40.



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MACHINE FOR MAKING AND PRINTING ENVELOPES.

No. 524,288.

Patented Aug. 7, 1894.

Fig. 41.

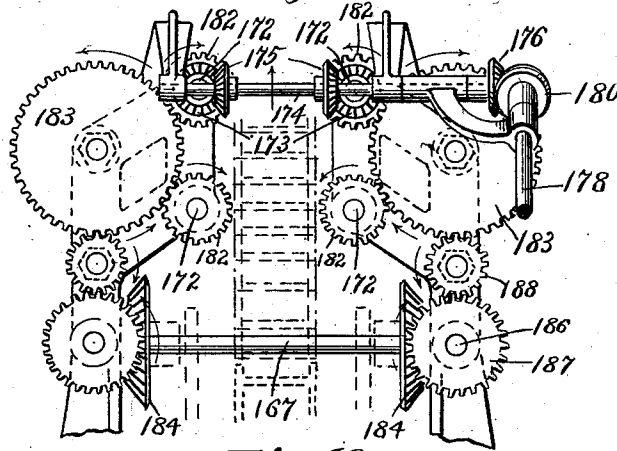


Fig. 42.

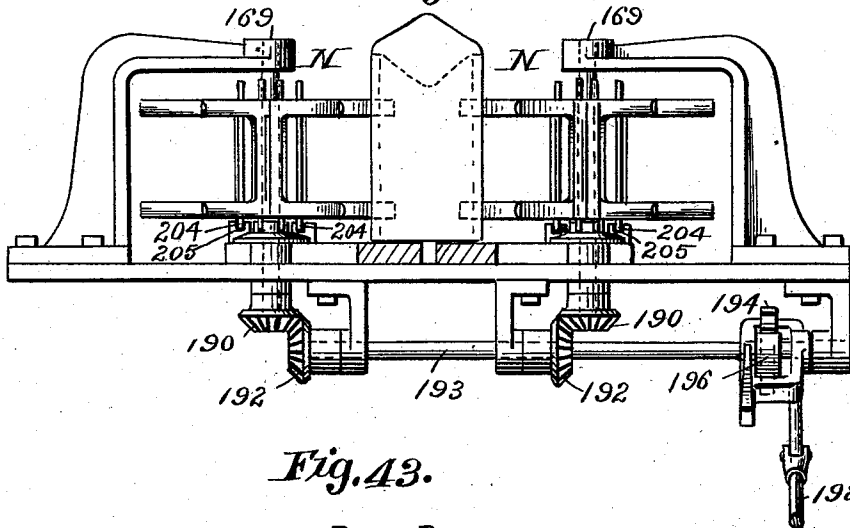
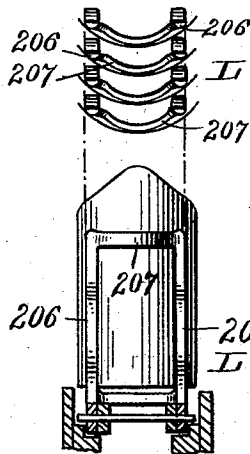


Fig. 43.



Witnesses
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J. Brediker

Inventor,
Chas. A. Teal,
Per Chapman & Co., Atty.

UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING AND PRINTING ENVELOPES.

SPECIFICATION forming part of Letters Patent No. 524,288, dated August 7, 1894.

Application filed July 13, 1893. Serial No. 480,357. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. TEAL, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful improvements in Machines for Making and Printing Envelopes, of which the following is a specification.

This invention relates to improvements in machines for making envelopes, the seams of which are at the side edges and which can be made from a continuous roll or web.

The machine which embodies the present improvements, in its operation feeds forward the paper to the action of a rotary printing mechanism, thence to rotary cutting rolls which cut out the properly shaped blank,—and from which rolls the waste paper cuttings are discharged,—thence to two sets of folding mechanism, the pasting or gumming devices being arranged in conjunction therewith; the printed, pasted, and folded envelopes are then carried into the drier apparatus and set off in bunches of twenty-five, or other suitable number.

The blank, from which the envelopes are formed, is cut in at one end and has the tongue or folding flap at its other, and the body of the blank has for half of its considerable length, which is twice that of the completed envelope, narrow sidewise extensions or wings which are at the opposite sides of the blank, extending half of the length thereof, and all as will be seen in Figures 27 and 33 to 36 of the drawings. The said side extensions are turned inwardly on the body of the flap, as seen in Fig. 33, their exposed surfaces gummed, as well, preferably, as also the longitudinal marginal portions of the half of the blank farthest from the flap; the said latter half of the gummed blank is folded over and pressed onto the half having said inturned and gummed wings, the tongue or seal flap being usually also gummed, but is, however, left unfolded.

An envelope, formed by a blank, folded and stuck as described, is furthermore advantageous for business correspondence, as better adapted to be typewritten upon than envelopes formed from the diamond shaped blanks.

Having given an indication of the kind of envelopes produced, it will be stated that the invention relates to improvements in the blank cutting rolls whereby it is assured that they will cut out the blanks from the running strip of the paper with great certainty, and also crease or score the blanks on their proper folding lines, and all without liability of such rolls becoming smeared with ink from the already printed paper,—and also to coating devices by means of which the waste or cuttings are efficiently discharged from the machine.

The invention further relates to the construction of the driving gears for the cutting rolls whereby they run absolutely in unison there being no lost motion as the speed of the one is related to that of the other.

The invention further relates to the conveyers for carrying the cut-out blanks to the action of the devices which overturn the side extensions, and thence to the action of the gumming and folding devices; as well as to said overturning devices and to said gumming and folding devices coacting with which latter are means for the discharge and guidance of the envelopes into the drier chain.

The invention also relates to the arrangement of the drier chain devices and in the form or construction of certain of the articulated members thereof whereby the gummed flaps of the envelopes may not be permitted to bend to contact one with the next.

The invention also relates to improvements in the counting or bunching mechanism; and also to various minor features of improvement in different parts of the machine which experience has shown to be important and all as will be rendered apparent hereinafter. And to these ends the invention consists in the various combinations of parts or devices, and the construction or formation of certain of the parts all substantially as will hereinafter be fully described and set forth in the claims.

Reference is to be had to the accompanying drawings in which the present improvements are illustrated, and in which—

Fig. 1 is a side elevation of the complete machine for printing the paper, cutting out, gumming, and folding the blank, and drying and bunching the printed and pasted envel-

opes. Fig. 2 is a side elevation on a larger scale of the principal parts of the machine, that is at the rear of the drier mechanism a small portion only of the latter being shown, and Fig. 3 is a plan view of the same. Fig. 4 is a vertical sectional view taken in the direction of the length of the machine through the ink distributing devices. Fig. 5 is a plan view of the adjustable supporting devices for the ink fount and supply roll and for the ink transmitter. Fig. 6 is a vertical sectional view taken on the line 6—6, Fig. 4. Fig. 7 is a representation in perspective of parts forming the medium of driving connection between the ink transmitter and the supply roll in the fount. Fig. 8 is a perspective view showing parts of the inking rolls relative to the printing cylinder and showing the swinging support therefor, and the vertically and longitudinally adjustable support for the swinging support. Fig. 9 is an end view and partial vertical section showing the printing cylinder and part of the platen roll, Fig. 10 being a sectional view and partial elevation at right angles thereto. Fig. 11 is a perspective view of the rolls for cutting out the blanks with coating devices movable in unison therewith. Fig. 12 is a perspective view of a part which is combined with the lower cutter roll and which is herein termed the "clearer" for the waste. Figs. 13, 14 and 15 are views showing the relations of parts of the blank cutter rolls at different stages of the operation. These views will be hereinafter particularly referred to. Fig. 15^a is a sectional view showing the longitudinal contour of one of the cutting and creasing rolls. Fig. 16 is an end elevation of the gears of the cutter rolls, Fig. 17 being a vertical section through same. Fig. 18 is a sectional view on line 18—18, Fig. 16, and Fig. 19 is a sectional view on the line 19—19, of Fig. 16. Fig. 20 is a vertical sectional view longitudinally of the machine showing especially the blank cutting rolls, the conveyers, side folders, and the rolls which perform the gumming and also overturn the half of the blank, which forms the back of the envelope, onto the other half which constitutes the front. This view also comprises the end flap gummer and parts of the discharge guides. Fig. 21 is a plan view of the parts shown in Fig. 20. Fig. 22 is a vertical sectional view more particularly showing the folder and gumming rolls, and the discharge and guide devices. Fig. 23 is in part a plan showing the last mentioned rolls with parts of the lower one broken away to show more clearly one of the grippers, and one of the movable fingers which insures, at a given time, the proper forward feed of the front end of the blank, all as will hereinafter be explained. Fig. 24 is an end view of said roll with the gripper and finger combined therewith,—Fig. 25 being a side elevation of the same taken at right angles thereto, this view showing the relation of one of the grippers to the paper from which the envelope is being

formed. Fig. 26 is a perspective view showing a part of the lower folding roll, the gripper in engagement with the edge portion of the blank and a part of the cam for operating the gripper. Fig. 27 is a plan view of one complete blank as produced by the cutter rolls, and contiguous portions of the next; the spaces between the ends of the blanks, and in part bounded by the dotted lines, indicate the form of the waste stock. Fig. 28 is a plan view of the folders which overturn the side extensions of the blank. The blank is also shown as passing through and between these folders. Figs. 29, 30, 31, and 32 are cross sectional views of the said folders as seen at different places along the length thereof, as indicated by the lines 29—29, 30—30, 31—31, and 32—32, respectively, the different stages in the overturning of the side extensions of the blank being very clearly shown. Fig. 33 is a perspective view showing the blank with the side extensions overturned. Figs. 34 and 35 are perspective views showing the blank as in further stages toward the condition of a complete envelope, Fig. 36 showing the completed envelope. Fig. 37 is a side elevation of the first portion of the drier apparatus, Fig. 38 being an elevation showing the final part of the drier, while Fig. 39 is a plan view of the parts shown in Fig. 38. Fig. 40 is a perspective view of one of the members of the chain seen in Figs. 38 and 39. Fig. 41 is a front elevation of the gearing for the driving of the first chain, and the spiral conveyers. Fig. 42 is an elevation taken just front of the second or bunching chain. Fig. 43 is an illustration of the particular form of the members of the first chain.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the paper-supply-roll, suitably mounted; the paper is to be drawn therefrom under slight tension, by the rotary running parts of the machine, it passing thence between the printing cylinder, B, and the platen roll, C, to and between the upper and lower cutting rolls, D and F, the blank being cut out from the strip after the printing has been effected.

50 represents the fount or receptacle for the ink, in which rotates the ink supply, or delivering roll, 52.

51 is the transmitter, and 53, 54, 55, 56, and 57, 57 are the distributing rolls, and all of these parts are carried on the support, a, swinging from the point 59, at one side of the machine, so that they may, at pleasure, be bodily carried away from the printing cylinder; all of said distributing rolls, and the transmitting segment, 51, have intermeshing gears, receiving their motion by their mesh with the gear, 60, on the printing cylinder.

The supply roll in the ink fount moves only as the transmitting segment passes it, its motion being imparted by the connecting-rod, 62, one end of which is in engagement with the eccentric pin, 63, on the journal of the

transmitter and the other is in engagement with the pawl carrier, 64, loosely hung on the journal of the supply roll. The supply roll has the ratchet wheel, 65, fixed thereon with which engages the pawl, 66, pivotally mounted on the said pawl carrier. The support, *a*, comprises the opposing side frames or members and the suitable uniting cross bars, as *a'*, *a''*, the support, *b*, for the ink transmitting segment being intermediately and adjustably supported on the bar, *a'*, while the ink fount is adjustably mounted on the said support, *b*. All of these said inking devices are mounted to swing as aforementioned, on the vertical axis, as seen at 59, by being supported at one side upon the arm, 70, which has the depending stud at its lower end which sets into the socket hub, 72, of the block, 73. This block is adapted to slide for adjustment horizontally in the direction of the length of the machine in ways therefor in another block, 74, which is vertically movable on the framing of the machine. The adjusting screw, 75, effects the vertical adjustment of the block, 74, relative to the frame, while the screw, 76, engaged with the block, 73, having the screw engagement with the block, 74, insures the horizontal adjustment, all whereby the inking rolls and auxiliary parts may be given their proper co-operative relations to the printing cylinder, whether larger or smaller, as variously employed. When the support for the inking devices is so swung as to bring the rolls, 57, 57, to contact with the printing cylinder, B, said support is immovably held by the dog or latch, 77, which is pivoted on a supporting arm of the frame and adapted to be swung to endwise contact with a part of the ink roll support, *a*.

The equipment of the frame, *b*, which carries the segmental ink transmitter for its adjustment by a swing movement whereby the proper contact between the inking face of the segment and the face of distributing roll, 53, may be insured, is by means of passing the shank of the headed screw, 78, loosely and vertically upwardly through the forward extension of the frame, *b*, with a screw engagement up into the cross-bar, *a''*; the adjustment insured by turning the screw 78 is held by turning the screw, 79, (which passes with a screw engagement through the said frame extension,) to firm endwise bearing against the under side of said bar, *a''*.

The ink fount or receptacle, 50, in which runs the ink supply roll, 52, has forwardly and upwardly extended ear pieces, 80, 80, which are pivotally hung as indicated at 82, upon the aforesaid adjustably mounted frame, *b*. There is also forwardly projected from the ink fount the arm or extension, 83, which has a position under the web of the cross-bar, 84, of said frame, *b*. The screw, 85, passing with a screw engagement through the arm, 83, to endwise bearing against the said part, 84, is to be so set as to swing the fount to bring the surface of the ink supply roll, 52,

journalled therein, into the path of revolution of the ink transmitting segment, 51.

The printing cylinder is illustrated in section in Fig. 10 and in partial cross section in Fig. 9, and is formed with the annular depression, 86, with the undercut sides for the reception of the segmental type sections, 87. For the insertion of these type sections the printing cylinder has, at one end, the removable head, 88. It will be now manifest that by releasing the dog, 77, all of the above described inking devices may be bodily swung a quarter way round, more or less, and entirely free from the printing cylinder, the gearing for these rolls being thrown out of mesh with the gear 60 of the printing cylinder.

The printing devices just hereinbefore described constitute the subject matter of a separate application for patent filed by me January 11, 1894, under Serial No. 496,460.

The blank cutting rolls, D and F, are journalled to run in peripheral contact the one with the other, and at exactly the same speed of rotation, their axes being parallel to each other and to the printing cylinder and platen as well, also, as to the axes of the gumming and folding rolls H, J, K, to be hereinafter described. These blank-cutting rolls are constructed to the end of cutting out the blank of the form seen in Fig. 27, forming the scores or creases, *x, x, x, x*, in the blank, in the parallel longitudinal and parallel transverse lines, shown in said Fig. 27, upon which the blank is folded in the making of the envelope, and to the end of assisting in the discharge of the waste cuttings free from the rolls and out of the machine and also insuring the freeing of the cut blank from peripheral contact with the one or the other of the rolls whereby the blank may with certainty be carried straight forward to the folding devices for the side extensions, *x''*, *x''*. The development of the peripheral surface of the lower roll, F, is the same as the form of the said illustrated blank, the curved depression, 90, across the face of this roll corresponding to the transverse part of the waste paper, which divides one blank endwise from the next, and *d, d*, represent the cutting edges of the roll, F, while, *f, f*, represent the cutting edges of the upper roll, D, which are formed by the boundaries of the depressed portions of said roll; the cutting edges of the one roll match as the rolls rotate in unison, for shear actions, as common in rotary rolls for cutting paper and other thin material. In practice the upper roll, and a semi-cylindrical portion of the lower roll are equal to the width of the paper fed through the machine, and which is the same as the transverse dimension of the blank between the outer edges of the side extensions, *x''*, *x''*, thereof; and, therefore, as plain, it does not become necessary to cut away the side portions from the supply paper for half of the length of each blank. The rolls are also provided with the longitudinal and transverse,

matching, narrow, scoring ribs and depressions, 92 and 93, so that as the blank is cut out it is also scored on the proper folding lines. The middle portions of one or both of the rolls are reduced or depressed, as at 94, Fig. 15^a, so that the freshly printed paper from which the blank is being cut may not smear the roll over which it passes with ink, by reason of its having no pressure contact therewith. The prominent portions, 91, 91^a, of the upper roll correspond in form to the waste stock, the curved transverse part, 91^a, matching into the said crosswise depression 90, of the lower roll, while the prominent side parts, 91, 91, of the upper roll fit down for the shearing action by matching surfaces of the cut away or shortened part of the lower roll. One of the rolls,—as shown, the upper,—has the rubber treads, 95, constituted by the rubber bands set into circular depressions therefor whereby an efficient frictional contact for the forward feed of the paper is insured. The said prominent parts, 91, 91, of the upper roll have at their forward extremities the short radial studs, 96, 96, which bear to impart a stretching tension on the paper as the forward transverse shear cutting thereof is to take place, whereby such cutting action may be rendered positive and complete. The bearing ends of the said studs, being farther from the axis of the roll than the normal plane of the forwardly traveling paper, bend the paper slightly, as indicated in Fig. 14, for the stated purpose. Furthermore, each of the prominent parallel portions, 91, 91, of the upper roll have at their rearward extremities the studs, 97, 97, the ends of which are serrated. As the two rolls rotate, the ends of the studs, 97, and the plate spring, 98, supported within the cut away ends of the lower roll, come together, and the ends of the said studs being farther from the axis of the upper roll than the normal plane of the traveling paper have accelerated movements relative to the blank proper which is being cut out, so that the rear extremities of the side sections of the waste are drawn forwardly with a slightly accelerated movement away from the forward end of the side extensions, x^2 , x^3 , insuring a more efficient and complete cutting and a better clearance of the waste.

The spring, 98, affords a yielding bearing for the under side of the paper, the studs having a slight slipping or wiping movement relative thereto, and the co-operative relations of these parts are indicated in Fig. 13.

The tendency of the cut out blank is to lie within the depression of the upper roll which is bounded by the shear cutting edges, f , f , while the cross part of the waste lies within the said depression, 90, under which is the follower or clearer, g , and thus as the rolls rotate the blank will move over the horizontal plate, 99, the rear edge of which is very near to the surfaces of the rolls at their throat. The upper roll, next to the cross protuberance, 91^a, has the rubber springs 41 set into de-

pressions thereof, these serving to clear the forward end of the blank from the upper roll as the surfaces of the rolls diverge, so that it will then travel horizontally over the said plate, 99, to the conveyers which coact with the side folders. The clearer, g , is in the form of a curved plate (see Fig. 12) to fit and play slightly radially within the said transverse depression, 90, of the lower roll, F. Said lower roll has on its hubs or journals at its ends the radially projecting studs, 102, which revolve in unison with the rolls and on which are fitted for revolution, and also slight radial sliding movements, the blocks, 103, 103, in which the ends of the clearer are secured. Each of the blocks has the projection, 104, which in its movement past and in contact with the stationary cam, 105, forces the blocks and the clearer outward, so as to expel the cross portion of the waste from the depression, 90, just after such has been severed from the blank. The springs, 106, secured on the ends of the roll and bearing on the blocks, normally maintain them inwardly and the clearer in the base of the said depression, 90. It will be perceived that there is, close to the throat of the lower cutting roll, under the aforesaid plate, 99, an idler roll, 100. As the waste cuttings are downwardly directed, moving with the lower roll, the plate springs, 98, 98, which are on and at the ends of the said lower roll, moving in contact with the said idler cause the rotation thereof for hastening and rendering more positive the discharge of the wastestock downwardly away from the throat of the rolls.

The conveyers for carrying the cut out blank from the rolls through or between subject to the action of the stationary folders for the side extensions, consist of the two upper and lower pairs of longitudinally running endless bands, 110, 112, preferably of rubber, mounted on the wheels or pulleys, 113, 113, and 114, 114, therefor, which have movements at their peripheries at the same rate of speed as the feed of the paper through the printing and cutting rolls as well also as afterward through pasting and folding rolls, H, J, K. The upper bands have between the upper and lower courses thereof the idler rolls, 111, of increased diameter, by means of which they are borne upon for insuring the proper frictional contact. On the shaft carrying the rear upper wheels, 113, for the conveyor bands, are the winged wheels, 115 the wings or arms thereof having a greater radial extent than the rims of the said wheels, 113, and, therefore, the said arms have movements considerably faster than the travel of the blank, and serve to strike against and downwardly throw the forward end of the blank should it, perchance,—as sometimes occurs,—move upwardly around hugging the periphery of the upper roll. This provision has been found important and very useful to insure the continuous running of the machine properly and without clogging.

The stationary folders, *h, h*, for the side extensions, x^2 , of the blank, are especially illustrated in Figs. 20 and 21, and 27 to 30, inclusive, and are formed by opposite separated parallel and longitudinally ranging metallic castings or parts suitably horizontally supported; and the inner working surfaces of these folders merge from horizontal planes at the rear, as seen at 116, to downward and inward inclines, as seen at line 29—29,—and the section thereof Fig. 29,—further merging into vertical sides,—see line 30—30 and Fig. 30,—and then to surfaces constituted by the inner faces of overhanging ledges,—see lines 31—31, and 32—32, Fig. 28, and Figs. 31 and 32, and in connection with these various cross sectional views observe the indications of the positions of the side extensions which are being overturned. The blank, after passing through the folders, *h, h*, for overturning the side extensions, next passes through the rolls, H and J, receiving the paste on its upper side in longitudinal lines as indicated at x^3 , in Fig. 33. The upper roll has at its peripheral portions, near its ends, the raised gumming surfaces, 118, 118, with the reduced or recessed portions, 119, so that the lower roll may not receive any of the gum at the places thereon which are left uncovered by the space between one blank and the next following.

The gum is contained in the gum-box, *i*, which is shown above the folders, *h, h*, and to the rear of the roll, H, the gum supply wheels, 120, 120, running in the box while the gum transmitting disks, 122, 122, are mounted between and in peripheral contact with said rolls, 120 and H. The forward end of the blank runs forwardly over the horizontal plate, *k*, its extremity overlying the roll, K, as indicated in dotted lines at x^4 , when the grippers, *j, j*, at each end of the roll, J, press upon the overturned gummed extensions, x^2 , of the blank at its opposite edges next behind the cross folding line, *x*, so that the blank, instead of passing horizontally farther forward over the roll, K, is carried downwardly upon and with the forward face of the roll, J,—the gummed forward half which had been moved forwardly over roll, K, being now rearwardly withdrawn and pressed upon the rear half of the blank, this operation being in a manner indicated in Fig. 22, as also in Fig. 34,—the arrows on the latter figure showing the relative directions of movements of the forward and rearward halves of the blanks for bringing them to adhesion the one upon the other. The parallel longitudinal and superimposed portions are pressed together by the peripherally bearing portions of rolls, J and K. The roller 150 is a pressure roller of a length to extend along, and press and crease the bottom fold of the envelope, that is at the middle transverse line of the blank. The roller, 150, is journaled on the arms, 150^a, of the brackets which have pivotal supports and to which are applied the springs, 150^b, for causing the roll to have its yielding pressure against the

periphery of the said rolls, J. It will be here observed that the grippers bear upon the marginal portions of the blank only a short distance across the gummed strip, x^3 , as indicated in Figs. 25 and 26; the grippers are operated so as to seize the blanks as they come up to the top of the roll, and the operation thereof and of their actuating means will be now described.

The roll, J, has ear-lugs, 125, at its ends with the longitudinal slots, 126, while each gripper consists of a block or body, 127, to lie across the peripheral surface of the roll, J, at its end, with the angularly extended ear-lugs, 128, 128, to project at each side of the lug, 125, the pin, 129, passing through the said ears and said slotted lug. The spring, 130, mounted on the end of the roll and bearing against the outer end of the gripper exerts the stress to maintain the gripper in its inner disposition, the inner end of the slot, 126, then being next to the pin. Each gripper therefore, is adapted to have two movements, a bodily sliding movement parallel with the axis of the roll, and a swinging movement against and away from the peripheral face of the roll. Each gripper is also provided with the outwardly extended lug, 132, encroaching over the path of which is the under cam surface, 133, of a stationary fixture, 134, see Figs. 20, 22, and 26. As the roll, J, assumes the position where the grippers in their revolution approach their highest positions, the impingement of the members, 132, of the grippers against the cam surfaces 133 causes the grippers to open from the adjacent surfaces of the roll, closing down upon the blank when the said cams are passed. The grippers hold the blank closely to the roll while the rear half is being folded onto the front half, as insured by such detention of the blank by the grippers, and they are then released to permit the downward discharge of the envelope into the drier chain by the cam surfaces, K², Fig. 23, on the ends of the adjacent roll, K,—see Fig. 23,—which, at the proper time contact with the portions of the grippers to force them outwardly.

It will be perceived, on reference to Fig. 26, that the body of the gripper is provided at its top with a projection, or shoulder, j^2 , somewhat outside of the lip, or part, j^3 , of the gripper which directly presses upon the envelope between the two thicknesses thereof, and it is against this portion of the gripper that the cam, K², of the roll, K, seasonably impinges.

In order that the forward end of the blank, on emerging from between the rolls, H and J, may be held from sagging down, and so that it may be directed over the horizontal plate, 141, (the rear edge of which, however, is downwardly inclined,) the roll, J, carries at its ends, within suitable recesses therein which open to the periphery, fingers, 140, which are pivotally mounted and substantially cam operated all so that at the proper time the fingers are swung outwardly beyond the periph-

ery of the roll holding the paper up until it has run onto the said horizontal plate, and all as indicated in Fig. 20. The said fingers, 140, are carried on, and as parts of the studs or short shafts, 142, set in the sockets therefor in the roll, each of said studs having the inwardly directed arm, 143, with the spring, 144, secured thereto and to the roll. Upon the aforementioned fixtures, near the ends of the roll, are the cam or wiper projections, 145, to be so impinged upon by said arms, 143, as they revolve, as to swing the device for the action explained. Adjacent the forward lower portion of the roll, J, and under the pressure roll 150 are the vertical guides, 152, 153, for the envelopes, while below them are the properly driven rollers or feed wheels, 154, which positively run the envelopes down into the chain, L, therebelow. The roll, K, just in advance of the folding roll, J, has thereon the gumming segment, 155, which receives gum from the roll, 156, running in the gum-box, 157, and the relation and rotation of this roll to the feed of the folded envelope are such that just as the rear flap is about to pass down between the guides, 152, 153, the said segment comes to the contact therewith to gum it, the forward face of the roll, J, serving as the support for holding the blank firmly to the gumming impact.

All of the several and various rolls described are run at corresponding rates of speed by suitable trains of gearing which are indicated in the drawings, but which will require no description, as embodying no novelty, except in so far as will be hereinafter particularly described, with respect to certain portions thereof. The power is transmitted to the gearing through the main shaft, M, and the chain, L, is driven by the shaft, 173, through the gearing to shaft, 167, which carries the upper end of said chain, L. The envelopes, being carried upwardly and forwardly by the chain, are, as the chain breaks over the sprocket gear therefor on the shaft, 167, engaged by the two pairs of horizontally mounted spiral conveyers, 168, 168, and carried to the double set of chains, N N. Each one of these chains, N, consists of a series of sections, l, and each of these sections, as seen in Fig. 40, comprises a vertical bar, l², with the fingers, l³, l³, extending horizontally from its top and bottom, and the said bar is provided at its upper and lower ends with the perforated lugs, l⁴, l⁵, arranged step-like, as shown, so that the inner lugs, l⁴, of one chain section may match into the outer lugs, l⁵, l⁵, of the next section to be held by the pintle, or rod, l⁶. By having the lugs, l⁴, l⁵, of sufficient extent of projection beyond the lines of the fingers, l³, and having the perforations through which the pintles, l⁶, pass at the desired distances apart, the intervals between the fingers may be such as to easily accommodate bunches of twenty-five of the envelopes between every two of such chain members. These chains are mounted on suitable, axially

vertical, sprocket shafts, 169, 170, therefor, so that the fingers of the inner or approached courses of the two sets move in opposite pairs horizontally forward,—see Fig. 39,—they having a forward step-like movement after the chain, L, has moved through the distance of twenty-five of its fingers, and serve as bunchers for the envelopes. Each of the said spiral conveyers is formed, or secured upon, a properly journaled shaft, 172, therefor, the upper one of each pair having a bevel gear-wheel, 173, thereon; the horizontally journaled transverse shaft, 174, has bevel gear wheels, 175, 175, thereon, which mesh with said spiral shaft gears, 173,—said shaft, 174, also having the bevel gear, 176.

On the main shaft, M, is the bevel gear, 177, and the shaft, 178, is so mounted as to transmit, by its gears 179 and 180, the proper rotation to shaft, 174, for driving the upper spiral carrying shafts.

The upper and lower spiral carrying shafts have spur gears, 182, 182, 182, 182, thereon, those on the lower being driven by those on the upper through the intermediate spur gears, 183.

The forward sprocket shaft, 167, for the chain, L, has thereon the bevel gear, 184, meshing with which is the bevel gear, 185, on the shaft, 186, on the rear of which shaft is the spur gear, 187, the same receiving its rotation by the idler gear, 188, between it and the adjacent gear, 183.

The rear vertical sprocket shafts of both of the chains, N, N, have bevel gears, 190, 190, thereon with which mesh the bevel gears, 192, 192, on the shaft, 193. This shaft has fixed thereon, the ratchet wheel, 194, and, loose thereon, the pawl-carrier, 195, with the spring-pressed pawl, 196, which takes into said ratchet wheel. The pawl carrier has the crank-like arm, 197, with which is connected the rod, 198, the rear end of which is subject to the action, for its reciprocatory movement, of the snail or involute cam, 199, which is fixed on the shaft, 166, which forms the journal support for the rear sprocket wheel, or sheave, for the chain, L. The spring 200, exerts the tendency to hold the rear end of the rod, 198, to the edge of said cam. As shown the rear end of the rod is pivoted to the upper end of a lever, 202, which at its lower end is pivotally supported on the floor. The said snail cam, 199, is as one with the ratchet wheel, 165, and as seen in Fig. 2 the ratchet wheel has its step-by-step movement through means of the pawl, 164, on the reciprocatory pawl-carrying lever, 163, to an arm of which lever, is secured the end of the eccentric rod, 162, the eccentric being indicated by dotted lines at 160. Inasmuch as the ratchet wheel, 165, which is rotatable independently of the movements of the chain, or its rear end supporting sprocket wheel, has twenty-five teeth, and the cam, 199, rotates as one therewith, the members of the chain, N, N, will be moved forward one step, after twenty-five en-

velopes have been conveyed thereto, all so as to properly bunch the envelopes, the fingers being so jointed as to leave sufficient spaces between them for the accommodation of such number of envelopes. The sections of the chains, N, N, have at their bottoms the downwardly extended pins, 204, 204, which pass along and through the guiding channels, 205, therefor in the table or support on which said chains are mounted, see Fig. 42.

In Fig. 43 it will be seen that the side fingers, 206, 206, of each section of the chain, L, are at the outer extremities united by the transverse portion, 207, which has its middle rearwardly curved. This formation of these chain members insures a curvature of the freshly gummed flaps of the envelopes as indicated in said Fig. 43, whereby is overcome any tendency which they might have the one to curl or bend toward the next so that the one might be unduly stuck to the next. This chain, L, comprises no novelty with the exception that each articulated section thereof comprises the aforesaid curved transverse portion, 207, as and for the purpose above stated.

In this envelope machine, in order that there may be absolutely no lost motion as the blank cutting rolls, H, J, rotate, ensuing by reason of wearing of the working sides of the teeth of the gear wheels connecting the journals of said rolls, but so that their movements shall be always exactly concurrent, I provide on the journal of one of said cutting rolls a fixed gear wheel, *n*, and a loose gear wheel, *o*, the one having at its side a spring engagement relative to the other, whereby while rotating bodily, substantially in unison therewith, it may have a slight compensating or wear take up movement independently thereof, while the other blank cutting roll has thereon a gear with which mesh said gears of the first roll. To this end, on the journal H of the roll, H, I provide the fixed gear, *n*, with the sidewise projecting stud, 210, while the loose gear, *o*, has the aperture 212, in its web through which protrudes said stud. The gear, *o*, has projecting from its web opposite the protruding stud, the lug, 213, which is split to be contractible and provided with the constricting screw, 214. The protruding stud has on its side toward the lug, 213, the washer, 215, of rubber or other elastic material; the pin, 216, passes through said washer and for a slight endwise play into a socket therefor in the stud, it having the wide, flat head, 217, which overlies the washer. The screw, 218, longitudinally adjustable through the said lug, 213, bears upon the said flat head of the pin. The constricting screw, 214, binds the split portions of the lug upon the screw, 218, to maintain it with certainty in its adjustment. The journal J' of the other blank-cutting roll has the gear (or gears), *p*, fixed thereon with which mesh, as closely as may be, practicably, the teeth of the said gears, *n* and *o*. I preferably arrange the gears, *n* and

o, with the teeth of the one opposite the spaces of the other, and arrange the fixed gears, *p*, *p*, on the journal of the other roll also similarly offset; this arrangement minimizes in a degree the tendency to lash or lost motion; but I do not desire to be understood as limiting the take-up contrivance explained to such offset arrangements of the gears. Hence it becomes apparent that, relatively to the gear, *p*, *p*, on journal, J', of roll, J, the double gears, *n*, *o*,—(the one thereof being pressed for a slight movement rotationally from its fellow)—amount to practically the same as a gear having automatically expanding, or widening spur teeth, so that on the rotation being positively imparted to the one roll, the other must directly, and with no lost motion or lash, however great has been the wear between the gear teeth, rotate in conjunction therewith.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an envelope making machine the matching pair of cutting rolls, one of which has the sockets with rubber blank clearing springs therein and protruding therefrom, and the other having the transverse depression, 90, in which the reciprocatory clearer for the waste is located, and means for periodically reciprocating the said clearer, substantially as described.

2. In an envelope machine, a pair of blank-cutting-rolls, D and F, having the matching-cutting-edges substantially as described, the rolls, F, being at one side thereof of less endwise extent than roll, D, so that the latter at a portion of each rotation has an overhanging relation to the ends of said roll, F, and the roll, D, provided peripherally at such overhanging part with the endwise serrated studs, 97, 97, and the spring plates, 98, 98, supported at the ends of the roll, F, and normally standing outside of the periphery of the roll, F, substantially as and for the purpose set forth.

3. In an envelope machine, the combination with the cutting roll having the crosswise depression, 90, of the clearer, the members to which the ends of the clearer are attached and which are revoluble with the rotary roll being also radially movable relative thereto, a spring for forcing the blocks inward, and a cam surface and in contact with which the said blocks move, for forcing them and the clearer outward, substantially as described.

4. In an envelope machine, the combination with the blank cutting roll having the transverse depression, 90, and having the studs radially extended from its journals or hubs, of the clearer, the blocks to which the clearer is attached mounted to revolve with said studs and adapted to slide along the length thereof, and the stationary cam having the projection, substantially as described.

5. In an envelope machine, the combination with the blank cutting rolls of conveyers in advance thereof for carrying the blank hori-

zontally forward and a winged wheel the outer extremities of the arms of which have movements faster than the run of the paper, substantially as and for the purpose explained.

5 6. In an envelope machine, the combination with a pair of rollers through which the blank is passed, of a pair of grippers mounted on one of the rolls to have movements longitudinally and radially relatively to said roll and adapted to seize edge portions of the blank between the ends of the blank and hold it to the roll, means for periodically opening the grippers radially from the roll and then forcing them endwise from engagement therewith and means for pressing the opposite leaves of the blank together along its line of fold, for the purpose set forth.

7. The combination with the rolls for cutting out blanks with side wings, of endless carriers for carrying the blank forward from said cutting-out rolls and the opposing wing-overturning-devices, *h, h*, the roll, *J*, and the roll, *H*, having the narrow peripheral gumming faces near its ends, said roll, *J*, having the grippers to periodically seize edge portions of the blank between the ends thereof, means for operating the grippers and a pair of rollers for pressing the opposite leaves of the blank together along its line of fold, substantially as described.

8. The combination with the rolls for cutting out blanks with side wings, of endless carriers for carrying the blank forward from said cutting-out rolls and the opposing wing-overturning-devices, *h, h*, the roll, *J*, and the roll, *H*, having the narrow peripheral gumming faces near its ends, with the reduced portions, 119, said roll, *J*, having the grippers to periodically seize edge portions of the blank between the ends thereof, means for operating the grippers and a pair of rollers for pressing the opposite leaves of the blank together along its line of fold, substantially as described.

9. In an envelope machine, the combination with rolls for cutting out blanks with side wings, of endless carriers for carrying the blank forward from said cutting-out rolls and the opposing wing-overturning-devices, *h, h*, the roll, *J*, together with the roll, *H*, having the raised narrow peripheral gumming faces near its ends, said roll, *J*, having the grippers to periodically seize edge portions of the blank between the ends thereof, means for operating the grippers and a pressure roller, 150, for pressing against the roll, *H*, substantially as described.

10. In an envelope machine the combination with the roll, *J*, having on each end the lug, 125, of the grippers each consisting of the body having the lip, *j*³, to lie across a portion of the peripheral surface of the roll near its end and having the shoulder, *j*², outside of said lip, and said body having the ears which have a pin-and-slot engagement with said lug whereby the gripper may have a swinging movement and also a sliding movement, the

spring for forcing the gripper inwardly and an adjacent roll having at each end a cam surface, *K*², for periodically exerting an outwardly forcing bearing against the said shoulder, *j*², of the adjacent gripper, substantially as described.

11. In an envelope machine, the combination with the roll, *H*, and the roll, *K*, with the cam surfaces, *K*², *K*², of the roll, *J*, having the lugs, 125, 125, the grippers each comprising the body provided with the lip, *j*³, the shoulder, *j*², at an intermediate part which is outwardly beyond the said lip, the ears, 126, which have a pin-and-slot engagement with said lugs, 125, and the outwardly extended projection, 132, the springs, 130, exerting an inward forcing bearing on the grippers and the stationary cams, 133, for coacting with said projections, 132, substantially as described.

12. In an envelope machine, the combination with the roll, *H*, with the peripheral gumming surfaces thereon, and the gum-box and gum supply rolls therefor, of the roll, *J*, with the grippers and means for operating them, the roll, 150, in contact with the roll, *J*, and the roll, *K*, having the gumming segment, 155, the gum-box, 157, and roll therein for supplying said segment, and the feed wheels, 154, 154, substantially as described.

13. In an envelope machine, conveyers for carrying forward the envelopes successively, and chains, *N, N*, arranged adjacent and in advance of the said conveyers, and having means for moving them forward one step after a certain number of delivering movements have been imparted to the conveyers, substantially as described.

14. In an envelope machine, the combination with the chain, *L*, the spiral conveyers, and the double chains, *N, N*, arranged and operating substantially as and for the purpose set forth.

15. In an envelope machine, the combination with the chain, *L*, and the spiral conveyers, of the two sets of endless carrier chains, *N, N*, adjacent and in advance of said conveyers mounted to be moved by axially vertical sprocket shafts so that the fingers of the adjacent courses of the chains stand in coincident vertical planes which are at right angles to the carrying movements of the chains, and means for intermittently moving the said chains forwardly, substantially as described.

16. In an envelope machine, the combination with the two sets of chains, *N, N*, and the sprocket shafts thereof, of a shaft geared thereto having a ratchet wheel thereon, and a pawl and carrier therefor, the properly rotated cam, 199, and the rod connected to said pawl carrier and in engagement with the said cam, substantially as and for the purpose set forth.

17. In an envelope machine, the combination with the chain, *L*, and means for causing its progressive movement, and a cam movable in conjunction with the chain, of the two sets

of chains, N, N, a shaft having a driving connection with said two chains which is provided with a ratchet-wheel, a pawl-carrier with a pawl engaging said ratchet-wheel, a rod connected to the pawl-carrier and periodically receiving its thrust movement by said cam and means for transferring the envelopes from the chain, L, to the chains, N, N, substantially as described.

18. In an envelope machine, the combination with the two sets of endless chains N, N which are mounted for their progressive movements around sprocket wheels, or like journal-supporting devices, the axes of pairs of which supporting devices are arranged in lines substantially parallel, so that the angularly extended fingers of the articulated members of the parallel courses of the two chains stand opposite each other in coinciding lines which are at right angles to the direction of movement of said parallel courses of the chains, of the chain, L, means for imparting thereto its progressive movement, means for periodically imparting a forward step movement to both of the chains, N, N, and means for transferring the envelopes from the chain, L, to the said chains, N, N, for the purpose set forth.

19. In an envelope machine, the combination with the chain, L, and sprocket shaft therefor having the ratchet wheel and snail cam, 199, loose thereon, and means for causing the rotation of said cam; of the two sets of chains, N, N, and the shaft, 193, gear connected to the sprocket shafts of said chains, and provided with the ratchet wheel, 194, the pawl-carrier and pawl, the rod, 198, connected to the pawl carrier, and having its rear end in contact with the snail cam, the lever, 202, pivotally mounted and pivoted to the rod, 198, and the spring, 200, and means for transferring the envelopes from the chain, L, to the chains, N, N, substantially as shown and described.

20. In an envelope machine, the combination with the chain, L, having a progressive movement and the two sets of chains, N, N, in advance thereof, and means for intermittently actuating said chains N, N, after the chain has been given a certain distance of travel, substantially as described, of the spiral conveyers between and adjacent the chain, L, and said chains, N, N, and having gears on their shafts, and gear and shaft connections between said conveyer shafts and a suit-

able driving shaft of the machine, substantially as and for the purpose set forth.

21. In an envelope machine, the chain, L, having the outer extremities of the fingers of the articulated members thereof united by the sections, 207, which are extended in the longitudinal line of travel of the chain beyond the common transverse plane of the outer fingers, substantially as and for the purpose set forth.

22. In an envelope machine, the combination with the blank cutting rolls, one having on its journal the fixed gear with the stud and the loosely mounted gear with the aperture through which said stud protrudes, and with the lug adjacent the protruding stud, the elastic member on the stud and the screw adjustable through the lug for endwise bearing against said elastic bearing member, of a gear on the other roll with which said gears of the first roll mesh, substantially as described.

23. In an envelope machine in combination, the blank cutting rolls, H, J, one having on its journal the fixed gear with the stud projecting sidewise therefrom and the loose gear with the aperture through which the stud protrudes and the lug on its side opposite the protruding lug, of the elastic washer against the lug, and the pin passed through the washer and into the lug with the head or bearing member overlying the said washer, the screw adjustably passed through the said lug to sidewise bearing against the said member, and the journal of the other roll having a fixed gear with which mesh the said gears of the first roll, substantially as described.

24. In an envelope machine, the combination with the journal of one of the blank cutting rolls, of the fixed gear thereon having the stud with the yielding or elastic bearing member thereon, and the loose gear with the aperture, and the split lug, with the constricting screw, 214, and the adjustable screw, 218, having endwise contact with the said elastic bearing member, and the coacting blank-cutting roll having fixed on its journal the gear-wheel, *p*, with which mesh the teeth of the aforesaid gears of the fellow roll, substantially as described.

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Witnesses:

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