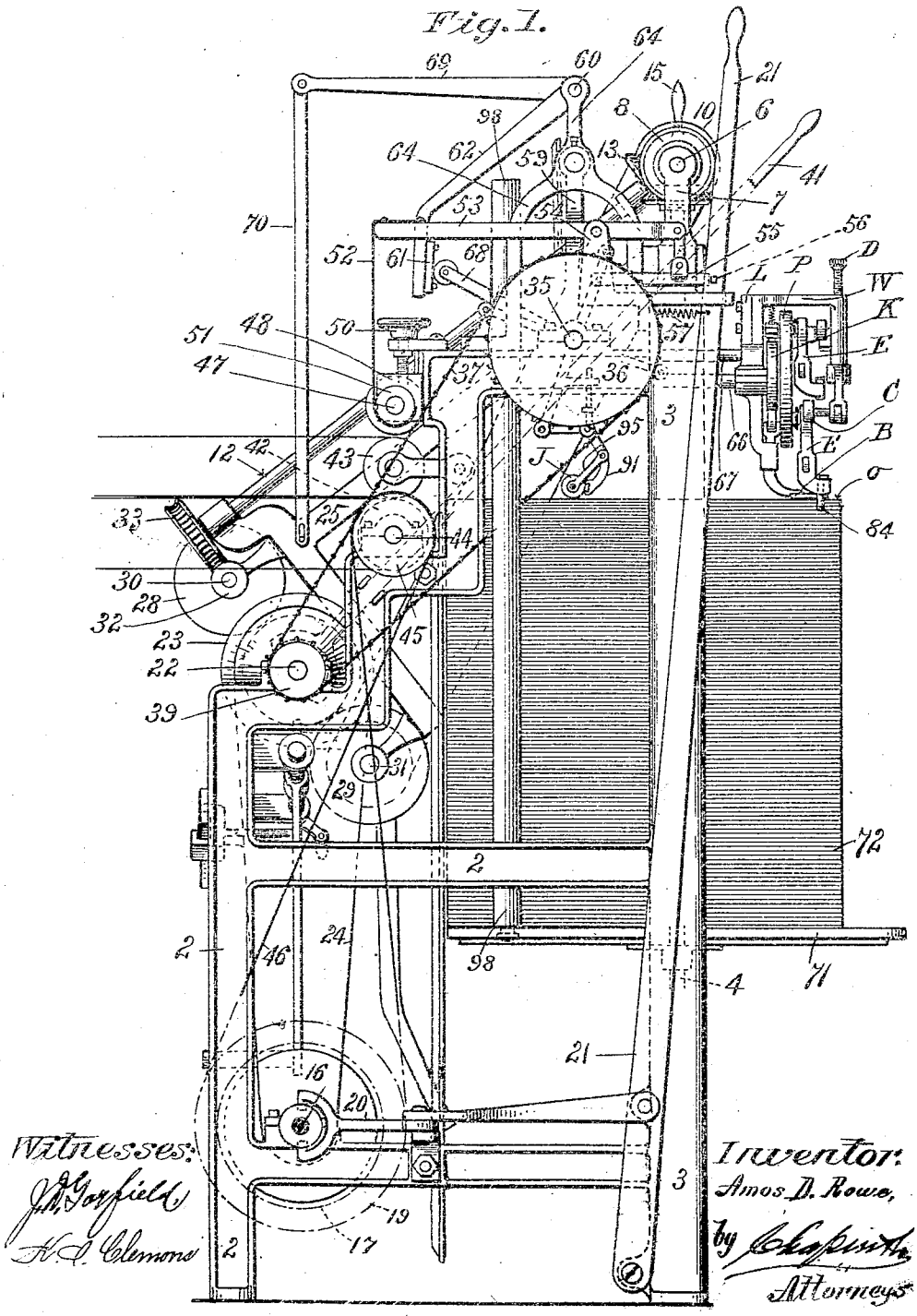
(No Model.) 6 Sheets—Sheet 1.

# A. D. ROWE.

## PAPER FEEDING MACHINE.

No. 593,554. Patented Nov. 9, 1897.

Fig. 1.




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Fig. 2.

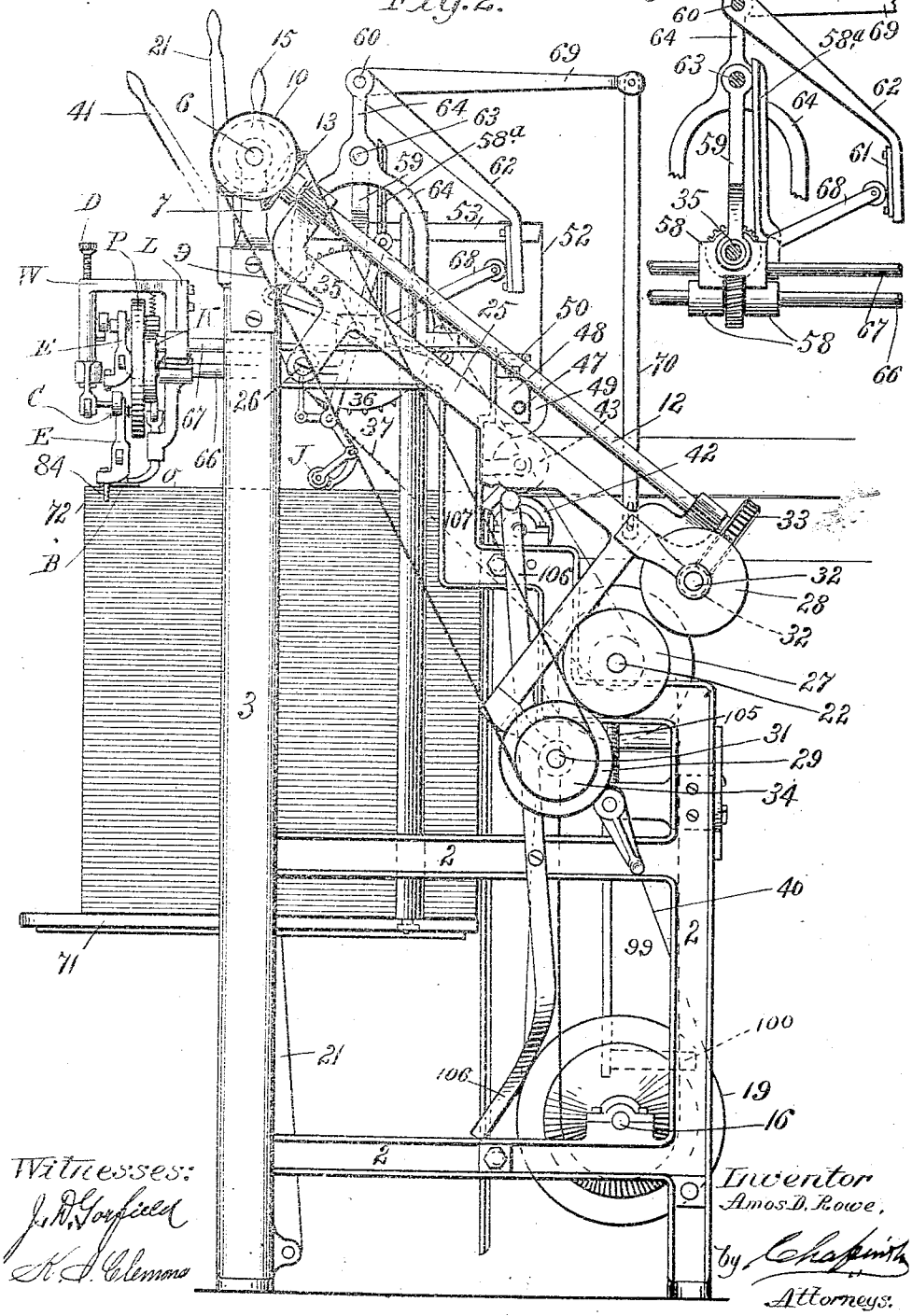



Fig. 2a.




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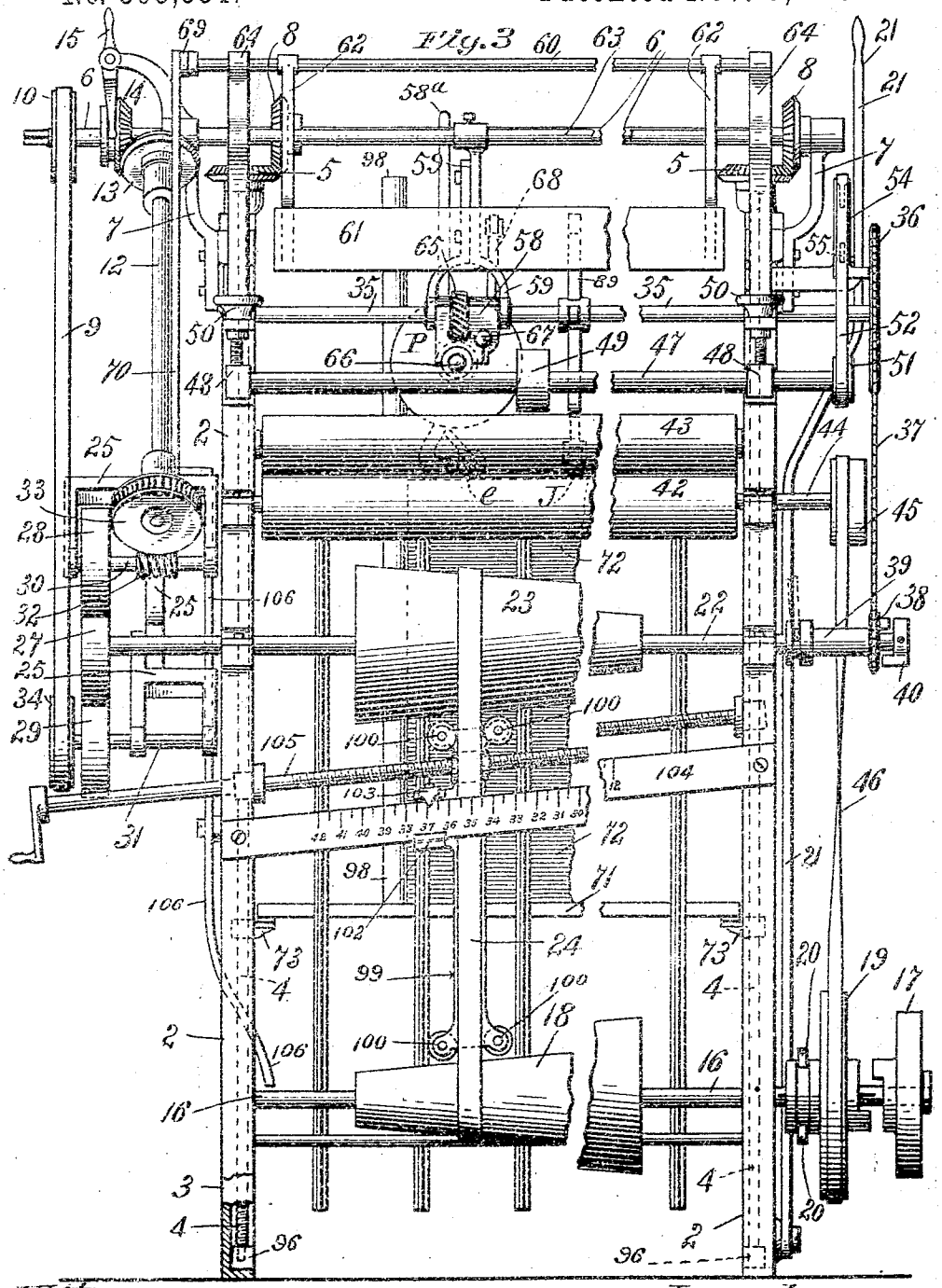
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Fig. 3



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Fig. 4.

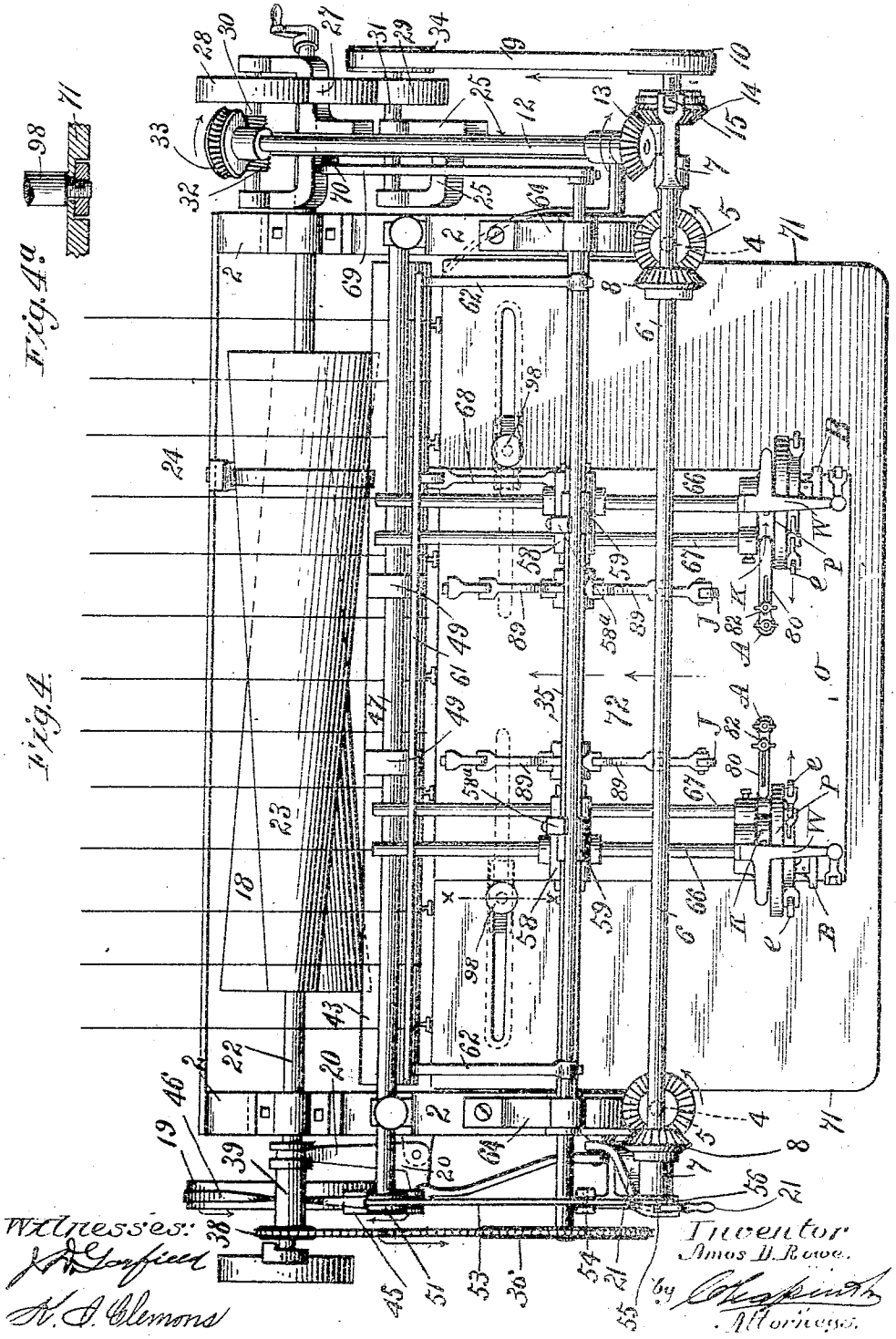


Fig. 4a.



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Fig. 5.

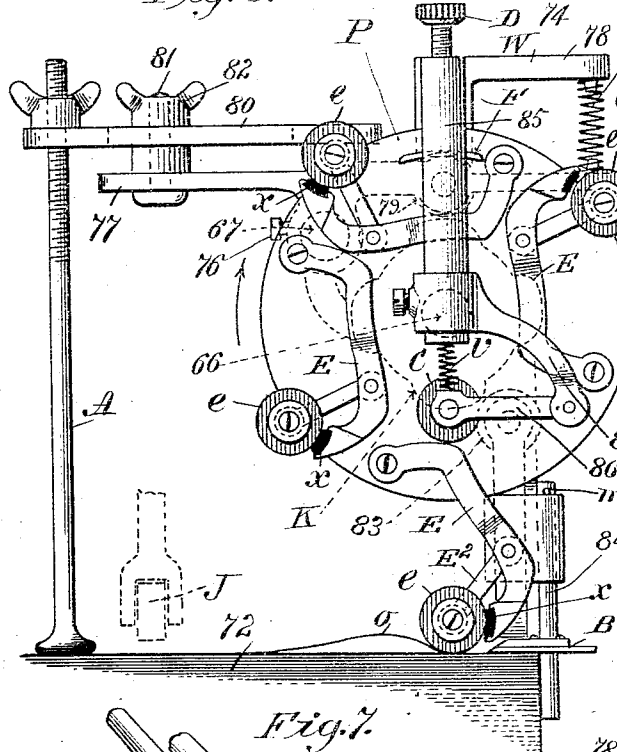



Fig. 6.

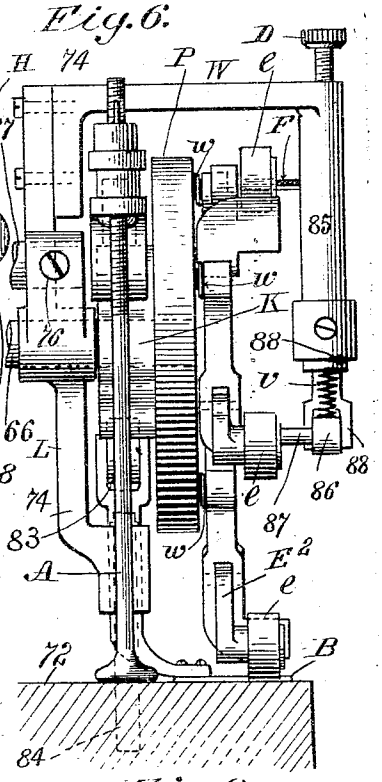



Fig. 7.

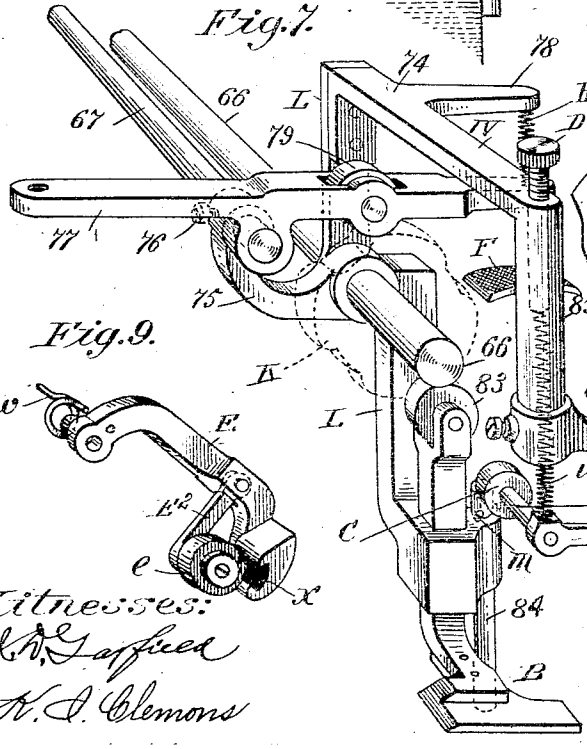



Fig. 8.

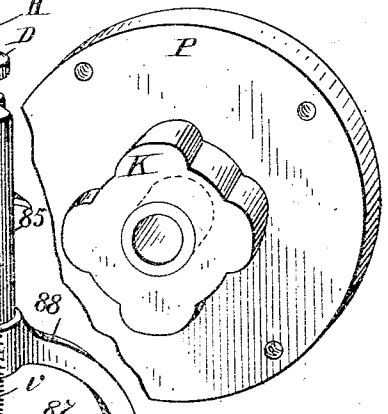



Fig. 9.




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## PAPER FEEDING MACHINE.

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Fig. 10.

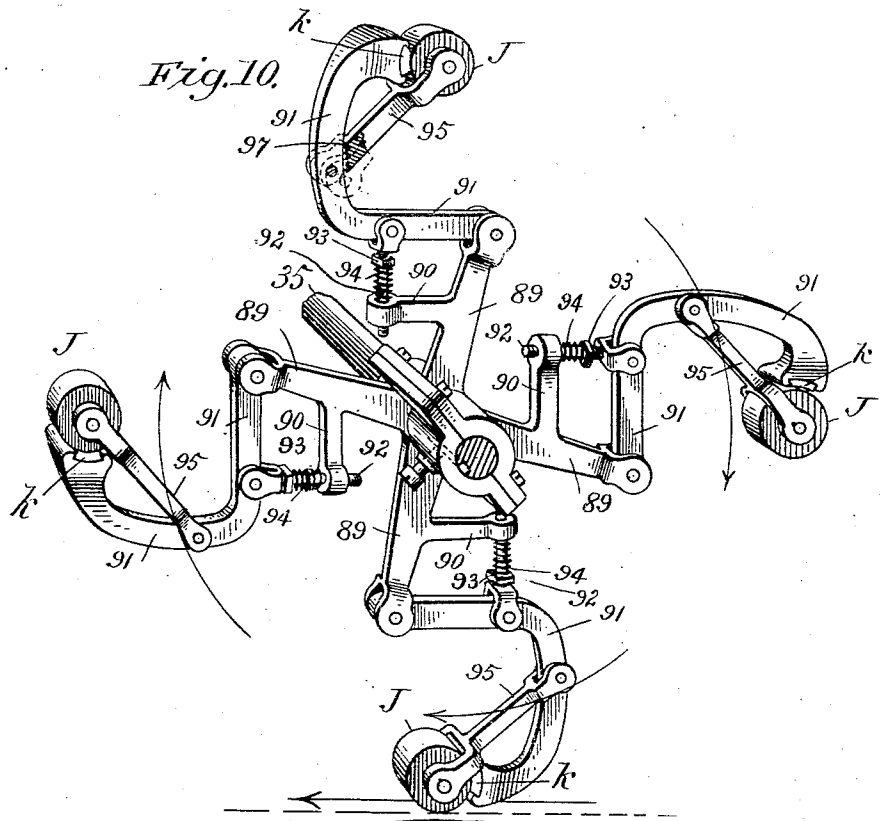
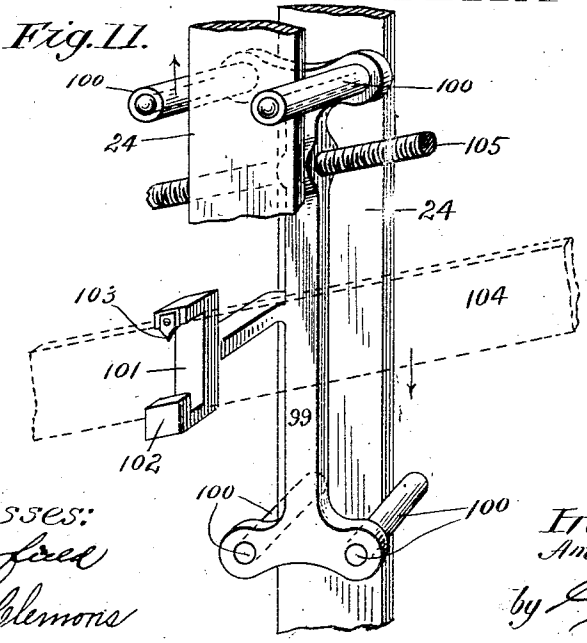



Fig. 11.




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# UNITED STATES PATENT OFFICE.

AMOS D. ROWE, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO PETER J. WESTPHAL AND JAMES C. KEOUGH, OF SAME PLACE.

## PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 593,554, dated November 9, 1897.

Application filed August 14, 1896. Serial No. 602,695. (No model.)

*To all whom it may concern:*

Be it known that I, AMOS D. ROWE, a citizen of the United States of America, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

This invention relates to machines for feeding sheets of paper successively from a pile of such sheets to a paper calender, ruling, or other machine requiring the feeding of paper sheets thereto, the object being to provide an improved machine of this class in respect to the various mechanisms thereof; and the invention consists in the peculiar construction and arrangement of the said mechanisms and devices of the machine, all as hereinafter fully described, and more particularly pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a left-hand side elevation. Fig. 2 is a right-hand side elevation. Fig. 2ª illustrates details hereinafter described. Fig. 3 is a rear elevation, and Fig. 4 a top plan view, of a paper-feeding machine embodying my improvements. Fig. 4ª is a sectional view of a part of a paper-holding table and of the lower end of one of the paper-guiding posts thereon. Figs. 5 and 6 are respectively front and side elevations of the sheet-separating devices. Fig. 7 is a perspective view of certain detailed parts of the devices shown in Figs. 5 and 6 and of portions of certain shafts of the machine to which said devices are attached. Fig. 8 is a perspective view of the rotating disk and cam of said separating devices, and Fig. 9 is a perspective view of one of the arms which is pivoted on said disk. Fig. 10 is a perspective view of one of the two groups of sheet-feeding devices. Fig. 11 is a perspective view illustrating certain elements of the speed-governing devices of the machine, which are hereinafter fully described.

In the drawings, 2 indicates parts of the main frame of the machine, of suitable iron construction, preferably.

3 indicates two hollow posts on the front side of the machine, between which the paper-holding table 71 is located. 4 4 indicate vertical screw-rods, which are located in said posts 3, the lower end of one of which rods and its step 96 are shown at the lower end of the figure in Fig. 3. The said screw-rods have an engagement with two nuts 73, (see Fig. 3,) which project through the inner sides of said post 3 and are attached to said paper-holding table 71. Referring to Fig. 3, it will be noted at the lower left corner of said figure that said hollow posts 3 are located forward of the rear posts 2 of the machine. 5 5 indicate beveled gears, one of each being secured on the upper extremities of said screw-rods 4. 6 indicates a horizontal shaft supported on the upper end of the machine by two brackets 7 7, which are bolted to the side of said posts 3. 8 8 indicate two beveled gears fixed on said shaft 6 and engaging with said gears 5. Said shaft 6 is driven in one direction, as below described, by means of a belt 9, applied to a pulley 10 thereon. Said shaft 6 is driven in an opposite direction at the pleasure of the operator by a shaft 12, having a beveled gear 13 on its upper extremities, which gear 13 is engaged with or disengaged from said shaft 6 by a beveled shipping-gear 14, which is provided for stopping the paper-feeding table by hand, if desired. The said beveled gear 14 is moved into and out of engagement with said gear 13 by means of the shipping-lever 15, pivoted on a bracket on the machine, as shown, and having a fork engagement with said gear 14, the latter having a common spline engagement with said shaft 6, whereby it rotates with the latter and has the requisite sliding movement thereon to provide for its operation, as described. The outer end of said shaft 6, as shown in Fig. 3, is squared to provide for attaching, if desired, a crank thereto for turning said shaft 6 by hand when said gear 14 is not engaged with said gear 13 for adjusting the said paper-carrying table 71 and parts connected therewith.

The main driving-shaft 16 of the machine is located near the lower end thereof, as shown in Fig. 3, and on said main driving-shaft is a driving-clutch-bearing pulley 17, running loosely thereon. A cone-drum 18 is fixed on said driving-shaft 16, and a clutch-pulley 19 is applied to said last-named shaft, having a spline connection therewith and a clutch on

the side thereof adjoining said pulley 17 for engagement with a clutch on the latter. Said pulley 19 has a grooved hub, as shown, with which a shipping-lever 20, of elbow form, as shown in Fig. 4, engages. The short arm of said elbow-lever is engaged by a long vertical shipper-lever 21, which extends nearly to the upper end of the machine, as shown in several figures. A shaft 22 is supported to rotate in the frame of the machine above said shaft 16, on which is a second cone-drum 23, and a belt 24 is applied to said two drums 18 and 23, whereby the rotary motion of shaft 16 is communicated to said shaft 22. An auxiliary frame 25 is pivotally hung on one side of the main frame at the point 26 thereon, (see Fig. 2,) and said frame 25 supports certain operative parts of the machine hereinafter described. A frictional driving-disk 27 is fixed on said shaft 22 and is adapted for alternate engagement therewith of similar frictionally-rotating disks 28 and 29, which are fixed, respectively, on shafts 30 and 31, which are hung to rotate in said frame 25. A worm 32 is fixed on said shaft 30 and has an engagement with a worm-gear 33 on said shaft 12, heretofore referred to. A pulley 34 is secured on the outer end of said shaft 31, which is hung in said frame 25, and a belt 9, above mentioned, connects the last-named pulley with said pulley 10 on said shaft 6. Either of said friction-disks 28 or 29 may have its periphery engaged by the periphery of said friction-disk 27, said alternate engagement of said disks 28 and 29 effecting, as below described, the movement of the paper-holding table 71 up or down. The normal rising speed of the paper-holding table is slightly faster than is required for feeding the sheets, thus insuring at all times, as nearly as possible, a proper position thereof for the action of the sheet-feeding devices.

A shaft 35 is hung in the frame of the machine near the upper portion thereof, and, as below described, operates to control the action of the sheet-feeding mechanism hereinafter described and referred to. A sprocket-wheel 36 is fixed on the outer end of said shaft 35, and a drive-chain 37 engages said last-named sprocket-wheel and a sprocket-wheel 38 on a sleeve 39, (see Fig. 3,) in which said shaft 22 runs freely. Said last-named sleeve has an annular groove therein, with which a shipper-lever 41 engages, (see Fig. 1,) whereby a clutch-point on the end of said sleeve engages with a like clutch-point on a collar 40, which is secured on the end of said shaft 22, whereby by the engagement and disengagement of said parts 39 and 40 said shaft 35 is caused to run or be stopped. The result of stopping said last-named shaft is to cause a cessation of action of the sheet-separating mechanism, whereby the transmission of the sheets to the tape-carrying rolls, and thence to a calender or other machine, is stopped, while the main machine continues running, thus providing, if desired, for clearing the calender or other machine to which paper has been fed of the sheets previously received therein.

Two rolls 42 and 43 constitute, respectively, the lower and the upper paper-feeding rolls, between which sheet after sheet of the paper which is fed from the paper pile 72, as below described, is gripped by said rolls as the paper is supplied thereto by the sheet-feeding devices, as below described. The said roll 42 is hung in the machine, as shown, on shaft 44, and on said shaft is a pulley 45, which is connected with said clutch-pulley 19 on said main shaft 16 by a belt 46. (Shown in Figs. 1 and 3.) Said roller 43 is hung in bearings in the frame of the machine in such manner that it rests, normally, against the surface of said roller 42, and it is subject to more or less of a rising motion under the action of one or more sheets of paper that may be passed between them either singly or unitedly. The below-described mechanism is provided for automatically stopping the machine when an excess of, or more than one sheet of, paper is inadvertently fed between said rolls 42 and 43 at the same time. A shaft 47 is hung in the machine parallel with the axis of said rolls 42 and 43, or substantially so, in adjustable bearings 48, attached to the frame of the machine, as shown in Fig. 3, said adjustment of said bearings being effected by the screws 50, engaging therewith, or by any other suitable means. On said shaft 47 are placed one or more friction-disks 49, engaging with said shaft and of greater or less length. The said provision for the adjustment vertically of said shaft 47 is for the purpose of bringing the said friction disk or disks 49 thereon to such position that any abnormal rising movement of said roll 43 during the operation of the machine, which is caused by the inadvertent passage therethrough of more than one sheet of paper or of any thicker substance than the machine is set to act upon, will cause the rotation of said shaft 47. A pulley 51 is fixed on one extremity of the said shaft 47, and a strap 52 (see Figs. 1 and 3) has one end thereof wound partially around said pulley 51 and secured thereto. The opposite end of said strap 52 is attached to the free end of a pivoted lever 53, (see Figs. 1 and 4,) said lever being pivoted on a support 54, secured to one of said posts 3 of the frame of the machine. A latch 55 is pivoted by one end to said support 54, with which said lever 53 has a link connection, as clearly shown in Fig. 1. The said shipper-lever 21, by which the machine is started, as below described, and is also stopped, has a pin 56 therein, one end of which projects from one side thereof opposite the end of said latch 55 when the latter occupies its normal position, which is that shown in Fig. 1, while the machine is running. The said shipper-lever 21 may be operated by hand by swinging it laterally, so that said pin shall be disengaged from the end of said latch when it is desired to stop

the machine by hand; but when said lever 21 is set in the position shown in Fig. 1, whereby the machine is set in motion, said pin 56 is brought into engagement with the end of said latch, thereby holding the shipper-lever in such position that the machine is caused to be in motion. When, however, as stated, more than one sheet of paper is fed under said roll 43, whereby the latter is abnormally raised, the last-named roll is carried against the disk or disks 49 on said shaft 47, thereby causing an instantaneous revoluble movement in said shaft, which acts to wind up the end of said strap 52 on said pulley 51, and thereby to pull down the end of said lever 53, to which said strap 52 is attached, and, through said lever, causing said latch 55 to be lifted out of engagement with said pin 56 in said shipping-lever 21, thereby permitting the last-named lever to be operated upon by a spring 57, Fig. 1, to separate the said clutch-bearing pulleys 19 and 17 on the main shaft 16 of the machine, thereby stopping the latter. A gear and shaft holding box 58 is supported on said shaft 35, which shaft runs loosely through said box, one of said boxes being provided for each group of sheet-separating devices, two groups of said devices being ordinarily employed, as illustrated in Fig. 4. One of said boxes is also shown in Fig. 3. Said boxes 58 are each provided with suitable bosses on their opposite ends, with which a fork-shaped yoke 59 engages. A rock-shaft 60 is hung for oscillatory motion in the upper part of the machine, as shown in Fig. 3. A plate 61, of suitable material, (metal or hard wood,) is supported in the position shown in Figs. 2, 3, and $2^a$ on arm 62, fixed on said rock-shaft 60. A stationary shaft 63 is rigidly supported in a horizontal position in uprights 64 on the upper part of the machine, and said yoke 59 or yokes are supported on said shaft 63, as shown in Fig. 3. A gear 65, attached to said shaft 35 to rotate therewith and having a sliding connection with said shaft, whereby said box 58 and gear may be moved to different positions longitudinally thereon, is free to be so adjusted by freeing said yoke 59 on its supporting-shaft 63. After said box 58 shall have been adjusted, as aforesaid, to a new position it is again secured in place on said shaft 35 by securing said yoke again on its supporting-shaft 63. A shaft 66, extending horizontally from the front to the rear of the machine, as shown in Fig. 4, is provided for each sheet-separating group of devices and has a gear connection with said gear 65, whereby said shaft 60 derives a rotary motion from said shaft 35, on which said gear 65 is placed, as described. Said shafts 35 and 66, together with said box 58 and the gear connections herein described between said two shafts, are of well-known construction in machines of this class. To aid in supporting the said sheet-separating devices, which are carried on the extremity of said shaft 66, a supporting-rod 67, which has a sliding connection through or in said box or boxes 58, has its front end secured to said sheet-separating devices by a set-screw 76 or by other suitable means, as shown in Fig. 4 and more plainly in Fig. 7. An arm 68, having a roller pivoted in its extremity, as shown in the several figures, is fixed on the rear side of one of said gear and shaft holding boxes 58, and said arm extends upwardly and rearwardly from said box against the front side of said plate 61. When the upfeed of the pile of paper is too rapid, the end of shaft 66, bearing the sheet-separating devices, is elevated, thereby rocking said box 58, to which said arm 68 is secured, and moving the latter downward against said plate 61. The purpose of the engagement of said arm and plate is that upon the undue elevation of the sheet-separating devices, which may be caused by the lifting of the pile of paper too high, to force said arm against said plate 61, so as to swing arm 62 more or less, thereby rocking said rock-shaft 60 and the lever 69, (shown in Figs. 1, 2, and $2^a$,) and thereby causing the said auxiliary frame 25, which is connected to said lever 69 by a connecting-rod 70, to be swung upward, whereby the friction-disk 28 on said frame is removed from contact with the friction-disk 27 thereon, thereby stopping all feed of the paper-table either up or down.

The sheet separating and holding devices illustrated in detail in Figs. 5 to 9, inclusive, are constructed as follows: A metallic frame 74, composed of two sections W and L, rigidly secured together, as shown in Figs. 6 and 7 and also in Figs. 1 and 2, constitutes the supporting element for the detailed parts of the sheet-separating devices. Said composite frame 74, having an arm 75 thereon, which is perforated to receive the end of said supporting-rod 67, and said frame and shaft are secured one to the other by a set-screw 76, as shown in Fig. 6 and in dotted lines in Fig. 7, or by other suitable means. The said frame 74 receives the outer end of said rotating shaft 66 through a suitable bearing therein, as clearly shown in Fig. 7, and on the end of said shaft 66 within said frame is secured for revoluble movement with said shaft 66 the disk P, carrying on its face the cam K. The said section L of said frame 74 has the vibratory lever 77 hung thereon on the end of said supporting-rod 67, one end of said arm extending under arm 78 on the top of said frame 74 and connected thereto by a spiral spring H. The opposite end of said lever 77 has connected indirectly thereto the paper-clamping post A. Said vibratory lever 77 has a roll 79 pivoted therein, against which the said cam K on said disk P moves, which constitutes a frictionless roller. Said lever 77 has vibratory motions imparted thereto by the contact of said roll 79 with the border of said cam K, and thereby reciprocating vertical motions are imparted to said paper-clamping post A. Said indirect connection between

said last-named post and said lever 77 consists of a longitudinally-slotted bar 80. (See Figs. 4 and 5.) The connection between said bar 80 and lever 77 consists of a bolt 81, passing upwardly through the end of lever 77 and through the slot in said bar, a washer, as shown, being interposed between said lever and bar. A nut on said bolt 81 secures said lever and bar rigidly to each other. Thus means are provided for adjusting said clamping-post A at different positions from the paper-separating roll *e*, shown on the extremities of the crooked levers E in Fig. 5. The said frame-section L carries therein the edge clamp B, which has a post extending vertically through an opening in said frame-section L, and carries on the upper end thereof a roller 83 for engagement with the border of said cam K, whereby said clamp is at the proper time moved against the paper thereunder. At the side of said clamp-post is set a paper-guiding pin 84, which has a free vertical movement in a part of said frame-section L adjoining the said post of said pressure-clamp B, produced by the movement of the table 71. Said paper-guiding pin 84 is supported in said position by the transverse pin *m*, the object of said pin being to keep the paper always in position relative to the said clamp and the sheet-separating devices. On the said section W of the metallic frame 74 is a depending branch 85 of cylindrical form, preferably longitudinally perforated and having an adjusting-screw D entering it from its upper end. In said branch 85 under said adjusting-screw is a spiral spring *v*, whose lower end is connected to the end of an arm 86 to move it downward. A roll *c* is hung to rotate on said arm 86, and the latter is pivotally hung on an arm 88, secured on said depending branch 85. The said crooked lever E is given a form substantially as shown to provide for pivoting it on the disk P in such a way that the roller *e*, carried thereon and supported on an arm $E^2$, pivoted on said crooked lever, is brought to one side of the lever-pivot when it engages with the paper. A corner of said lever is subjected to the backing-up action of the spring *v*, which is more or less yielding. The said manner of hanging and supporting said lever and roll causes the latter, primarily, to move a short distance when first acting to separate a sheet substantially parallel with the upper surface of the pile of paper, and, secondarily, upwardly and away from said sheet, thus most effectually producing such separation. Referring to Fig. $2^a$, there is shown an arm $58^a$, which is attached to said gear and shaft-box 58, which arm has a vibratory movement toward and from shaft 63 above said box, which movement is induced by a similar movement in the latter, and when said arm swings against said shaft it exerts a restraining action against the downward movement of the said sheet-separating devices on the forward ends of said shaft 66 and supporting-rod 67 when the table is lowered for reloading.

The sheet-feeding devices illustrated in detail in Figs. 1, 2, 3, 4, and 10 are constructed as follows: One or more radial arms 89 project from a suitable hub, which hub is secured on said shaft 35 and longitudinally adjustable thereon over the portion of the sheet-pile 72 at the rear of the said sheet-separating devices. On each of said arms 89 is a laterally-projecting short arm 90, and on the extremity of each of said arms 89 is pivoted a crooked lever 91. A short connecting-rod 92 is pivotally connected to said lever 91, and one extremity of said connecting-rod extends freely through a perforation in the head of said arm 90 and has a sliding movement therein, but is retained in such position by suitable means, so that it cannot inadvertently be disengaged from said arm 90. Said connecting-rod 92, between its pivoted end and said arm 90, is screw-threaded and has a nut 93 thereon, between which nut and said arm 90 is a spiral spring 94, which acts to force said lever 91 away from said arm 90 with more or less power, according to the adjustment of said spring 94. Pivotally connected to said crooked lever 91 is a roller J, preferably of rubber, for frictional engagement against a sheet *o* of paper while moving in the direction indicated by the arrow in Fig. 10, whereby said sheet of paper so engaged is moved from the pile thereof into the feeding-rolls 42 and 43 of the machine. Said roller J is supported on an arm 95, which is pivotally hung on said lever 91. In the lower end of said last-named lever is fixed a block *k*, of rubber or similar material, for frictional engagement with the surface of said roll J when said roll is forced against said block. Said arm 95 has a limited swinging movement, whereby said rollers J, carried thereon, may move away from said block *k* when it shall be carried in the rotation of the devices to a position above or to the right hand of said shaft 35, as illustrated in said Fig. 10. The provision for limiting the swing of said arm 95, as described, consists in forming a part of the latter-named arm near its pivot-point on arm 91, as indicated at 97 in Fig. 10, whereby a shoulder is formed on said arm 95. Two paper-guiding posts 98 are adjustably connected in vertical positions to said paper-table 71, as shown in the various figures. Fig. 4 illustrates slots in said table whereby said posts are adjusted toward and from the center of the pile of paper thereon, and Fig. $4^a$ illustrates the manner of securing the lower end of each of said posts to said table by means of a nut screwed on the lower end of each of said posts, which moves with the latter when adjusted in a rabbeted recess on the borders of said slots, whereby the nut is held from turning when said posts are screwed against or from said table to tighten or loosen them. The usual sheet-conveying cords or tapes shown in Figs.

1, 2, and 4 are employed for conveying the paper from said rolls 42 and 43 to a paper-calender or other machine.

The operation of the complete paper-feeding and sheet-separating devices above referred to is as follows: The pile of paper 72 having been placed on said table 71 and the latter having been suitably adjusted vertically to bring the top of said pile into proper relation to the sheet-separating devices, the machine is started by operating said shipper-lever 21. By the above-described devices the said disk P, Fig. 5 and elsewhere, and its connected parts are caused to rotate, and as each sheet-separating roll *e* reaches a point nearly in a vertical line below the center of said disk P the cam K, attached to the rear side of said disk, operates upon lever 77 to press the clamping-post A down onto the paper. Immediately after said action said cam K in its forward movement releases said pressure-clamp B, which is holding the sheet at the edge of the pile of paper, as shown in Fig. 5. Said rubber roll *e*, which is so held from rotation, as hereinafter described, as to have a frictional engagement with the upper sheet *o* of said pile, now reaches a point where it comes in contact with said top sheet of paper, and being pressed down thereagainst by the roller C, operated by the spring *v* and the pressure-adjusting screw D, it moves forward in a straight line for an instant and carries the edge of the said top sheet of paper along with it, as shown. After said roll *e* has moved forward a certain distance the crooked lever E, which is held down by said roller C, approaches a point where it gradually leaves said roller C, and said separating-roll *e* not only rises from the sheet *o*, but also recedes toward the center of the disk P, as illustrated in Fig. 5. The said drawing-in motion of said lever E being accomplished by a spring *w*, connected thereto, as shown in Fig. 9 in the first instance, and partially by gravity prevents any danger of wrinkling or breaking the paper after said roll *e* has completed its primary action thereagainst, as described. As the said roll *e* approaches a point somewhere nearly vertical above the axis of said disk P it moves over and has a slight peripheral contact with a shoe F, whereby said roll is slightly turned on its pivot or shaft, thereby bringing a part of its surface for contact with another sheet of paper other than that part of its periphery which last acted. The purpose of such alternate rotation of said roll *e* is to avoid the usual wear of such a paper-separating member which occurs when said member has a part thereof which constantly acts against the paper and thereby becomes eventually so worn that it does not perform its proper function. Said roll *e* is now in position to repeat the operation above described, and said roll, while in contact with and moving said sheet *o*, is prevented from turning on its axial support by a pad *x*, of rubber or similar material, affixed to the end of said lever E, directly back of said roll, with which the latter has a frictional contact while acting to separate a sheet, as described. Immediately after the said roll *e* begins to leave the sheet of paper on which it has just acted the said cam K presses said clamp B against the succeeding sheet of paper, and said cam then removes the pressure from said clamping-post A, and the latter is then raised by said spring H, which acts upon said lever 77 and allows the paper-feeding devices below described to carry the sheet forward into said feed-rolls 42 and 43. It will be noted from the above description that when said roll *e* pushes up a corner of the paper, as shown in Fig. 5, said pressure-post A is bearing against the sheet and the presser-foot B at the corner of the pile is up or slightly separated from the paper. Said paper-feeding devices, which carry the paper between the rolls 42 and 43, act immediately after said post rises. In feeding the sheets of paper after their separation, as above described, and now referring to Fig. 10, the feed-rolls J there shown, being carried over the paper at a higher rate of speed than were said separating-rolls *e*, act to draw the sheet of paper away from said roll *e*, thus removing the pressure of the roll J which the latter has exerted against the rubber pad *k* and thus allowing said roll to turn on its own axis, so as to present a new surface to the next sheet of paper. The movement of the sheets of paper under said roller J whereby the above action thereof results is caused by each of said sheets *o* being caught by the said feed-rolls 42 and 43 and drawn away from under said roll J at a speed faster than they were moved by the latter, thus swinging said rolls in the direction in which the paper moves. Should two or more sheets *o* of paper enter the feed-rolls 42 or 43 together, as heretofore referred to, the top roll 43 is lifted and the machine is stopped through the action of automatic mechanism already described.

The main driving mechanism of the machine consists of said main shaft 16 and the shaft 22, carrying, respectively, the said cone-drums 18 and 23, which are united, as aforesaid, by a belt 24. To provide for varying the speed of said shaft 22 proportionate to the requirements of the machine in respect to the manipulation of sheets of paper of varying lengths, the said belt 24 is adapted to be shifted or shipped on said cone-drums by means of a shipper-yoke 99, (see Figs. 3 and 11,) having belt-engaging arms 100 thereon extending in opposite directions opposite the edges of said belt, and on said arms are freely-rotating frictionless sleeves, as shown, whereby the said belt is given a freer action when acted upon to be moved on said drum by the shiping device. Said shipper-yoke 99 is provided with a hook 101, attached by a bracket, as shown, to said shipper-yoke. On the lower end of said hook 101 is a turned-up lip 102,

and on the upper end of said hook is an arm having a depending index-finger 103 thereon.

A graduated bar 104 is secured across the rear end of the machine, as shown in Fig. 3, having graduation-marks thereon indicated by figures, which denote the shipper position of the belt 24 for imparting proper motion to the operating parts of the machine when sheets of paper of the length denoted by the figures on which the indicating-pointer 103 rests are to be operated upon. The said bar 104 is engaged at its opposite edges by said lip 102 and finger 103, said finger being adapted to be brought to said indicating positions on said bar, as shown, by means of a screw-rod 105, having suitable bearings in the frame of the machine and extending through a screw-threaded portion of said yoke, as shown in Fig. 11. A crank on the end of said screw-rod, as shown, provides means for rotating said rod and thus moves the said yoke and belt 24 to different positions for the purpose stated. The said screw-rod 105 is provided with proper collars thereon, as shown, to prevent any endwise movement thereof. In shipping a belt on the cone-drums, as stated, it is found desirable that the shipper devices should move as near as may be in a line coincident with the adjoining face of the drum, and to that end the said shipper rod and bar 104 are arranged on the frame on an incline, as shown in Fig. 3.

A vertically-arranged lever 106 is pivotally hung on said frame 2 of the machine, as shown in Fig. 2, the upper end of which is adapted, if desired, for engagement with the under side of said auxiliary frame 25, when the latter occupies the upward position shown in said last-named figure, for holding said frame in said position independent of other described devices. The lower end of said lever is bent inwardly, as shown, to bring said end more or less in the path of the downward movement of the paper-table 71, whereby the latter, when descending inadvertently too low, strikes said bent end and swings said lever on its pivot and carries its upper or frame-engaging end into a notch 107 in said frame, thereby permitting said frame to drop sufficiently to remove the disk 34 away from the driving-disk 27, and thus stop the downward movement of the table. By continuing the said movement by hand of the upper end of said lever 106 in the same direction under said frame the latter will be allowed to fall lower, whereby the disk 28 will be brought into engagement with the driving-disk 27 and the upfeed of the table 71 will be resumed.

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

1. Sheet-separating devices for paper-feeding and analogous machines comprising a yielding substance for direct frictional action against a sheet of paper, a support for said substance consisting of a lever holding said substance in operative position against said paper, a revoluble carrier on which said lever is pivoted, a spring-actuated roller bearing against said lever whereby said substance is yieldingly pressed against a sheet of paper, combined with means for rotating said carrier, substantially as set forth.

2. Sheet-separating devices for paper-feeding and analogous machines, comprising a revoluble lever-carrier, a lever pivotally hung on said carrier, a paper-engaging roller of resilient material supported on an arm having a pivotal connection with said lever for direct frictional engagement with a sheet of paper, a roller hung to bear on said lever, a spring acting to force said last-named roller against said lever on said carrier, combined with means for rotating said carrier, substantially as set forth.

3. Sheet-separating devices for paper-feeding and analogous machines comprising a revoluble lever-carrier, a frame in which said carrier is supported, means for rotating said carrier, one or more paper-feeding levers pivotally hung on said carrier, a paper-engaging roller of resilient material supported on an arm having a pivotal connection with each of said levers, a resilient substance inserted in said lever opposite said roller for frictional engagement therewith, a shoe fixed in said frame against which said paper-engaging roller is carried after each paper-feeding movement thereof, whereby said roller is revolubly moved and a different part of its periphery is alternately carried against said paper, combined and operating substantially as set forth.

4. Sheet-separating devices for paper-feeding and analogous machines, comprising a revoluble lever-carrier, a frame in which said carrier is supported, combined with means for rotating said carrier, one or more paper-feeding levers pivotally hung on said carrier, a paper-engaging roller of resilient material supported on an arm having a pivotal connection with each of said levers, a depending tubular branch 85, fixed on said frame, an arm 88, secured on said branch, an arm 86, pivoted on said last-named arm, a roller *c*, hung to rotate in the free end of said arm 86, a spring held in said tubular branch engaging said pivoted arm 86, and a screw acting against said spring, whereby the force thereof against said last-named arm and through the latter against said paper-feeding levers, is made variable, substantially as set forth.

5. Sheet-separating devices for paper-feeding and analogous machines, comprising a frame, a revoluble lever-carrier supported in said frame, a cam fixed on one face of said carrier, one or more sheet-separating levers pivoted on the opposite face of said carrier, combined with means for rotating said carrier and cam, a vibratory lever pivoted on said frame having one arm engaging with said cam, combined with a paper-pressing post A, adjustably connected to said lever, substantially as set forth.

6. Sheet-separating devices for paper-feeding and analogous machines, comprising a frame, a revoluble lever-carrier supported in said frame, a cam fixed on one face of said carrier, one or more sheet-separating levers pivoted on the opposite face of said carrier, combined with means for rotating said carrier and cam, a vibratory lever pivoted on said frame having one arm engaging with said cam, combined with a paper-pressing post A, adjustably connected to said lever, and a paper-pressing foot B, having a guiding-post support in said frame and engaging with said cam whereby said foot is moved against the paper, substantially as set forth.

7. In a paper-feeding machine, in combination with the frame of the paper-separating devices, a paper-guiding pin 84, supported by and having a free vertical movement in said frame, and in contact with the side of the paper pile 72, whereby the sheets are held in uniform position, substantially as set forth.

8. In combination, the paper-pressing foot B, having a guiding-post thereon, the frame-section L, in which said post is supported, combined with the paper-guiding pin 84, supported on the base of said post for a free vertical motion, substantially as set forth.

9. The frame composed of the sections L and W, the lever 77, pivoted for vibratory motion in said frame, the post A, connected to said lever, a spring H, acting against one arm of said lever to raise its longer arm, and said post, combined with the slotted bar 80, to one end of which said post is attached, a bolt 81, uniting said lever and bar and having a nut 82, thereon, and a washer on said bolt between said bar and lever, substantially as set forth.

10. In combination, the revoluble lever-carrier P, the lever E pivoted on said carrier, a roll *e*, pivoted on said lever, the lever-retracting spring *w*, engaging said lever and carrier, and means for applying a controlled pressure on said roll, substantially as set forth.

11. In paper-feeding machines, a sheet-feeding lever 91, having a block *k*, of resilient substance fixed thereon, an arm 95, pivoted on said lever, a roller J, of resilient material hung on said arm 95 for engagement with a sheet of paper, and having a frictional engagement with said block *k*, while so engaged, and free to be subsequently moved from said block by the independent movement of said paper, whereby said roll is disengaged from the latter, a radial arm 89, extending from a suitable hub, having an arm 90, thereon, a connection-rod 92, pivoted on said lever 91, and having a sliding engagement with said arm 90, means on said connection-rod for varying the pressure of said roller against a sheet of paper, combined with a revoluble shaft, means for securing said arm 90 on said shaft, and for rotating said shaft, substantially as set forth.

12. In combination, the gear and shaft holding box 58, having circular bosses on its opposite ends, a fork-shaped yoke engaging said bosses and having a connection with a fixed part of the machine thereabove, whereby said box is supported in operative position and is permitted to rock coincidently with the varying heights of the top of the pile of paper, means whereby the movements of the paper-holding table are controlled consisting of the arm 68, secured to the box 58, the lever 62, the lever 69, the lever 70, the latter being secured to the free end of the swinging frame 25, suitable connections between said swinging frame and the supports of said paper-holding table and means for rocking the box 58 consisting of the shaft 66 engaging with said box, a cam K, secured on said shaft, the presser-foot B, one end of which is in contact with said cam and the opposite end of which rests on said pile of paper, substantially as set forth.

13. In a paper-feeding machine, means for operating the upward feed of the paper-holding table thereof comprising an auxiliary frame pivoted by one end on the main frame of the machine, whose opposite end has a limited vertically-swinging movement, a friction-disk hung on a suitable shaft on said frame, combined with the driven shaft 22, having suitable engagement with said friction-disk, whereby the latter is rotated, the paper-carrying table, the screw-rods connected with said table whereby feeding movements are imparted thereto, and mechanism intermediate of said friction-disk and the upper extremities of said rods for rotating the same, substantially as set forth.

14. In a paper-feeding machine, means for operating the upward feed of the paper-holding table thereof comprising an auxiliary frame pivoted by one end on the main frame of the machine, whose opposite end has a limited vertically-swinging movement, a friction-disk hung on a suitable shaft on said frame, combined with the driven shaft 22, having suitable engagement with said friction-disk, whereby the latter is rotated, the paper-carrying table, the screw-rods connected with said table whereby feeding movements are imparted thereto, a shaft 6, hung on frame 2, gear connections between said shaft 6, and said screw-rods, a shaft 12, hung to rotate on said frame, having engagement with the shaft 30, and said shaft 6, substantially as set forth.

15. In a paper-feeding machine, means for stopping the machine when an excess of thickness of paper, or other matter, is inadvertently passed between the two rolls thereof which convey the separated sheets of paper from the machine, comprising an upper feed-roll having a rotary and a free vertical movement actuated by the passage thereunder of a sheet or sheets of paper, a normally non-rotating drum supported on a shaft in proximity to said roll, which, together with its said supporting-shaft, is revoluble by contact with

said feed-roll, combined with the main shipper-lever of the machine, a spring for moving said lever to stop the machine, and mechanism interposed between said drum-carrying shaft and said shipper-lever, whereby a revoluble movement of said drum and its shaft effects a release of said shipper-lever, and permits said spring to act, substantially as set forth.

16. In a paper-feeding machine, means for stopping the machine when an excess of thickness of paper, or other matter, is inadvertently passed between the two rolls thereof which convey the separated sheets of paper from the machine, comprising an upper feed-roll having a rotary and a free vertical movement actuated by the passage thereunder of a sheet or sheets of paper, a normally non-rotating drum supported on a shaft in proximity to said roll, which, together with its said supporting-shaft is revoluble by contact with said feed-roll, combined with the main shipper-lever of the machine, a spring for moving said lever to stop the machine, a latch engaging said shipper-lever and means actuated by the revoluble movement of said drum whereby said latch is disengaged from said lever, substantially as set forth.

17. In a paper-feeding machine, means for stopping the machine when an excess of thickness of paper, or other matter, is inadvertently passed between the two rolls thereof which convey the separated sheets of paper from the machine, comprising an upper feed-roll having a rotary and a free vertical movement actuated by the passage thereunder of a sheet or sheets of paper, a normally non-rotating drum supported on a shaft in proximity to said roll, which, together with its said supporting-shaft, is revoluble by contact with said feed-roll, combined with the main shipper-lever of the machine, a spring for moving said lever to stop the machine, a latch engaging said shipper-lever, a pivoted lever 53, having one arm thereof connected to said latch, and a connection between the opposite arm thereof and said drum-carrying shaft, whereby a revoluble movement of said drum and its shaft vibrates said lever and permits said spring to act, substantially as set forth.

18. In a paper-feeding machine, the paper-table having a pile of paper thereon, means for arresting the undue upward movement thereof consisting of the auxiliary frame, means intermediate of said table and said auxiliary frame, a rock-shaft 60, connections between said shaft and the free end of said frame, the gear-containing box 58, a supporting-rod 67, extending through said box, the sheet-separating devices secured on the extremity of said supporting-rod over said pile of paper, combined with a plate 61, fixed on arms extending from said rock-shaft, and an arm fixed on said box whose extremity bears against said plate, whereby a vibratory movement of said box imparts a swinging motion to the free end of said frame thereby disconnecting the said sheet-elevating devices thereon, substantially as set forth.

19. In a paper-feeding machine, in combination, the feeding-table, feed-screws, the auxiliary frame, the driving-pulley, and means for rocking said auxiliary frame, the shafts 6 and 31, hung respectively in the main frame of the machine and in the auxiliary frame thereof, a driving-belt connecting said shafts, a shipping-gear 14, on said shaft 6, and means for sliding the same thereon, and means for rotating said last-named shaft by a hand-crank whereby the screw-rods 4, are rotated and the paper-holding table is adjusted to operative position, substantially as described.

20. The combination in a paper-feeding machine, of a paper-holding table, the auxiliary frame 25, means between said frame and said table whereby the movements of the latter are controlled by said frame, the lever 106, adapted for engagement of one end thereof when said table is moving downward and having its upper end movable to different positions under said frame, substantially as set forth.

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Witnesses:
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