No. 694,039. Patented Feb. 25, 1902.

C. A. STURTEVANT.

PAPER FEEDING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.

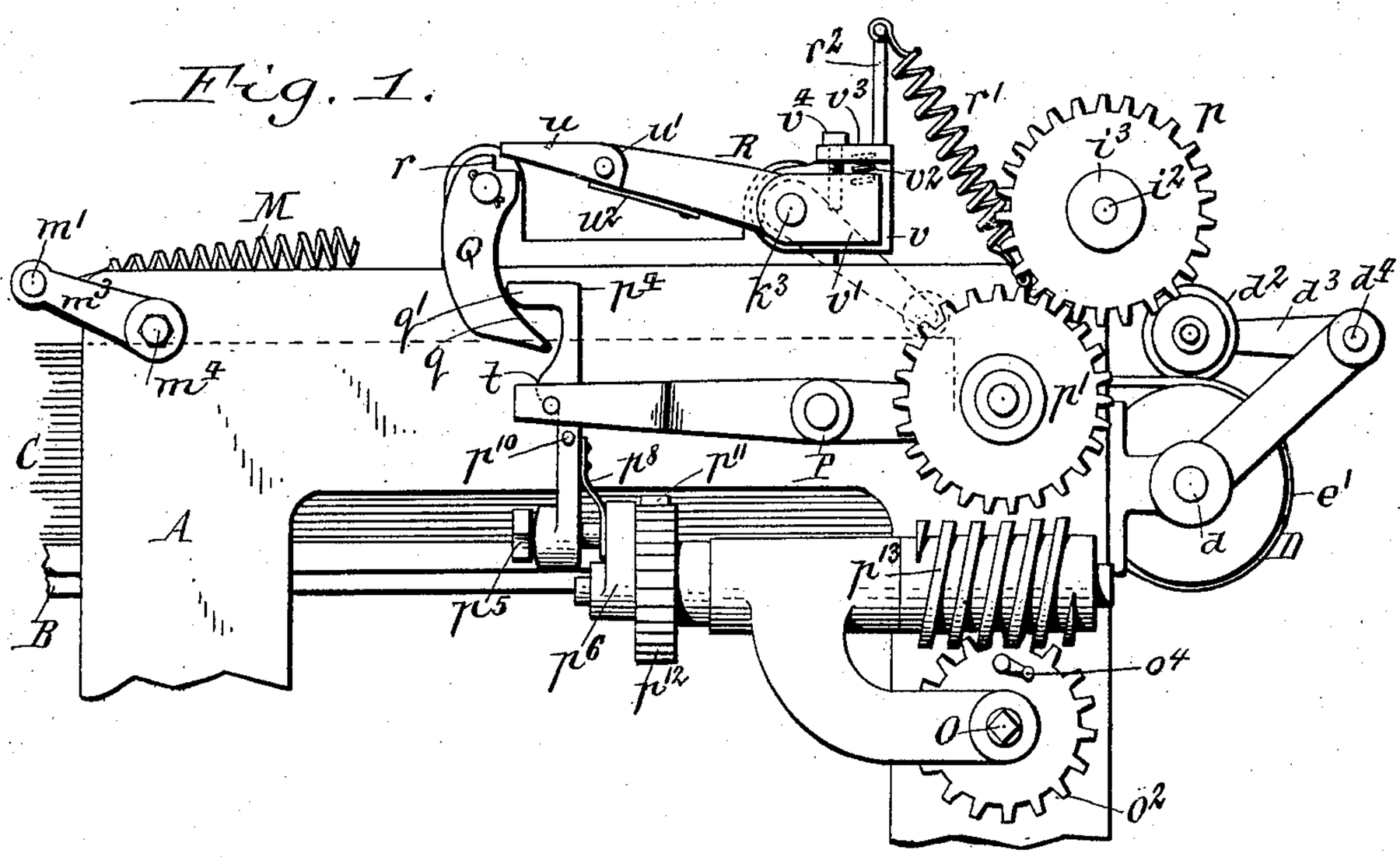


Fig. 4.

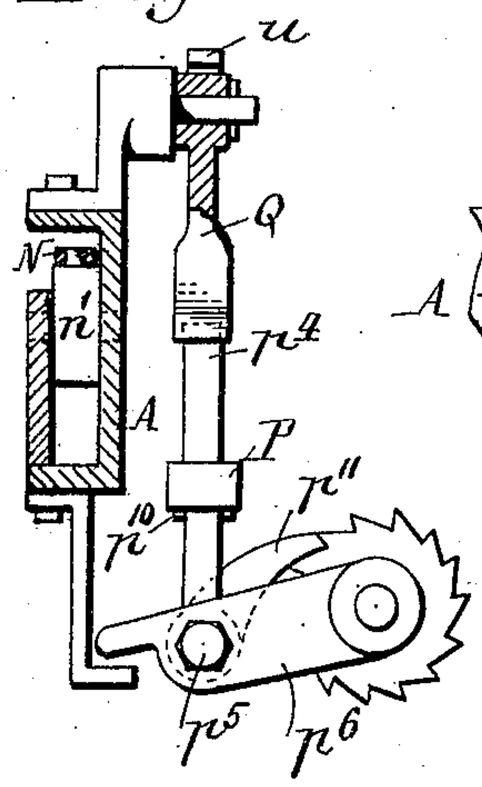


Fig. 2.

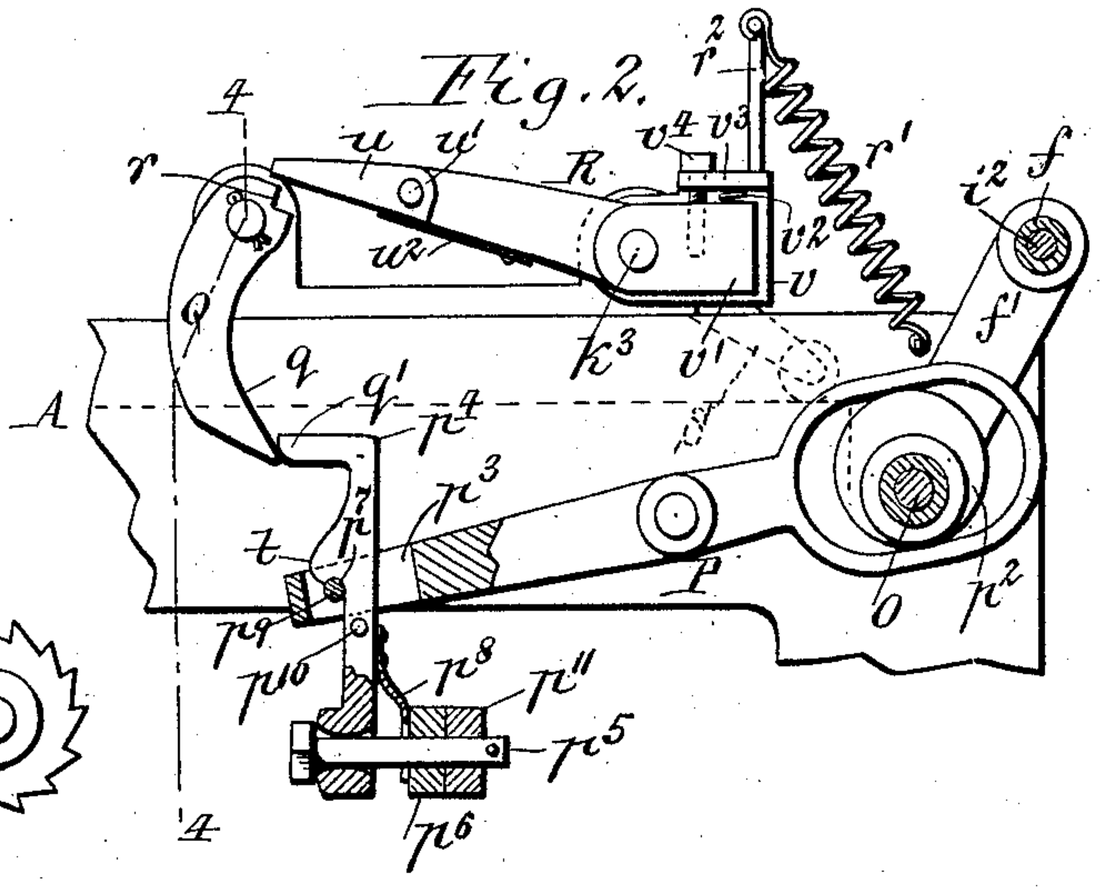


Fig. 3.

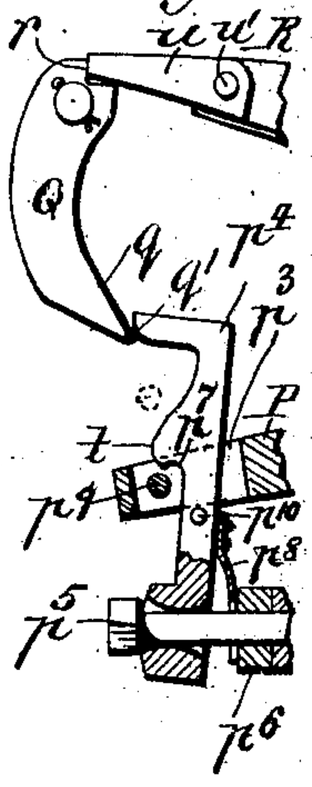


Fig. 5.

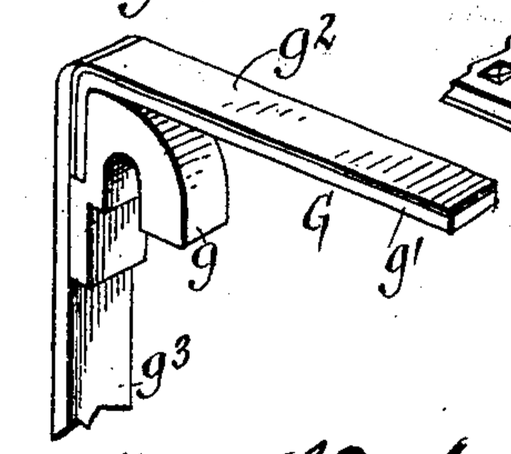


Fig. 6.

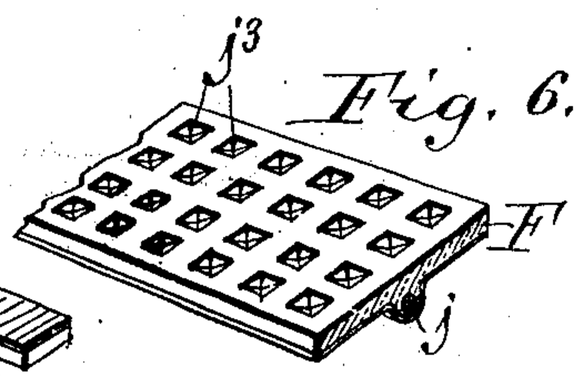


Fig. 7.

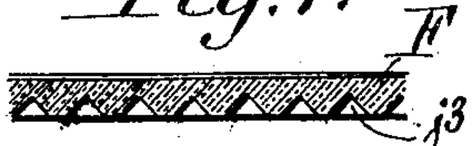
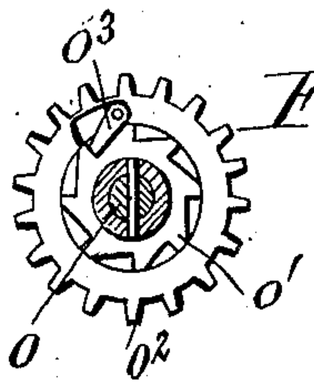


Fig. 8.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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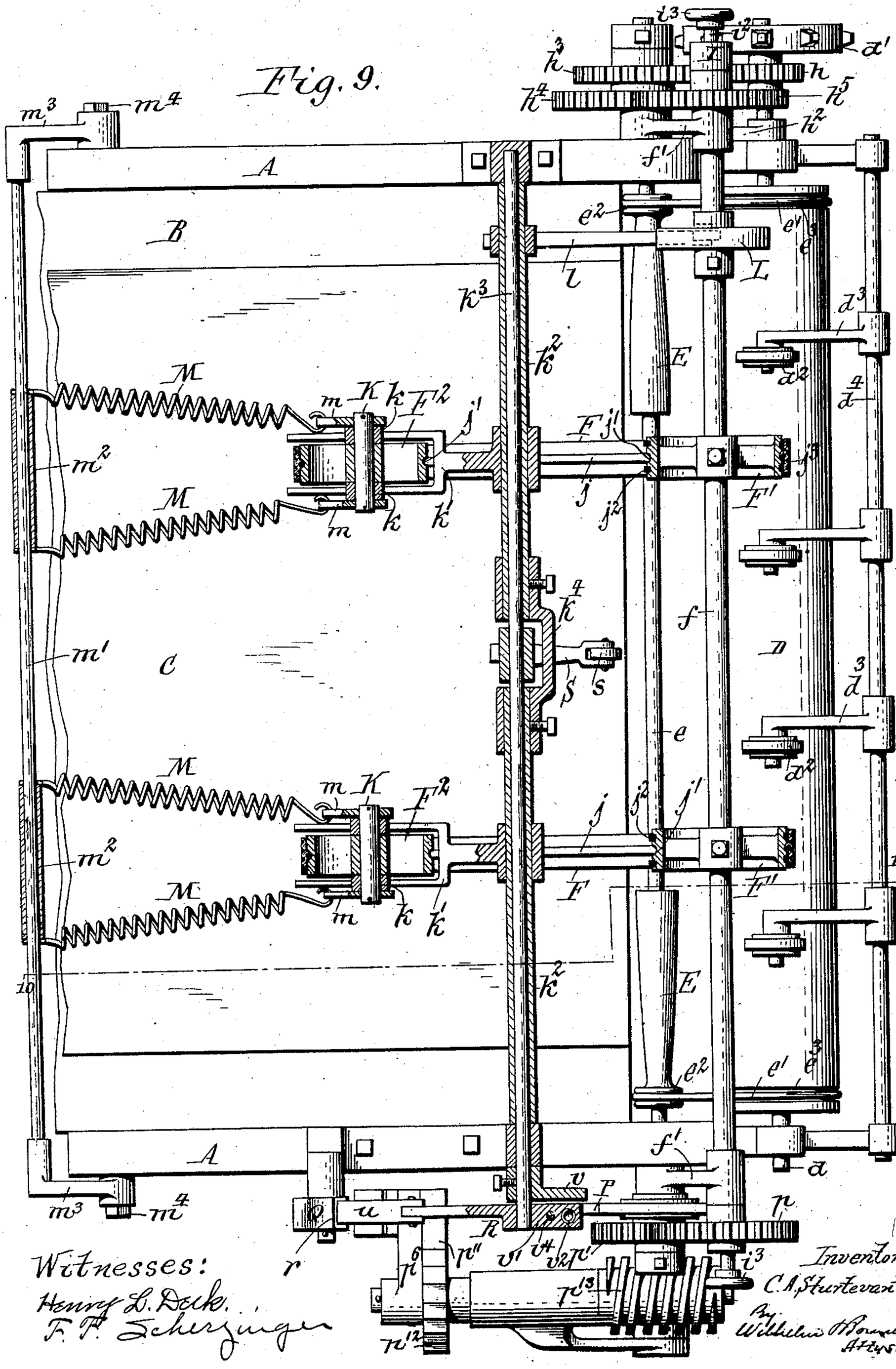
(No Model.) 5 Sheets—Sheet 2.

Fig. 9.



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(No Model.) 5 Sheets—Sheet 3.

Fig. 10.

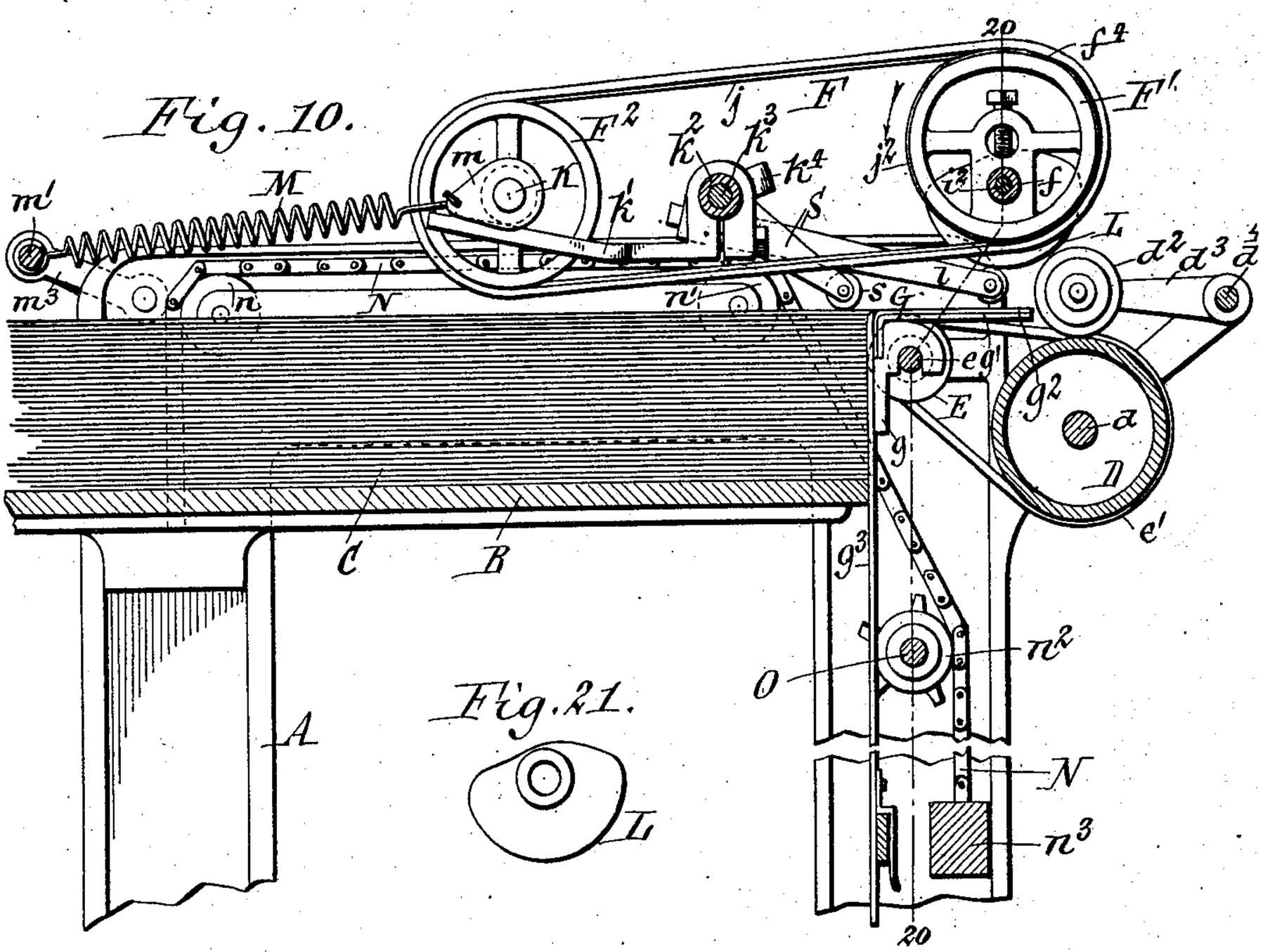


Fig. 21.

Fig. 11.

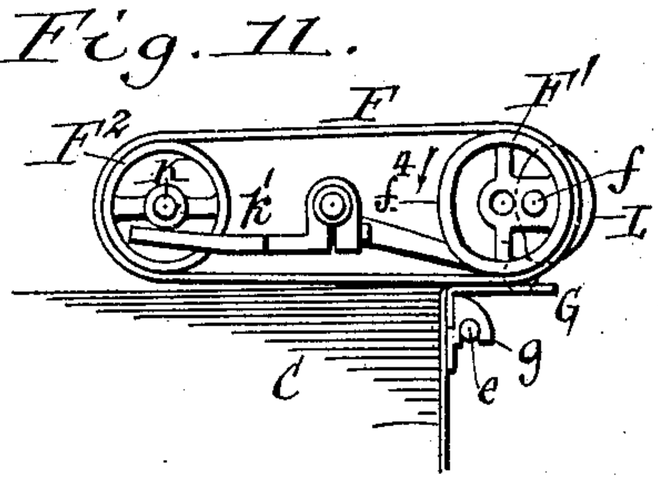


Fig. 13.

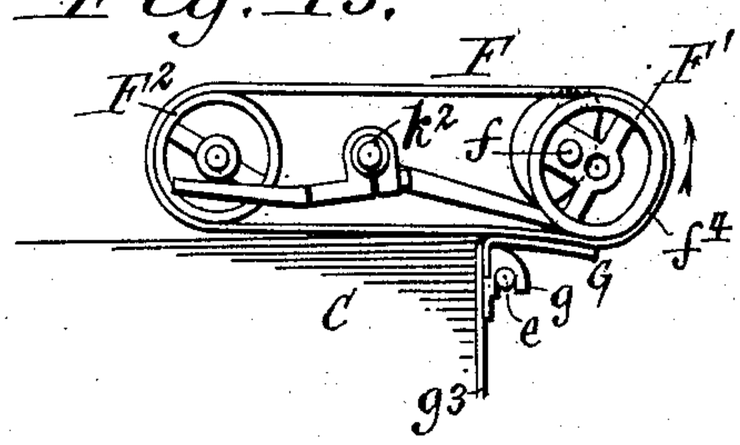


Fig. 12.

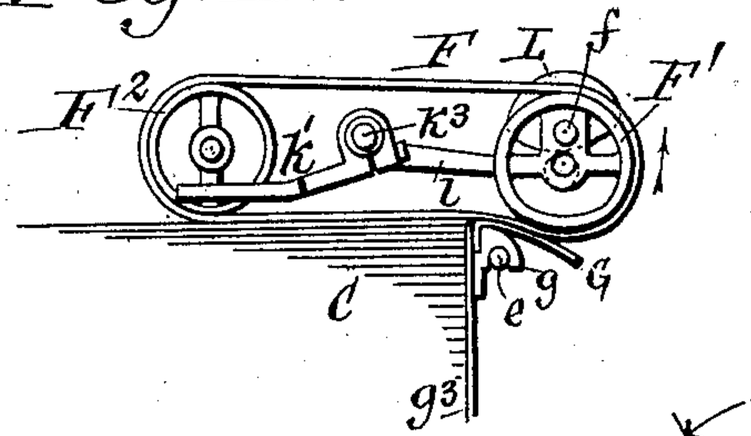


Fig. 14.

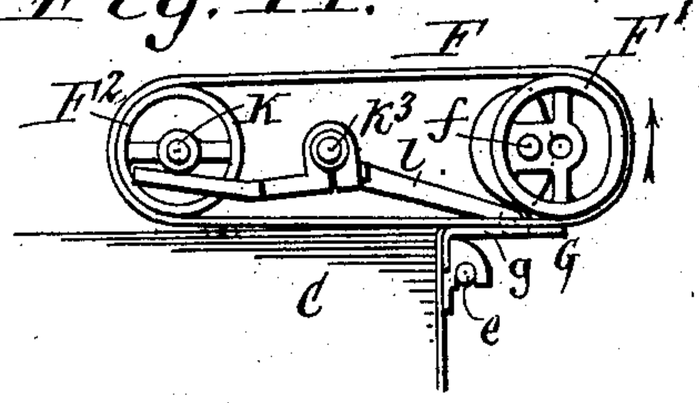
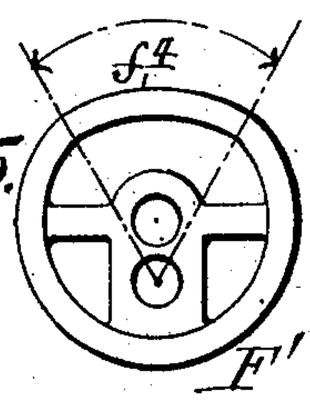


Fig. 15.



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PAPER FEEDING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 16.

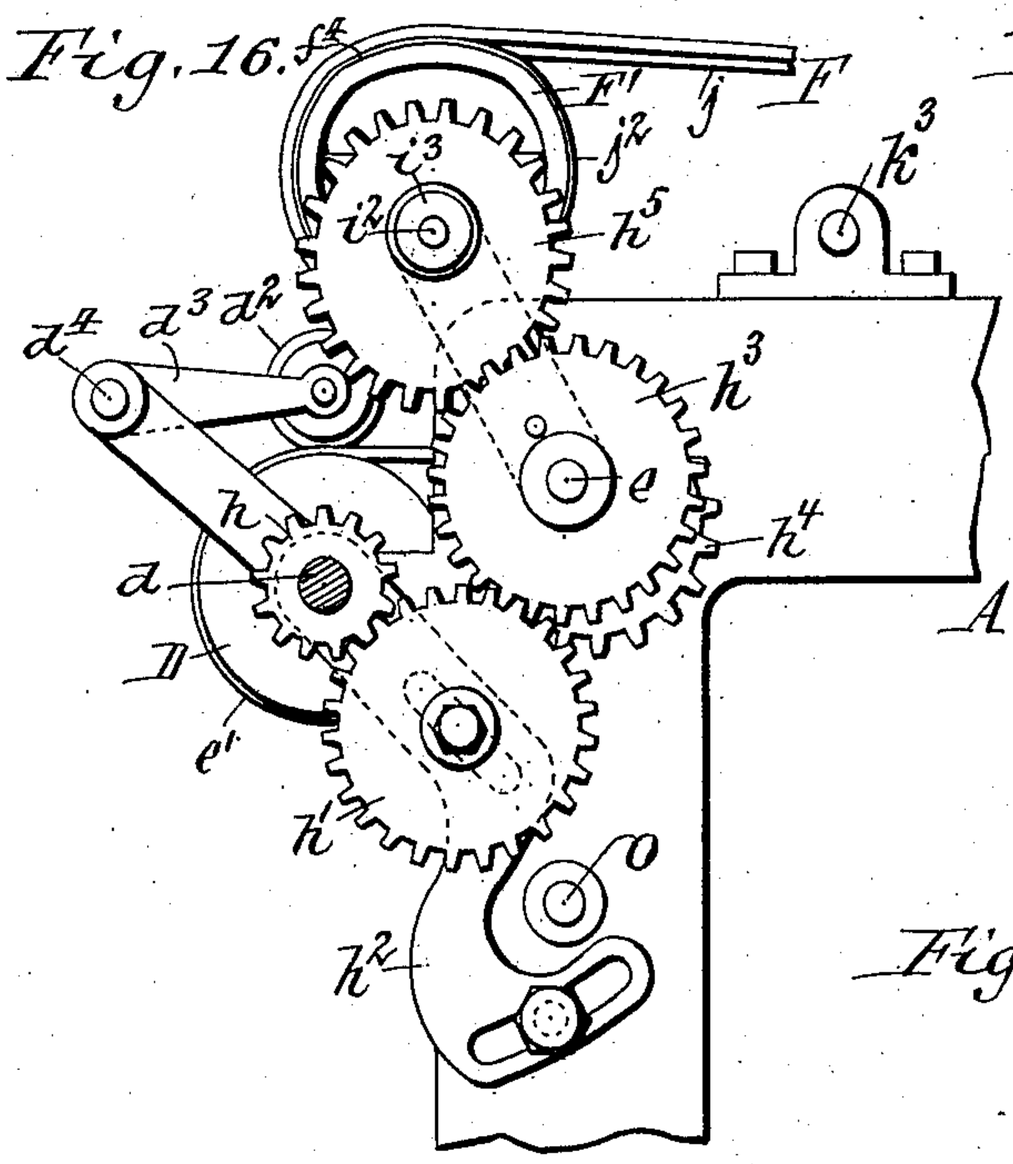


Fig. 17.

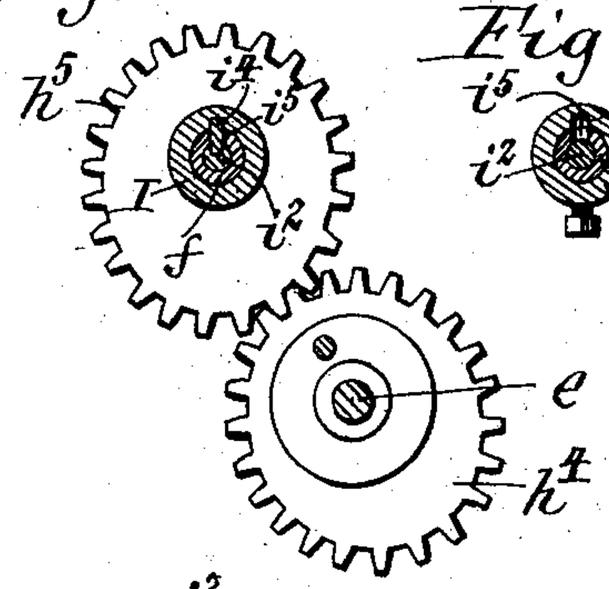


Fig. 18.

Fig. 19.

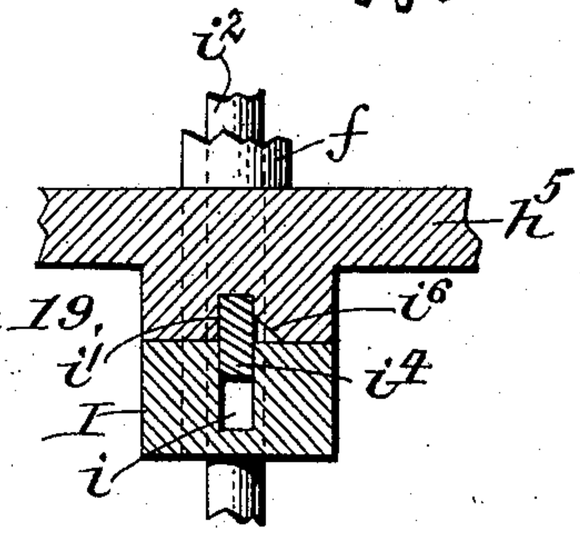
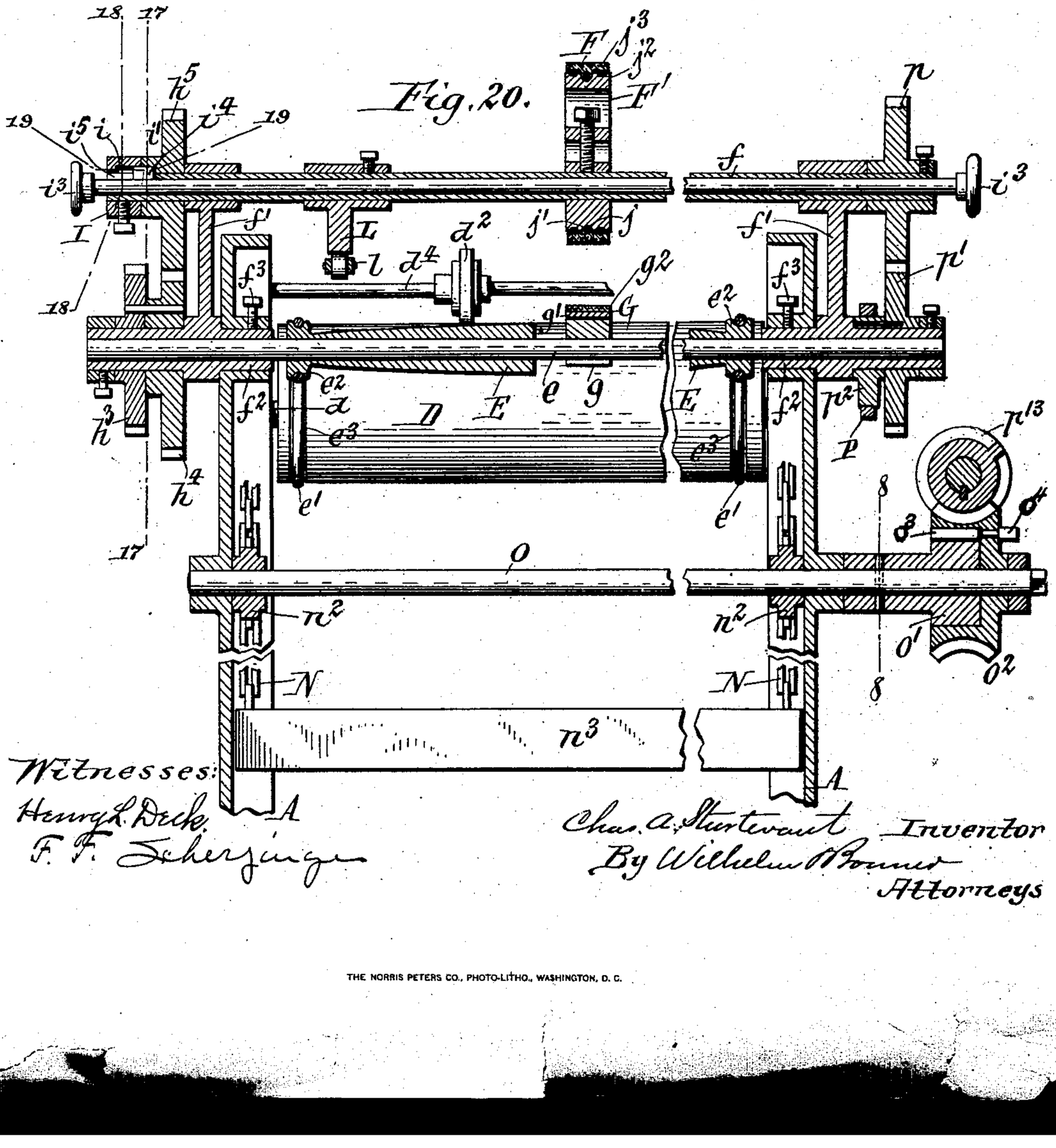


Fig. 20.



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C. A. STURTEVANT.

PAPER FEEDING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.) 5 Sheets—Sheet 5.

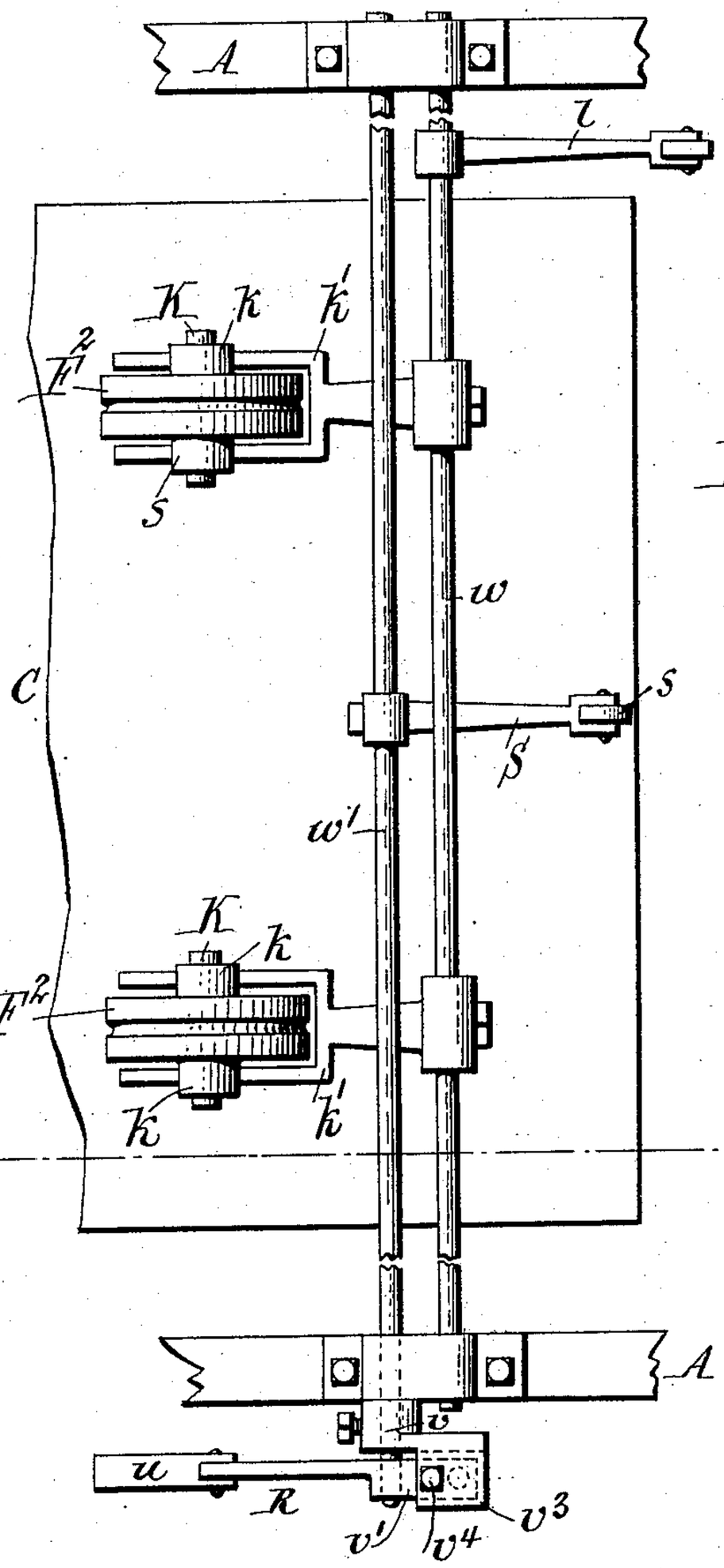

Fig. 22.

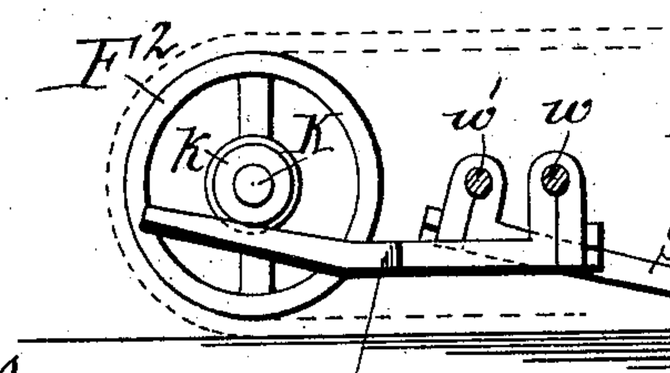

Fig. 23.

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Chas. A. Sturtevant
Inventor.
By Wilhelm Bonner
Attorneys.

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UNITED STATES PATENT OFFICE.

CHARLES A. STURTEVANT, OF PLAINFIELD, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO WELVANT MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 694,039, dated February 25, 1902.

Application filed December 11, 1900. Serial No. 39,538. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. STURTEVANT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Paper-Feeding Machines, of which the following is a specification.

This invention relates to that class of machines which are employed for feeding sheets of paper successively from a pile, stack, or bank to a ruling-machine, printing-press, or other machine.

The invention relates more particularly to such a sheet-feeding machine in which the top sheet is separated and fed from the pile by one or more endless traveling bands which are moved bodily toward and from the top sheet and at the same time propelled in the proper direction. A machine embodying a feeding device of this general character is described and claimed in Letters Patent No. 664,340, dated December 18, 1900, granted to De Witt C. Weld, Jr., and myself. In the machine of that application each feeding-band is mounted upon two wheels, which are both eccentrically journaled and which by their rotation about their eccentric axes move the feeding-band toward and from the pile in the proper manner and also propel the band in the proper direction and at the proper speed. The main object of my present invention is to improve this feeding mechanism, so as to better control the timing of the movement of the front and rear portions of the feeding-band toward and from the pile and the contact of the band with the top sheet.

My invention has the further object to improve the feeding-machine in several other respects.

In the accompanying drawings, consisting of five sheets, Figure 1 is a fragmentary side elevation of my improved paper-feeding machine. Figs. 2 and 3 are fragmentary sectional side elevations showing different positions of the pile-elevating mechanism. Fig. 4 is a vertical transverse section in line 4 4, Fig. 2. Fig. 5 is a fragmentary perspective view of one of the front pile-guides and the sheet-separator at the upper end thereof. Fig. 6 is a sectional perspective view of a portion of the feeding-band. Fig. 7 is a longitudinal section of the feeding-band. Fig. 8 is a sectional inside view of the clutch whereby the pile-elevating mechanism is connected with and disconnected from the driving mechanism, the section being taken in line 8 8, Fig. 20. Fig. 9 is a top plan view, partly in horizontal section, of my improved paper-feeding machine. Fig. 10 is a vertical longitudinal section of the same in line 10 10, Fig. 9. Figs. 11 to 14 are side elevations, on a reduced scale, illustrating different positions of the feeding-band, its front driving-wheel, and rear supporting-wheel. Fig. 15 is a detached side view of the band-driving wheel. Fig. 16 is a fragmentary side elevation of the machine viewed from the side opposite to that shown in Fig. 1 and showing part of the driving mechanism. Figs. 17 and 18 are vertical sections in lines 17 17 and 18 18, Fig. 20, respectively. Fig. 19 is a fragmentary cross-section of the clutch in line 19 19, Fig. 20, on an enlarged scale. Fig. 20 is a fragmentary vertical cross-section in line 20 20, Fig. 10. Fig. 21 is a side elevation of the cam by which the rear wheel of each feeding-band is raised and lowered. Fig. 22 is a fragmentary top plan view of the machine, showing a modified construction and arrangement of the two transverse shafts which carry the rear band-wheels and the pile-regulating finger. Fig. 23 is a vertical longitudinal section in line 23 23, Fig. 22.

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

A represents the side frames of the machine, between which the table B is arranged, on which the pile of sheets C is supported. These side frames are connected by cross-stays in the usual manner. The table is vertically movable between the side frames and is moved upwardly automatically in such manner that the top of the pile is maintained in the proper relation to the mechanism by which the top sheet is fed off.

D represents the main delivery-roller, which is arranged transversely at the front end of the machine and which receives and removes

plates m to opposite ends of the arbor K of the band-wheel and at their rear ends to a transverse supporting-rod m', which is secured to the rear portion of the frame of the machine. A spreading-sleeve m^2 is arranged upon the supporting-rod between the rear ends of the springs M M to hold them apart and cause the two springs to diverge rearwardly, whereby the strain of these springs causes the rear band-wheel to be always held in alinement with the front band-wheel. The supporting-rod m' is secured at its ends to rock-arms m^3, which are adjustably secured by bolts m^4 to the outer sides of the side frames. By shifting these rock-arms up or down the direction of the pull of the springs M may be varied.

G represents a sheet retarder or separator, which is arranged beneath the front portion of each feeding-band on a level with the top sheet of the pile for the purpose of obstructing the forward movement of the sheets lying next below the top sheet and preventing a lower sheet from being fed out with the top sheet. As shown in Figs. 5, 10–14, and 20, these retarders are mounted upon the same rod e which carries the supporting-arms f' of the shaft of the front wheels F' and the supporting-rollers E. Each sheet-retarder is composed of a block or saddle g, which is recessed in its under side to straddle the rod e, and a horizontal spring-plate g', secured at its downwardly-bent rear end to the top of the saddle and provided on its upper side with a friction covering or facing g^2, of rubber or other suitable material. The upright front guides g^3, which restrain the front portion of the pile, may be secured with their upper ends to the rear sides of the saddles, as shown in the drawings. The operation of this sheet separating and feeding mechanism is as follows: In the position of the parts shown in Fig. 10 the front band-wheel is arranged with its salient part uppermost and the cam L has raised the rear band-wheel into its highest position, in which position of these wheels the band is lifted with its lower operative portion wholly out of contact with the top sheet of the pile. As the shaft f of the front band-wheel turns in the direction of the arrow in Fig. 10 the eccentric front band-wheel causes the band to move with its lower part forwardly and with its upper part rearwardly. At the same time the eccentricity of the front band-wheel moves the front part of the feeding-band downwardly toward the top of the pile. When the front band-wheel has made about one-quarter of a rotation, the front part of the feeding-band is brought into engagement with the front portion of the top sheet, as represented in Fig. 11, and the feeding-band begins to separate the top sheet from the pile. After the front end of the sheet has been so engaged by the feeding-band and the separation of the sheet has been started the cam L lowers the rock-arm k and permits the rear band-wheel to descend with the rear part of the feeding-band upon the top sheet, as represented in Fig. 12. The top sheet is now separated from the pile and fed off. When the salient part of the front band-wheel has passed in front of the shaft f, the cam L raises the rear band-wheel and the rear portion of the feeding-band from the top sheet, while the front portion of the feeding-band still bears upon the same, as represented in Fig. 13. When the front band-wheel has made about three-quarters of a revolution, as shown in Fig. 14, it begins to lift the front part of the feeding-band from the pile. This lifting movement is completed when the front wheel has completed its revolution and its salient part is uppermost, as represented in Fig. 10. By this timing of the movements of the front and rear band-wheels toward and from the top of the pile the separating and feeding of the top sheet always begins at the front end of the sheet, whereby the sheet is first drawn taut and all wrinkles and slack are taken out of the sheet. The feeding action is then extended to the rear part of the sheet and is discontinued at the rear part before the feeding action upon the front of the sheet ceases, thereby placing the separation and feeding of the sheet wholly within the control of the front part of the feeding-band and preventing kinking or injuring of the sheet. By starting the feeding off of the sheets from the front end of the pile the separation of one sheet at a time is secured. If the feeding of the sheets were started in the middle of the pile, more than one sheet would be liable to be fed off on account of the tendency of the sheets to remain together. If the front and rear parts of the feeding-band were engaged at the same time with a sheet which is wrinkled, the sheet would be fed forward in a wrinkled condition, and the wrinkles would become set and form creases or kinks by the pressure of the feeding-band. If the rear part of the feeding-band were brought into engagement with the rear part of a smooth sheet before the front part of the feeding-band is brought in contact with the sheet, the latter would be wrinkled or buckled against the front part of the band when the same is subsequently lowered, and these wrinkles would become set. When the rock-arms k' have been lowered, they stand below the rollers on the arbors of the rear band-wheels, as shown in Fig. 12, and so allow each rear band-wheel to rest freely on the top of the pile and adjust itself to any irregularities in the surface of the same.

The feeding-band is propelled by the circumferential face of its front supporting-wheel, and as this wheel is eccentric with reference to its shaft it imparts a linear movement to the band, which increases in speed as the band moves downwardly toward the top sheet, and this speed is greatest in the lowest position of the band.

The free front end of the sheet-retarder is arranged below the front band-wheel, and its rubber facing coöperates with the front part

of the feeding-band to prevent feeding off more than one sheet at a time from the pile. The retarder when free projects horizontally forward from the top of the pile, as shown in Fig. 10. As the salient part of the front band-wheel moves downwardly with the band, the retarder is deflected downwardly thereby, as represented in Fig. 12, and as the wheel and band move upwardly the retarder follows the same, whereby the pressure upon the sheet between the feeding-band and the retarder is continued for a considerable time, thereby effectually holding back the lower sheets and preventing the same from being fed off with the top sheet.

The concentric face f^4 on the front band-wheel extends about one-quarter around the highest part of this wheel, which causes this wheel to exert its greatest pressure against the sheet for a considerable period of time and during nearly the whole time that the wheel is in its operative position, thereby producing a maximum pressure for a considerable time and insuring a more reliable separation of the top sheet than when the band-wheel is wholly eccentric and bears only momentarily with its highest part on the top sheet.

By raising or lowering the shaft supporting the front band-wheels the pressure of these wheels upon the sheet may be varied, and by raising or lowering the arms supporting the transverse rod m' the direction of the pull of the springs M may be adjusted so as to vary the pressure of the rear band-wheels upon the sheet. It is usually difficult to separate thin sheets of paper and to start the same moving, but when started the movement of the same is easily continued. For this reason the shaft of the front band-wheels is lowered when feeding thin sheets, so as to exert considerable pressure upon the front ends of the sheets and to insure the perfect separation thereof, but the spring-supporting rod m' is raised so as to reduce the downward pull of the springs M and cause the rear band-wheels to bear lightly on the sheets. Heavy paper usually requires comparatively light pressure to effect a separation of the sheets, but considerable pressure to keep the sheets moving after they have been started. For this reason the shaft of the front band-wheels is raised, so that these wheels bear lightly on the front end of the pile, and the supporting-rod m' is lowered, so as to increase the downward pull upon the rear band-wheels and cause the bands to be pressed heavily against the rear part of the pile. By adjusting the front wheels downwardly the length of the contact between the band and the retarder is increased, thereby increasing the hold of the front portion of the band on the sheet. By adjusting the front wheel upwardly the contact is reduced.

Motion is transmitted to the front shaft f from the main driving-shaft d by a train of gear-wheels, which is shown in Figs. 9, 16, 17, and 20. This train consists of a pinion h, which is mounted on the main driving-shaft d, a gear-wheel h', which meshes with this pinion and is mounted on an adjustable arm h^2, a gear-wheel h^3, which meshes with the wheel h' and is mounted loosely on the outer portion of the hub of the adjacent supporting-arm f' of the front shaft f, an elliptical gear-wheel h^4, arranged on the rear side of the wheel h^3 and secured thereto, as shown in Fig. 20, and an elliptical gear-wheel h^5, mounted on the front shaft f and meshing with the elliptical gear-wheel h^4. The gear-wheel h' is interchangeable for a smaller or larger one for changing the speed. These elliptical wheels impart to the feeding-bands a greatly-increased speed in the lowered position of the feeding-bands.

The sheet-separating mechanism may be connected with or disconnected from the driving mechanism for feeding or stopping the feeding of sheets by a clutch of any suitable construction. The preferred form of clutch for this purpose is shown in the drawings, Figs. 9, 10, 17–20, and is constructed as follows: I represents a clutch sleeve or collar, which is secured to the front shaft f adjacent to the outer side of the elliptical gear-wheel h^5 and provided with a recess i in its inner side, which is adapted to register with a similar recess i' in the outer side of the elliptical gear-wheel h^5. i^2 is a shipper-rod which is arranged lengthwise in the front shaft f, made hollow for that purpose, and which is provided at opposite ends with handles or knobs i^3, whereby the shipper-rod may be shifted lengthwise in the shaft f. i^4 represents a coupling-lug which is arranged on the side of the shipper-rod and projects outwardly through a longitudinal slot i^5 in the shaft into the recesses $i\,i'$ of the clutch-sleeve and the elliptical gear-wheel h^5. Upon moving the shipper-rod in one direction until its coupling-lug is withdrawn outwardly from the recess i' in the elliptical gear-wheel h^5 and is seated wholly in the recess i of the clutch-sleeve the feed mechanism is disconnected from the driving mechanism, and upon moving the shipper-rod in the opposite direction until the coupling-lug is seated partly in the recess of the clutch-sleeve and partly in the recess of the elliptical gear-wheel h^5, as shown in Figs. 19 and 20, these parts are coupled and the feeding mechanism is connected with the driving mechanism. The sides of both recesses $i\,i'$ are abrupt and the coupling-lug bears squarely against the same, whereby the clutch-sleeve and gear-wheel h^5 are locked against movement upon each other in either direction and any backlash in the feeding-bands and displacement of the sheets are prevented, which otherwise would be liable to happen if the clutch were so organized as to drive forward positively, but permit the driven parts to move backwardly independent of the driving mechanism. The rear side of the recess i' in the gear-wheel h^5 is beveled, as shown at i^6, Fig. 19, to facilitate the entrance of the coupling-lug into this recess

while the lug is turning. By extending the shipper-rod beyond the ends of the hollow shaft *f* the clutch can be operated from either side of the machine.

In order to prevent slipping, the feeding-bands are preferably provided with a rib *j*, Figs. 6, 10, and 20, formed longitudinally on the inner side or back of each band, and each band-wheel in its face with a circumferential groove *j'*, in which the rib engages snugly. The traction of the front wheels may be increased by facing the same on opposite sides of the central groove with rubber rings j^2, as shown in Figs. 9, 10, and 20. The feeding-bands are preferably made of soft rubber and provided on the outer side or face with numerous cavities j^3. As the band is pressed with its face against the top sheet the air is partially expelled from the cavities, whereby a suction action is produced which increases the grip of the band on the sheet.

The pile-table B is guided on both sides in the upright rear portions of the side frames and is suspended by two chains N, each of which extends from the pile-table upwardly on the inner side of each side frame over a rear guide-roller *n*, then forwardly and over a front guide-roller *n'*, then downwardly and over a sprocket wheel or pinion n^2, and then down to a counter-weight n^3, Figs. 4, 10, and 20. The sprocket-pinions n^2 are secured to a transverse shaft O, and by turning the shaft in one or the other direction the table is raised or lowered. The automatic mechanism for raising and lowering the table is applied to the shaft O. The right-hand end of the shaft O is made square or otherwise adapted to receive a hand-crank, as shown in Figs. 1 and 20, and carries on the outer side of the right-hand side frame a ratchet-wheel *o'*, Figs. 8 and 20, which is secured to the shaft.

o^2 is a worm-wheel, which surrounds the ratchet-wheel *o'* and is loosely mounted on the shaft. A pawl o^3 is arranged in the worm-wheel, so as to couple the two together when engaged with the ratchet-wheel, as shown in Fig. 8; but this pawl can be disengaged from the ratchet-wheel by a handle o^4, with which the pawl is provided, and when it is so disengaged the shaft O can be turned by hand in either direction and the table can be quickly lowered for receiving a pile of sheets and raised for bringing the top of the pile in line with the feeding-off devices.

The automatic mechanism for raising the table in the same measure as the sheets are fed off is constructed as follows: P is a longitudinal lever which oscillates vertically and is actuated from the front shaft *f* of the band-wheels by a gear-wheel *p*, secured to the shaft *f*, a gear-wheel *p'*, meshing with the wheel *p*, and a cam p^2, arranged on the rear side of the gear-wheel *p'* and engaging in the looped front arm of the rock-lever P, Figs. 1 to 4, 9, and 20. The rear arm of the rock-lever P is provided with a longitudinal slot p^3, in which plays an upright dog p^4, Figs. 1 to 4. This dog is pivoted at its lower end by a pin p^5 to the inner end of a pawl-arm p^6 and is provided on its rear side with a downwardly-facing shoulder p^7. The dog is yieldingly pressed rearwardly by a spring p^8, so that its shoulder engages with a cross-pin p^9 in the rear end of the slot p^3. The spring is secured to the front side of the dog, and bears against the pawl-arm, as shown in Figs. 1–3. The dog is provided below the rock-lever P with a pin or shoulder p^{10}. The vertical rocking movement of the lever P raises the dog p^4 when the shoulder p^9 of the lever engages with the shoulder p^7 of the dog, and the dog is lowered by the rock-lever engaging with the pin p^{10} of the dog. The pawl-arm p^6 carries a pawl p^{11}, which actuates a ratchet-wheel p^{12}, Figs. 1, 4, and 9, and this ratchet-wheel is secured to the longitudinal shaft of a worm p^{13}, by which the worm-wheel o^2 is rotated, Figs. 1, 9, and 22. The up-and-down movement of the rear arm of the rock-lever P actuates the dog p^4 so long as the upper shoulder p^7 of the latter engages over the rock-lever, as shown in Fig. 2, and this up-and-down movement of the dog actuates the ratchet-wheel p^{12} and through the worm and worm-wheel and the ratchet-wheel *o'* the shaft O, to which the chain-sprocket pinions n^2 are secured and which are thereby rotated in the proper direction to slowly raise the table and pile. When the dog is pressed back into the slot of the rock-lever so that its shoulder p^7 does not engage over the pin p^9 of the rock-lever, as shown in Fig. 3, the up-and-down movement of the rock-lever does not move the dog and the pile-table is not moved.

Q represents a disengaging-arm which is pivoted at its upper end to the side frame above the dog and which is provided with a downwardly-inclined front side *q*, which is engaged by a rearwardly-projecting nose *q'* at the upper end of the dog. While the elevating mechanism of the pile-table is operating this arm is unrestrained and capable of swinging freely on its pivot. When the dog is in its highest position, as represented in Fig. 1, its nose *q'* projects rearwardly over the lower inclined front side *q* of the arm. During each downward movement of the dog the nose of the latter strikes the inclined front side of the arm and swings the latter backward out of the way, as represented in Fig. 2. When the top of the pile of sheets has been raised to its normal position, the arm Q is automatically locked against backward movement by a restraining-finger R, which is controlled by the top of the pile. During the next descent of the dog, while the arm is so held against backward movement, the dog is moved forwardly by its nose *q'* riding down on the incline *q* of the arm until the upper shoulder p^7 of the dog is disengaged from the pin or shoulder p^9 of the actuating rock-lever, as represented in Fig. 3. The disengagement of the dog from the rock-lever disconnects the pile-elevating mechanism from its actuating mech-

anism, whereby the upward movement of the pile is stopped. After a sufficient number of sheets have been fed off from the pile to lower the top of the same below the normal the restaining-finger R releases the arm, and the spring of the dog moves the latter backwardly with its upper shoulder p^7 into the path of the shoulder p^9 of the rock-lever, thereby causing the latter during its next following upward movement to engage the dog, whereby the actuating of the pile mechanism is resumed.

The restraining-finger R is mounted on one end of the rock-shaft k^3, from which it projects rearwardly. Its rear end is adapted to move into and out of the path of a forwardly-facing shoulder r, formed on the disengaging-arm Q, above the pivot thereof. S represents a regulating-arm which is secured to the central part of the shaft k^3 between the hollow shafts k^2 and which rests at its front end by a roller s on the top of the pile near the front side thereof. A spring r' is applied to the rock-shaft k^3 in such manner that the regulating-arm S is held yieldingly against the top of the pile. This spring is preferably secured to the frame and to a post r^2, connected with the shaft k^3.

When the top of the pile is below the normal, the regulating-arm S, bearing upon the same, permits the rock-shaft k^3 to be turned by the spring r' so far that the restraining-finger R is held above the shoulder of the disengaging-arm, in which position of the parts the dog is not affected by the arm and is coupled with its actuating rock-lever P, so as to rise and fall therewith and operate the pile-elevating mechanism. When the top of the pile reaches the normal position, the regulating-arm S is so far raised by the pile that the rock-shaft k^3 is turned sufficiently to depress the restraining-finger R into engagement with the shoulder r of the disengaging-arm. The raising of the pile takes place during the upward stroke of the dog, and at the end of this stroke the disengaging-arm has swung into its forward position by gravity, so that when the pile has been raised to its normal height the restraining-finger is lowered in front of the shoulder r of the arm. When the finger has reached this position, the disengaging-arm is locked against backward movement and causes the dog during its subsequent downward movement to be disengaged from the actuating rock-lever P, thereby stopping the upward movement of the pile-table. The dog remains in its depressed position and the pile-raising mechanism remains inoperative until the continued feeding off of sheets from the top of the pile lowers the same below the normal, when the descent of the regulating-arm lifts the finger out of engagement with the shoulder of the disengaging-arm, thereby releasing the dog and permitting the same to be engaged with the actuating-lever, whereby the raising of the pile is resumed. When the dog is disconnected from the actuating rock-lever, it is pressed by its spring against the disengaging-arm and the latter presses with its shoulder against the end of the restraining-finger. In order to relieve this pressure upon the finger and permit the regulating-arm to descend freely as the top of the pile is lowered by the feeding off of sheets, the dog is provided on its rear side above its upper shoulder with a rearwardly-projecting cam or salient part t, which stands in the path of the shoulder or pin p^9 of the actuating rock-lever when the dog is disengaged therefrom, as shown in Fig. 3. During each upward-and-downward movement of the rear arm of the actuating-lever the shoulder or pin p^9 thereof engages with the cam t of the dog and moves the latter slightly forward, thereby temporarily relieving the pressure on the disengaging-arm and permitting the restraining-finger to move upwardly out of engagement therewith if the top of the pile is low enough to permit the regulating-arm to drop the required distance. If the restraining-finger is released from the disengaging-arm during the downward movement of the actuating rock-lever, the dog engages its upper shoulder with said lever at the end of said downward movement and the raising of the pile is resumed during the subsequent upward movement of the actuating-lever; but if the finger is released during the upward movement of the actuating-lever the dog is not coupled therewith until the end of the next downward movement of the lever. In the absence of any provision to relieve the pressure of the dog against the disengaging-arm the latter would be liable to be constantly held in an elevated position, in which case the upward movement of the pile would be permanently arrested.

When the pile is raised to its normal position while the disengaging-arm is swung into its backward position, the rear arm of the restraining-finger strikes upon the top of the hub of the arm. In order to prevent the finger from exerting any considerable downward pressure upon the arm, which would interfere with the free movement of the latter, the finger is provided with a vertically-yielding end portion u, by which it engages with the arm. This end portion is pivoted to the finger by a horizontal pin u' and is normally held in its operative position by a flat spring u^2, which is secured to the finger and bears against the flat under side of the end portion. This normally-yielding end portion of the finger does not impair the practical rigidity of the finger in a lengthwise direction. If no provision were made to prevent the finger from bearing hard upon the disengaging-arm, the latter might be held in its backward position by friction, in which case the elevating mechanism would operate constantly.

In order to permit of conveniently adjusting the regulating mechanism to the height

of the pile, the hub of the finger R is constructed of two sections v v', which are adjustably connected, so that the relative position of these sections may be changed, Figs. 1, 2, and 9. The inner section v is secured directly to the outer end of the rock-shaft k^3, while the outer section is secured to the finger and mounted loosely on the outer end of the shaft k^3.

v^2 represents a spring interposed between the outer section v' and an overhanging ear v^3 on the inner section v, and v^4 is an adjusting-screw connecting said ear and the outer section v'. Upon tightening this screw the section v is drawn up and the point of the finger is thrown down upon the disengaging-arm. Upon loosening the screw the spring separates the sections, forcing the section v down and raising the point of the finger. When the finger is adjusted upwardly from the disengaging-arm, the pile must be raised higher before reaching the normal position than when the finger is adjusted closely to the arm. This adjustment is used to adapt the machine to feed different kinds of paper.

By interposing the disengaging-arm between the restraining-finger which is controlled by the pile and the dog which actuates the elevating mechanism the regulating mechanism which bears upon the pile is not required to disengage the dog directly, the shifting of the dog being effected by the interposed arm, and the regulating mechanism is rendered more sensitive in its operation.

Instead of constructing and arranging the two shafts k^2 k^3, as hereinbefore described and shown, in such manner that the shaft k^2 is composed of two tubular parts, which are mounted upon the shaft k^3, these shafts may be constructed and arranged as shown in Figs. 22 and 23. In this construction the two shafts are arranged one behind the other. The front shaft w carries the cam-arm l and the rock-levers k' of the rear band-wheels, while the rear shaft w' carries the regulating-arm S and the hub v of the restraining-finger R. In the first-described construction there is a liability under certain conditions of the regulating-shaft k^3 being turned slightly by the movements of the tubular shafts k^2, which would interfere with the accurate working of the pile-regulating mechanism. Such interference is entirely avoided by the last-described construction and arrangement of these shafts.

I claim as my invention—

1. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, substantially as set forth.

2. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, and mechanism whereby said rear wheel is raised and lowered, substantially as set forth.

3. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, a vertically-movable support for said rear wheel, and a cam whereby said support is raised and lowered, substantially as set forth.

4. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, a vertically-movable rock-arm adapted to support the arbor of the rear wheel, and a cam whereby said rock-arm is raised and lowered, substantially as set forth.

5. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, a vertically-movable support for said rear wheel, and a cam which lowers said support after the front wheel has engaged the front portion of said feed-band with the top sheet and raises said support before the front portion of the band leaves the top sheet, substantially as set forth.

6. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, and a tension device which presses said rear wheel rearwardly and tightens the feeding-band, substantially as set forth.

7. The combination with a support for the sheets and an endless feeding-band, of an eccentrically-journaled front driving-wheel and a centrally-journaled idle rear wheel upon which said band is mounted, a bifurcated vertically-movable rock-arm which is adapted to support on its rear portion the arbor of said rear wheel, a cam whereby said rock-arm is raised and lowered, and a rearwardly-acting tension-spring connected with the arbor of said rear wheel, substantially as set forth.

8. The combination with a support for the sheets and an endless feeding-band, of front and rear wheels upon which said band is mounted, said front wheel being journaled eccentrically and having the salient portion of its peripheral face curved concentrically with the axis about which it turns, substantially as set forth.

9. The combination with a support for the sheets, the endless feeding-band, its eccentric front wheel and rear wheel, of a sheet-retarder arranged below said front wheel and having a forwardly-projecting flexible tongue which yields vertically under the action of the eccentric front wheel, substantially as set forth.

10. The combination with the pile-support, of outwardly-tapering supporting-rollers which are arranged above the pile-support in

front of the corners of the pile and adapted to support the corners of the sheet which is being fed off, substantially as set forth.

11. The combination with the pile-table, its elevating mechanism and a rocking actuating-lever, of a dog which actuates said elevating mechanism and which is capable of engagement with said rocking lever for actuating the elevating mechanism or disengagement from said rocking lever for stopping the elevating mechanism, a restraining-finger which is controlled from the pile on the table, and a movable disengaging-arm which is interposed between said finger and said dog and which disengages the latter from the actuating-lever when the arm is locked by the restraining-finger, substantially as set forth.

12. The combination with the pile-table, its elevating mechanism and the rocking actuating-lever, of a dog which actuates said elevating mechanism and which is capable of engagement with said rocking lever for actuating the elevating mechanism, a restraining-finger which is controlled from the pile on the table, and a pivoted disengaging-arm interposed between said dog and said finger and provided with a stop-shoulder adapted to be engaged by said finger, substantially as set forth.

13. The combination with the pile-table, its elevating mechanism and the rocking actuating-lever having an actuating-shoulder, of a dog which actuates said elevating mechanism and which is provided with a shoulder for engagement with the actuating-shoulder of said lever and above said shoulder, with a cam or projection which is struck by the actuating-lever when the dog is disengaged from the same, a pivoted disengaging-arm, and a restraining-finger which is controlled by the pile on the table and which is adapted to engage said disengaging-arm, substantially as set forth.

14. The combination with the pile-table, its elevating mechanism and the rocking actuating-lever, of a dog which actuates said elevating mechanism and which is capable of engagement with and disengagement from said rocking lever, a disengaging-arm provided with a stop-shoulder, and a restraining-finger which is controlled by the pile on the table and which is provided with a pivoted end portion capable of yielding upon striking upon the disengaging-arm, substantially as set forth.

15. The combination with the pile-table, its elevating mechanism and the rocking actuating-lever, of a dog which actuates said elevating mechanism and which is capable of engagement with and disengagement from said actuating-lever, a disengaging-arm, a rock-shaft, a restraining-finger which is adjustably secured to said rock-shaft, and a regulating-arm secured to said rock-shaft and adapted to rest upon the pile, substantially as set forth.

16. The combination with the pile-table, its automatic elevating mechanism, a rock-shaft provided at one end with a restraining-finger by which said elevating mechanism is controlled and between its ends with a regulating-arm adapted to bear upon the pile, of endless feeding-bands arranged on opposite sides of said regulating-arm, tubular shafts mounted upon said rock-shaft on opposite sides of said arm and connected by a bridge-piece, wheel-supports secured to said tubular shafts, rear band-wheels adapted to be raised and lowered by said supports, an actuating-arm secured to one of said tubular shafts, a cam acting upon said arm, and front band-wheels, substantially as set forth.

17. The combination with front and rear band-wheels, of an endless feeding-band provided in its outer face with suction-recesses, substantially as set forth.

Witness my hand this 9th day of November, 1900.

CHARLES A. STURTEVANT.

Witnesses:
EDWARD WILHELM,
DE WITT C. WELD, Jr.