No. 664,340. Patented Dec. 18, 1900.

C. A. STURTEVANT.

PAPER FEEDING MACHINE.

(Application filed Apr. 28, 1897. Renewed Mar. 9, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

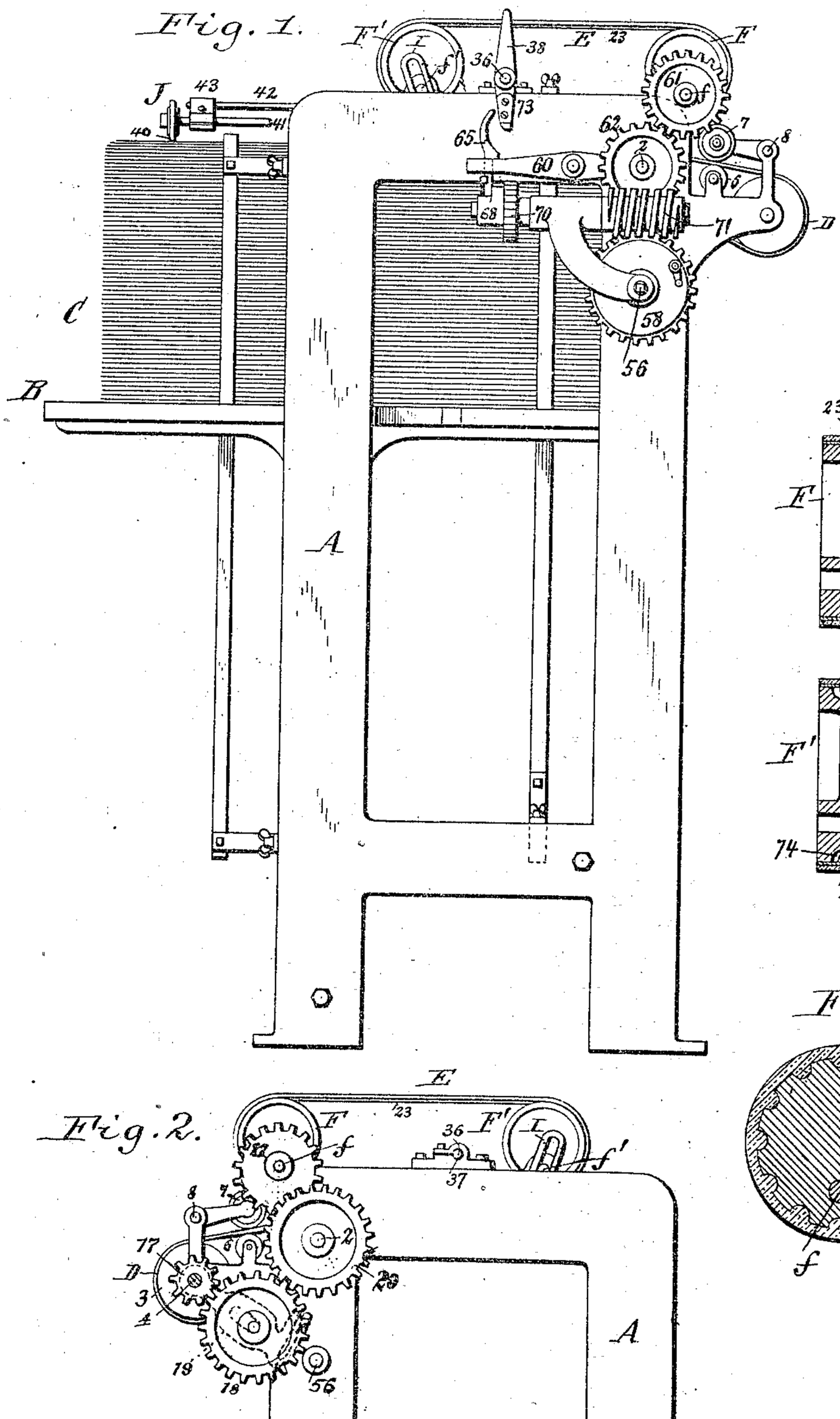

Fig. 3.

Fig. 4.

Fig. 5.

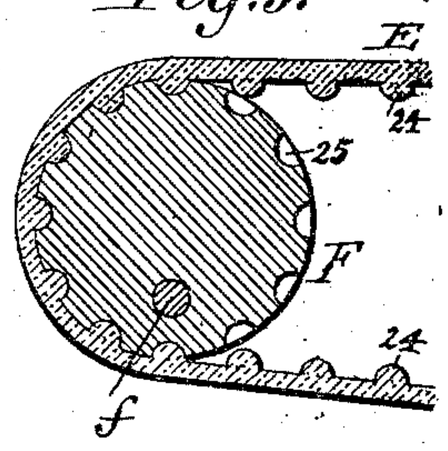

Fig. 2.

Witnesses:
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(No Model.) 4 Sheets—Sheet 2.

Fig. 6.

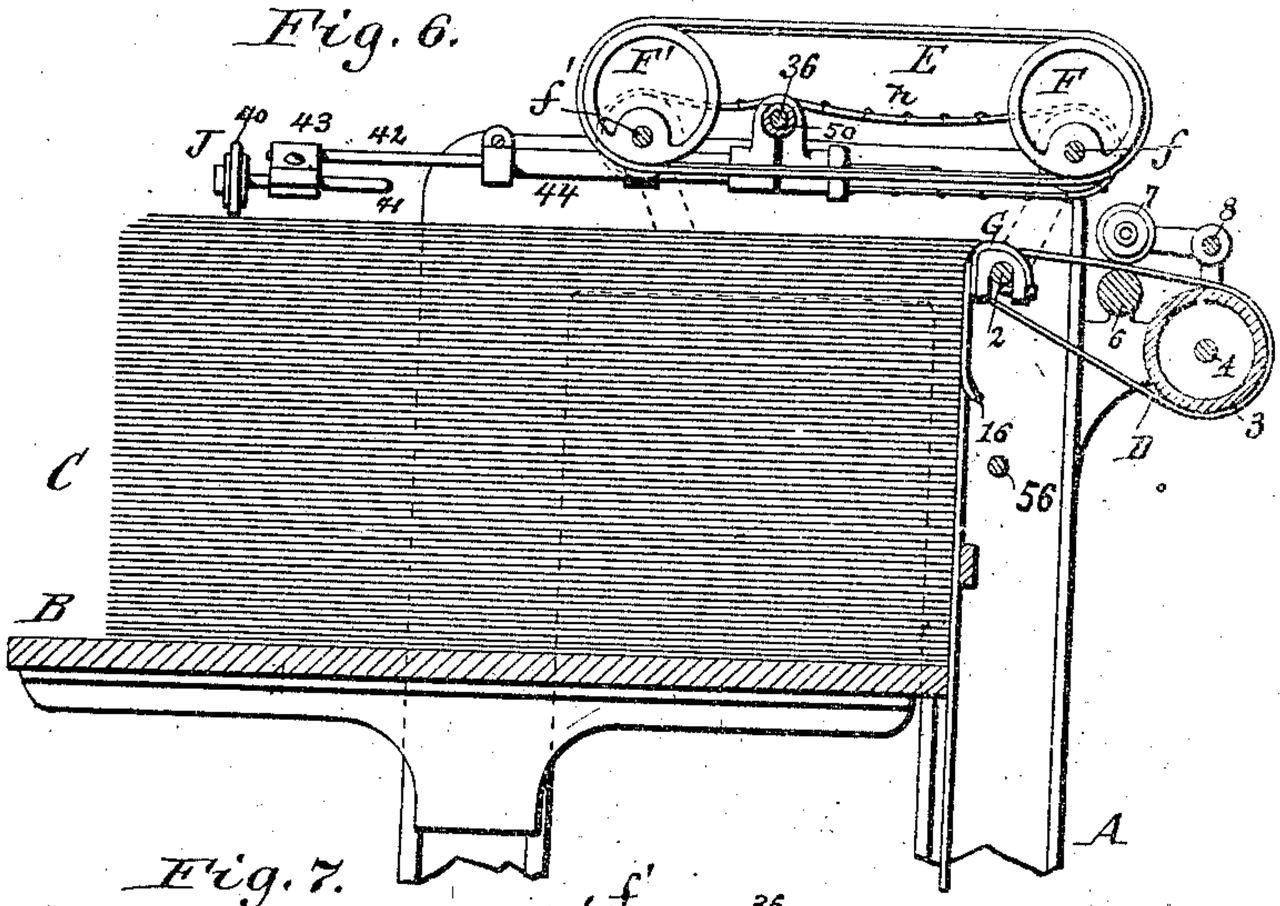


Fig. 9.

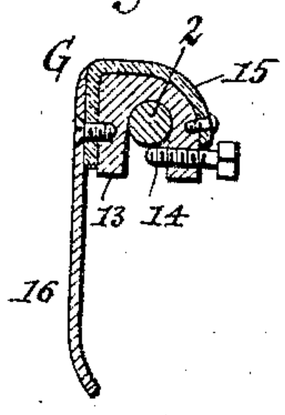


Fig. 7.

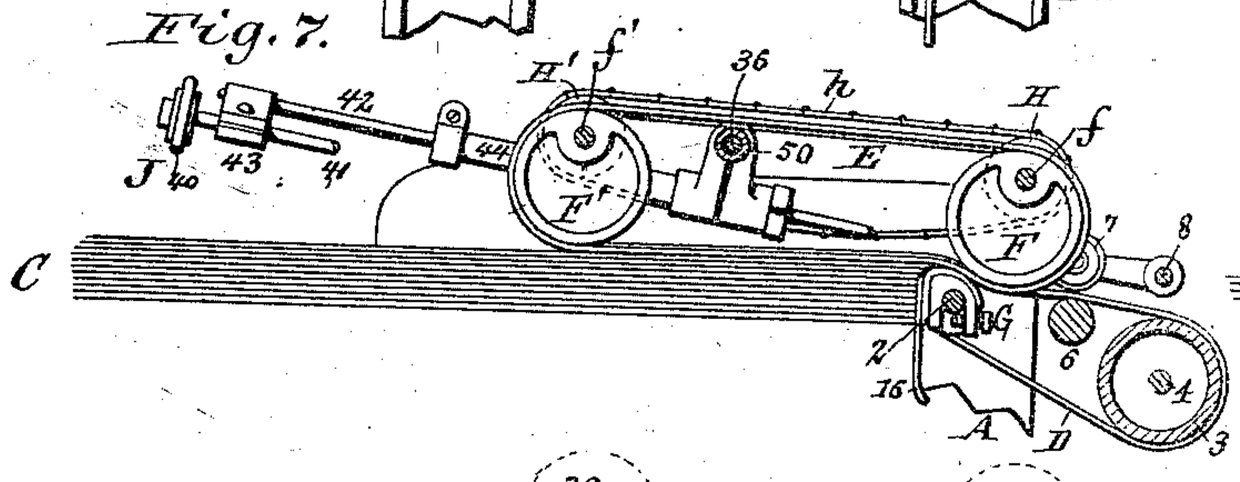


Fig. 10.

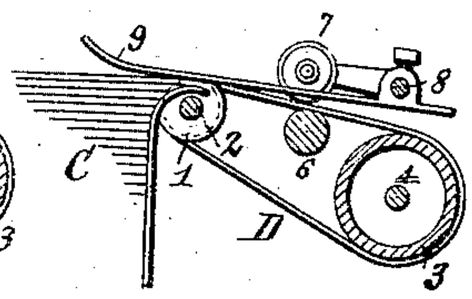


Fig. 8.

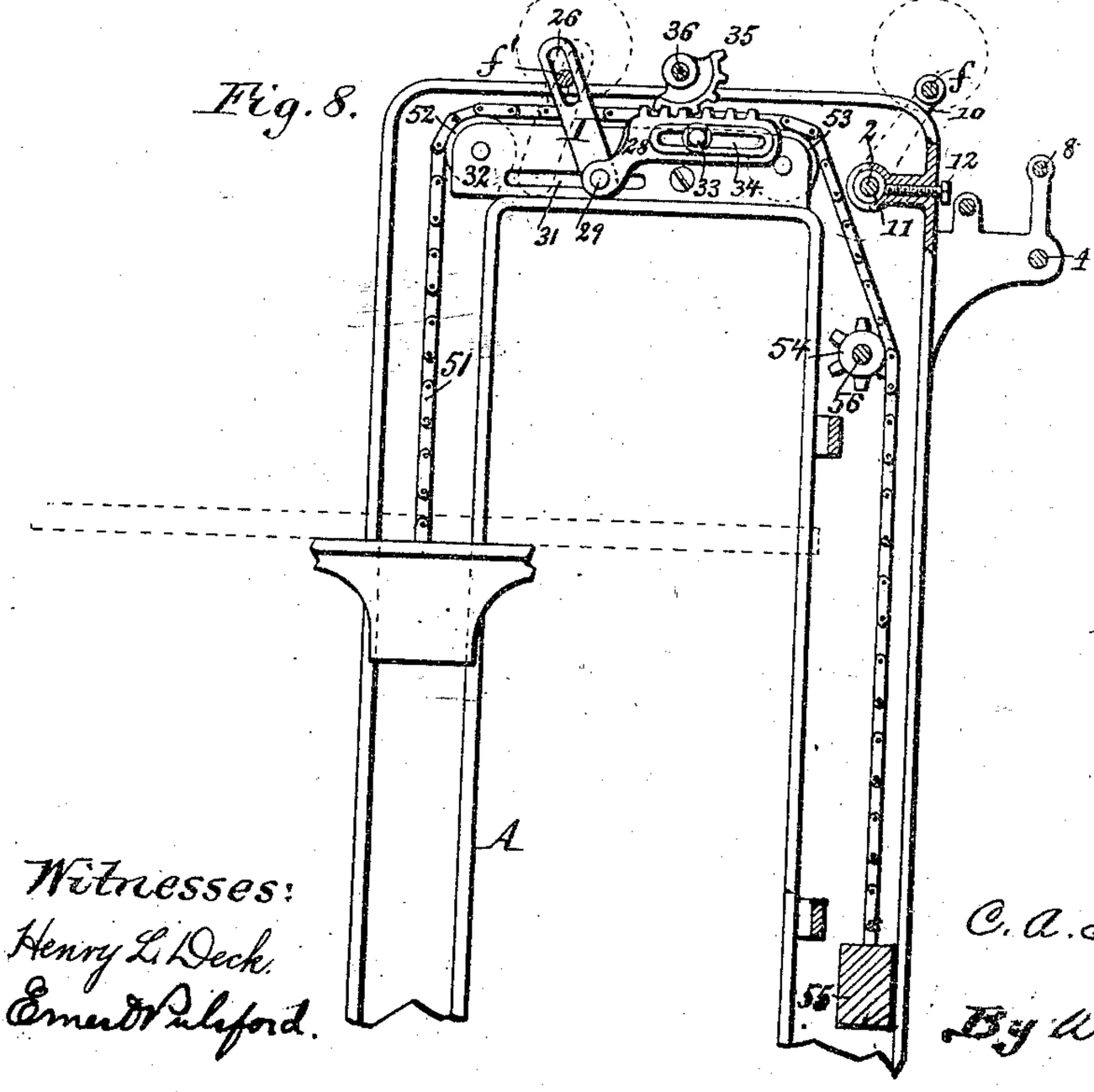


Fig. 11.

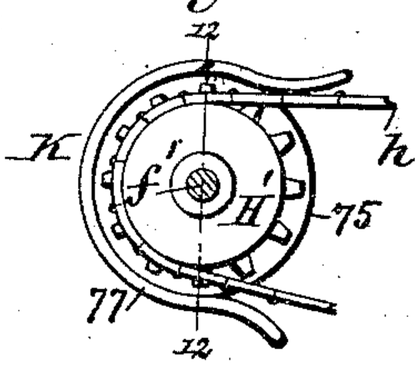
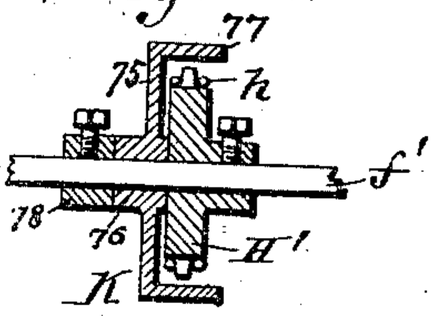


Fig. 12.



Witnesses:
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PAPER FEEDING MACHINE.

(Application filed Apr. 28, 1897. Renewed Mar. 9, 1900.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 13.

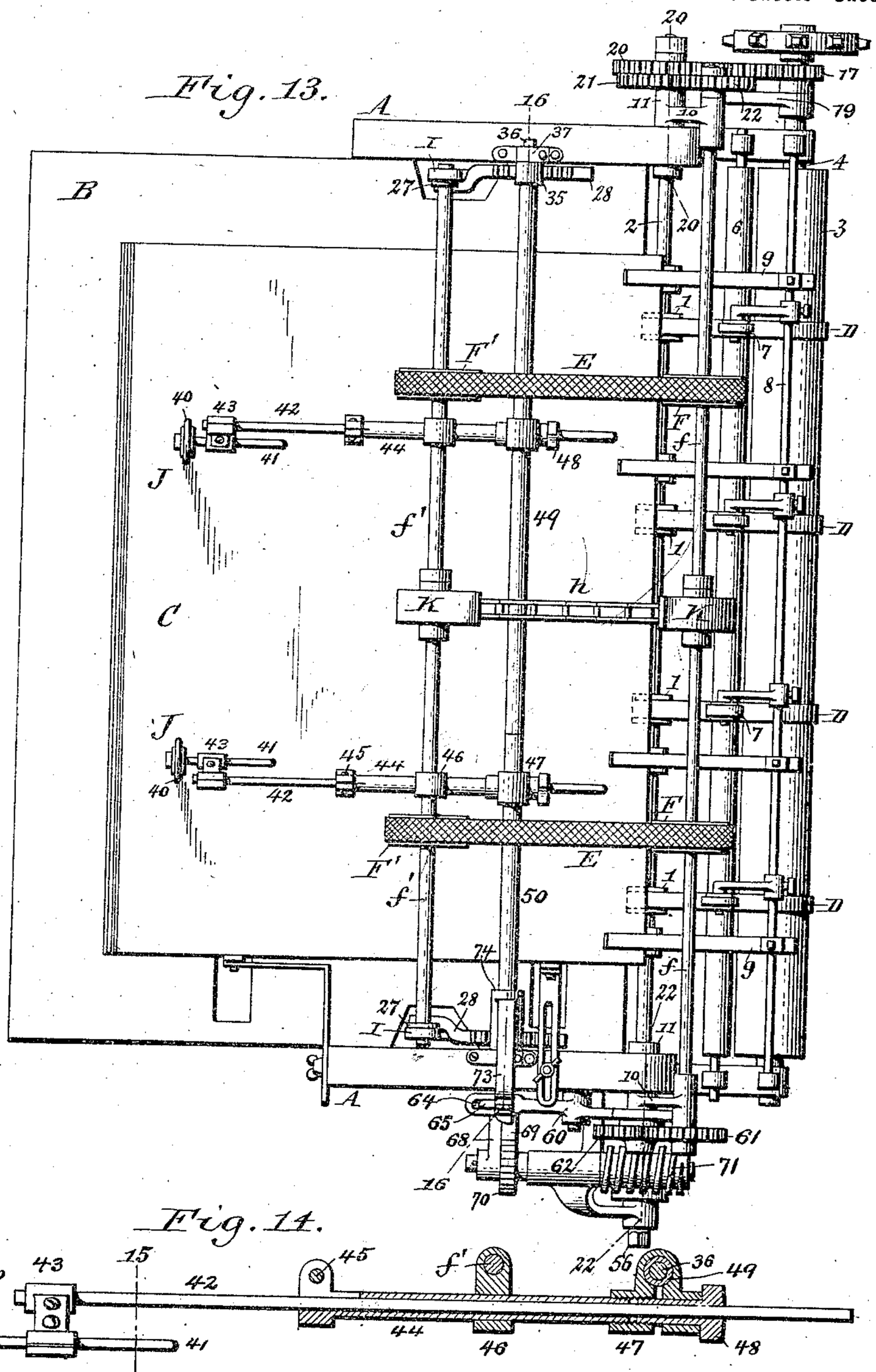
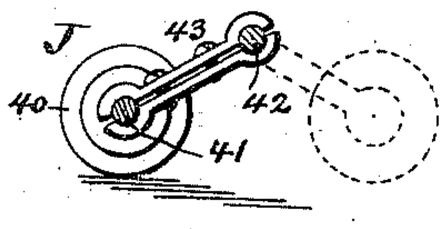


Fig. 14.

Fig. 15.



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(Application filed Apr. 28, 1897. Renewed Mar. 9, 1900.)

(No Model.) 4 Sheets—Sheet 4.

17

Fig. 16.

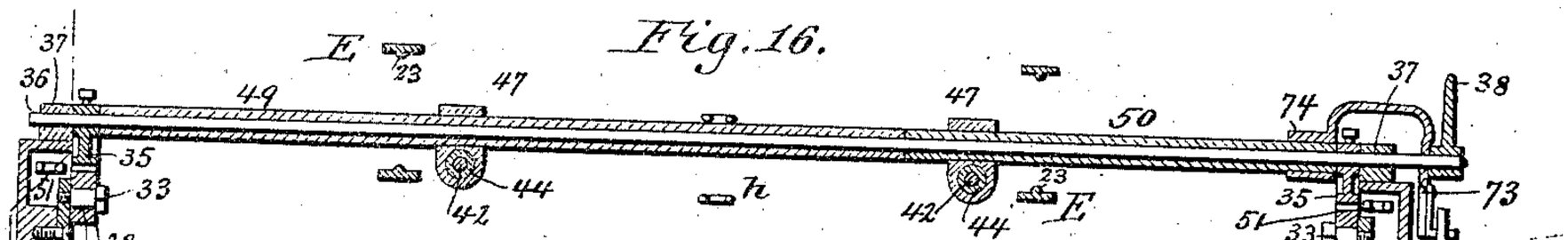


Fig. 17.

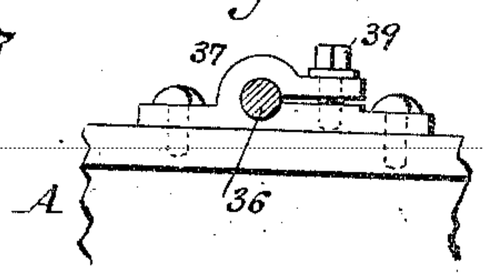


Fig. 18.

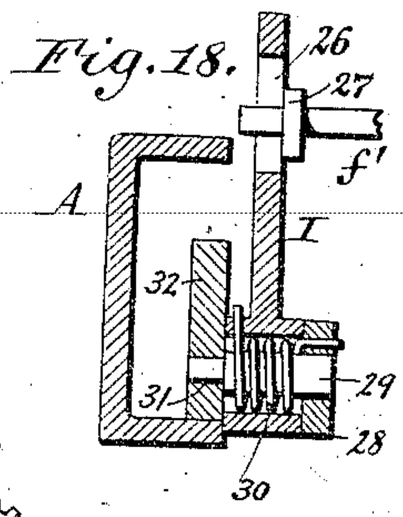


Fig. 19.

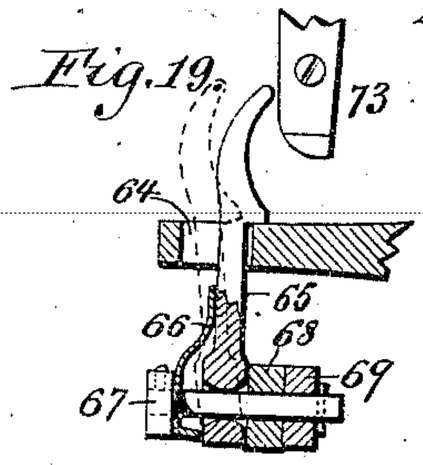


Fig. 20.

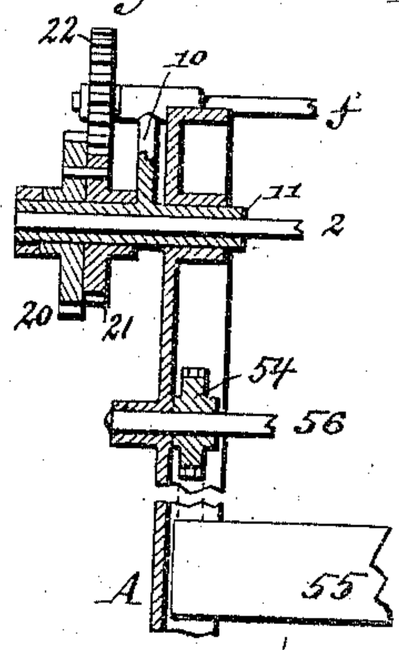


Fig. 21.

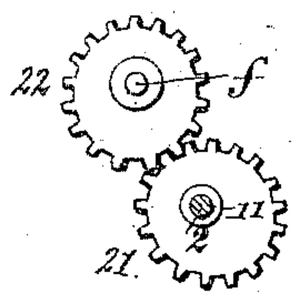


Fig. 23.

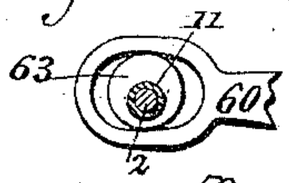


Fig. 24.

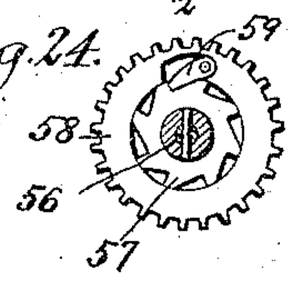


Fig. 22.

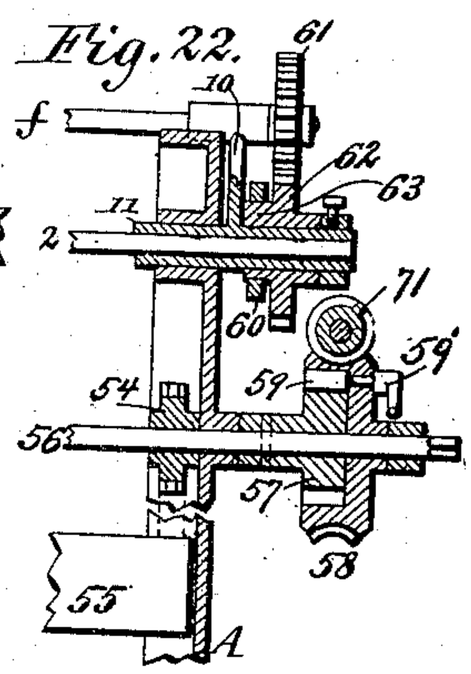


Fig. 25.

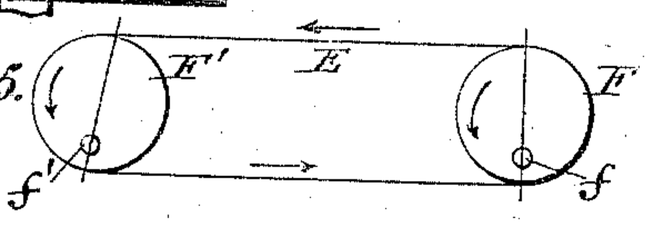


Fig. 26.

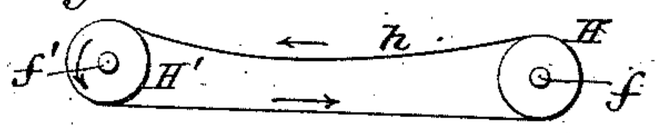


Fig. 27.

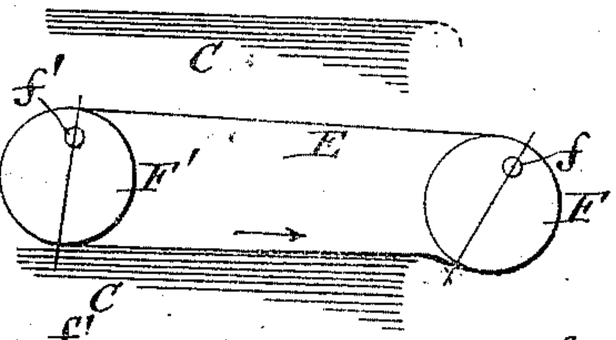


Fig. 28.

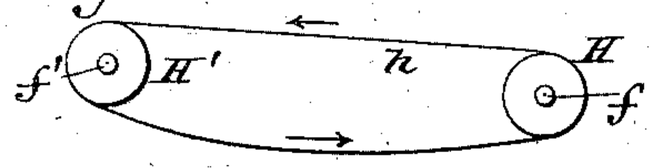


Fig. 29.

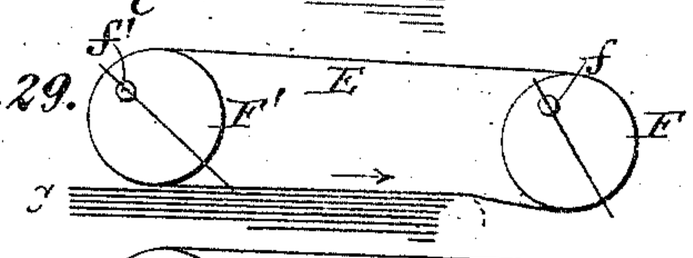


Fig. 30.

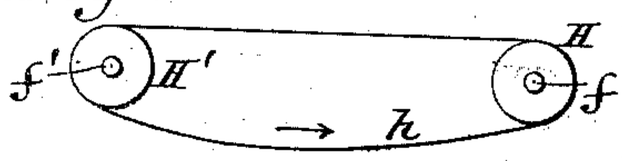


Fig. 31.

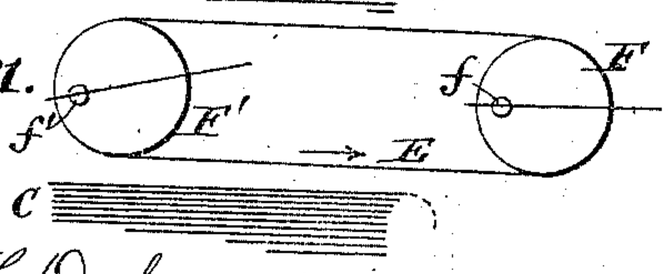
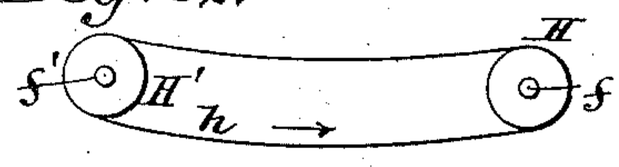


Fig. 32.



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UNITED STATES PATENT OFFICE.

CHARLES A. STURTEVANT, OF PLAINFIELD, NEW JERSEY, ASSIGNOR OF ONE-HALF TO DE WITT C. WELD, JR., OF SING SING, NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 664,340, dated December 18, 1900.

Application filed April 28, 1897. Renewed March 9, 1900. Serial No. 8,076. (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 new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

This invention relates to that class of machines which are used for feeding sheets of paper successively from a pile, stack, or bank to a ruling-machine, printing-press, or other apparatus; and it has for its object to produce a simple and efficient machine for this purpose.

In the accompanying drawings, consisting of four sheets, Figure 1 is a side elevation of a paper-feeding machine provided with my improvements. Fig. 2 is a side elevation showing the upper portion of the machine viewed from the opposite side. Figs. 3 and 4 are cross-sections, on an enlarged scale, respectively, of the front and rear wheels on which the feed-bands are mounted. Fig. 5 is a longitudinal section of the front feed-wheel and the feed-band, showing a modified construction of these parts. Fig. 6 is a longitudinal sectional elevation of the upper portion of the machine, showing the feed-band elevated from the pile of sheets. Fig. 7 is a similar view showing the feed-band depressed. Fig. 8 is an inside elevation, partly in section, of one of the side frames and connecting parts. Fig. 9 is a longitudinal vertical section, on an enlarged scale, of one of the pile-retarders. Fig. 10 is a longitudinal section of one of the front tapes which receive and remove the sheet after it has been separated from the pile. Fig. 11 is a side elevation of one of the sprocket-wheels and guards. Fig. 12 is a cross-section in line 12 12, Fig. 11. Fig. 13 is a top plan view of the machine. Fig. 14 is a longitudinal section of one of the pile-retainers on an enlarged scale. Fig. 15 is a cross-section in line 15 15, Fig. 14, looking backward. Fig. 16 is a cross-section in line 16 16, Fig. 13. Fig. 17 is a sectional elevation in line 17 17, Fig. 16. Fig. 18 is a vertical cross-section, on an enlarged scale, of one of the guide-standards of the rear band-wheel shaft. Fig. 19 is a longitudinal vertical section, on an enlarged scale, of the clog and connecting parts of the automatic mechanism for raising the pile-table. Fig. 20 is a vertical transverse section in line 20 20, Fig. 13. Fig. 21 is a side elevation of the elliptical gear-wheels, whereby motion is transmitted to the front shaft of the band-wheels. Fig. 22 is a vertical transverse section in line 22 22, Fig. 13, and corresponding with Fig. 20, the latter showing parts on the left-hand side and Fig. 22 parts on the right-hand side of the machine. Fig. 23 is a side elevation of the cam forming part of the automatic table-raising mechanism. Fig. 24 is a side elevation of the ratchet-wheel forming part of the same mechanism. Figs. 25 to 32 are diagrams illustrating different positions of the feeding-bands and drive-chain.

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

A represents the side frames of the machine, between which the vertically-movable 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 endless tapes, which are arranged at the front end of the machine and which receive and remove the sheet as it is fed off from the top of the pile. These tapes run with their receiving portions around small rollers 1, which turn loosely about a transverse rod 2, arranged in the front portion of the machine, adjacent to the upper front end of the pile, as shown in Figs. 6, 7, 8, and 10, and with their delivery portions around a large roller 3, which is secured to a transverse shaft 4 and forming the main driving-shaft, to which power is applied by a sprocket-wheel 5 or other mechanism. The upper carrying portions of these tapes are supported between the rollers 1 and 3 by a lower roller 6, against which the tapes are held by upper rollers 7, which are mounted on arms secured to a transverse rod 8, which also carries the upper longitudinal guides 9.

These tapes and guides may, however, be arranged and operated in any other suitable manner.

E represents endless feeding-bands which are arranged lengthwise above the pile and which are capable of movement toward and from the top of the pile and which move with their lower portions forwardly or in the direction in which the top sheet is fed off, so that when the feeding-bands are brought down upon the top sheet the forward movement of the lower portions of the bands will separate the top sheet from the pile and move the sheet forwardly within reach of the front tapes or other devices which may be employed for removing the sheet.

The drawings show two feeding-bands arranged side by side over convenient portions of the pile, so as to properly take hold of the top sheet; but the number of these bands may be increased as the size of the sheet, the quality of the paper, or other conditions may require. Each of these bands is mounted upon a front wheel F and a rear wheel F', and these wheels are mounted eccentrically upon transverse shafts *f f'*. The rotation of these eccentric wheels moves the feeding-bands toward and from the top of the pile and at the same time propels the bands in the proper direction to cause them to feed the top sheet forwardly from the top of the pile when the lower portions of the bands are in frictional contact with the top sheet. The front shaft *f* is journaled in arms 10, which are secured with their lower ends to the transverse rod 2, on which the receiving-rollers of the front tapes are mounted. These rock-arms are arranged on the outer sides of the side frames, Figs. 8, 13, 20, and 22, and are both swung simultaneously for raising and lowering the front shaft *f* and the front band-wheels F. Each rock-arm is preferably provided with a hub 11, which is journaled in the side frame and clamped for holding the rock-arms in their adjusted positions by a clamping-screw 12, Fig. 8.

G represents a lower-sheet retarder, which is arranged beneath the front portion of each feeding-band in line 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 any lower sheets from being fed out with the top sheet. As shown in Figs. 6, 7, and 9, these retarders are mounted upon the same rod 2 which carries the supporting-arms of the front wheels and the receiving-rollers of the front tapes and are each composed of a bifurcated block or saddle 13, which straddles the rod 2 and is clamped thereon by a screw 14, and a covering or facing 15 of rubber or other suitable material. The upright front guides 16, which restrain the upper front portion of the pile, may be secured to these retarders, as shown in the drawings.

Motion is transmitted to the front shaft *f* of the feeding-bands from the main driving-shaft 4 by a train of gear-wheels, which is shown in Figs. 2, 13, 20, and 21. This train consists of a pinion 17, which is mounted on the main driving-shaft 4, a gear-wheel 18, which meshes with that pinion and is mounted on an adjustable arm 19, (shown in dotted lines in Fig. 2 and in full lines in Fig. 13,) a gear-wheel 20, which meshes with the wheel 18 and is mounted loosely on the outer portion of the hub of the adjacent supporting-arm of the front shaft *f*, as shown in Fig. 20, an elliptical gear-wheel 21, arranged on the rear side of the wheel 20 and secured thereto, and an elliptical gear-wheel 22, secured to the front shaft *f*. The gear-wheel 17 is interchangeable for a smaller or larger one for changing the speed.

H H' are sprocket-wheels which are secured concentrically, respectively, to the front and rear shafts *f* and *f'* of the band-wheels, and *h* is a drive-chain or chain belt, which is applied to these sprocket-wheels. In order to compel the feeding-bands to travel with the front band-wheels without slipping, various devices may be employed. For instance, as shown in Fig. 3, a rib 23 may be formed longitudinally on the inner side or back of each band, in which case the front wheel F is provided in its face with a circumferential groove, in which the rib of the band engages snugly. This rib may be formed by a cord which is secured to the band by means of a canvas covering cemented to the band. Another construction for the same purpose is shown in Fig. 5. In this construction the band is provided on its inner side with projections 24 and the front wheel is provided in its face with a circumferential row of corresponding depressions 25, in which the projections engage. These projections may be formed integrally with the band if the latter is made of soft rubber, which is the preferred material. The outer side or face of the band is preferably roughened in order to give the band a firm hold upon the paper, as the intention is to move the top sheet by the frictional contact of the band on the sheet with as little downward pressure upon the pile as can be used.

The position of the rear shaft of the band-wheel is controlled by standards I, which are arranged on the inner side of the side frames, as shown in Figs. 1, 2, 8, 13, and 18. These guide-standards are provided in their upper portions with slots 26, into which the end portions of the rear shaft *f'* project, the shaft being provided with collars 27 on the inner sides of the standards. The latter are pivoted at their lower ends, and their pivotal points are made longitudinally adjustable in the machine, so that the position of the standards can be changed by shifting the pivotal points backwardly or forwardly. In the position of the standards shown in Fig. 8 the arms lean rearwardly from their pivotal points. In this position of the standards the tension of the feeding-bands tends to draw

the rear shaft forwardly and downwardly in the slots, and as the weight of the rear shaft and the parts mounted thereon also tends to move the rear shaft downwardly in the slots the rear wheels exert considerable downward pressure upon the pile. When it is desired to reduce this downward pressure, the pivotal points of the standards are shifted rearwardly, so that the standards lean forwardly, as shown in dotted lines in Fig. 8. In that position of the standards the tension of the feed-bands tends to draw the rear shaft upwardly in the slots and relieves the downward pressure to that extent. The devices whereby the position of these standards can be adjusted may be constructed in various ways, the construction which is shown in the drawings being as follows: 28 represents a horizontal rack-bar which is arranged longitudinally in front of each standard and which carries at its downwardly-turned rear end the horizontal pivot 29, on which the standard is mounted. This pivot extends outwardly from the rack-bar and is surrounded by a spring 30, which is secured at one end to the rack-bar and at the other end to the standard and strained in such a direction that it tends to turn the arm backwardly, thereby applying tension to the bands. The outer end of the pivot 29 projects into a horizontal slot 31, formed in a longitudinal guide-plate 32, secured to the upper portion of the side frame, on the inner side thereof, Figs. 8 and 18. The rack-bar is guided on the side frame by a bolt 33, which is secured to the plate 32 and engages in a horizontal slot 34 in the rack-bar. The two rack-bars are moved simultaneously back and forth by gear-segments 35, which are secured to a transverse shaft 36, Figs. 8, 13, and 16. This shaft is journaled in bearings 37 on the side frames and provided at one end with a handle 38, by which it can be turned for adjusting the standards. The shaft is held in its adjusted position by any suitable device—for instance, by a clamping-screw 39, which passes through the movable jaw of the bearing 37, which is split on one side, as shown in Fig. 17, to permit the bearing to be tightened against the shaft.

J represents pile-retainers, which are arranged over the rear portion of the pile and which come down on the pile after the top sheet has been moved forwardly by the feeding-bands and bear upon the next lower sheet in rear of the forwardly-moving top sheet and prevent undue displacement of the sheets immediately below the top sheet. These pile-retainers are hung upon the transverse shaft 36, by which the guide-arms I are adjusted; but this is merely a matter of convenience, and other pivotal supports for the pile-retainers may be provided. As shown in Figs. 6, 7, 13, 14, and 15, each pile-retainer consists of a rubber-faced disk 40, mounted on a longitudinal stem 41, a longitudinal rod 42, arranged on one side of the stem 41 and connected at its rear end with said stem by a clamping-arm 43, and a supporting-sleeve 44, in which the longitudinal rod 42 is clamped and which is hung upon the pivotal support of the pile-retainer and connected with the shaft f' of the rear band-wheels. The supporting-sleeve 44 is split at its rear end and provided with a clamping-bolt 45, by which means the rod 42 is clamped in the sleeve. This rod can be adjusted lengthwise in the sleeve for adjusting the retainer-disk 40 backwardly or forwardly on the pile. The supporting-sleeve 44 is connected with the rear shaft f' by a hanger 46, which is secured to the sleeve and provided above the sleeve with a transverse opening in which the rear shaft turns. The front end of the supporting-sleeve is clamped to a transverse sleeve by which it turns on the pivotal shaft 36 by means of a divided socket 47, which embraces the transverse sleeve and which is clamped upon the latter by a tubular screw 48. The latter surrounds the rod 42 and enters the divided socket from the front and engages with its inner threaded end in a screw-thread in the socket, as shown in Fig. 14.

The clamping-arm 43, which connects the rear end of the rod 42 with the stem 41, is composed of two similar parts which embrace the stem and the rod and which are clamped thereon by screws, as shown in Figs. 14 and 15. This clamping-arm permits of the lengthwise adjustment of the retainer-disk 40 and also of raising and lowering the same with reference to the rod 42 and of arranging it on one side or the other of the rod, as may be most suitable for properly retaining the pile.

The supporting-sleeve 44 of one of the pile-retainers is clamped at its front end to a transverse sleeve 49, which serves merely as a swiveling connection of the supporting-sleeve with the transverse shaft 36. This is the sleeve which, as shown in the drawings, is arranged on the left-hand side of the machine viewed in the direction in which the paper is fed off and which is shown in the upper portion of Fig. 13 and in the left-hand portion of Fig. 16. The pile-retainer on the right-hand side of the machine is clamped to a separate transverse sleeve 50, which serves not only as such swiveling connection, but also as part of the mechanism whereby the pile-table is automatically controlled.

The mechanism by which the top sheet is separated from the pile and removed can be used with any suitable pile-support—for instance, a table which is automatically moved up as the sheets are fed off or a stationary table on which the bank of sheets is feathered out. The drawings show a table which is raised by automatic mechanism controlled by the height of the pile, and this mechanism is so contrived that the automatic mechanism can be thrown out of gear and the table can be raised or lowered quickly by hand for placing the table in position to receive a new pile of paper or to bring the top of the pile up to the feeding-off mechanism for

starting. This mechanism is constructed as follows:

The pile-table B is guided on both sides in the upright rear portions of the side frames and is suspended by two chains 51, which extend from the pile-table upwardly on the inner side of each side frame over a rear guide-roller 52, then forwardly and over a front guide-roller 53, then downwardly and over a sprocket-pinion 54, and then down to a counterweight 55, Figs. 8, 20, and 22. The sprocket-pinions 54 are secured to a transverse shaft 56, and by turning the shaft in one or the other direction the table is raised or lowered. The automatic mechanism for raising and lowering it are applied to the shaft 56. The right-hand end of the shaft 56 is made square or otherwise adapted to receive a hand-crank, as shown in Fig. 22, and carries on the outer side of the right-hand side frame a ratchet-wheel 57, Fig. 24, which is secured to the shaft.

58 is a worm-wheel which surrounds the ratchet-wheel 57 and is loosely mounted on the shaft. A pawl 59 is arranged in the worm-wheel so as to couple the two together when engaged with the ratchet-wheel, as shown in Fig. 24; but this pawl can be disengaged from the ratchet-wheel by a handle 59′, with which the pawl is provided, and when it is so disengaged the shaft 56 can be turned by hand in either direction and the table can be quickly raised or lowered.

60 is a longitudinal rock-lever which is actuated from the front shaft *f* of the band-wheels by a gear-wheel 61, secured to the shaft *f*, a gear-wheel 62, meshing therewith, and a cam 63, arranged on the rear side of the gear-wheel 62 and engaging in the looped front arm of the rock-lever 60, Figs. 1, 13, 22, and 23. The rear arm of the rock-lever 60 is provided with a longitudinal slot 64, in which plays an upright dog 65, Figs. 1, 16, and 19. This dog is held against the front end of the slot by a spring 66, which is applied to the stud 67, connecting the lower end of the dog with a pawl-arm 68. The latter carries a pawl 69, which actuates a ratchet-wheel 70, Fig. 16, and this ratchet-wheel is secured to the longitudinal shaft of a worm 71, by which the worm-wheel 58 is rotated, Figs. 1, 13, 16, and 22. The up-and-down movement of the rear arm of the rock-lever 60 actuates the dog 65 so long as the shoulder of the latter engages over the rock-lever, as shown in Fig. 19, and this up-and-down movement of the dog actuates the ratchet-wheel 70 and through the worm and worm-wheel and the ratchet-wheel 57 the shaft 56, to which the chain sprocket-pinions are secured, and which are thereby rotated in the proper direction to slowly raise the table and pile. The throw of the pawl-arm 68 can be regulated by a screw-stop 72, Fig. 16. When the dog 65 is pressed back in the slot of the rock-lever, so that its shoulder does not engage over the upper side of the rock-lever, as shown in dotted lines in Fig. 19, the up-and-down movement of the rock-lever does not move the dog and the pile-table is not moved.

73 is a bent finger which is secured by its hub 74 to the right-hand end of the sleeve 50, Fig. 16, and which extends over the adjacent side frame and downwardly on the outer side of the latter and below the shaft 50 and terminates in front of the upper end of the dog 65, as shown in Figs. 1 and 19. The position of this finger is controlled by the position of the top of the pile. The downward movement of the rear band-wheel, which is connected with the sleeve 50, is arrested by the top of the pile, and as this point to which the rear band-wheel descends is higher or lower the finger 73 is swung back with its lower end to a greater or less extent by the greater or less rocking movement which is thereby imparted to the sleeve about the shaft 36 as a fulcrum. If the top of the pile is comparatively high, the downward movement of the band-wheel is arrested sooner and the lower end of the finger is swung back so far that it presses the dog rearwardly and out of engagement with the rock-lever 60, so that no further upward movement of the table takes place. If the top of the pile is comparatively low, the band-wheel does not strike the pile so soon, and the end of the finger is not thrown back far enough to disengage the dog from the rock-arm, and the upward movement of the latter moves the table. This backward swinging movement of the finger takes place at every downward movement of the band-wheel and just before the upward movement of the rear arm of the rock-lever begins.

The operation of the endless feeding-bands is as follows: The rotary movement of the front shaft *f* produces a rotary movement of both eccentric front band-wheels F, and the movement of the front shaft is transmitted to the rear shaft *f′* principally by the drive-chain and sprocket-wheels, but also to a small extent by the feeding-bands. The rotary movement of the wheels takes place in the proper direction to cause the bands to travel with their lower portions forwardly and their upper portions rearwardly, as indicated by the arrows. This rotary movement of the band-wheels about axes which are eccentric to the wheels causes the wheels and the bands to move bodily toward and from the pile of paper. During the downward movement of the wheels the lower portions of the bands approach the top of the pile and are finally pressed down upon the top sheet and move the top sheet quickly from the pile. After the sheet has been fed off the bands rise again from the pile. The bands are propelled by the circular faces of their supporting-wheels, and as these wheels are eccentric with reference to their shafts they impart a linear movement to the bands, which increases in speed as the bands move downwardly toward the top sheet, and this speed is greatest in the lowest position of the bands. This is

true even when the front shaft is rotated with a uniform speed; but the speed of the bands in the position in which they feed off the top sheet is preferably further increased by elliptical gears, as described and shown, which impart to the front shaft a varying speed which is greatest in the lowest position of the band-wheels. The drive-chain, which connects the front and rear shafts of the band-wheels, is preferably somewhat slack, so as to allow the rear wheels a limited capacity to move independently of the front wheels. This is illustrated by the diagrams Figs. 25 to 32. Fig. 25 shows the bands in their highest position, and Fig. 26 the corresponding condition of the drive-chain, which is taut in its lower portion and slack in its upper portion. In this position of the wheels the center of the rear wheel lags slightly behind the center of the front wheel. As the center of the rear wheel turns rearwardly beyond its highest position and moves downwardly the rear wheel is free to slip and turns downward more quickly than the front wheel until the upper portion of the drive-chain has become taut and the lower portion slack, as shown in Fig. 28. This enables the rear wheel to come down on the pile quickly and strike the top sheet with the rear portion of the band immediately after the front portion of the band strikes. The front wheel and the front portion of the band controlled thereby strike the top sheet slightly in advance of the rear wheel and start the sheet on its forward movement, because the front shaft is arranged somewhat lower than the rear shaft, as shown in Fig. 7, and the independent downward movement of the rear wheel enables the latter to catch up with the front wheel and to gain on the front wheel in its rotary movement, so that the center of the rear wheel is then slightly in advance of the center of the front wheel, as shown in Figs. 27 and 29. This relative position of the two wheels is maintained until the band has been lifted from the pile, as shown in Fig. 31. When the band is down on the pile, the lower part of the chain is slack, as shown in Figs. 28 and 30, and when the band has been lifted from the pile, as shown in Fig. 31, both parts of the chain are slack, as shown in Fig. 32. During the further rotation of the wheel in approaching the highest position the lower part of the chain becomes taut and the rear wheel lags again behind the front wheel. The slip of the rear wheels in the bands during their downward movement is facilitated by making the grooves 74 in the faces of the rear wheels, Fig. 4, so wide as not to confine the rib on the back of the band. As the center of the rear wheel is slightly in advance of the center of the front wheel in the lowest position of the wheels and bands, the rear wheel rises from the top sheet first and leaves the top sheet in control of the front wheel, which is the wheel to which the power is primarily applied. The lower sheet-retarder is arranged adjacent to the front wheel by which the feeding off of the sheet is controlled and cooperates therewith in preventing the feeding out of more than one sheet at a time. As the drive-chain is alternately taut on one side or the other and at times slack on both sides, it is desirable to guard against any possibility of the chain leaving its sprocket-wheels, and for that purpose a chain-guard K, Figs. 11 and 12, is preferably applied to each sprocket-wheel. This guard is loosely mounted on the shaft on one side of the sprocket-wheel and consists of a disk 75, having a hub 76, through which the shaft passes, and a flange 77, which overhangs the sprocket-wheel and chain and has flaring ends. This guard is held against lateral displacement on the shaft on one side by the sprocket-wheel and on the other side by a collar 78, secured to the shaft.

The front band-wheels can be adjusted up or down by means of the adjustable arms, in which their shaft *f* is mounted, so that the front part of the lower portion of the band is held below the top of the lower sheet-retarder to the extent which is necessary to give the bands the desired hold on the sheet immediately above the retarder. By adjusting the front wheels downwardly the length of the contact between the band and the retarder is increased and the bend in the band 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. When the front wheels are adjusted in one or the other direction, the rear wheels are adjusted correspondingly by adjusting the guide-standards with which the rear shaft *f'* is connected.

When the rear wheels are elevated above the pile, as shown in Fig. 6, the pile-retainers rest upon the pile, being supported on the shaft 36 in front of the rear wheels and being held down upon the pile by the weight of the rear wheels and connecting parts, which rest upon the supporting-sleeves of the pile-retainers in rear of the pivotal supports thereof. When the rear wheels strike the pile in their downward movement, their shaft *f'* rises in the slots of the guide-standards, and this upward movement of the shaft swings the supporting-sleeves on their pivotal supports, thereby raising the pile-retainers, as shown in Fig. 7. The pile-retainers remain in their elevated position until the rear wheels rise from the pile, when their shaft descends and lowers the retainers upon the pile. In this manner the pile-retainers are raised while the top sheet is being fed off and are lowered and pressed upon the pile immediately after the feeding action of the rear wheels has ceased. As each of the pile-retainers is pivotally supported independent of the other, each can bear upon the pile firmly without interference by the other.

The duration of the contact of the rear band-wheels with the pile can be regulated by adjusting the pile-retaining disk up or down on the longitudinal rod, to the rear end

of which it is secured. By raising the pile-retaining disk the duration of this contact is increased and by lowering it it is reduced. This pile-retainer is made in the form of a disk to enable a new part of its face to be placed in position for contact with the paper when the part first used has become worn or glazed by use, and to enable the retainer to always bear properly upon the sheet in any position to which it may be adjusted.

I claim as my invention—

1. In a machine for feeding sheets of paper from a pile, stack or bank of sheets, the combination with an endless traveling feeding-band, of means whereby the band is moved toward and from the pile, stack or bank, and mechanism whereby a variable linear movement is imparted to the band, substantially as set forth.

2. The combination with a support for a pile, stack or bank of sheets, of an endless feeding-band, and eccentric circular wheels on which said band is mounted, substantially as set forth.

3. The combination with a support for a pile, stack or bank of sheets, of an endless feeding-band, supporting-wheels on which said band is mounted and which are eccentrically secured to their shafts, sprocket-wheels which are concentrically secured to said shafts, and a drive-chain applied to said sprocket-wheels, substantially as set forth.

4. The combination with a support for a pile, stack or bank of sheets, of an endless feeding-band, an eccentric front supporting-wheel and its shaft, means whereby said shaft is rotated, an eccentric rear supporting-wheel and its shaft, movable supports in which the shaft of said rear wheel is arranged, and means whereby the shaft of said rear wheel is driven from that of said front wheel, substantially as set forth.

5. The combination with a support for a pile, stack or bank of sheets, of an endless feeding-band, a front supporting-wheel and its shaft, means whereby said shaft is rotated, a rear supporting-wheel and its shaft, adjustable standards in which said rear shaft is arranged, springs whereby said standards are held rearward, and means whereby the shafts of said wheels are connected, substantially as set forth.

6. The combination with a pile-support, of an endless traveling band having a longitudinal rib on its back, an eccentric front wheel having a narrow groove in which said rib binds, and an eccentric rear wheel having a wide groove in which said rib slips, substantially as set forth.

7. The combination with a pile-support, of an endless traveling feeding-band, eccentric front and rear band-wheels, means whereby the front wheel can be adjusted up or down, and a lower sheet-retarder arranged below said front wheel, substantially as set forth.

8. The combination with a pile-support, of an endless traveling feeding-band, eccentric front and rear band-wheels, a shaft to which the front wheel is secured, adjustable arms in which said shaft is journaled and which are secured to a transverse rod capable of a rocking adjustment, and a lower sheet-retarder mounted on said rod, substantially as set forth.

9. The combination with a pile-support, an endless traveling feeding-band, and front and rear band-wheels and their shafts, of standards in which the shaft of the rear wheel is guided, and pivotal supports for said standards which are longitudinally adjustable and whereby the inclination of the standards can be changed, substantially as set forth.

10. The combination with the pile-support, an endless traveling feeding-band, and front and rear band-wheels, of pivoted standards in which the shaft of the rear wheel is guided, longitudinal rack-bars which carry the pivots on which said standards are mounted, and gear-segments by which said rack-bars can be adjusted forwardly and backwardly, substantially as set forth.

11. The combination with a pile-support, an endless traveling feeding-band, and eccentric front and rear band-wheels and their shafts, of slotted standards in which the shaft of the rear wheel is guided and in which said shaft can rise and fall, substantially as set forth.

12. The combination with a pile-support, an endless traveling feeding-band, and eccentric band-wheels, of a pile-retainer which is operated by the up-and-down movement of the rear band-wheel and brought down on the pile as the band-wheel rises therefrom and raised as the wheel strikes the pile, substantially as set forth.

13. The combination with a pile-support, an endless traveling feeding-band, and eccentric band-wheels and their shafts, of a pile-retainer connected with the shaft of the rear band-wheel, substantially as set forth.

14. The combination with a pile-support, an endless traveling feeding-band, and eccentric band-wheels and their shafts, of a pile-retainer adapted to bear upon the pile in rear of the rear band-wheel and having a pivotal support in front of the shaft of the rear band-wheel and having a connection with said shaft, substantially as set forth.

15. The combination with a pile-support, an endless traveling feeding-band, and eccentric band-wheels and their shafts, of a pile-retainer attached to a longitudinal rod which is clamped in a sleeve, a swiveling support on which said sleeve is hung in front of said rear wheel, and a hanger attached to said sleeve and through which the shaft of the rear wheel passes, substantially as set forth.

16. The combination with a pile-support, an endless traveling feeding-band, and eccentric band-wheels, of a pile-retainer which is operated by the up-and-down movement of the rear wheel and which is provided with a longitudinal supporting-rod connected with the shaft of said rear wheel, a stem arranged on

one side of said rod, a lateral adjusting-arm connecting said rod and stem, and a retaining-disk mounted on said stem, substantially as set forth.

17. The combination with the vertically-movable pile-table, its elevating-chains, the sprocket-wheels and shaft by which the chains are moved in either direction to raise or lower the table, and the pile-controlled table-elevating mechanism having a worm which is actuated by a ratchet and pawl and which meshes with a gear-wheel loosely mounted on said shaft, of a ratchet-wheel secured to said shaft and connected by a coupling-pawl with said loose gear-wheel, whereby upon releasing said coupling-pawl the shaft is uncoupled from said loose gear-wheel without disengaging the actuating-pawl of the table-elevating mechanism, substantially as set forth.

18. The combination with a vertically-movable pile-table, an endless traveling feeding-band, and band-wheels which move toward and from the pile, of elevating mechanism connected with said table, actuating mechanism whereby said elevating mechanism is operated, a releasable coupling device whereby the actuating mechanism can be coupled with or uncoupled from said elevating mechanism, and means whereby said coupling device is controlled from one of said band-wheels, substantially as set forth.

19. The combination with a vertically-movable pile-table, an endless traveling feeding-band, and band-wheels which move toward and from the pile, of elevating mechanism connected with said table, actuating mechanism whereby said elevating mechanism is operated, a releasable coupling device whereby the actuating mechanism can be coupled with or uncoupled from said elevating mechanism, and a rocking finger controlled by the rear band-wheel and whereby the coupling device is shifted, substantially as set forth.

20. The combination with the pile-table, its elevating mechanism and the actuating rock-lever, of a dog which is connected with said elevating mechanism and actuates the same and which is capable of engagement with said actuating-lever for actuating the elevating mechanism or disengagement from said lever for stopping the elevating mechanism, a disengaging-finger adapted to hold said dog out of engagement with said actuating-lever, and means whereby said finger is controlled from the pile, substantially as set forth.

21. The combination with the pile-table, its elevating mechanism and the actuating rock-lever having an actuating-shoulder, of a dog which is connected with said elevating mechanism and actuates the same and which is capable of movement toward and from the path of the shoulder of said actuating-lever to engage with or clear said shoulder, a rocking finger adapted to hold said dog clear of said actuating-shoulder, and means whereby said finger is controlled from the pile, substantially as set forth.

22. The combination with a vertically-movable pile-table, an endless traveling feeding-band, and band-wheels which move toward and from the pile, of elevating mechanism connected with said table, actuating mechanism containing a slotted rock-lever, a spring-pressed dog connected with the elevating mechanism and arranged in the slot of said rock-lever, and a rocking finger controlled by the rear band-wheel and adapted to disengage said dog from said rock-lever, substantially as set forth.

23. The combination with a pile-support, of an endless feeding-band, band-wheels which are secured eccentrically on their shafts, sprocket-wheels which are secured concentrically to said shafts, a drive-chain applied to said sprocket-wheels, and chain-guards loosely mounted on said shafts adjacent to said sprocket-wheels, substantially as set forth.

Witness my hand this 26th day of April, 1897.

CHAS. A. STURTEVANT.

Witnesses:
DE WITT C. WELD, Jr.,
CHARLES CLARK.