No. 609,954. Patented Aug. 30, 1898.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

(Application filed Mar. 27, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

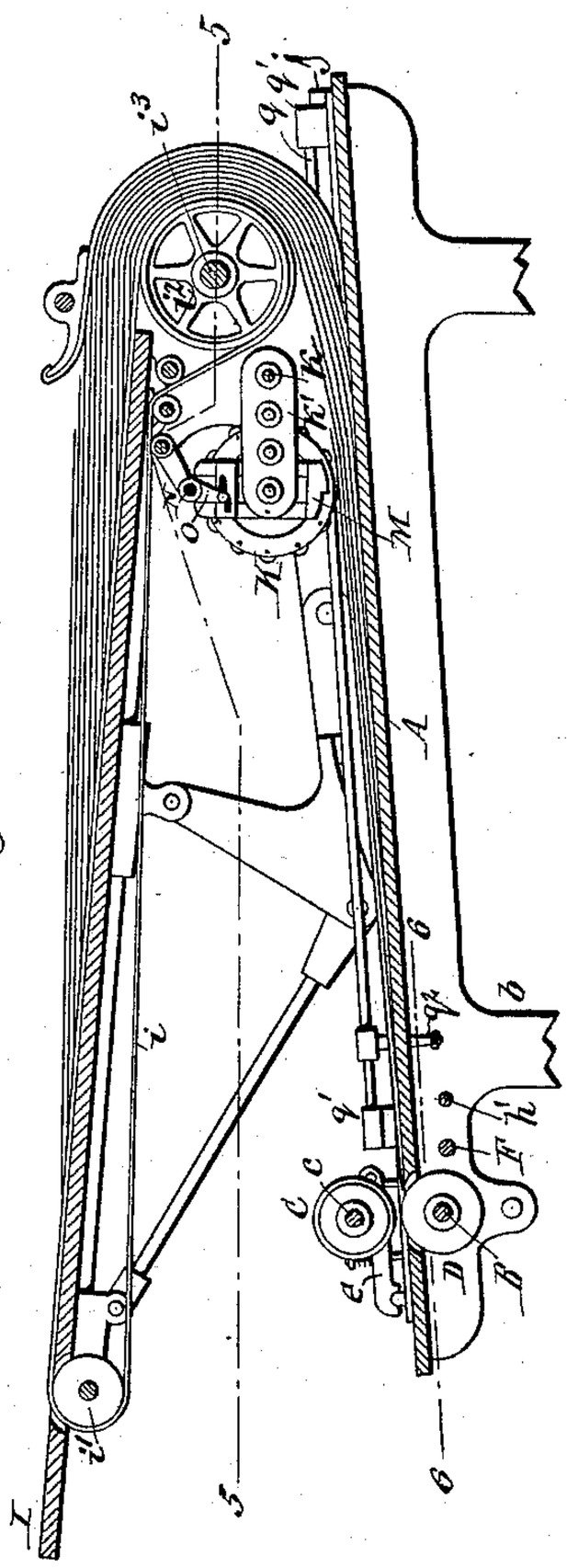


Fig. 2.

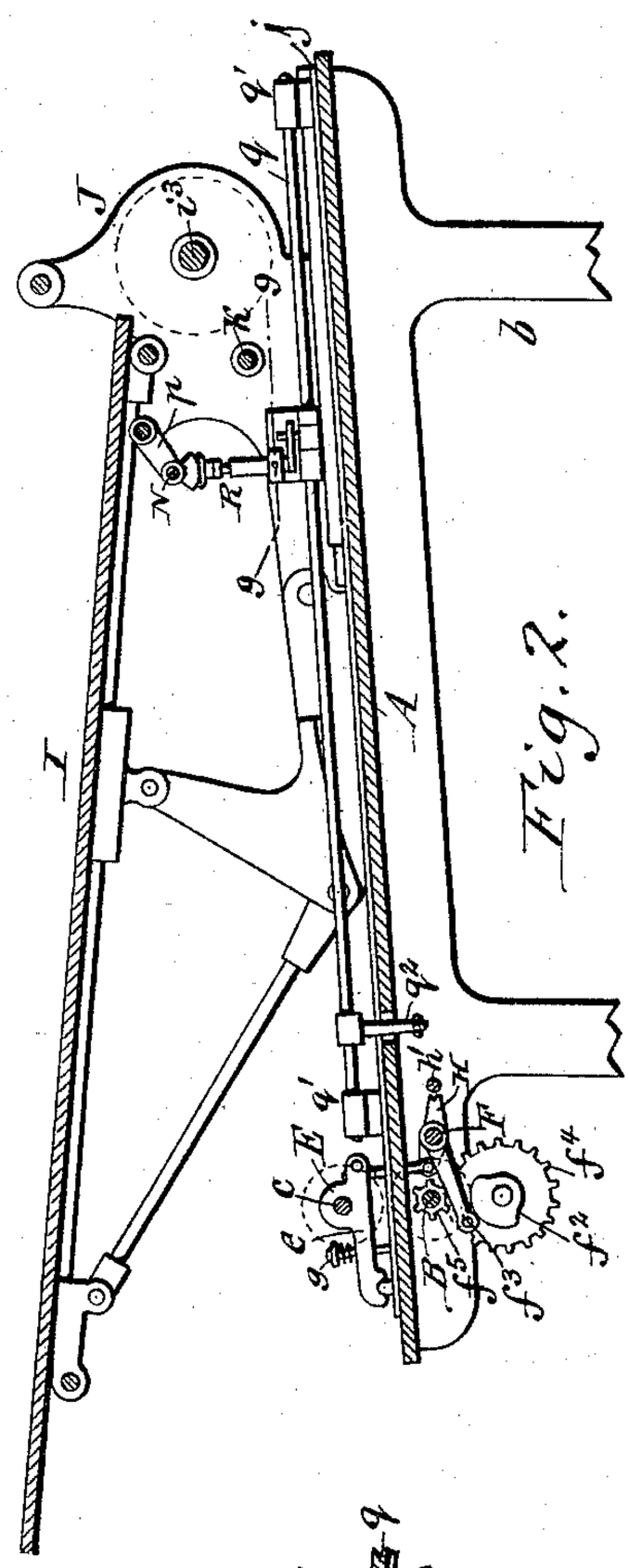


Fig. 3.

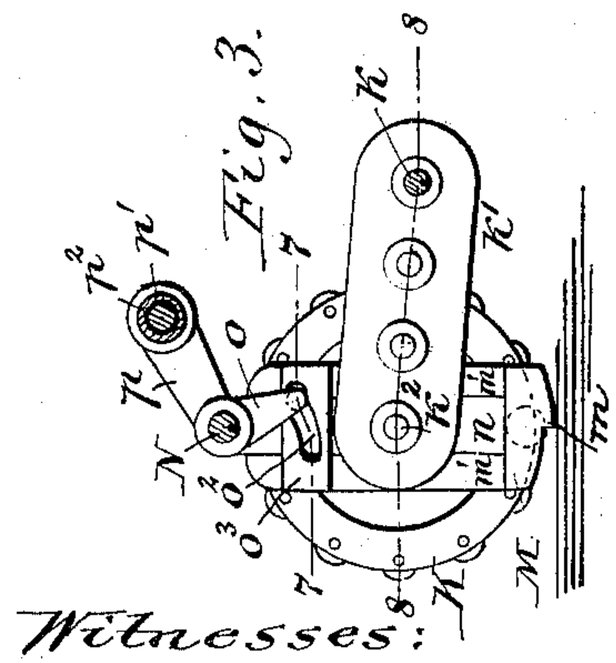
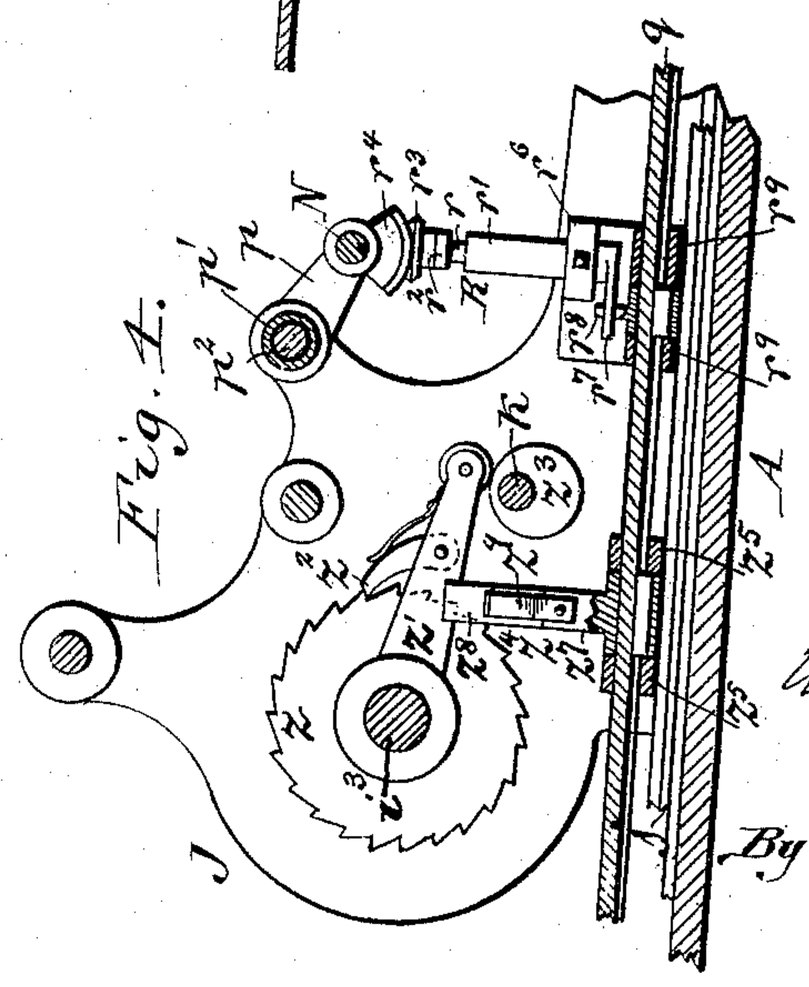


Fig. 4.



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(No Model.) 4 Sheets—Sheet 2.

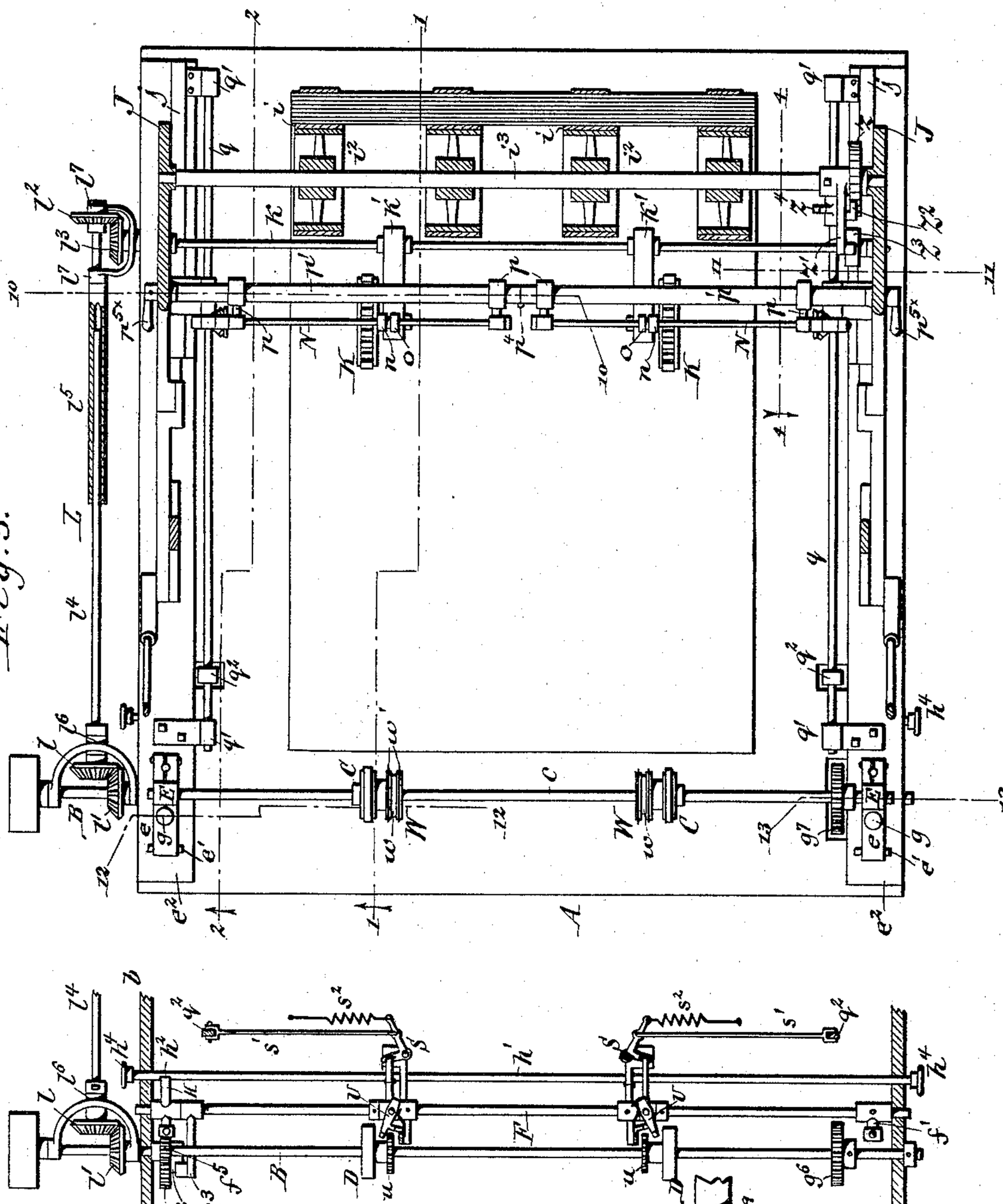

Fig. 5.

Fig. 6.

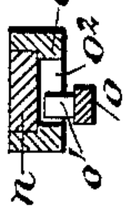

Fig. 7.

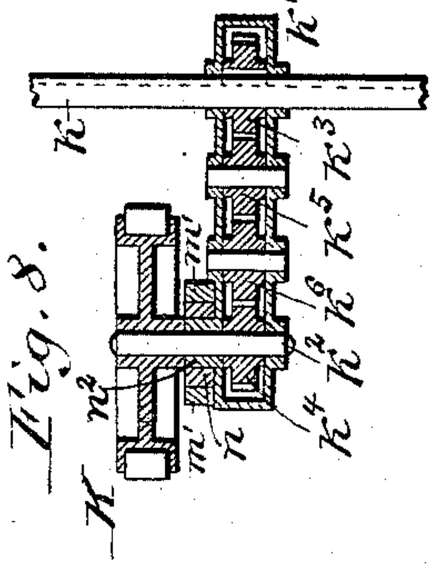

Fig. 8.

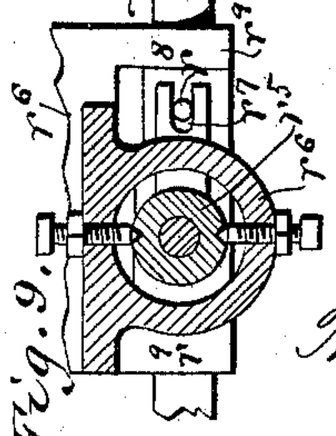

Fig. 9.

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Fig. 11.

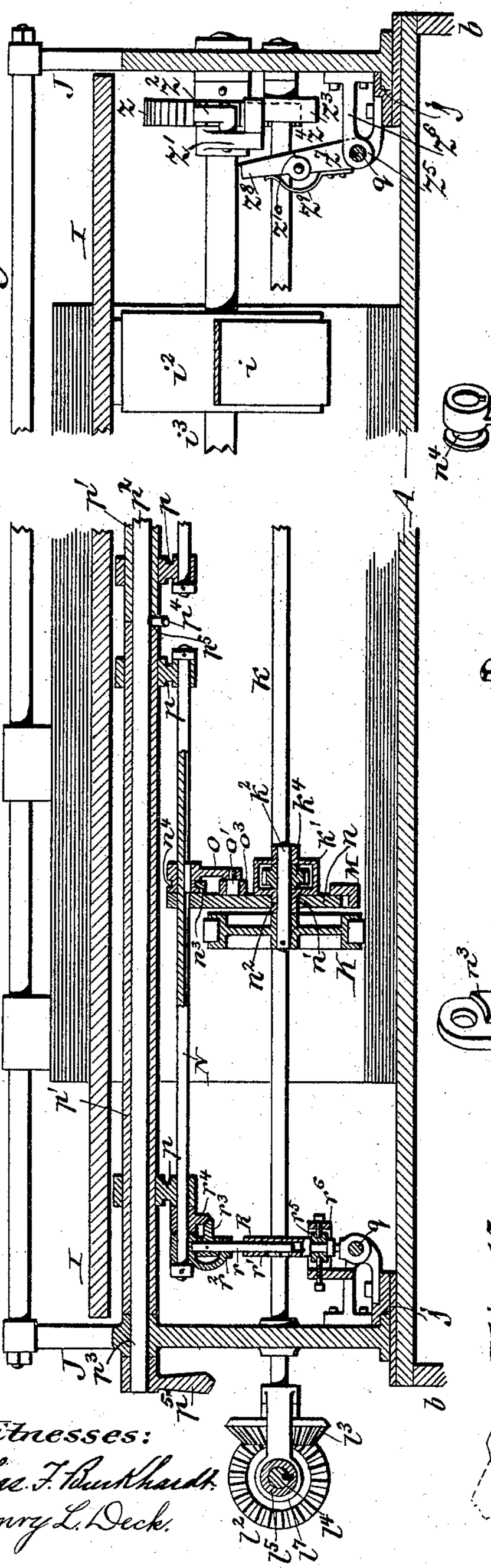

Fig. 13.

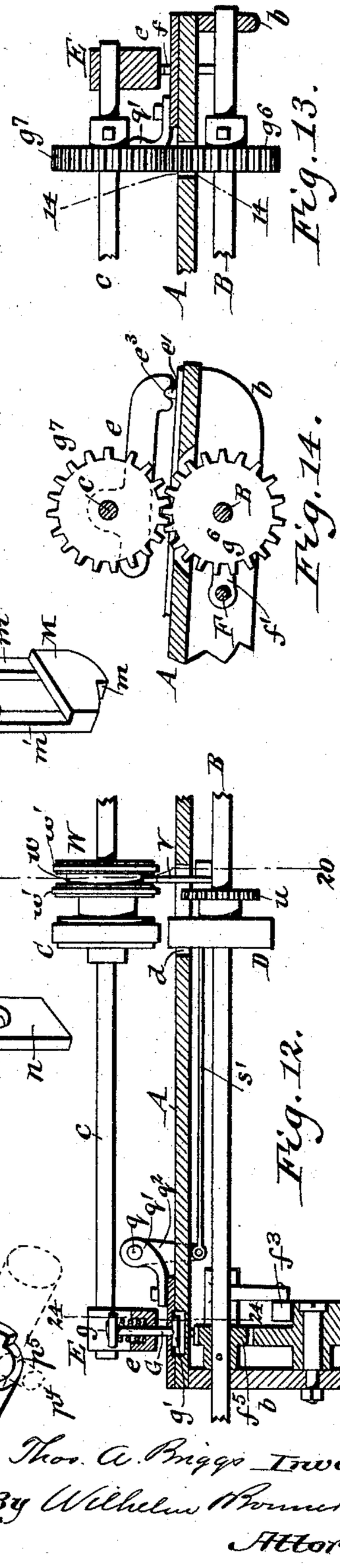

Fig. 18.

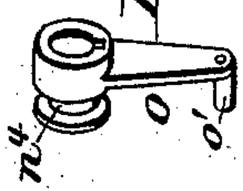

Fig. 17.

Fig. 14.

Fig. 10.

Fig. 16.

Fig. 12.

Fig. 15.

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Fig. 20.

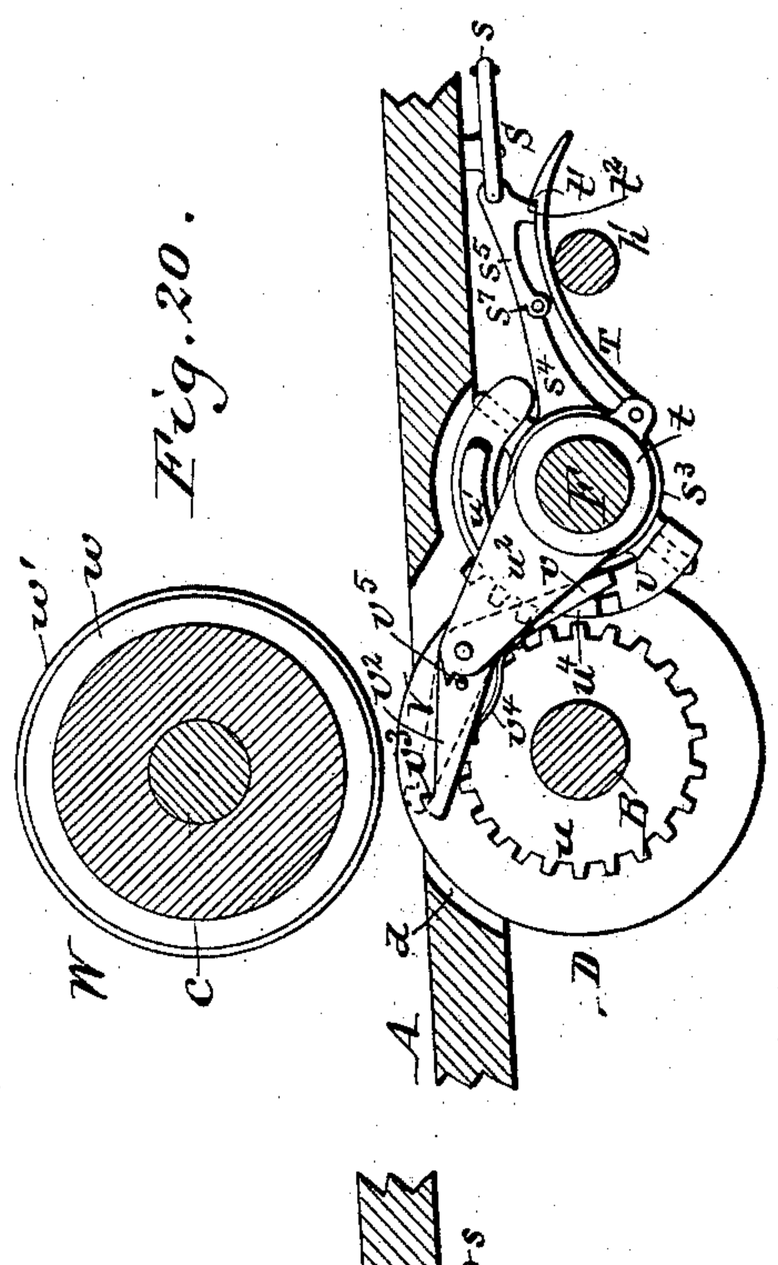


Fig. 22.

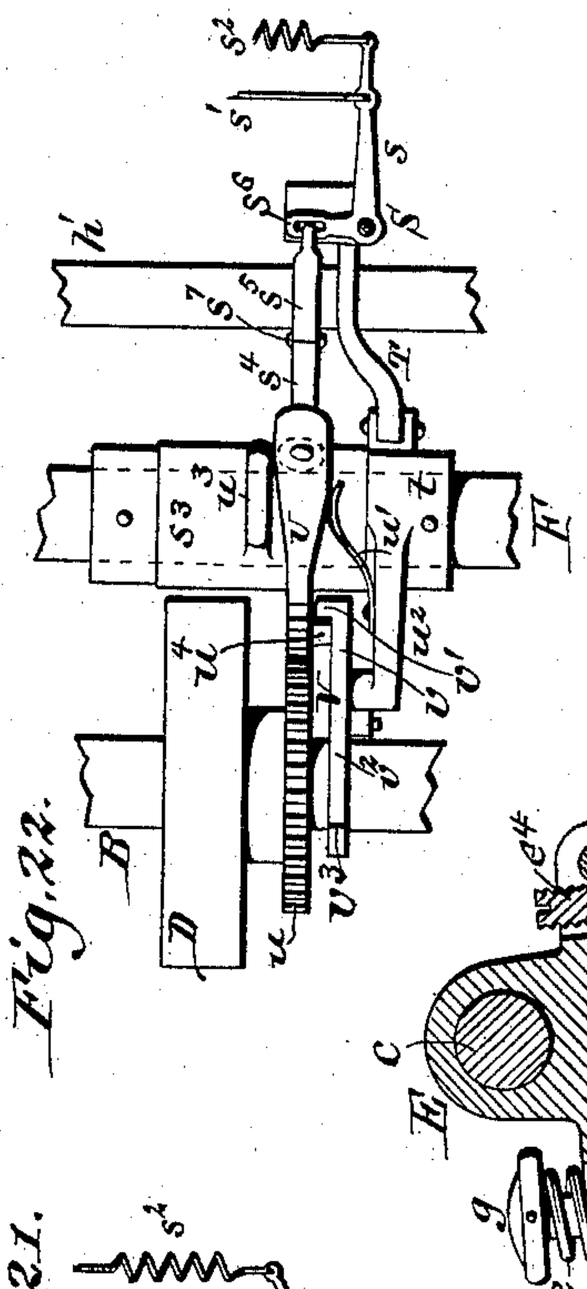


Fig. 25.

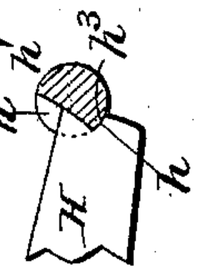


Fig. 19.

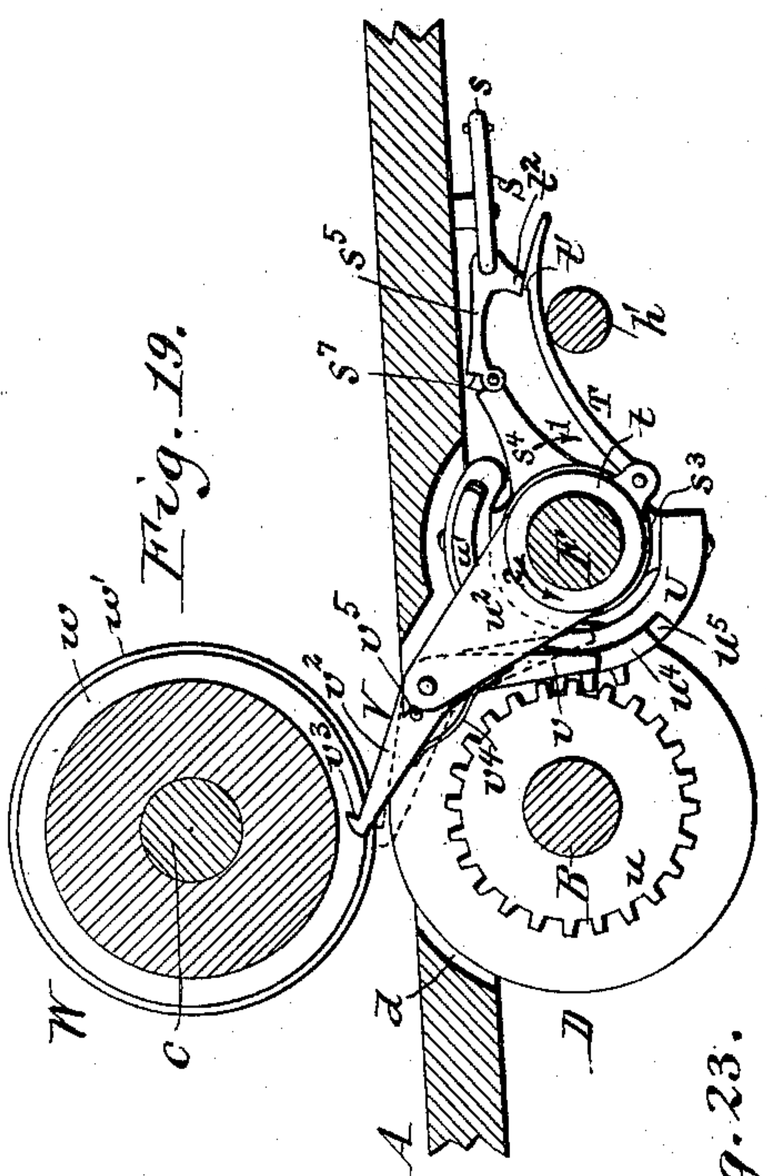


Fig. 21.

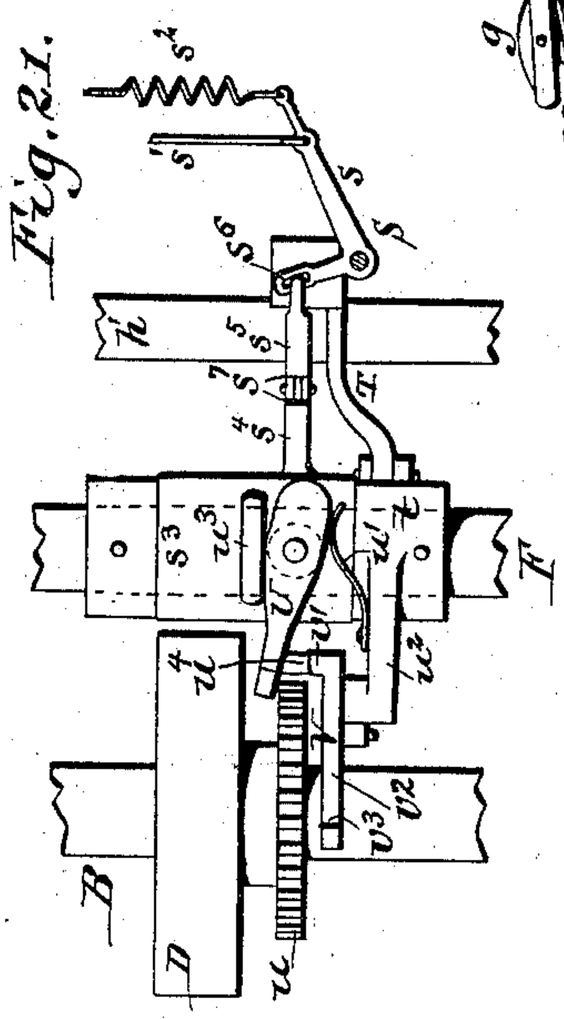


Fig. 24.

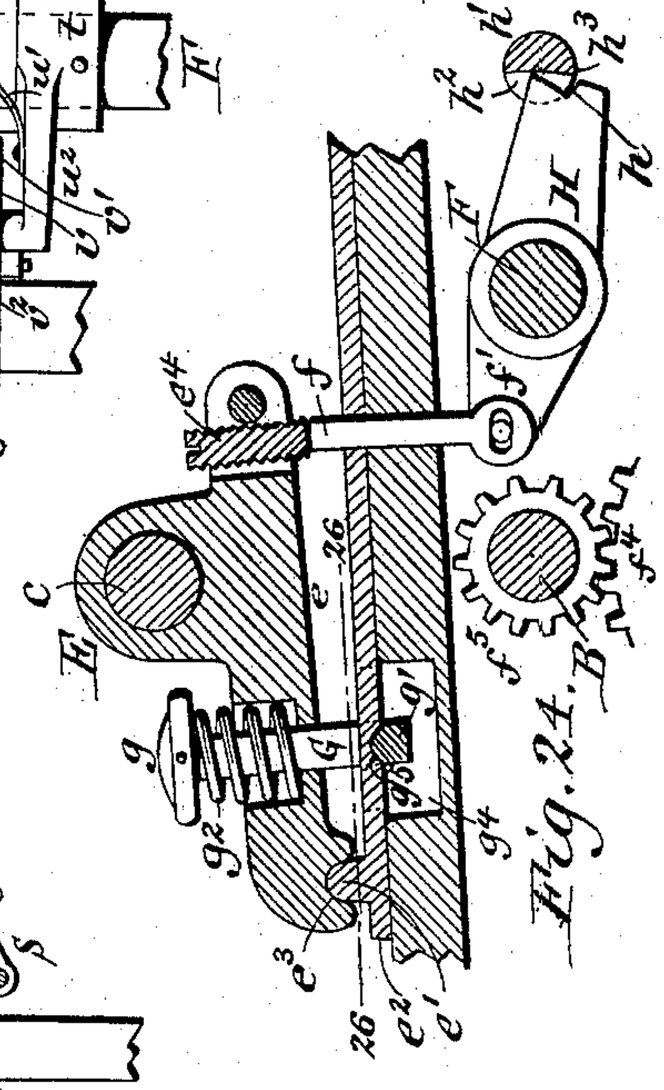


Fig. 26.

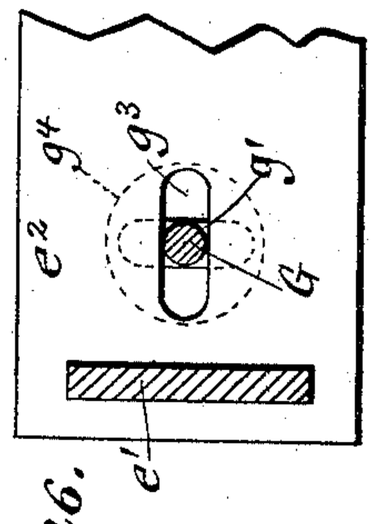
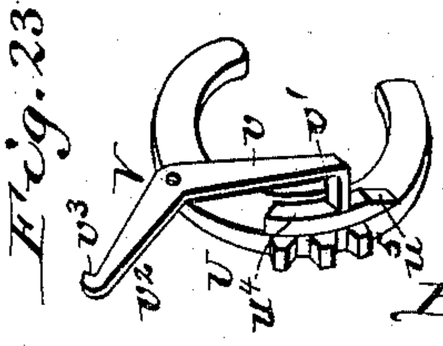


Fig. 23.



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UNITED STATES PATENT OFFICE.

THOMAS A. BRIGGS, OF ARLINGTON, MASSACHUSETTS, ASSIGNOR TO THE STANDARD MACHINERY COMPANY, OF MYSTIC RIVER, CONNECTICUT.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 609,954, dated August 30, 1898.

Application filed March 27, 1897. Serial No. 629,504. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. BRIGGS, a citizen of the United States, residing at Arlington, in the county of Middlesex 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 sheet-paper feeders of that class in which the pile or bank of sheets is feathered or combed out and the sheets are fed successively from the top of the pile by one or more rotary comb-wheels. The rotary movement of these wheels when it is intermittent has been started and stopped by electrical devices, and the comb-wheels have also been lowered upon and raised from the bank of sheets by electrical devices.

One of the objects of my invention is to provide a sheet-separating mechanism of this character which is controlled solely by mechanical means.

My invention has the further objects to improve the means whereby the sheets are carried off from the pile and to simplify and improve the machine in other respects.

In the accompanying drawings, consisting of four sheets, Figures 1 and 2 are vertical longitudinal sections in lines 1 1 and 2 2, Fig. 5, respectively. Fig. 3 is a fragmentary sectional elevation, on an enlarged scale, of the pile combing and pressing mechanism. Fig. 4 is a fragmentary vertical longitudinal section, on an enlarged scale, in line 4 4, Fig. 5. Figs. 5 and 6 are horizontal sections in lines 5 5 and 6 6, Fig. 1, respectively. Figs. 7 and 8 are horizontal sections in lines 7 7 and 8 8, Fig. 3, respectively. Fig. 9 is a horizontal section, on an enlarged scale, in line 9 9, Fig. 2. Figs. 10, 11, 12, and 13 are fragmentary vertical transverse sections, on an enlarged scale, in lines 10 10, 11 11, 12 12, and 13 13, Fig. 5, respectively. Fig. 14 is a longitudinal sectional elevation in line 14 14, Fig. 13. Fig. 15 is a fragmentary perspective view of one of the hollow rock-shafts. Fig. 16 is a similar view of one of the comb-wheel-supporting bars or hangers. Fig. 17 is a similar view of one of the pile-clamping feet. Fig. 18 is a similar view of one of the rock-arms whereby the comb-wheel and clamping-foot are alternately lowered on the paper. Figs. 19 and 20 are fragmentary longitudinal sections, on an enlarged scale, in line 19 20, Fig. 12, showing different positions of the tripping mechanism. Figs. 21 and 22 are top plan views of the lower portion of the tripping mechanism, showing different positions of the parts. Fig. 23 is a perspective view of the trip-lever and the trip-segment. Fig. 24 is a vertical longitudinal section, on an enlarged scale, in line 24 24, Fig. 12. Fig. 25 is a fragmentary longitudinal section showing the catch for locking the upper or drop rollers in an elevated position. Fig. 26 is a horizontal section in line 26 26, Fig. 24.

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

A is the lower or feed table, upon which the front portion of the feathered bank or body of sheets rests, and B is the continuously-rotating driving-shaft, arranged transversely underneath the front or delivery portion of the table and journaled in bearings in the frame *b* of the machine.

C C and D D are upper and lower feed-rollers, between which the sheets are fed successively from the pile on the feed-table and which carry the foremost or top sheet from the pile to the printing-press or other machine. The lower feed-rollers are mounted on the driving-shaft and protrude slightly through openings *d* in the feed-table, as shown in Figs. 1, 12, 19, and 20. The upper feed-rollers C C are arranged above the lower feed-rollers and are mounted on a transverse shaft *c*, which is journaled at its ends in vertically-movable bearings E, as shown in Figs. 2, 5, 12, and 24. Each of these bearings is arranged on a vertically-swinging arm *e*, which is pivoted at its front end to the table and raised and lowered at its rear end for the purpose of moving the upper feed-rollers toward and from the lower feed-rollers. The pivot of the bearing-arm consists, preferably, of a transverse lug or rib e', which is formed on a plate e^2, secured lengthwise upon the table and which engages with its upper rounded side in a rounded notch e^3, formed in the under side of the rock-arm. The front end of the bearing-arm is provided with a vertical adjusting-screw e^4, which rests with its lower

end on a vertical lifting pin or rod *f*. The latter is guided in the feed-table and plate e^2 and is loosely connected below the same with the front end of a rock-arm *f'*, which is mounted with its rear end on a transverse rock-shaft F. This shaft is journaled in bearings arranged on the main frame in rear of the main shaft and receives an intermittent rocking movement by means of a rotary cam f^2, which bears against an arm f^3, secured to the rock-shaft, as shown in Figs. 2, 6, and 12. The cam is arranged on one side of a gear-wheel f^4, which is pivoted on the adjacent portion of the frame and meshes with a gear-pinion f^5 on the main shaft B.

G G represent coupling-bolts, whereby the bearing-arms *e* are held in place and each of which is arranged in a vertical opening in one of the bearing-arms and provided above the arm with a thumb-piece or button *g* and below the arm with a cross bar or head *g'*.

g^2 is a spring surrounding the coupling-bolt and bearing with its ends against the thumb-piece and the bottom of a socket in the upper side of the bearing-arm.

g^3 is a slot which is formed in the plate e^2 in line with the coupling-bolt and which is sufficiently large to permit the head of the coupling-bolt to be passed through the same lengthwise. The feed-table is provided with a cavity g^4 below the slot g^3 in the plate to permit the head of the bolt to be turned freely below the plate.

In placing the upper feed-rollers in their operative position the notches and bearing-screws at the front and rear ends of both bearing-arms are engaged, respectively, with the lugs *e'* and lifting-rods *f*, and the heads of the coupling-bolts are passed through the slots g^3 in the plate e^2 and then turned so as to engage with the under sides of the plates on opposite sides of their slots. During this operation the springs g^2 are compressed and tend to move the upper feed-rollers downwardly against the lower feed-rollers. The under side of each plate e^2 is preferably provided with notches g^5 on opposite sides of its slot, which receive the ends of the bolt-head, as shown in Figs. 12 and 24, and prevent the latter from being easily displaced. The upper feed-rollers are rotated by means of intermeshing gear-wheels g^6 g^7, which are secured, respectively, to the lower and upper shafts, as shown in Figs. 13 and 14, and which have their teeth of sufficient length to permit of the requisite vertical movement of the upper shaft without disengaging the gear-wheels. This means of supporting the upper feed-rollers permits the same to be readily and conveniently detached from and attached to the feed-table for getting the machine ready. Upon turning the rock-shaft F, so that the upper feed-rollers are lowered upon the lower feed-rollers, the sheet which has previously been fed between the rollers will be carried rapidly from the feed-table. The timing of the cam f^2 is such that the upper rollers remain in a depressed position a sufficient time to carry off the widest sheet which the machine is designed to feed, after which the upper rollers are raised to permit the next sheet to be fed from the pile on the feed-table between the feed-rollers.

For the purpose of rendering the feed-rollers inoperative without stopping their rotation when it is desired that no sheet be fed the upper rollers are locked in an elevated position, so that they cannot be lowered by the cam f^2 into engagement with the lower rollers. This lock is preferably constructed as follows:

H represents a stop-arm projecting rearwardly from the lifting rock-shaft F and provided at its rear end with a notch forming an upwardly-facing shoulder *h*.

h' is a transverse stop or catch rod arranged in rear of the rock-shaft F and provided with a notch h^2, which receives the rear end of the stop-arm, and with a downwardly-facing shoulder h^3, adapted to engage with the shoulder of the stop-arm. The catch-rod is journaled with its ends in bearings in the frame and provided at both ends with a knob or button h^4, whereby the same may be turned from either side of the machine. In the normal position of the catch-rod it is turned so that its shoulder clears the shoulder of the stop-arm, as shown in Fig. 24, and permits the latter to move freely up and down in the notch of the stop-rod as the upper rollers are raised and lowered by the rock-shaft. When it is desired to lock the upper feed-rollers in an elevated position to stop the feeding action of the rollers, the catch-rod is turned so that its shoulder engages with that of the stop-arm, as represented in Fig. 25, thereby holding the latter in a depressed position.

I is the upper or supply table, upon which the feathered bank or pile of sheets is placed by the operator, and *i* are the feed-belts whereby the pile of sheets is carried from the upper supply-table to the lower feed-table and which pass around rollers *i'*, mounted on the front end of the upper table and feed-wheels i^2, arranged between the rear ends of the upper and lower tables.

i^3 is a transverse feed-shaft on which the feed-wheels are mounted and which is journaled with its ends in bearings formed in standards J, arranged on opposite sides of the feed-table. These standards are capable of sliding lengthwise in guides *j* on the feed-table, Figs. 1, 5, 10, and 11, for adjusting the sheet-separating mechanism which is carried by the standards toward and from the feed-rollers C D for feeding different sizes of sheet paper.

K K represent two continuously-rotating separating or combing wheels, which are adapted to bear upon the pile of sheets lying on the lower table and which comb out or separate the body of sheets and feed the top sheet forwardly to the feed-rollers. Each of the comb-wheels is lowered upon the pile and raised therefrom at intervals, thereby pro-

ducing an intermittent feeding of the sheets from the top of the pile to the feed-rollers.

k is a continuously-rotating counter-shaft arranged transversely in rear of the comb-wheels and journaled in bearings on the standards J.

k' k'' are hollow rock-arms, which hang loosely with their rear ends on the counter-shaft *k* and each of which is provided at its front end with a bearing in which the shaft k^2 of one of the comb-wheels is journaled. Motion is transmitted from the counter-shaft to each comb-wheel by gear-wheels k^3 k^4, arranged in the hollow arm and secured, respectively, to the counter-shaft and comb-wheel shaft and two intermeshing gear-wheels k^5 k^6, journaled in the hollow arm and meshing, respectively, with the gear-wheels of the counter-shaft and comb-wheel shaft, as shown in Fig. 8.

Motion is transmitted from the main shaft to the counter-shaft *k* by a longitudinal shaft L, provided at its front end with a bevel gear-wheel *l*, which meshes with a similar gear-wheel *l'* on the driving-shaft and at its rear end with a bevel gear-wheel l^2, which meshes with a similar gear-wheel l^3 on the counter-shaft. In order to permit of shifting the standards J back and forth without disturbing the driving mechanism between the driving-shaft B and the counter-shaft *k*, the longitudinal shaft L is made up of two telescopic sections l^4 l^5, which are connected by a spline, the front section l^4 being journaled in a bearing l^6, which is hung on the main shaft, while the rear section l^5 is journaled in bearings l^7, which are hung on the counter-shaft.

M M, Figs. 1, 3, 10, and 17, represent two vertically-movable pressure-feet whereby pressure is applied to the pile in rear of the top sheet when the comb-wheels are raised, thereby preventing the pile of sheets from being displaced while the top sheet is being carried off from the pile by the feed-rollers. One of these pressure-feet is arranged adjacent to each comb-wheel, and each foot is provided with a toe *m*, which is adapted to bear upon the pile in line with the lowest part of the adjacent comb-wheel. Each comb-wheel and the adjacent pressure-foot are alternately lowered upon the pile by the following mechanism:

N represents a floating or shifting rock-shaft arranged transversely above the comb-wheel, and *n* is a vertical guide-bar or hanger which is arranged between the comb-wheel and its rock-arm and which is hung loosely with its upper end on the rock-shaft N and provided at its lower end with a bearing *n'*. This bearing receives a bushing n^2, Figs. 8 and 10, which is formed on the rock-arm *k'* around the comb-wheel shaft k^2, whereby the comb-wheel is hung from the rock-shaft N. The pressure-foot is guided on the hanger *n*, so as to slide vertically thereon, by means of two vertical bars *m' m'*, which slide on opposite sides of the hanger and carry the presser-foot at their lower ends.

O represents a depending shifting rock-arm which is connected at its upper end with the shifting shaft N and provided at its lower end with a horizontal shifting pin *o'*. The latter engages with a cam-slot o^2, formed in a cross-piece o^3, connecting the upper ends of the bars which support the pressure-foot. The cam-slot o^2 is so formed that upon turning the shifting arm O in one direction by means of the shifting shaft the first portion of this movement causes the shifting pin *o'*, by its engagement with the lower side of the cam-slot, to depress the presser-foot until the same rests on the paper. After the presser-foot bears against the pile it can move downwardly no farther and forms an abutment, which causes the shifting pin *o'* while continuing its movement in the same direction to be raised by riding up the lower inclined side of the cam-slot, thereby raising the shifting shaft and lifting the comb-wheel from the pile through the medium of the hanger, as represented in Fig. 3, whereby the comb-wheel is rendered inoperative and the lower sheets of the pile are held in place by the presser-foot while the top sheet is being carried away. Upon rocking the shifting shaft in the reverse direction the shifting pin *o'* rides down the inclined lower side of the cam-slot until the comb-wheel is lowered upon the paper and the further downward movement of the shifting shaft is arrested. When the comb-wheel has been lowered upon the paper, the downward movement of the shifting shaft is also arrested, whereby the shifting pin is caused to engage with the upper inclined side of the cam-slot and to lift the presser-foot from the paper during the last portion of the reverse movement of the shifting shaft, as represented in Figs. 1 and 10. The rocking movement of the shifting shaft is so rapid that the comb-wheel and pressure-foot rest only for an instant on the paper at the same time while shifting the comb-wheel and presser-foot alternately into an operative position.

In order to permit of shifting the combing and presser mechanism laterally for feeding different sizes of sheets, the shifting arm O and the gear-wheel k^3 are secured to their respective shafts by means of splines, which enable the arm and gear-wheel to slide on their shafts, but compels them to turn therewith. The hanger *n* is compelled to move with the shifting arm O by a lip or hook n^3, which engages with an annular groove n^4 in the hub of the shifting arm, as represented in Figs. 10, 16, and 18.

The shifting shaft is journaled with its ends in bearings formed in the front ends of the lifting rock-arms *p*, which latter are secured with their rear ends to a hollow shaft *p'*. The hollow shafts *p'* of both combing mechanisms abut against each other with their inner ends and are mounted loosely on a lifting shaft or

rod p^2, which is journaled with its ends in bearings p^3, arranged on the standards J.

p^4 is a radial pin which is arranged on the central portion of the lifting-shaft and which engages with a segmental slot p^5, which is formed partly in the inner end of each hollow shaft, as shown in Figs. 5, 10, and 15.

During the operation of the machine the hollow shafts p' turn on the lifting-shaft p^2 as the shifting shafts N rise and fall with the comb-wheels, during which movement the lifting-shaft is not disturbed owing to the slot in the hollow shafts, which slot is of such length that its ends do not strike the radial pin of the lifting-shaft during this movement of the hollow shaft. When it is desired to lift both comb-wheels and presser-feet from the pile for the purpose of adjusting the machine in getting ready, the lifting-shaft is turned so that its radial pin engages with the front end of the slot in the hollow shafts and turns the latter with the lifting-shaft in the proper direction for raising the sheet combing and pressing mechanism from the pile. The lifting-shaft is turned by means of handles $p^{5\times}$, secured to opposite ends thereof outside of the standards, so that the combing and pressing mechanisms can be lifted from either side of the machine.

q q represent two horizontal rock-shafts, whereby the comb-wheels and presser-feet are alternately raised and lowered and which are arranged lengthwise on opposite sides of the lower feed-table. Each of these longitudinal shafts is journaled with its ends in bearings q', arranged on the feed-table, and is provided near its front end with an actuating rock-arm q^2, which depends through an opening in the feed-table, as shown in Figs. 2 and 5. Motion is transmitted from each longitudinal rock-shaft to the adjacent shifting shaft N by a vertical telescopic shaft R, the sections r r' of which are connected by a spline, so that one section can slide on the other, but the sections are compelled to turn together. The upper section r of the vertical shaft is journaled in a bearing r^2, which is hung on the end of the shifting shaft, and is provided with a gear-segment r^3, which meshes with a gear-segment r^4 on the shifting shaft. The lower section r' of the vertical shaft is journaled in a bearing r^5, which is pivoted on a bracket r^6 on the adjacent standard, Figs. 9 and 10, so that the vertical shaft is enabled to tilt back and forth with its upper end and adjust itself to the varying position of the horizontal shifting shaft. The lower shaft-section is provided with a slotted horizontal arm r^7, which receives a vertical arm r^8 on the longitudinal shaft q. The vertical arm r^8 is connected with the longitudinal shaft by a spline, so as to turn therewith, but is compelled to slide thereon when the standards J are shifted lengthwise by means of collars r^9, which are formed on the bracket r^6 and embrace the longitudinal shaft on opposite sides of the arm r^8. Each comb-wheel continues to roll in contact with the top sheet until the front corner of this sheet on the respective side of the machine has been fed between the pair of feed-rollers on that side of the machine, when the comb-wheel is raised from the pile and held in this raised position until the top sheet has been carried away and the feed-rollers are in position for receiving the next sheet. The feeding action of each comb-wheel is controlled by the movement of the front edge of the sheet on the respective side of the combing-wheel by a tripping mechanism, which is constructed as follows:

S represents an elbow-lever which is pivoted to the under side of the feed-table in rear of one of the lower feed-rollers and which has one of its arms s connected by a rod s' with the depending arm q^2 of the longitudinal rock-shaft q on the same side of the machine. This elbow-lever is turned by a spring s^2 in the direction for lowering the comb-wheel connected therewith upon the pile of paper, which spring is connected with its ends to the arm s of said lever and to the feed-table or some other stationary part of the machine.

s^3 represents a sleeve which turns loosely on the rock-shaft F in rear of the adjacent lower feed-roller and which is confined against longitudinal movement thereon.

s^4 s^5 are the two bars or members of a toggle-joint, the front bar s^4 of which is formed on the rear side of the rotary sleeve s^3, while the rear bar s^5 is pivoted at its front end to the front bar and loosely connected at its rear end to the other arm s^6 of the elbow-lever. Upon turning the rotary sleeve in the direction of the arrow 1, Fig. 19, the bars of the toggle are straightened and the elbow-lever is turned in the direction for lifting the comb-wheel from the pile of paper. The toggle-bars are provided on opposite sides of the connecting-pivot with shoulders s^7, which are adapted to abut against each other after the connecting-pivot has passed below the dead-center, thereby arresting the movement of the toggle-bars in that direction and holding them in a straightened position.

T represents a releasing rod or bar whereby the toggle-bars are turned so as to unlock them and permit the elbow-lever to turn in the direction for lowering the comb-wheel on the pile of paper. This rod is pivoted at its front end to a collar t, which is secured to the rock-shaft F, and is provided at its rear end with a forwardly-facing shoulder or catch t', which is adapted to engage with a shoulder or lug t^2 on the lower side of the rear toggle-bar. The rear end of the releasing-bar may be guided in any suitable manner—for instance, by resting the same on the catch-bar h', as shown in Figs. 19, 20, 21, and 22.

U is a trip gear-segment which is pivoted transversely on diametrically opposite sides of the rotary sleeve s^3, and which is adapted to be engaged and disengaged with a continuously-rotating gear-wheel u, mounted on the main driving-shaft adjacent to the lower

feed-roller. This trip-segment is oscillated for engaging its teeth with and disengaging the same from the teeth of the gear-wheel u by a shifting spring u', which alternately bears against the segment on opposite sides of its transverse pivot. The shifting spring u' is secured to a rock-arm u^2, formed on the collar t, which latter is fast on the rock-shaft F.

u^3 is a stop which is formed on the sleeve s^3, and against which the trip-segment is adapted to bear on opposite sides of its center for limiting its swinging movement. The trip-segment is provided on one side with a curved rib or flange u^4, which has an inclined lower end u^5.

V represents a trip-lever whereby the raising of the comb-wheel from the paper is controlled and which is pivoted by a horizontal pin to the forwardly-projecting rock-arm u^2, secured to the rock-shaft F. The lower arm v of the trip-lever is provided with a laterally-projecting finger or lug v', which is adapted to engage with the flange of the segment and hold the latter out of engagement with the actuating gear-wheel u. The upper arm v^2 of the trip-lever is provided at its end with a hook or shoulder v^3 and is adapted to project forwardly at an angle above the feed-table through the opening d, formed in the latter. The trip-lever is turned on the supporting-arm u^2, so that its front arm tends to move upwardly by means of a spring v^4, which is connected with the supporting-arm and bears against the upper arm of the trip-lever. The turning movement of the trip-lever, which tends to move its upper arm upwardly on the supporting-arm, is limited by means of a stop, which consists of a pin v^5, arranged on the upper trip-arm and engaging with a shoulder on the supporting-arm.

W is an abutment-wheel mounted on the upper feed-shaft and provided with a circumferential groove w, which is adapted to receive the end of the upper arm of the trip-lever when the latter is in its highest operative position.

While the comb-wheel is resting on the pile of paper and feeding the top sheet between the upper and lower feed-rollers on the same side of the machine, the upper feed-roller and the adjacent abutment-wheel are elevated, the trip-lever projects with its upper arm into the groove of the abutment-wheel, while the lower arm thereof engages with its finger the top of the flange of the trip-segment and holds the latter out of engagement with the actuating gear-wheel, and the segment is turned so that the toggle-bars are open or broken, as represented in full lines in Figs. 19 and 21. As the sheet of paper is fed forward by the comb-wheel between the upper and lower feed-rollers its front edge is forced between the lower portion of the abutment-wheel and the upwardly-projecting arm of the trip-lever, which together form a rearwardly tapering or converging throat. During this forward movement of the sheet its front edge, in striking the upper arm of the trip-lever, wedges or deflects the same downwardly and turns the lever until the front edge of the sheet strikes the hook or shoulder on the upper arm thereof, as represented in dotted lines, Fig. 19, when the forward movement of that side of the sheet is arrested. When the trip-lever is turned by the front edge of the sheet, as before described, its lower arm carries its finger rearwardly sufficiently to clear the flange of the trip-segment, whereby the latter is released and instantly turned on its transverse pivot by the spring u', which at this time bears against the trip-segment in rear of its transverse pivot, thereby engaging the teeth of the segment with those of the actuating gear-wheel u, as represented in Fig. 22. The instant the actuating gear-wheel and the trip-segment are engaged the latter is turned quickly until the last tooth of the segment has cleared the gear-wheel, as represented in full lines, Fig. 20, whereby the rotary sleeve s^3 is turned sufficiently to straighten the toggle-bars and turn the elbow-lever S for raising the comb-wheel from the pile and lowering the presser-foot on the pile, thereby stopping the feeding of the sheets. While the trip-segment is being turned on the horizontal pivot, together with the sleeve s^3, by the actuating gear-wheel, its transverse pivot is carried in rear of the spring u' during the last portion of this movement, whereby the pressure of this spring causes the trip-segment to swing laterally on its transverse pivot, so that its teeth are out of line with the teeth of the actuating gear-wheel. Fig. 22 shows the position of the parts when the spring u' is about to disengage the trip-segment from the actuating gear-wheel. When the machine to which the sheets are fed is ready to receive a sheet, the rock-shaft F is turned in the direction of the arrow 2, Fig. 19, whereby the trip-lever is carried bodily downward from the dotted position shown in this figure into the position shown in full lines, Fig. 20, whereby the shoulder on the upper arm of the trip-lever is disengaged from the sheet. At the same time the upper feed-roller is lowered upon the lower feed-roller, whereby the sheet is seized and carried off from the feed-table. After the trip-lever has been disengaged from the sheet during its bodily downward movement it is turned by the spring V^4 from the position indicated by the full lines, Fig. 20, into the position shown by the dotted lines in the same figure, whereby the finger on the trip-lever is shifted below the lower end and in line with the flange of the trip-segment. After the sheet has passed beyond the feed-rollers the rock-shaft F is turned in a reverse direction from that indicated by the arrow 2, Fig. 19, whereby the upper feed-roller is raised, together with the adjacent abutment-wheel, and the trip-lever is raised bodily, so that its upper arm again projects into the groove in the abutment-wheel. By thus raising the trip-

lever the finger on its lower arm is carried upward, so as to stand opposite the front or face of the flange on the trip-segment, the incline formed on the lower end of the flange preventing the finger from being caught on the lower end of the flange. When the rock-shaft F is turned in the direction of the arrow 2 for lowering the trip-lever below the path of the sheet, the releasing-bar T is moved rearwardly sufficiently by the rotation of the shaft so that its shoulder stands in rear of the depending lug or shoulder on the rear toggle-bar. During the subsequent reverse movement of the rock-shaft for lifting the upper feed-roller and trip-lever the releasing-bar is moved forward with its shoulder in engagement with the depending lug of the rear toggle-bar, whereby the latter is turned and the toggle-bars are broken or folded, thereby turning the elbow-lever and resuming the feeding of the next sheet between the feed-rollers by lowering the comb-wheel on the pile and raising the presser-foot therefrom. When the rock-shaft F turns in a direction for restoring the feeding action of the comb-wheel, the trip-segment is turned in a direction opposite to that in which it was moved by the actuating gear-wheel until it assumes its initial position. (Shown in Figs. 19 and 21.) During this return movement of the trip-segment its transverse pivot is again carried in front of the spring u'; but the latter is prevented from turning the trip-segment, so as to engage it with the actuating gear-wheel, by reason of its flange abutting at this time against the finger of the trip-lever.

In order to prevent the sheet of paper from being retarded when it engages with its front edge against the trip-lever, the abutment-wheel is provided with a peripheral facing w', of rubber or similar material, on one or both sides of its groove, which facing enables the abutment-wheel to obtain a firm grip on the sheet and feed the same forwardly positively until the front edge of the sheet strikes the shoulder on the upper arm of the trip-lever.

The comb-wheels on opposite sides of the machine are always lowered on the pile at the same time, so that the feeding of the sheet is started simultaneously on opposite sides of the sheet, thereby preventing the comb-wheels from displacing the same. The controlling devices on opposite sides of the machine stop the feeding action of the comb-wheels on the respective sides of the machine independent of one another. This enables the feeding of a displaced sheet to be arrested on one side when its front edge is arranged between the feed-rollers and the feeding on the other side to be continued until that side has also been fed with its front edge between the feed-rollers, when the feeding action on the latter side is also arrested, thereby insuring alinement of the sheet before it is carried away from the feed-table.

In order to effect the feeding of the pile of sheets from the upper to the lower table simultaneously with the feeding off of the sheets from the lower table to the printing-press or other machine, the pile-feeding mechanism is operated as follows:

z, Figs. 4, 5, and 11, represents a ratchet-wheel mounted on one end of the feed-wheel shaft i^3, and z' is a ratchet-lever which is pivoted loosely on said shaft and which is provided with a pawl z^2, engaging with the teeth of the ratchet-wheel. z^3 is a cam arranged on the counter-shaft and engaging with the ratchet-lever. During each rotation of the cam it lifts the ratchet-wheel and turns the feed-wheels forward and then permits the ratchet-lever to drop back and take up a new tooth.

z^4 is an upright stop-arm, which is adapted to project under the ratchet-lever and prevent the same from dropping back and taking up a new tooth, thereby stopping the forward movement of the feeding-wheels. This stop-arm is splined with its lower end on the adjacent longitudinal rock-shaft q, so as to turn therewith, but is compelled to slide thereon when the standards are adjusted longitudinally by means of two collars z^5 z^5, which embrace the rock-shaft q on opposite sides of the stop-arm and which are connected by a bracket z^6 with the adjacent standard. When the rock-shaft q is turned in one direction for lifting the comb-wheel connected therewith from the pile, the stop-arm is moved underneath the ratchet-lever and stops the feeding of the pile, and when the rock-shaft q is turned in the opposite direction for lowering the comb-wheel on the pile the stop-arm is withdrawn from underneath the ratchet-lever, thereby permitting the feeding of the pile to be resumed. In order to prevent the stop-arm from being broken if the same is moved against the ratchet-lever while the same is lowered, the stop-arm is made of two sections z^7 z^8, the lower section z^7 being mounted on the rock-shaft q, while the upper section is pivoted to the lower section by a horizontal pin. The sections of the stop-arm are yieldingly held in a straightened position by a spring z^9, which is secured with one end to one section and bears with its opposite end against the other section. The upper section is prevented from moving in one direction beyond a straightened position by means of coöperating shoulders z^{10}, formed on the sections on opposite sides of the pivotal connection between the same. If the stop-arm is moved toward the ratchet-lever while the latter is in its lower position, the upper section of the arm will strike the lever and be deflected, and when the lever is raised by the cam the upper section will be moved under the lever by the spring z^9, when the ratchet-lever will be held against downward movement until the stop-arm is withdrawn by the rock-shaft.

I claim as my invention—

1. The combination with the feed-table, the lower feed-roller, and the upper feed-roller,

of a rock-shaft arranged below the feed-table and provided with arms carrying upwardly-projecting rods or pins, and bearings in which the upper feed-roller is mounted and which rest loosely on said rods or pins, whereby said bearings and the upper feed-roller can be removed without disturbing said rods or pins, substantially as set forth.

2. The combination with the feed-table, the lower feed-roller, the upper feed-roller and the shaft supporting the upper feed-roller, of a rock-arm provided with a bearing in which said shaft is journaled, a vertical pin or rod guided in said table, an adjusting-screw arranged in said arm and resting on said pin or rod, and a rock-shaft provided with an arm which is connected with the lower end of said pin or rod, substantially as set forth.

3. The combination with the feed-table, the lower feed-roller, the upper feed-roller, and the shaft supporting the upper feed-roller, of a rock-arm provided with a bearing in which said shaft is journaled, and an upwardly-projecting lug arranged on the table and engaging with a notch in the underside of said arm, substantially as set forth.

4. The combination with the feed-table, the lower feed-roller, the upper feed-roller, and the shaft supporting the upper feed-roller, of a rock-arm pivoted on the table and provided with a bearing in which said shaft is journaled, a coupling-bolt detachably connecting the arm with the table, and a spring interposed between the arm and the bolt, substantially as set forth.

5. The combination with the table, the lower feed-roller, the upper feed-roller, and the shaft supporting the upper feed-roller, of a rock-arm provided with a bearing in which said shaft is journaled, a plate arranged on the table below the rock-arm and provided with a slot, a coupling-bolt arranged in said arm and slot and provided at its lower end with a cross-bar which bridges the slot, and a spring interposed between the upper side of said arm and a shoulder or head on said bolt, substantially as set forth.

6. The combination with the lower feed-roller, of an upper feed-roller, vertically-movable bearings in which the upper feed-roller is journaled, a rock-shaft connected with said bearings to raise and lower the same and provided with a rock-arm, and a stop which can be adjusted to stand in the path of said rock-arm for holding the bearings in an elevated position or to clear the arm for permitting the bearings to be lowered, substantially as set forth.

7. The combination with the lower feed-rollers and the upper feed-rollers, of a shaft carrying the upper feed-rollers, vertically-movable bearings in which said shaft is journaled, a rock-shaft whereby said bearings are raised and lowered, a rock-arm arranged on the rock-shaft and provided with a shoulder, and a rotary rod provided with a notch or recess which receives said arm and with a shoulder which is adapted to engage with the shoulder of said arm, substantially as set forth.

8. The combination with the feed-table and the main driving-shaft journaled in stationary bearings, of a comb-wheel, a counter-shaft geared with the comb-wheel and journaled in longitudinally-movable bearings, and a longitudinal telescopic shaft geared with the main shaft and the counter-shaft, substantially as set forth.

9. The combination with the feed-table, of a comb-wheel, mechanism whereby said wheel is alternately lowered upon the bank of paper and raised therefrom, and a presser-foot arranged at the side of the comb-wheel and adapted to bear upon the bank of paper, substantially in line with the comb-wheel, substantially as set forth.

10. The combination with the feed-table, of a comb-wheel, mechanism whereby said wheel is alternately lowered upon the bank of paper and raised therefrom, a presser-foot, and mechanism whereby said foot is lowered to hold the bank of paper when the comb-wheel is elevated, and raised to release the top sheet when the comb-wheel is lowered, substantially as set forth.

11. The combination with the feed-table, of a comb-wheel, a vertically-movable rock-shaft, a hanger loosely connecting said wheel with said shaft, a presser-foot guided on said hanger and provided with a cam, and a rock-arm secured to said rock-shaft and engaging with said cam, substantially as set forth.

12. The combination with the feed-table, of a comb-wheel, a vertically-movable rock-shaft arranged over the comb-wheel, a hanger loosely connecting the wheel with said shaft, a presser-foot provided with upright bars guided on opposite sides of said hanger and having a cross-bar provided with a cam-slot, and a rock-arm secured to said rock-shaft and provided with a pin or projection engaging with said slot, substantially as set forth.

13. The combination with the feed-table, of a comb-wheel, a presser-foot, a vertically-movable shaft whereby the comb-wheel and presser-foot are supported and alternately lowered on the pile, a rock-shaft journaled in stationary bearings, and rock-arms connecting said shafts, substantially as set forth.

14. The combination with the feed-table, of a comb-wheel, a presser-foot, a vertically-movable shaft whereby the comb-wheel and presser-foot are supported and alternately lowered on the pile, a rotary lifting-rod journaled in stationary bearings, a hollow shaft journaled on said rod, arms connecting the vertically-movable shaft with the hollow shaft, and a radial pin arranged on the lifting-rod and engaging with a segmental slot in the hollow shaft, substantially as set forth.

15. The combination with the feed-table, of a comb-wheel, a presser-foot, a vertically-movable transverse shaft whereby the comb-wheel and presser-foot are supported and al-

ternately lowered on the pile, a longitudinal shaft journaled in stationary bearings, and a telescopic vertical shaft having its upper and lower ends geared respectively with the transverse shaft and the longitudinal shaft, substantially as set forth.

16. The combination with the feed-table, of a sheet-feeding device, a moving shaft which when coupled with said device causes the same to become inoperative, a trip-lever which is shifted by the advancing sheet and which causes the coupling of said shaft to said sheet-feeding device, and mechanism whereby the feeding device is returned to its operative position after having been rendered inoperative, substantially as set forth.

17. The combination with the feed-table, and a rotating shaft, of a comb-wheel, lifting mechanism whereby the comb-wheel is raised and lowered and which is adapted to be operated by said rotating shaft, and a trip-lever which is shifted by the advancing sheet and which couples said lifting mechanism to said rotating shaft for raising the comb-wheel, substantially as set forth.

18. The combination with the feed-table, of a sheet-feeding device, a moving shaft which when coupled with said device causes the same to become inoperative, a trip-lever which is shifted by the advancing sheet and which causes the coupling of said shaft to said sheet-feeding device, mechanism whereby the feeding device is returned to its operative position after having been rendered inoperative, and an abutment arranged opposite said trip-lever, substantially as set forth.

19. The combination with the feed-table, of a sheet-separating mechanism, an actuating mechanism whereby the separating mechanism is alternately rendered operative and inoperative, a trip-lever which is provided with a shoulder adapted to be engaged by a sheet and which controls said actuating mechanism, and a movable support on which said lever is pivoted, substantially as set forth.

20. The combination with the feed-table, of a sheet-separating mechanism, an abutment-roller arranged on one side of the path of the sheets and provided with a circumferential groove, a trip-lever arranged on the opposite side of the path of the sheets and projecting into the groove of the abutment-roller, a rock-shaft carrying the trip-lever, and intermediate actuating mechanism which is controlled by the trip-lever and whereby the separating mechanism is alternately rendered operative and inoperative, substantially as set forth.

21. The combination with the feed-table and the sheet-separating mechanism, of a trip-segment capable of turning on a horizontal axis and on an axis transversely to the horizontal axis, a gear-wheel with which the trip-segment is adapted to be engaged by swinging on its transverse axis, a trip-lever having an upper arm adapted to be engaged by the sheets and a lower arm which is adapted to hold the trip-segment out of engagement with the gear-wheel, and intermediate mechanism which is actuated by the movement of the trip-segment about its horizontal axis and whereby the separating mechanism is alternately rendered operative and inoperative, substantially as set forth.

22. The combination with the feed-table and the sheet-separating mechanism, of a horizontal rock-shaft, a gear-wheel arranged adjacent to the rock-shaft, a rotary sleeve turning on the rock-shaft, a trip-segment pivoted to said sleeve transversely to the axis of the sleeve and adapted to be engaged with and disengaged from the gear-wheel, a trip-lever pivotally supported on the rock-shaft and having its lower arm engaging with a flange on the segment for holding the latter out of engagement with the gear-wheel while its upper arm is adapted to be engaged by the sheets, a spring whereby the trip-segment is turned for engaging the same with the gear-wheel, an elbow-lever connected by intermediate mechanism with the separating mechanism for shifting the same alternately into an operative and an inoperative position, toggle-bars connecting said elbow-lever with said rotary sleeve, and a releasing-bar pivoted at one end to the rock-shaft and provided at its opposite end with a shoulder adapted to engage with a shoulder on one of the toggle-bars, substantially as set forth.

23. The combination with the upper and lower tables and the mechanism by which the bank of sheets is moved from one table to the other and which is provided with a ratchet-wheel, of a pawl-carrier having a forward-and-backward movement and provided with a pawl engaging with said ratchet-wheel, and a rock-arm consisting of a lower section mounted on a rock-shaft and an upper section which is yieldingly connected with the lower section and adapted to be moved into and out of the path of the pawl-carrier, substantially as set forth.

Witness my hand this 23d day of March, 1897.

THOMAS A. BRIGGS.

Witnesses:
WILLIAM H. H. TUTTLE,
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