(No Model.) 3 Sheets—Sheet 1.

T. A. BRIGGS & W. A. PHILPOTT, Jr.

PAPER FEEDING MACHINE.

No. 538,640. Patented Apr. 30, 1895.

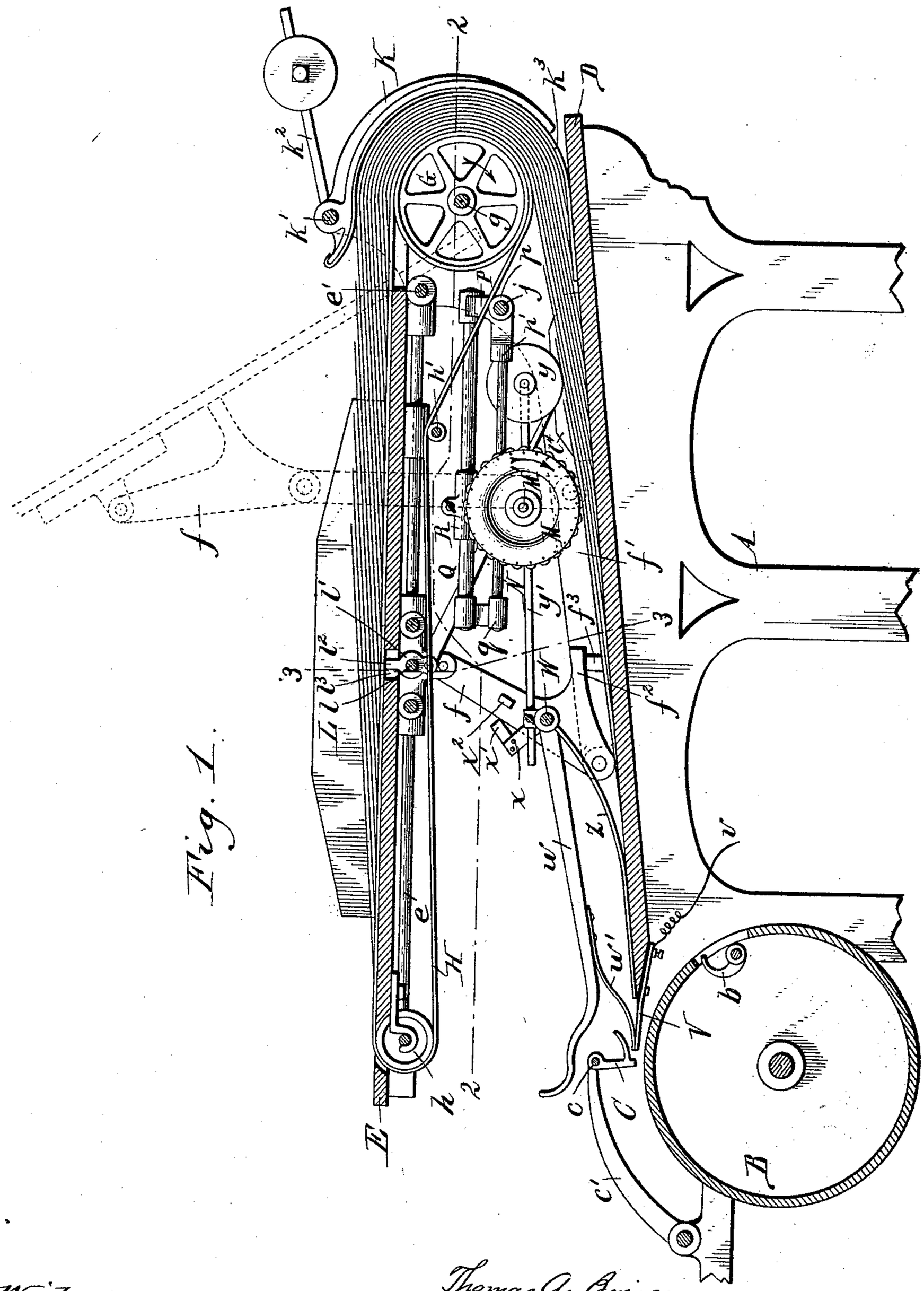

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

T. A. BRIGGS & W. A. PHILPOTT, Jr.

PAPER FEEDING MACHINE.

No. 538,640. Patented Apr. 30, 1895.

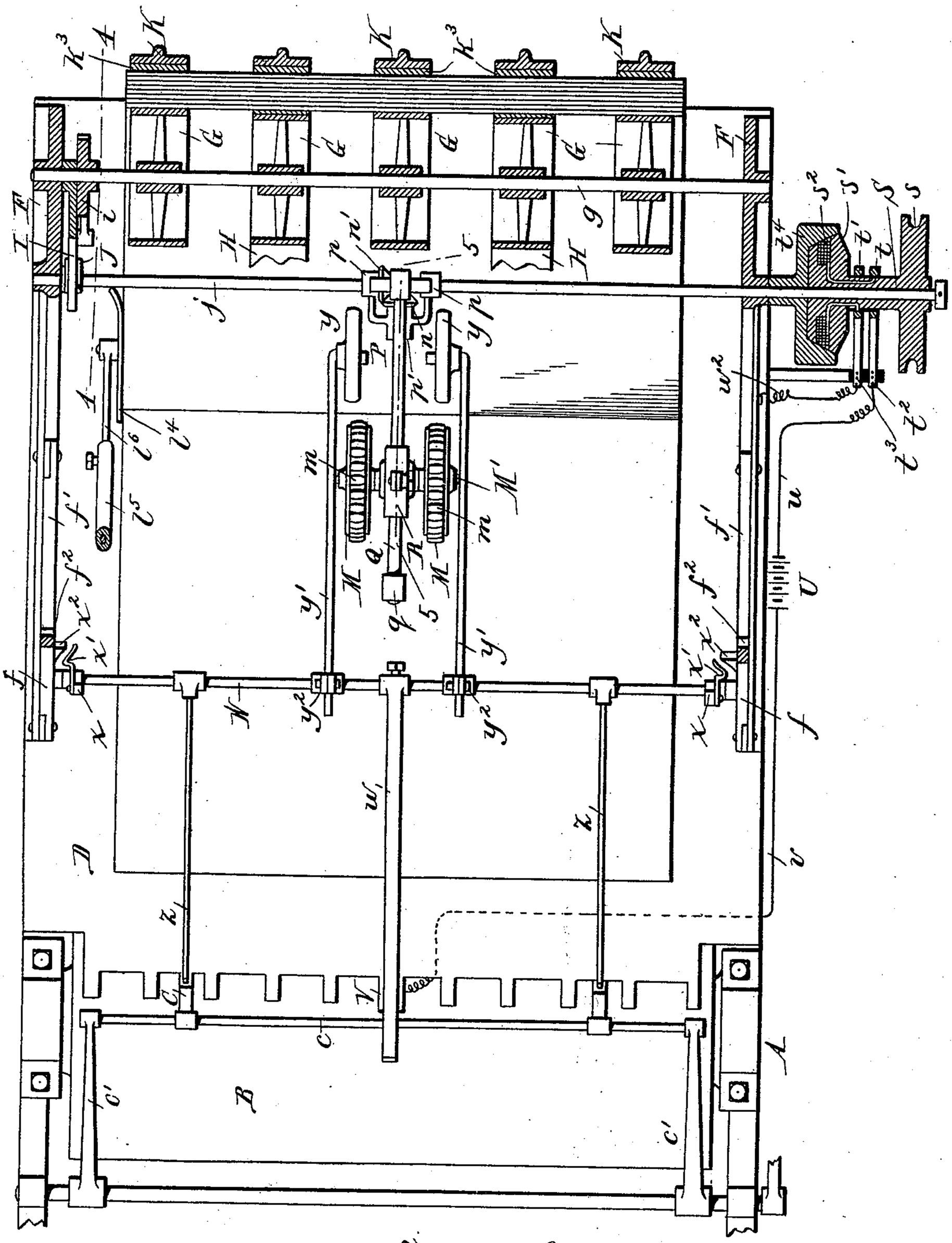

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

T. A. BRIGGS & W. A. PHILPOTT, Jr.

PAPER FEEDING MACHINE.

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Fig. 4.

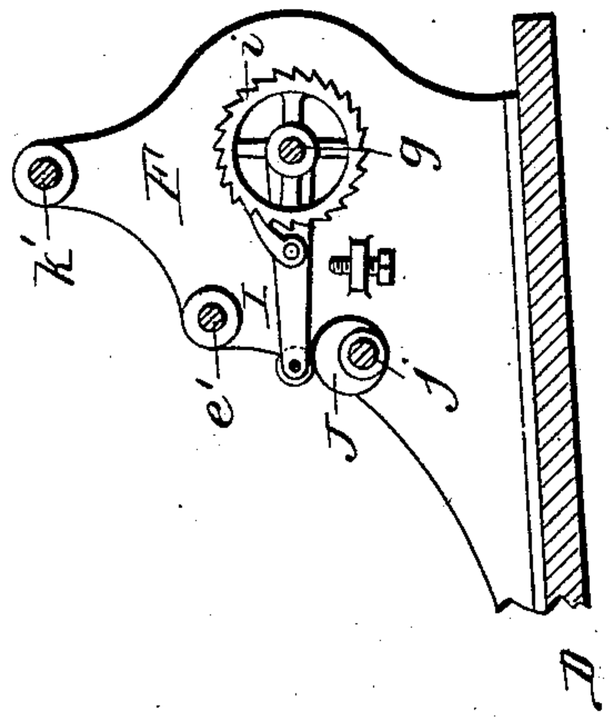


Fig. 5.

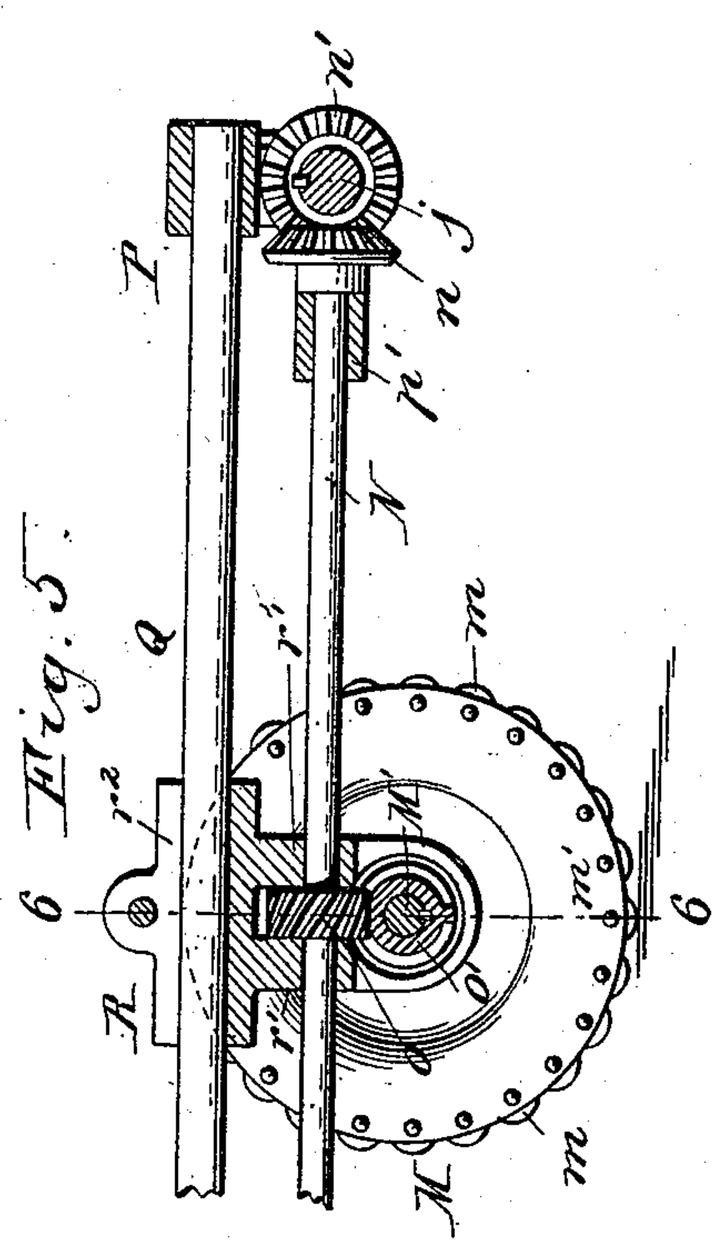


Fig. 3.

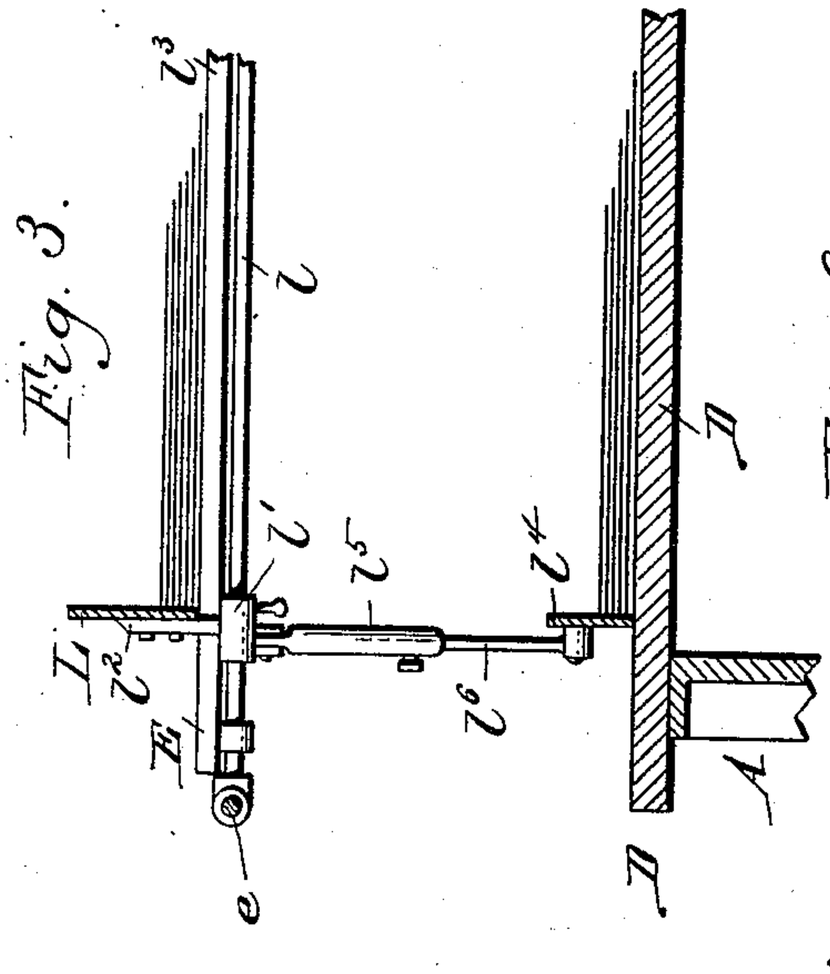
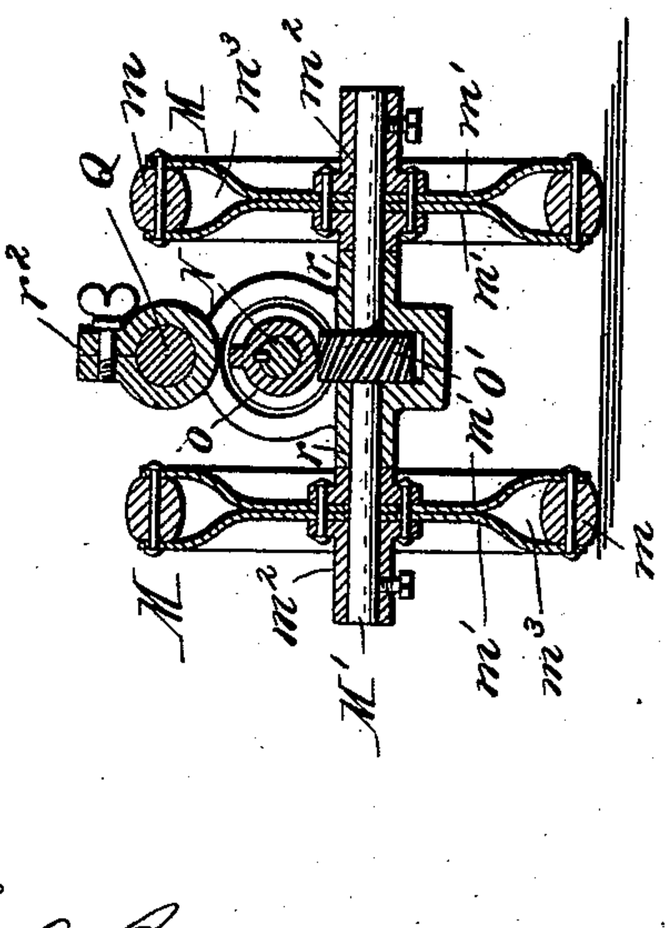


Fig. 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

THOMAS A. BRIGGS, OF NIAGARA, CANADA, AND WILLIAM A. PHILPOTT, JR., OF NIAGARA FALLS, NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 538,640, dated April 30, 1895.

Application filed September 15, 1894. Serial No. 523,150. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. BRIGGS, of Niagara, Ontario, Canada, and WILLIAM A. PHILPOTT, Jr., of Niagara Falls, in the county of Niagara and State of New York, citizens of the United States, have invented a new and useful Improvement in Paper-Feeding Machines, of which the following is a specification.

This invention relates to a paper feeding machine whereby sheet paper is automatically fed from a pile to a printing press, folding, ruling, calendering or other machine in which sheet paper is operated upon.

One object of our invention is to improve the construction and arrangement of the feed tables so as to permit of conveniently renewing the supply of paper without stopping the machine. Another object of our invention is to provide a feed machanism which is simple in construction and reliable in operation; and other objects are to improve the machine in various other respects.

In the accompanying drawings, consisting of three sheets, Figure 1 is a longitudinal sectional elevation of our improved paper-feeding machine applied to a printing-press. Fig. 2 is a horizontal section thereof in line 2 2, Fig. 1. Fig. 3 is a fragmentary cross-section of the feed-tables in line 3 3, Fig. 1. Fig. 4 is a fragmentary longitudinal section in line 4 4, Fig. 2. Fig. 5 is a vertical longitudinal section, on an enlarged scale, in line 5 5, Fig. 2. Fig. 6 is a cross-section in line 6 6, Fig. 5.

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

A represents the main frame of the machine, B the impression cylinder of a printing press provided with the usual grippers *b*, and C the vertically movable registering guides arranged over the cylinder. These guides are secured to a transverse rod *c* which is supported at its ends by rock arms *c'*.

D represents the main or lower feed table arranged with its delivery end over the impression cylinder, and E the supply table or upper feed table arranged at a suitable height above the lower table. The supply table is secured to the upper side of a frame *e* which is pivoted at its rear end at *e'* to standards F mounted on the front portion of the feed table. The central portion of the supply table is supported on both sides by toggle braces, each of which consists of an upper link *f*, which is pivoted with its upper end to the frame *e*, and a lower link *f'*, which is pivoted with one end to the lower end of the upper link and with its opposite end to the front portion of the adjacent standard.

f^2 represents a stop arm arranged on the upper link *f* and adapted to bear either against a lug f^3 on the lower link, or against the under side of the supply table. In the operative or depressed position of the supply table the lower links of the braces rest lengthwise upon the feed table while the stop arms of the upper links rest upon the stop lugs and sustain the supply table, as shown in full lines in Fig. 1. As the supply table is moved upon the pivot of the frame *e* the links of the braces become straightened until the stop arms bear against the under side of the supply table, as shown in dotted lines in Fig. 1. In this inoperative position of the supply table the pivotal connection of the links is located slightly beyond the dead center, to enable the braces to securely hold the supply table in an elevated position by its own weight.

G represents feed wheels arranged between the front portions of the supply table and the feed table and having their upper sides arranged in line with the top of the supply table and their lower sides separated from the top of the feed table by a space forming a throat for the passage of the body of sheet paper. These feed wheels are secured to an intermittently rotating shaft *g* journaled in bearings on the standards.

H represents two feed belts or tapes passing with their receiving portions around rollers *h* journaled upon the rear portion of the table frame, thence forwardly over the top of the supply table, thence downwardly around two of the feed wheels, thence forwardly and upwardly over idler pulleys *h'* mounted on the supply table frame, and thence forwardly to the place of beginning.

The pile of sheets is placed upon the supply table and on the carrying portions of the feed tapes and combed or tipped forwardly,

or with its top leaning toward the printing press, which causes the bottom of the pile to be arranged nearest the feed wheels. Upon turning the latter in the direction of the arrow, Fig. 1, the bottom of the pile of sheets is carried backwardly over the supply table, thence around the feed wheels and thence forwardly over the feed table, whereby the position of the pile of sheets is reversed and the bottom of the pile is arranged uppermost as it passes over the feed table. When the pile of sheets on the supply table has been reduced considerably an additional quantity of paper can be placed thereon without stopping the machine, because the feeding of the sheets takes place from the under side of the pile on the supply table.

An intermittent rotary motion is imparted to the shaft of the feed wheels by any suitable mechanism. That which is shown in the drawings is constructed as follows:

I represents a ratchet lever mounted loosely on one end of the shaft *g* and provided with a pawl which engages with a ratchet wheel *i* secured to said shaft.

J represents a rotary feed cam engaging with the free end of the ratchet lever and oscillating the latter. The feed cam is secured to a driving shaft *j* near one end thereof and the latter is arranged transversely in front of the feed wheels and journaled in bearings formed in the standards.

K represents a number of curved pressure arms which press the sheets against the outer or front sides of the feed wheels for the purpose of increasing the grip of the latter upon the sheets. These pressure arms are secured with their upper ends to a transverse shaft *k'* which is journaled in bearings on the standards and are yieldingly held against the sheets by a weighted lever k^2 connected with the shaft *k'*. Each pressure arm is provided with a flexible metal band k^3 which extends downwardly over its face from its free end to the feed table, whereby the sheets are guided as they pass from the feed wheels to the feed table.

L represents an upper guide arranged lengthwise upon the supply table along one side of the pile of sheets and capable of transverse adjustment on this table.

l represents a transverse rod arranged underneath the supply table and secured to the table frame, and *l'* is a sleeve mounted on said rod and capable of longitudinal adjustment thereon. This sleeve is provided with an arm l^2 projecting upwardly through a transverse slot l^3 in the upper feed table and secured to the upper guide L, whereby the latter is held in its adjusted position.

l^4 is a lower guide arranged lengthwise upon the feed table, alongside of the pile of sheets, and vertically in line with the upper guide L. The upper and lower guides are adjustably connected by a connection consisting of a tube l^5 pivoted to the sleeve *l'* and a rod l^6 pivoted to the lower guide and adjustably secured with its upper end in the tube by a set screw. By adjusting the length of the connection the position of the lower guide can be shifted back and forth on the feed table to suit the pile of paper. By connecting the upper and lower guides they are always shifted together transversely, thereby retaining them in the proper relative position at all times.

M M represent rotary brushing or combing wheels which bear with their lower portions upon the sheets lying on the feed table and which rotate in the proper direction to feed the sheets successively against the front registering guides. These comb wheels have their faces provided with rolling bodies by which the wheels bear upon the sheets in feeding the latter from the table. As shown in Figs. 5 and 6 the comb wheels are secured to a transverse shaft M' and have these rolling bodies constructed in the form of oval rollers *m* which have their axes arranged parallel with the axes of the wheels. The body of each comb wheel consists preferably of two dish-shaped disks *m'*, Fig. 6, the central or web portions of which are secured to hub sections m^2 while their peripheral portions are separated and form an annular groove m^3 between the margin of the disks. The combing rollers are arranged in this groove and journaled to the disks and project beyond the peripheries of the disks so that each wheel bears upon the paper with these rollers.

Upon rotating the combing wheels in the direction of the arrow, Fig. 1, they roll with their combing rollers over the pile of sheets which produces a rubbing action, whereby the sheets are gradually combed or separated and the uppermost sheet is carried against the front registering guides. The action of the combing rollers is very gentle and enables the finest paper to be operated upon without marring or injuring the same.

N represents a longitudinal intermediate shaft arranged over the comb wheel shaft and provided at its front end with a bevel gear wheel *n* which meshes with a bevel gear wheel *n'* secured to the transverse shaft *j*.

o represents a spiral gear wheel mounted on the longitudinal shaft and meshing with a similar spiral gear wheel *o'* mounted on the comb wheel shaft. The lower spiral gear wheel *o'* is secured to the comb wheel shaft but the upper spiral gear wheel *o* is connected with the longitudinal shaft by a feather which compels the upper wheel to turn with its shaft but permits the wheel to slide lengthwise thereon. The bevel gear wheels are retained in their proper position by means of a yoke P which is provided with bearings *p* in which the transverse shaft *j* is journaled and by which the yoke is supported on the shaft and a bearing *p'* in which the front end of the longitudinal shaft N is journaled.

Q represents a supporting rod arranged lengthwise over the longitudinal shaft N and secured at its front end to the yoke P while its rear end is provided with a hanger *q* in

which the rear end of the longitudinal shaft is journaled.

R represents a sliding head whereby the spiral gear wheels are retained in their proper position and whereby the comb wheels may be adjusted lengthwise on the lower feed table. The lower portion of the head is provided on opposite sides of the lower spiral gear wheel with two bearings r in which the comb wheel shaft is journaled; its central portion is provided with two bearings r' on opposite sides of the upper spiral gear wheel in which the longitudinal shaft is journaled and its upper portion is provided with a split clamping sleeve r^2 which grasps the supporting rod. Upon loosening the clamping sleeve the head can be shifted upon the supporting rod and longitudinal shaft for adjusting the comb wheels lengthwise of the feed table. The comb wheels rest upon the sheets with their own weight and that of the connecting parts and are free to adjust themselves vertically to the variations in the thickness of the pile of sheets owing to the pivotal connection between the yoke and the transverse driving shaft j.

The movement of the comb wheels is automatically controlled by mechanism which is constructed as follows:

S represents a sleeve mounted loosely on one end of the driving shaft j and capable of a limited longitudinal movement thereon. This sleeve is provided at one end with a driving pulley s, which is connected with any suitable motor for imparting a continuous rotary motion to the sleeve. The opposite end of the sleeve is provided with a conical head s' having an annular groove in its face which contains a coil of insulated wire s^2. Upon conducting a current of electricity through this coil the conical head is converted into an electro-magnet. The ends of the coil are connected with insulated commutator rings $t\ t'$ surrounding the rotary sleeve and the current is conducted to the same by means of brushes $t^2\ t^3$ bearing respectively against the rings $t\ t'$.

t^4 is a circular armature secured to the driving shaft and provided with a conical socket which fits over the conical head. Upon energizing the magnet the latter attracts the armature, thereby coupling the driving pulley with the driving shaft and setting the comb wheels in motion for feeding the top sheet of the pile to the front registering guides. The instant the magnet is de-energized the armature is liberated, thereby arresting the movement of the driving shaft and stopping the feeding action of the comb wheels.

U represents an electric generator of any suitable construction having one of its poles connected with the brush t^2 by a wire u.

V represents a lower contact finger which is secured to the rear end of the feed table but insulated therefrom and which is connected with the opposite pole of the electric generator U by a wire v.

W represents a transverse rock shaft which is journaled at its ends in bearings arranged on the upper links of the braces.

w is a rock arm secured to the central portion of the rock shaft and extending with its free end over the rod c which supports the front registering guides.

w' represents an upper contact finger secured to the under side of the rock arm and adapted to bear against the lower contact finger. The upper contact finger is connected with the brush t^3 preferably by a wire w^2 connecting with the metallic frame of the machine, as shown in Fig. 2, whereby the frame is utilized as part of the conductor for conducting the current to the upper contact finger, but, if desired, this contact finger may be connected with the brush by an insulated wire. When the upper movable contact finger comes in contact with the lower fixed finger the electric circuit is closed and the comb wheels are coupled with the driving pulley by the electric clutch, which causes the comb wheels to rotate and to feed a sheet forwardly to the front registering guides. During the last portion of the forward movement of the sheet toward the front registering guides it passes between the contact fingers and separates the latter. The sheet of paper being an insulating medium breaks the circuit in passing between the contact fingers, thereby uncoupling the clutch and arresting the movement of the comb wheels. The comb wheels remain inactive during the entire time that the contact fingers are separated. After the sheet strikes the front registering guides the latter are raised to clear the sheet and the grippers of the impression cylinder grasp the sheet and carry it off from the feed table. During the upward movement of the front guides the rod supporting the same engages with the free end of the rock arm w and lifts the latter together with the upper contact finger, so that the latter cannot touch the lower contact finger and set the feeding mechanism in motion while the front guides are elevated. After the sheet has been carried from the feed table the front guides are again lowered into their operative position and the upper contact finger is again allowed to rest upon the lower finger for closing the circuit and starting the feeding of the next sheet.

By arranging the front guides in such a relation with the upper contact finger that the latter cannot touch the lower finger until the guides are in their operative position the proper registering of each sheet is insured. This also prevents the upper finger from dropping through a hole which may be torn in a sheet and thereby closing the circuit and starting to feed the next sheet before the preceding sheet has been wholly carried from the pile.

The comb wheels and the feed wheels are driven from the same shaft j, which latter is intermittently rotated as described, and the intermittent rotary movement of the feed

wheels is, therefore, synchronous with the intermittent movement of the comb wheels.

By the mechanism herein shown and described the comb wheels are rotated at a high rate of speed while the feed wheels and belts are moved very slowly. The fast rotative movement of the faces of the comb wheels over the upper surface of the top sheet causes the latter to be brushed off but as soon as this has been effected and the comb wheels have dropped upon the next lower sheet the rotative movement of the comb wheels is instantaneously stopped and the weight of the comb wheels and connecting parts now resting on the next lower sheets holds the same firmly in place and prevents displacement thereof while the top sheet is being fed off.

In order to prevent the arm *w* of the upper contact finger from dropping while raising the supply table, the rock shaft W is provided near its ends with lugs *x* carrying spring catches *x'* which are adapted to engage with lugs x^2 on the upper links of the braces and which when engaged prevent the shaft W from turning.

y represents pressure wheels which rest by their weight upon the pile of paper in front of the comb wheels, thereby increasing the frictional contact between the sheets and causing the feeding action of the comb wheels to be transmitted from the top sheet to the lower sheets. Each of these pressure wheels is pivoted on the front end of a rod *y'* which is adjustably secured to a sleeve y^2. The latter is mounted loosely for convenience on the transverse rock shaft W but the pressure wheels may be supported in any other suitable manner.

z represents two retaining arms which are mounted on the rock shaft W and rest with their free ends on the marginal portions of the sheets to prevent them from rising as they are fed to the front registering guides.

We claim as our invention—

1. The combination with the feed table, of a comb wheel, mechanism whereby the comb wheel is rapidly rotated, feed wheels whereby the sheets are carried slowly over the feed table, a support in which the comb wheel is mounted and by which it is caused to rest continuously on the sheets passing over the feed table, and means whereby the rotative movement of the comb wheel is stopped when the top sheet has cleared the comb wheel, thereby causing the comb wheel to rest immovably on the next lower sheets and retain the same against displacement while the top sheet is being fed off, substantially as set forth.

2. The combination with the feed table, of a rapidly rotating comb wheel arranged above the same, feed wheels whereby the sheets are slowly moved over the feed table, and an intermittently rotating driving mechanism whereby the comb wheel and the feed wheels are intermittently rotated, substantially as set forth.

3. The combination with the feed table, of comb wheels arranged above the same, a supply table arranged above the feed table and its comb wheels, feed wheels whereby the sheets are carried from the upper supply table to the lower feed table, and an intermittently rotated actuating shaft whereby the comb wheels and the feed wheels are intermittently rotated, substantially as set forth.

4. The combination with the feed table, of feed wheels arranged at the receiving end thereof, a supply table arranged above the feed table and pivoted adjacent to the feed wheels, and means for supporting the supply table, whereby the latter can be swung up when access is desired to parts below without disturbing the sheets on the supply table, feed wheels and feed table, substantially as set forth.

5. The combination with the feed table and the pivoted supply table arranged above the same, of a brace supporting the supply table and consisting of an upper link pivoted to the supply table and provided with a stop arm and a lower link pivotally connecting the upper link with the feed table and provided with a stop lug, said stop arm being adapted to bear against said lug when the supply table is in its lower operative position or to bear against the under side of the supply table when the latter is in its elevated or inoperative position, substantially as set forth.

6. The combination with the upper supply table and the lower feed table, of an upper and a lower side guide capable of transverse adjustment respectively on the upper and lower tables and arranged vertically in line and connected so as to move together, substantially as set forth.

7. The combination with the upper supply table and the lower feed table, of an upper movable side guide adapted to rest on the upper table, a lower movable side guide resting on the lower feed table and arranged in line with the upper guide, and a telescopic connection whereby said guides are adjustably connected, substantially as set forth.

8. The combination with the feed table, of a comb wheel arranged above the same, a shaft from which the comb wheel is driven, a supporting rod hung concentric with said shaft and arranged lengthwise of the feed table, a support in which the comb wheel is mounted and which is made adjustable lengthwise of the feed table on said rod, and means whereby the comb wheel is driven from said shaft, substantially as set forth.

9. The combination with the feed table and the transverse driving shaft, of a transverse comb wheel shaft, a comb wheel and a spiral gear wheel secured thereto, a longitudinal intermediate shaft provided at its front end with a bevel gear wheel which meshes with a similar wheel on the driving shaft and at its rear end with a spiral gear wheel mounted on the longitudinal shaft so as to turn therewith but capable of sliding thereon and meshing with the spiral gear wheel of the comb wheel

shaft, a yoke connecting the driving shaft and the longitudinal shaft, a longitudinal supporting rod secured to said yoke, a hanger secured to the supporting rod and in which the rear end of the longitudinal shaft is journaled, and a sliding head provided with bearings for the comb wheel shaft and longitudinal shaft on opposite sides of each spiral gear wheel and with a clamping sleeve embracing said supporting rod, substantially as set forth.

10. The combination with the feed table, the vertically movable registering guides arranged in rear of the table, the feed mechanism whereby the sheets are fed from the table against said guides, and the driving mechanism, of an electro-magnetic clutch whereby the driving and feed mechanisms are coupled or uncoupled, a lower and an upper contact finger arranged at the rear end of the feed table in the path of the sheet of paper and connected in circuit with said clutch, and means whereby said upper contact finger is raised with the registering guides to break the circuit, substantially as set forth.

11. The combination with the feed table, the vertically movable registering guides arranged in rear of the feed table, the feed mechanism whereby the sheets are fed from the feed table to the registering guides, and the driving mechanism, of an electric clutch whereby the driving and feed mechanisms are coupled or uncoupled, a lower contact finger secured to the rear end of the feed table, an upper contact finger arranged over the lower contact finger, said fingers being in circuit with the electric clutch and adapted to come in contact with each other when the registering guides are in their lower operative position, and to be separated by the passage of a sheet between the fingers for breaking the circuit, and a rock arm carrying the upper contact finger, the latter being arranged relatively with said guides so as to be held out of contact with the lower finger while said guides are elevated, substantially as set forth.

12. The combination with the feed table, the feed mechanism whereby the sheets are fed from the feed table and the driving mechanism, of an electric clutch whereby the driving and feeding mechanisms are coupled or uncoupled, a lower contact finger secured to the rear end of the feed table, a rock shaft journaled in vertically movable supports, a rock arm secured to said rock shaft and carrying the upper contact finger, and a catch whereby the rock shaft may be held against turning on its supports, substantially as set forth.

Witness our hands this 5th day of September, 1894.

THOMAS A. BRIGGS.
WILLIAM A. PHILPOTT, JR.

Witnesses:
CHAS. E. CROMLEY,
I. J. LAURENCE.