(No Model.) 3 Sheets—Sheet 1.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 469,932. Patented Mar. 1, 1892.

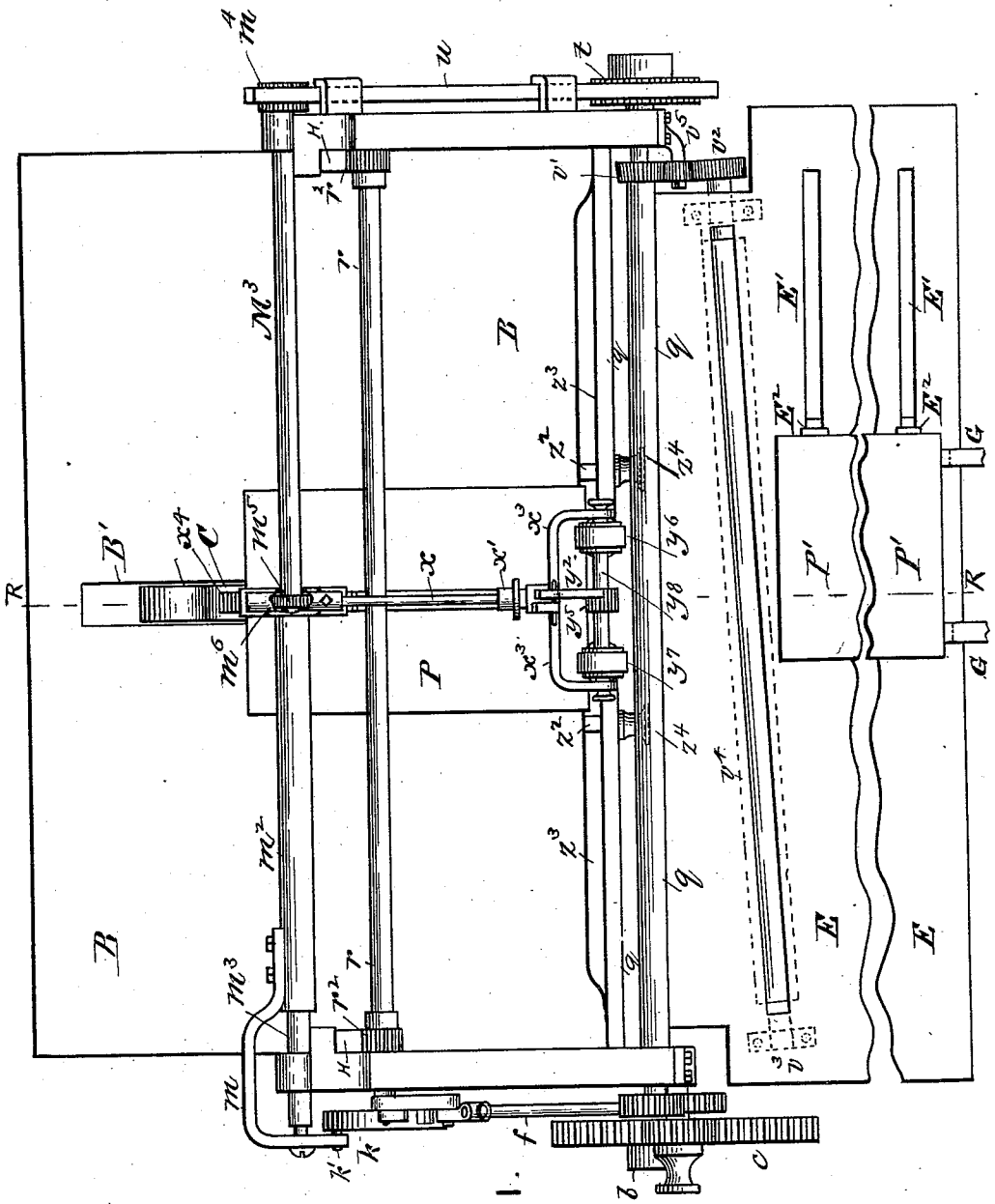


Fig. 1.

WITNESSES:
Frank H. Parker
Geo. H. Chase

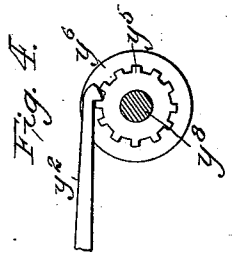
INVENTOR
Thomas A. Briggs.
by his attorney
Bowdoin S. Parker.

(No Model.) 3 Sheets—Sheet 2.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 469,932. Patented Mar. 1, 1892.



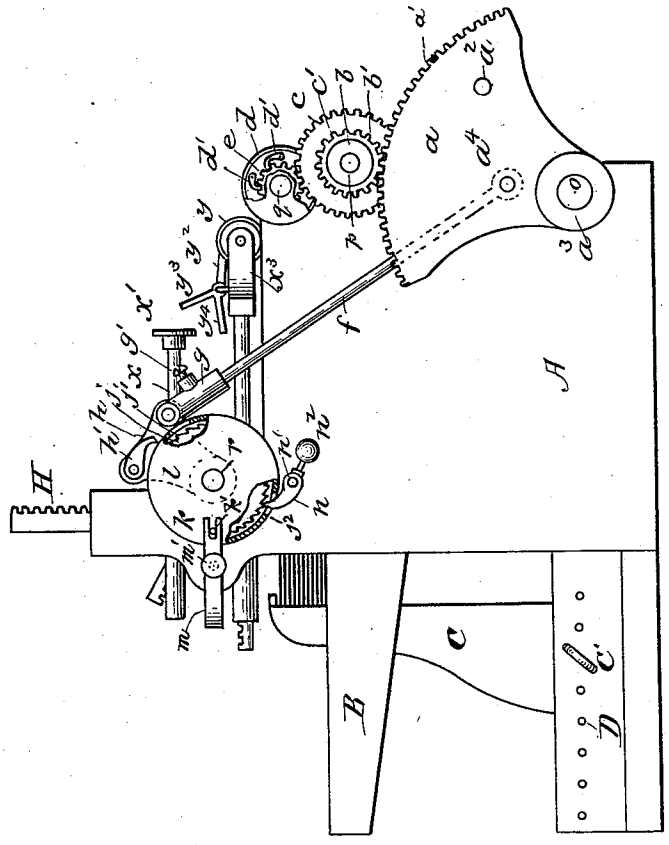


Fig. 2.

WITNESSES:
Frank G. Parker
Geo. H. Chase

INVENTOR
Thomas A. Briggs.
by his attorney
Bowdoin S. Parker.

(No Model.) 3 Sheets—Sheet 3.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 469,932. Patented Mar. 1, 1892.

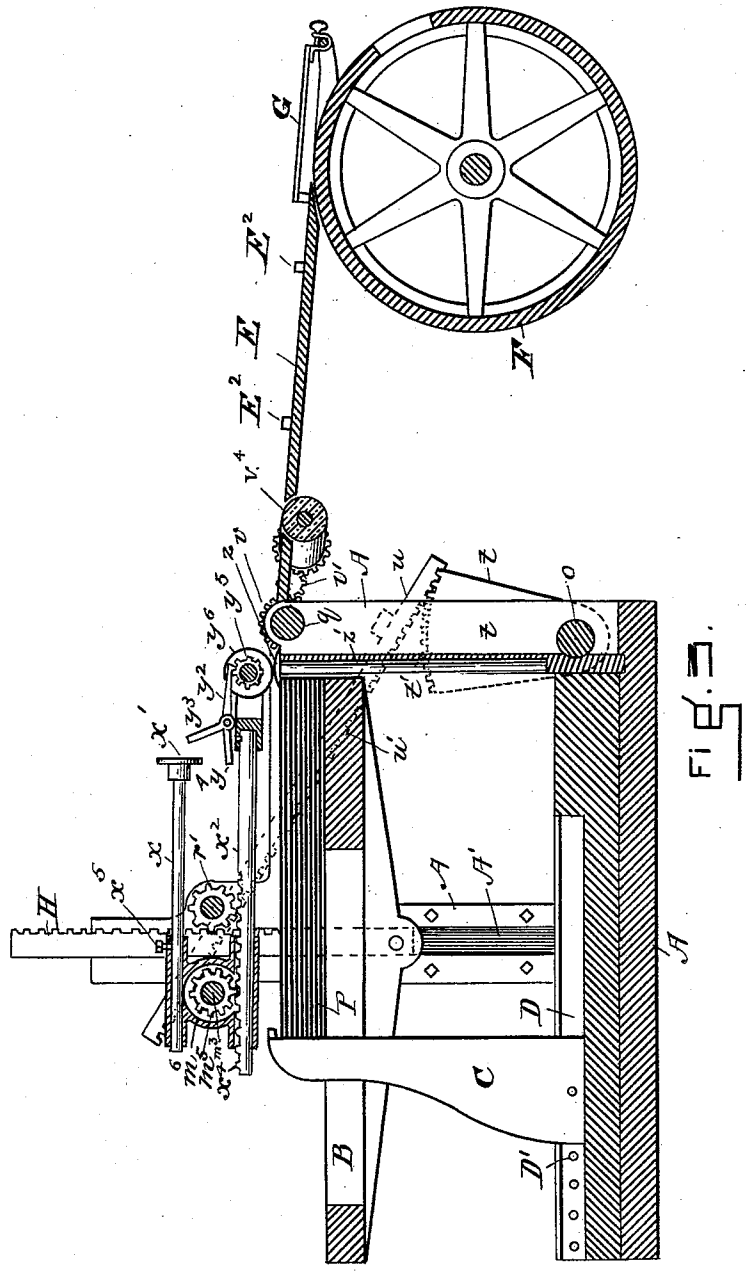


Fig. 5.

WITNESSES

Frank G. Parker.

Geo. H. Christ

INVENTOR

Thomas A. Briggs.

by his attorney

Bowdoin S. Parker.

UNITED STATES PATENT OFFICE.

THOMAS A. BRIGGS, OF ARLINGTON, MASSACHUSETTS.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 469,932, dated March 1, 1892.

Application filed December 15, 1890. Serial No. 374,711. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. BRIGGS, of Arlington, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Paper-Feeding Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My present invention relates to a paper-feeding machine in which by my improved devices I am able to automatically feed sheets singly from a pile of sheets of paper to a printing-press or other machine. I am aware that various devices have heretofore been employed for this purpose, but none to my knowledge operate upon the same plan and perform the work in so simple and effective a way as the machine herein described.

In the drawings like letters of reference indicate corresponding parts.

Figure 1 represents a plan view of the machine; Fig. 2, an end elevation; Fig. 3, a sectional elevation on line R R of Fig. 1; and Fig. 4 is an enlarged detail view of the feed-roll and the means for actuating the same.

A represents the frame of the machine; B, a vertically-movable table or bed upon which the paper is placed.

C is a clamp arranged to move back and forth in slot D of the frame A, the bottom of clamp C being held in place by set-screw C′, the clamp being arranged to hold the sheets of paper in place, the top of clamp projecting through a slot in the table B, as shown. The pile of sheets of paper P are held from moving backward by the clamp C and from moving forward by the frame of the machine. The guides z^2, moving in slot z^3 and secured by thumb-screws z^4, hold the paper at the sides. One or more fingers z, placed in the front of the frame, rest upon the top sheet. The fingers z are preferably formed, as shown, with a round head, one side of head overlapping and pressing upon the top of the pile of sheets. To the said head of the finger is attached a stem z', Fig. 3, which slides up and down in a groove formed in the frame. The groove is made a little out of the perpendicular, the top being nearer the front of the paper than the bottom, so that the head of the finger will tend to press downward upon the top sheet of the pile of paper. The fingers are free to move and are held in place by their weight upon the paper. Any number of fingers may be employed, as desired, or one long finger may be used; but I prefer the form described and the manner of inserting and operating, as shown, although they may be varied in form and manner of adjustment and still work quite efficiently. The manner in which they aid in holding and delivering the paper will be hereinafter described. The bed B, upon which the paper is placed, is arranged to be automatically raised as the sheets are taken off one at a time from the top of the pile, as will also be hereinafter explained.

Referring to Fig. 2, a is a segmental gear-wheel attached to the shaft o. The power is applied by suitable means at a^2, which imparts an oscillatory motion to the segmental gear-wheel a. The gear a' of wheel a meshes with gear-wheel b, which is journaled to stud p, the stud being secured to frame A. The gear-wheel c is also journaled to stud p and turns by gear-wheel b, to which it is attached, meshing into pinion or gear-wheel e, the latter being loosely journaled on shaft q. A pulley d is attached to the shaft q and has upon one side the pawls d' d', working in gear-wheel e. Attached to the segmental gear-wheel a is the arm f, connecting with the socket g and adjustably secured therein by set-screw g'. The socket g is jointed to the piece h, which piece h is also journaled to the arm l, and arm l is loosely journaled on shaft r, as indicated by dotted lines in Fig. 2. The piece h at one end has the pawl h'. On the shaft r is placed the hollow wheel k, loosely journaled thereon, and inside of wheel k is placed the ratchet j, as shown in Fig. 2. In the drawings part of wheel k is shown as broken away. The periphery of wheel k is entire, except at near the points j' and j^2, where the periphery is left open for the purpose of permitting pawls h' and n to engage the teeth of ratchet-wheel j, for the purpose hereinafter specified. The ratchet j is secured to shaft r. Pawl n is formed, preferably, weighted n^2. The arm m is secured to the frame A at m', one end of arm m being slotted to slip over the pin k', fixed in wheel k. The other end of arm m is bent so as to be conven-

iently secured to sleeve m^2, Fig. 1. Said sleeve m^2 surrounds the shaft m^3 and extends to fixture m^6, also as shown in Fig. 1.

Upon the opposite end of the machine are placed the segmental gear-wheel t, (the same being shown by dotted lines in Fig. 3,) the rack-bar u, with teeth u', and other operative parts. Wheel t is secured to shaft o. The teeth u' of bar u mesh with teeth t' of wheel t, and the said bar u operates shaft m^3 by means of gear-wheel m^4. Upon the shaft r are placed gears r^2 and r^2, which mesh in teeth of racks H, placed at each end of frame A, for the purpose of raising the table B, and to which they are attached. The operation will be readily understood by referring to Fig. 3.

Midway on shaft m^3 is placed the gear-wheel m^5, which is secured thereto. The gear m^5 meshes into rack-bar x^2 by its teeth x^4. The rack-bar x^2 slides longitudinally in and is guided by a sleeve m^2, formed on the bottom of the fixture m^6. The said fixture m^6 is attached to or a part of sleeve m^2 and moves with it on shaft m^3. The movement of the fixture m^6 and loose sleeve m^2 of course permits of an up-and-down motion of the end of bar x^2 and is important as a part of a regulating principle involved in my present invention. To the front end of bar x^2 is secured the yoke x^3, to the ends of which is journaled the arbor y^8, which is at right angles to the rack-bar x^2, and to this arbor are rigidly secured rollers y^6 and y^7, preferably faced with rubber on their peripheries to afford a frictional hold for said rollers on the underlying sheet of paper, for the purpose hereinafter described. To the arbor y^8, between the aforesaid rollers, is also firmly secured a ratchet-wheel y^5, and to the yoke x^3, at its juncture with the end of the rack x^2, is connected a pawl y^2, which is formed with a head by which it rides on the periphery of the ratchet-wheel y^5. The head of said pawl is beveled on its front to allow it to slide over the teeth of the ratchet-wheel and is formed with an abrupt rear shoulder by which it engages the said teeth. To the yoke x^3, adjacent to the end of the rack x^2, is also pivoted a dog y^3, which is provided with a tripping-finger y^4. This dog is adapted to fall with its free end onto the periphery of the ratchet-wheel y^5 and has said end terminating with a face adapted to engage the teeth of the ratchet-wheel, so as to prevent said wheel from rotating toward the rack x^2. Over the rack x^2 and parallel therewith is a rod x, which is mounted longitudinally adjustable in a sleeve or barrel formed on the fixture m^6 and is retained in its adjusted position by a set-screw x^5. The free end of said rod has affixed to it a disk or detent x', which is in such a position as to cause the dog y^3 to come in contact therewith during the rearward movement of the rack and become thereby thrown over upon the ratchet-wheel y^5. In said movement the tripping-finger y^4 falls against the back of the disk or detent x', and in the reverse movement of the rack x^2 the contact of said finger with the disk causes the finger to be swung back and down, and thereby raise the dog y^3 from the ratchet-wheel and to a rearwardly-inclined position, in which it is retained by gravity. By adjusting the rod r so as to hold the detent x' at different points in the path of the dog y^3 said dog is adapted to operate on paper of different sizes. The shaft q acts as a roll, or a roll may be affixed on shaft to aid in delivery of the sheets of paper.

E is a table upon which the several sheets of paper are delivered and roll v^4 placed on an arbor or shaft running in bearings v^2 and v^3 and driven by gears from shaft q, as shown in Fig. 1. The roll v^4 projects above the surface of table E and is preferably placed diagonally or beveling, as shown, for the purpose of carrying the sheet P′ down against the projecting guides E^2 E^3 and thereby always presenting the sheet of paper properly and true to be seized by the finger G or any similar device of the printing or other machine. F illustrates a type cylinder or wheel to which said sheets are separately delivered.

In Fig. 1 the table E is shown broken in two parts for convenience of illustration. The guides E^2 E^2 are adjustable in slots E′ E′ and are secured in position in any convenient manner.

Having now described the several parts of the machine, I will explain its operation. The pile of sheets of paper P is placed on the movable bed B and secured at the back by clamp C, the front being held by the frame of the machine, the guides z^2 being properly adjusted and secured. The fingers z by their heads rest upon the top sheet P′ of the pile. Now when power is applied to segmental gear-wheel a at a^2 said gear receives an oscillatory motion, which is transmitted to the shafts o and m^3, which latter imparts a reciprocating motion to the rack-bar x^2 by means of the pinion or gear-wheel m^5. In the backward movement of said rack-bar the rollers y^6 and y^7 are drawn back upon the top of the paper P′. During this movement the rollers are free to rotate upon the paper, owing to the capability of the pawl y^2 slipping over the teeth of the ratchet-wheel y^5; but in the latter part of the said movement of the rack the dog y^3 comes in contact with the disk x^8, and is thereby pushed forward and finally caused to drop by gravity into engagement with the ratchet-wheel, the tripping-finger y^4 of said dog lying then back of the disk. The engagement of the dog with the ratchet-wheel prevents the rollers y^6 and y^7 from turning, and in the further backward movement of the rack-bar the tripping-finger is carried some distance away from the disk, while the rollers act as drags and pull the front part of the top sheet of paper back from under the fingers z, while the back portion of said sheet is held by the clamp C. As soon as the paper has been withdrawn from under the fingers z, as aforesaid, the fingers drop by gravity upon

the next underlying sheet and are thus in position to allow the top sheet to slide over the top of the fingers. In the reverse movement of the rack x^2 the dog y^3 loses its hold on the ratchet-wheel and the pawl y^2 locks said ratchet-wheel and rollers y^6 and y^7 and causes the latter to push the top sheet of paper forward over the fingers z z and upon the roll or arbor v, by means of which the said sheet of paper is carried to the table E, and thence by roll v^4 to the printing or other machine, in which latter motion the paper is carried with one of its side edges against the guides E^2 E^2, which serve to direct the paper in its travel. In this latter movement of the rack the tripping-finger y^4 strikes the disk x' and thereby throws the dog y^4 back sufficient to rest by gravity in a rearwardly-inclined position, as represented in Fig. 3 of the drawings. The successive sheets are released from the fingers z in the same manner and delivered upon the table E. The bar x^2, being connected with the fixture m^6 and the fixture with the sleeve m^2, acts as a regulator to set in operation the mechanism for raising the bed B. As the sheets P are removed from the top of the pile the end of bar x^2 will fall correspondingly, which will cause the sleeve m^2 to turn, thus causing the outer end of arm m to be raised, while the other end of arm m will be lowered, thus depressing the stud k', attached to pulley k, and causing pulley k to be slightly turned sufficiently to enable pawl k' to engage the ratchet-wheel j, and as pawl h' is actuated by arm f the ratchet-wheel j will turn shaft r and the gears r^2 r^2 will operate with the racks H H, connected with bed B, and the bed will be raised, of course carrying upward the pile of paper P placed thereon. When the bed shall have been sufficiently raised, the bar x^2, still acting as a regulator, will automatically reverse the movement of sleeve m^2 and the arm m will turn back the pulley or shield k, so that the pawl h' will be disengaged and the upward movement of the bed B will cease. The bed B will be held in position by the pawl n, engaging the ratchet-wheel j. Thus as the paper is removed from the top of the pile the bed will be automatically raised and the top sheet will rest under fingers z and always be held in place ready for delivery by the mechanism already described.

I do not confine myself to the racks H H and gears r^2 for raising the bed B, as screws or other well-known means could be employed. The end of finger z (indicated by z') is preferably arranged in a slot or groove out of the perpendicular, as shown in Fig. 3, so that the edge of the head which overlaps the paper will always press upon the top surface of the upper sheet. The weight of the finger is sufficient to keep it in place and hold down the edge of the sheet. One or more fingers may be employed, or one long continuous finger with a continuous end z' or with two or more narrow ends z' may be used, if desired. The arm x^3 may be larger or may extend across the machine, and one or more rolls y^6 may be employed. Instead of one rack-bar x^2 and one rod x, a number may be used.

I do not confine myself to the exact details of construction shown, as it is evident that many mechanical changes may be made without departing from the spirit of my invention.

It will be observed that the operation of removing a sheet of paper from the top of the pile consists chiefly in rolling the wheels y^6 y^7 back upon the paper, then stopping the motion of wheels y^6 y^7, and dragging the said wheels sufficiently backward to release the sheet from the fingers z, the back of the sheet being meanwhile firmly held at the back by the clamp C. Then the wheels y^6 y^7 are pushed forward, dragging or pushing the sheet over the fingers z, which meanwhile have dropped upon the next sheet, the sheet passing over the roll q and being thence conveyed away, substantially as hereinbefore described. This method of releasing and removing the several sheets from a pile is original with my present invention and has many advantages over other methods known to me or heretofore employed.

The method of automatically regulating the raising of the bed herein set forth is also peculiar to my present invention, as the height of the top of the pile of sheets is gaged at the front near the retaining-fingers. This is important. The same mechanism that releases and removes the sheets also automatically regulates the raising of the bed B and the consequent height of the top of the pile in relation to the fingers and delivery-roll q. This combination is peculiarly valuable in operation.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In combination with the paper-supporting table and a clamp holding the paper in a pile upon said table, a reciprocating bar carrying rollers back and forth upon the paper, a pawl and ratchet locking said rollers in one direction, and a dog locking the rollers temporarily in the opposite direction during the reciprocating movement of the aforesaid bar, as set forth.

2. In combination with the paper-supporting table and a clamp holding the paper piled on said table, a reciprocating bar moving parallel with the line of feed, a yoke attached to said bar, an arbor journaled to said yoke at right angles to the reciprocating bar, rollers and a ratchet-wheel fixed to said arbor, a pawl locking the ratchet-wheel in one direction, a dog locking said wheel in the opposite direction, a tripping-finger attached to said dog, and a detent in the path of said tripping-finger and dog, as set forth.

3. In combination with the paper-supporting table, paper-holder, reciprocating bar, arbor on said bar at right angles thereto,

rollers and a ratchet-wheel fixed to said arbor, a pawl locking the ratchet-wheel in one direction, a dog locking said wheel temporarily in the opposite direction, a tripping-finger attached to said dog, and a detent supported adjustably in the path of said finger and dog, substantially as and for the purpose set forth.

4. In combination with the paper-supporting table, a paper-holding clamp on the rear portion of said table, a vertically-movable finger resting upon the front portion of the paper, a reciprocating bar over the paper, a yoke attached at right angles to the front end of said bar, an arbor journaled to said yoke, rollers and a ratchet-wheel fixed to said arbor, a pawl on the yoke, locking the ratchet-wheel in one direction, a dog locking the said wheel in the opposite direction, a tripping-finger attached to said dog, a detent in the path of the tripping-finger, and feed-rollers in front of the paper-holding table, as set forth.

5. The combination of a vertically-movable paper-supporting table, vertical racks H, attached to said table, the shaft r, pinions r^2 and ratchet-wheel j, fixed to said shaft, the pulley K, mounted loosely on said shaft and partly inclosing the ratchet-wheel, the pin K′, projecting from the side of said pulley, the arm m, having its free end slotted and receiving through it the aforesaid pin, the oscillatory arm l, also loosely connected to the aforesaid shaft, the pawl h' on said arm, the dog n on the frame, and the oscillatory gear a, connected to the arm l by rod f, substantially as described and shown.

6. In combination with the paper-supporting table B and oscillatory gear t, the shaft m^3, pinions m^4 and m^5, fixed to said shaft, the rack u, transmitting motion from the aforesaid gear to the pinion m^4, the sleeve m^2, supported by said shaft and provided with the fixture m^6, a sleeve on said fixture at right angles to the shaft, the rack x^2, sliding in the latter sleeve and engaging the pinion m^5, the feed-rolls y^6 and y^7, connected to said rack, a pawl locking said feed-rolls in one direction, and a dog temporarily locking said rolls in the opposite direction, substantially as set forth.

7. In combination with the paper-supporting table B, the oscillatory shaft m^3, pinion m^5, fixed to said shaft, the sleeve m^2, mounted loosely on the shaft and formed with the fixture m^6 and with sleeves on top and bottom of said fixture and at right angles to the shaft, the bar x, secured longitudinally adjustable in the upper sleeve and provided with the detent x' on its free end, the rack x^2, sliding in the lower sleeve and meshing with the pinion m^5, feed-rollers on the front end of the said rack, a pawl locking the feed-rolls in one direction, and a dog locking said rolls temporarily in the opposite direction, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 11th day of December, A. D. 1890.

THOS. A. BRIGGS.

Witnesses:
CHRISTOPHER T. SMITH,
BOWDOIN S. PARKER.