

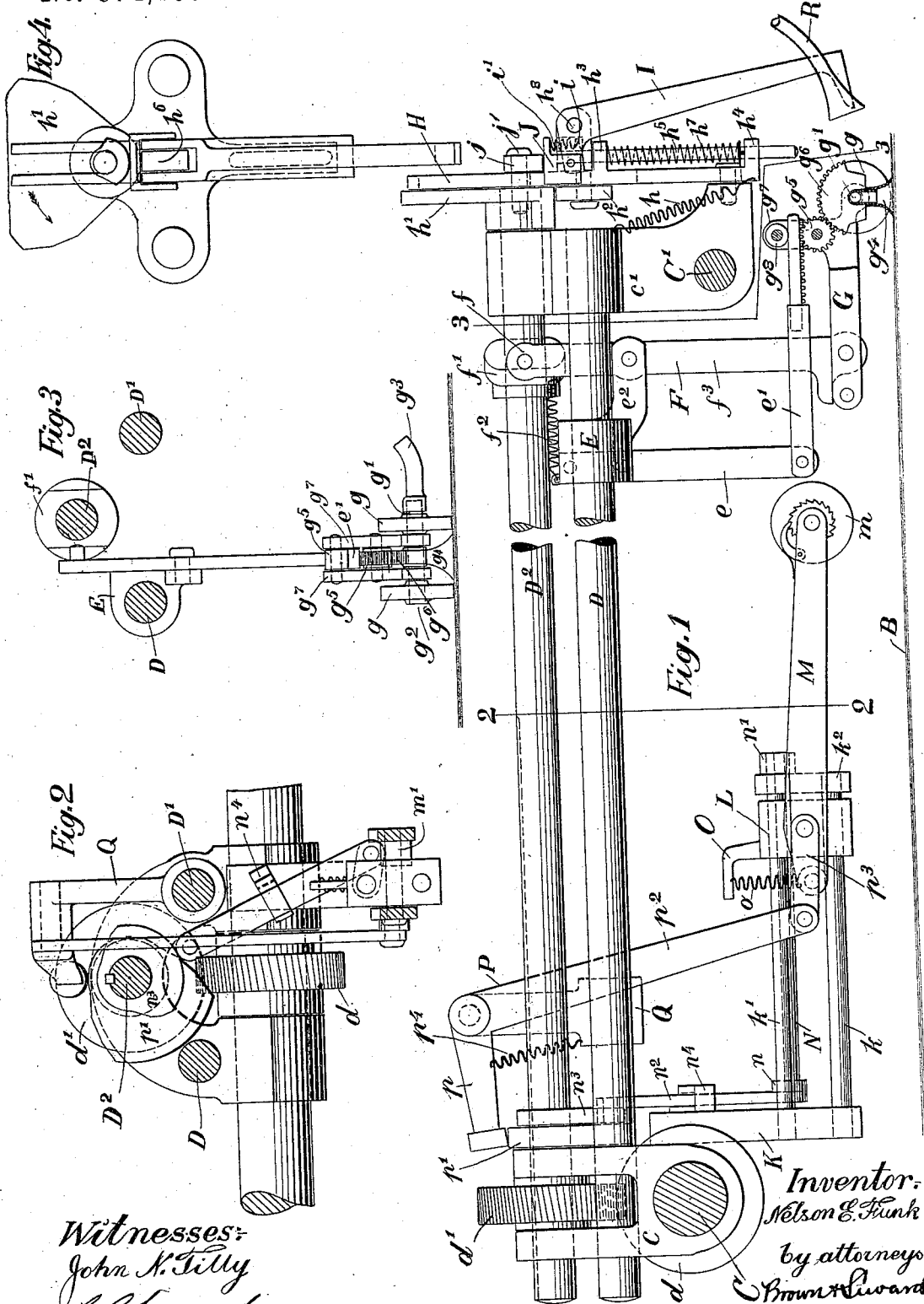
(No Model.)

2 Sheets—Sheet 1.

N. E. FUNK.
AUTOMATIC PAPER FEEDING MACHINE.

No. 574,199.

Patented Dec. 29, 1896.



N. E. FUNK.
AUTOMATIC PAPER FEEDING MACHINE.

No. 574,199.

Patented Dec. 20, 1896.

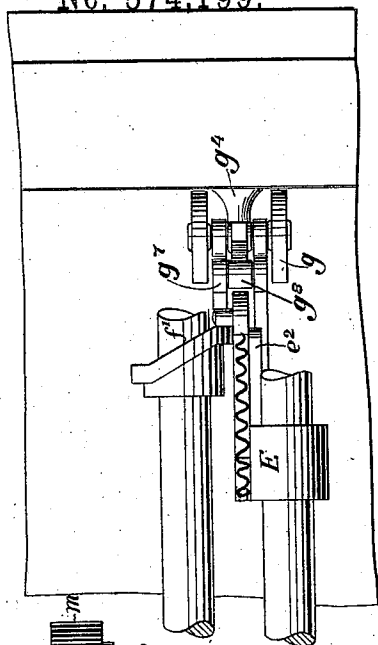


Fig. 6

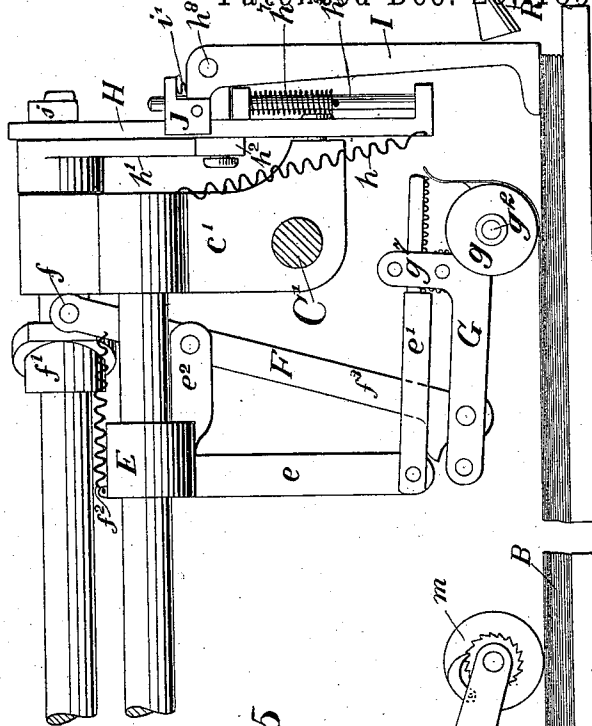
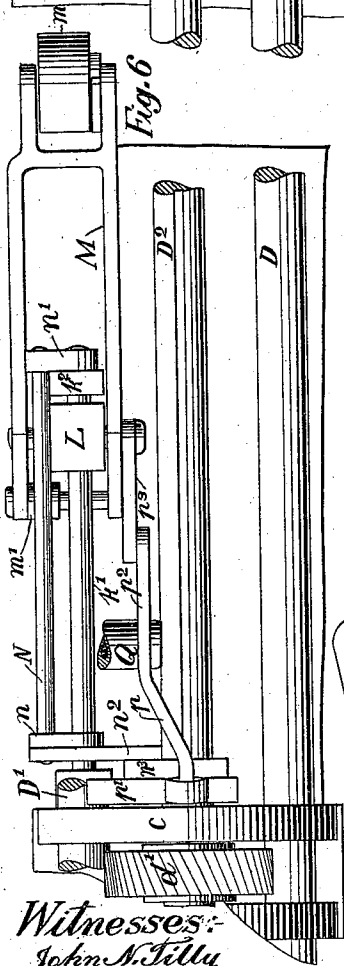
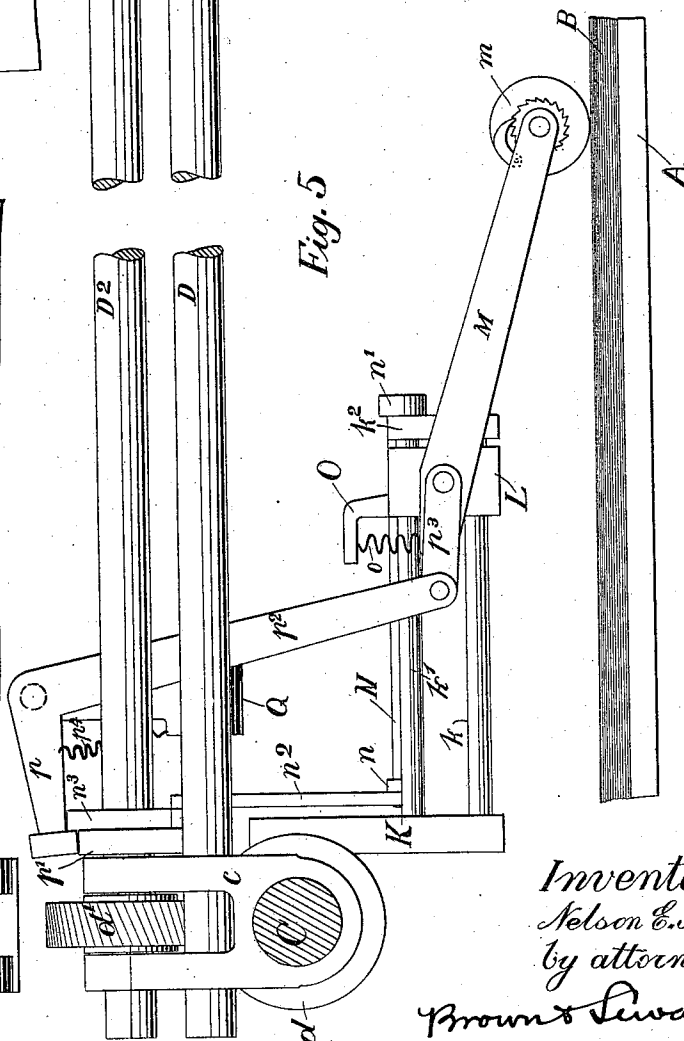


Fig. 5



Witnesses:
John N. Tilly
A. B. Seward



Inventor
Nelson E. Funk
by attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

NELSON E. FUNK, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
EMMERICH & VONDERLEHR, OF SAME PLACE.

AUTOMATIC PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,199, dated December 29, 1896.

Application filed April 22, 1896. Serial No. 588,545. (No model.)

To all whom it may concern:

Be it known that I, NELSON E. FUNK, of the city and county of New York, in the State of New York, have invented a new and useful
5 Improvement in Automatic Paper-Feeding Machines, of which the following is a specification.

My invention relates to an improvement in automatic paper-feeding machines, the object
10 being to provide a device which will advance sheets of paper one by one from a stack into position to be engaged by a printing-machine, a folding-machine, or any other machine to which it is desired to feed them, the paper
15 being fed positively and accurately and the liability of advancing more than one sheet being entirely obviated.

A practical embodiment of my invention is represented in the accompanying drawings,
20 in which—

Figure 1 is a side view of the machine, the advancing mechanism proper being shown raised away from engagement with the top sheet and the mechanism for raising the outer
25 edge of the top sheet being shown in the position which it occupies before the edge of the sheet is raised. Fig. 2 is a transverse section on the line 2 2 of Fig. 1. Fig. 3 is a transverse section on the line 3 3 of Fig. 1. Fig.
30 4 is a front view of the presser-foot and its operating parts. Fig. 5 is a side view of the mechanism shown in Fig. 1, the paper-advancing means being shown resting upon the paper in position to advance one sheet, the
35 edge-lifting mechanism being shown in the position it assumes when the edge of the sheet is raised, and the presser-foot being shown engaged with the rest of the stack of paper for holding it against movement while the top
40 sheet is advanced; and Fig. 6 is a top plan view of the mechanism shown in Fig. 5, the presser-foot and its support being removed to show more clearly the edge-raising device.

In the accompanying drawings I have not
45 shown the complete machine, but only such parts as are necessary to illustrate the operation of my improved paper-advancing mechanism.

The table is denoted by A, (see Fig. 5,) and
50 upon it rests a stack of sheets of paper B. The main drive-shaft is denoted by C and

extends transversely to the movement of the paper. Upon this drive-shaft I mount a suitable supporting-bracket *c*.

A supporting-shaft C' extends across the 55 machine transversely to the movement of the sheets of paper near the front of the machine, and upon it is secured a suitable supporting-bracket *c'*. These supporting-brackets *c c'* are connected by two lower bars D D', and a 60 rotary shaft D² is also mounted at its ends in the said brackets *c c'*. This rotary shaft D² derives its motion from the main drive-shaft C through suitable connecting-gear *d d'*.

I will now proceed first to describe the 65 mechanism for raising the outer edge of the top sheet of paper and holding the rest of the stack of paper in position after said edge has been raised, so that the top sheet may be advanced or fed into another machine without
70 disturbing the said stack.

A collar E is secured to one of the bars D D', in the present instance the bar D, near the bracket *c'*. Depending from the said collar E and secured rigidly thereto is a bar *e*, to 75 the free end of which is pivoted a rack-bar *e'*, which extends forwardly into position to engage a pinion to be hereinafter described. A rocking lever F is pivoted to a forwardly-extended arm *e²* of the collar E, its upper 80 arm *f* being engaged by a cam *f'* on the rotary shaft D², whereby the said lever F is rocked. The said arm *f* is held in engagement with the cam *f'* preferably by means of a coil-spring *f²*, extending between the said arm 85 and the collar E. The lower arm *f³* of the lever F extends down into proximity to the stack of paper B, and to its end is pivoted a carriage G. This carriage G has mounted in its forwardly-extended end a pair of rollers *g*. 90 These rollers *g* are mounted on a hollow shaft *g'*, which is closed at one end, *g²*, for instance, and at its opposite end there is secured an air-exhaust tube *g³*, which extends to a suitable exhaust-pump. (Not shown.) Between the 95 rollers *g*, which are adapted to rest upon and roll along the top sheet of the stack of paper B, I mount a suitable suction-cup *g⁴*, which is connected with the hollow shaft *g'*. This suction-cup *g⁴* rests with its open mouth in 100 engagement with the top sheet of paper when the parts are in the position shown in Fig. 1,

so that when air is being exhausted the cup will cause the top sheet to firmly adhere thereto. The cup g^4 is caused to positively roll the outer edge of the top sheet of paper upwardly by means of a pinion g^5 , mounted on the carriage G, which meshes with the rack e' , heretofore described, and also with a segment g^6 on the hollow shaft g' . The carriage G may be extended upwardly to form ears g^7 , between which may be mounted a suitable antifriction-roller g^8 , which travels along the top of the rack e' , for holding it positively in engagement with the pinion g^5 .

The mechanism for holding the balance of the stack firmly after the edge of the top sheet is raised is as follows: A plate H is secured to the front of the bracket c' and to the end of the shaft D^2 in sliding adjustment, and is held normally at the limit of its upward movement by means of a retracting-spring h , which preferably extends from a portion of the bracket c' to the lower end of the said plate H. This plate is depressed against the tension of the spring h by means of an eccentric h' , secured to the shaft D^2 , which engages an antifriction-roller h^2 on the said plate. The plate H is provided with forwardly-extended lugs or ears h^3 h^4 , and through them is extended a rod h^5 . This rod h^5 is provided at its upper end, above the projection h^3 , with a head h^6 , to which is pivoted the presser-foot I. This head, and thereby the presser-foot I, is yieldingly held at the limit of its downward movement relatively to the plate H by an extension-spring h^7 , which extends between an abutment on the rod h^5 and the upper lug h^3 .

The upper end of the presser-foot is preferably bifurcated, and is extended inwardly beyond its pivotal point h^6 to form arms i . The free ends of these arms i are secured to a hood J, which has a limited sliding movement along the plate H. An extension-spring i' is mounted in a socket in the head h^6 , and bears against the hood J, tending to force it upwardly and thereby rock the lower end of the presser-foot I inwardly over the stack of paper. An eccentric j is mounted on the shaft D^2 , in the present instance on a pin j' , extending into the end of said shaft, which eccentric is in position to engage the hood J and depress it at the proper time to swing the lower end of the presser-foot I out away from the stack of paper B to allow the paper-edge-raising mechanism to operate freely without interfering with the end of the presser-foot. The eccentrics h' and j are so timed that the presser-foot I is swung inwardly and then forced downwardly onto the stack of paper when the top sheet has been curled or rolled up at its edge.

The presser-foot I will yieldingly hold the stack B against movement, because of the sliding movement of the rod h^5 and the yielding of the spring h^7 , as will be clearly seen in Fig. 5 of the drawings.

Proceeding to describe the advancing means proper and the mechanism for operat-

ing it: Depending from the bracket c and secured rigidly thereto is a plate K. Two rods k k' extend forwardly, and their free ends are connected by a suitable plate k^2 . Mounted on the bars k k' is a sliding block L, to which is pivoted a rock-lever M, which carries at its forward end a paper-advancing roller m . This roller m is adapted to be swung toward and away from the stack of paper B, and has a pawl-and-ratchet connection with the lever M, so that it is held against rotating when drawn backwardly along the stack, but is free to rotate when advanced. This roller m may be of any desired gripping material or may be simply surfaced with gripping material, as found more desirable.

The roller m is raised and lowered in the following manner: A guide-bar N is connected at its opposite ends to the upper rod k' by suitable swinging arms n n' , whereby the guide-bar is free to swing up and down with the said rod k' as a pivot. To the inner end of the guide-bar N, I secure the lower end of a sliding dog n^2 , the upper end of said dog being engaged by an eccentric n^3 on the shaft D^2 . The sliding dog n^2 rests intermediate its ends in a suitable guide n^4 on the bracket c .

The lever M is preferably of double bifurcated form, as shown, and is pivoted on both sides of the sliding block L. Between its ends, opposite from those which support the roller m , I mount a roller m' , which engages with the guide-bar N and is adapted to travel along the same as the traveling block L slides along the rods k k' . If the weight of the roller m and the forwardly-extended arm of the lever M is not sufficient to hold the roller m' pressed against the guide-bar N, and thereby hold the upper end of the sliding dog n^2 against its eccentric n^3 , a retracting-spring o is extended from a bracket O on the block L down into engagement with the rearwardly-extended arm of the lever M. It will thus be seen that as the eccentric depresses the sliding dog n^2 the guide-bar N will be swung downwardly, thereby swinging the roller m away from its contact with the sheet of paper.

The block L and the lever M, which it supports, are moved forwardly and backwardly along the bars k k' in the following manner: A two-armed rocking lever P is pivoted to the upper end of a support Q, secured to the rod D' . The rearwardly-extended arm p engages with an eccentric p' upon the rotary shaft D^2 , and the downwardly-extended arm p^2 of the two-armed lever P is connected with the lever M and block L by a suitable link p^3 . The free end of the arm p is held against the surface of the eccentric p' by means of a retracting-spring p^4 , which extends from the support Q to the said arm p . This spring p^4 also serves to return the paper-advancing parts to the limit of their forward movement away from the advance edge of the sheet of paper. The eccentrics n^3 and p' are so timed with respect to each other that when the roller m is in its gripping position upon the surface of the pa-

per the eccentric p' will immediately begin to advance the roller m , thereby advancing the top sheet of paper, and after the paper has been advanced the proper distance the eccentric n^3 will raise the roller m away from the paper and keep it so raised while the roller m is returning to its first position. There are preferably two of these advancing mechanisms complete, as above described, located one near one side of the stack of paper and the other near the other side of the stack of paper, but, if so desired, one or more of these advancing means may be used.

A steady blast of air against the forward edges of the paper may be used for still further tending to separate the edges of the sheets of paper and after the edge of the top sheet has been raised to still further separate that sheet from the remaining sheets of the stack, which blast may also be used for drying the ink, if the sheets of paper have been printed and are being fed to a folding-machine. I have shown in the accompanying drawings the position of the nozzle of such an air-blast and have lettered it R. This blast of air, however, is not essential to operate the device.

Proceeding to describe the operation of my invention: Supposing the parts to be in the position shown in Fig. 1 of the drawings and supposing that the air has begun to be exhausted through the cup g^4 , the rotation of the shaft C will rotate the shaft D², thereby swinging the carriage G rearwardly and curling up the outer edge of the top sheet of paper. When this has been accomplished, the presser-foot I is operated, the first part of the movement being to swing the presser-foot into position over the rest of the stack of paper and the further movement being to bring the presser-foot firmly down onto said stack. The roller m is then brought down into gripping contact with the surface of the upper sheet of paper. The exhausting of air through the cup g^4 is stopped, allowing the sheet to free itself from said cup. The advancing mechanism is then further operated by the further rotation of the shaft D², drawing the roller m along the stack of paper and advancing the top sheet toward the machine to which it is to be fed. When it has advanced it the proper distance, all the parts return to the position shown in Fig. 1 of the drawings.

The device, as above described, entirely does away with the tendency to feed more than one sheet of paper and also prevents the rest of the stack of paper from being disarranged while the top sheet is being advanced.

The table A may be gradually raised as the sheets of paper are fed from the stack, so as

to keep the top sheet in position to be engaged by the mechanism, by any suitable operating means.

What I claim is—

1. In a paper-feeding machine, a device for lifting the edge of the top sheet of a stack from the next succeeding sheet, comprising a carriage having rollers adapted to roll along the top sheet, a suction device on the carriage adapted to engage the said top sheet and means for positively rotating the rolls as the carriage is moved back along the sheet to positively roll the edge of the top sheet upwardly, substantially as set forth.

2. In combination, a suitable supporting-bracket, a vertically-sliding plate secured thereto, a vertically-sliding rod mounted in the plate, a presser-foot carried by said rod, means for yieldingly holding the presser-foot at the limit of its downward movement relative to the plate, means for yieldingly holding the plate at the limit of its upward movement relative to the bracket and an operating-shaft having an eccentric thereon adapted to engage the plate for depressing it for causing the presser-foot to engage the stack of paper, substantially as set forth.

3. In combination, the supporting-bracket, a vertically-sliding plate secured thereto, a vertically-sliding rod mounted in said plate, a swinging presser-foot carried by said rod, means for yieldingly holding the presser-foot at the limit of its downward movement relative to the plate, means for yieldingly holding the lower end of the presser-foot at the limit of its inwardly-swinging movement, means for yieldingly holding the plate at the limit of its upward movement and a shaft having eccentrics thereon, the one adapted to release the presser-foot and allow it to swing inwardly and the other adapted to depress the plate and the presser-foot to cause the presser-foot to engage the stack of paper, substantially as set forth.

4. A paper-advancing mechanism, comprising a sliding block, a support therefor, a rocking lever pivoted on the block and carrying a paper-gripper on one arm and a guide-roller on the other arm, a guide-bar engaging the guide-roller, means for raising and lowering the guide-bar to raise and lower the gripper and means for sliding the block along its support for advancing the top sheet of paper and bringing the gripper back into position to engage the next succeeding sheet of paper, substantially as set forth.

NELSON E. FUNK.

Witnesses:

FREDK. HAYNES,
R. B. SEWARD.