J. Hunt. Sheet 1. 2 Sheets.

Feeding Paper to Printg Presses.

No. 44917. Patented Nov. 1. 1864.

Fig: 1

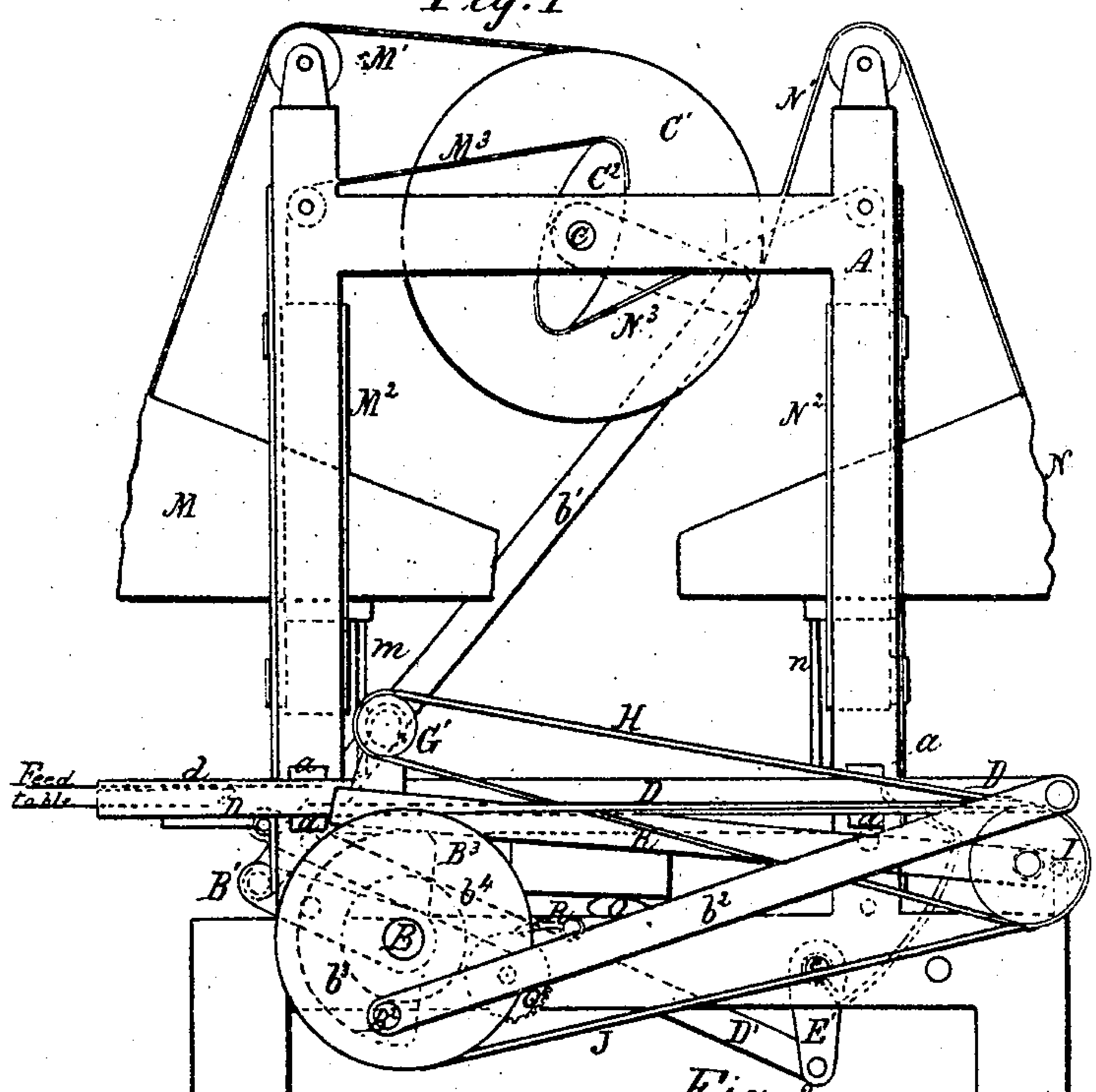
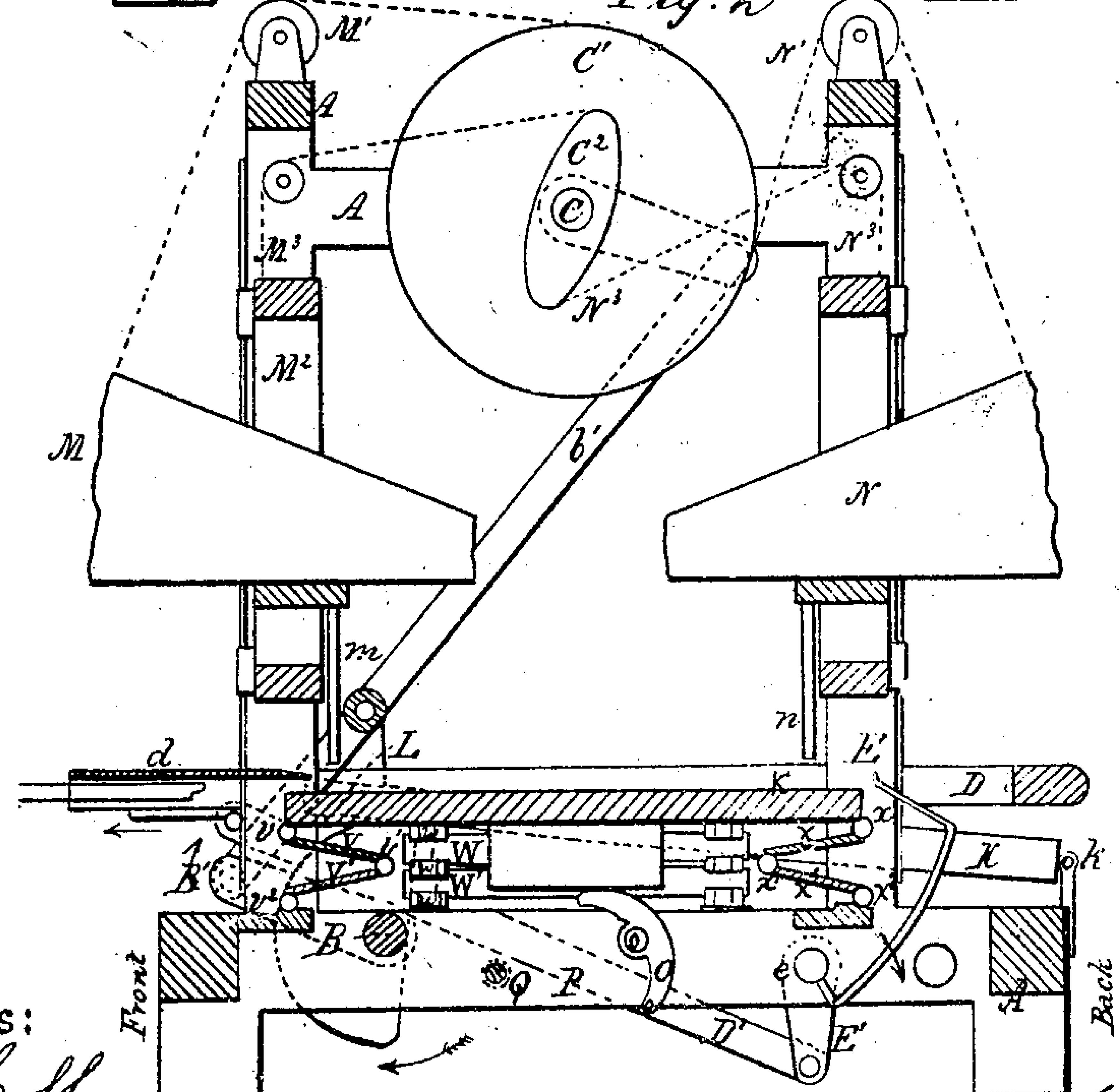


Fig: 2



Witnesses:

Henry M. Collyer
D. W. Stetson

Inventor.

John Hunt.

J. Hunt. Sheet 2. 2 Sheets.

Feeding Paper to Printing Presses.

No. 44917. Patented Nov. 1. 1864.

Fig: 3

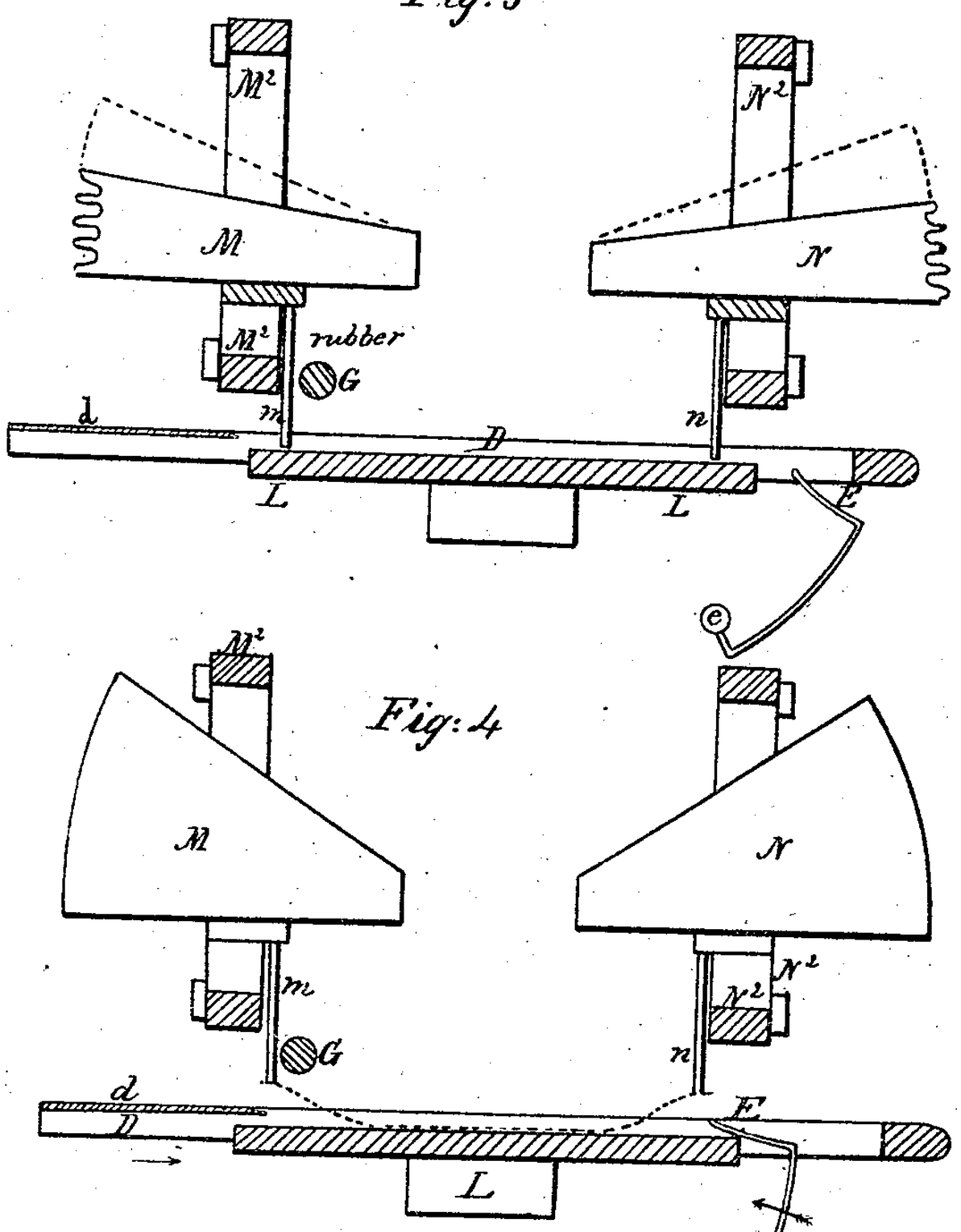
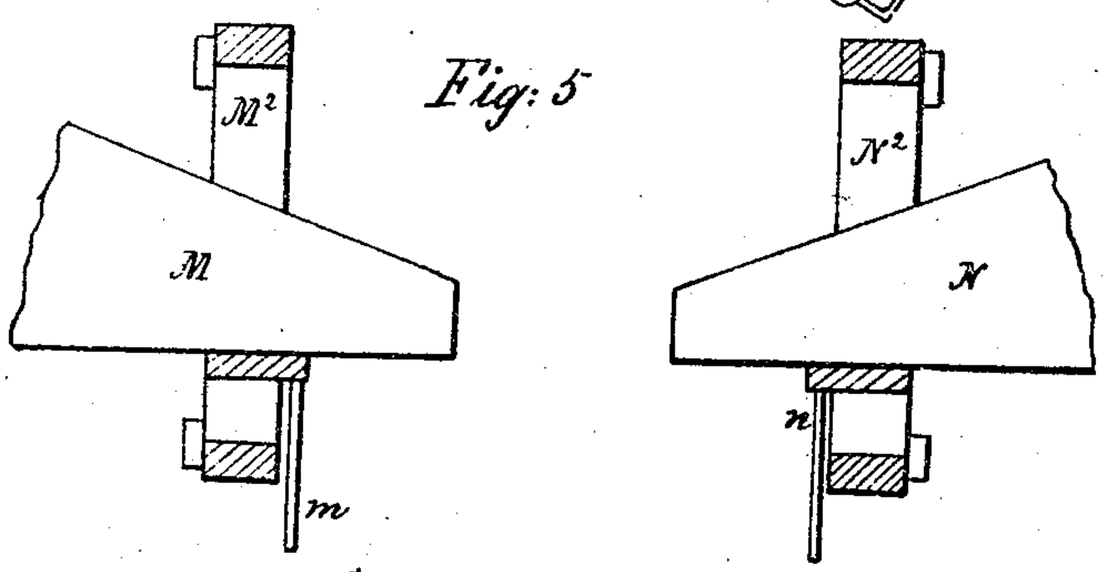
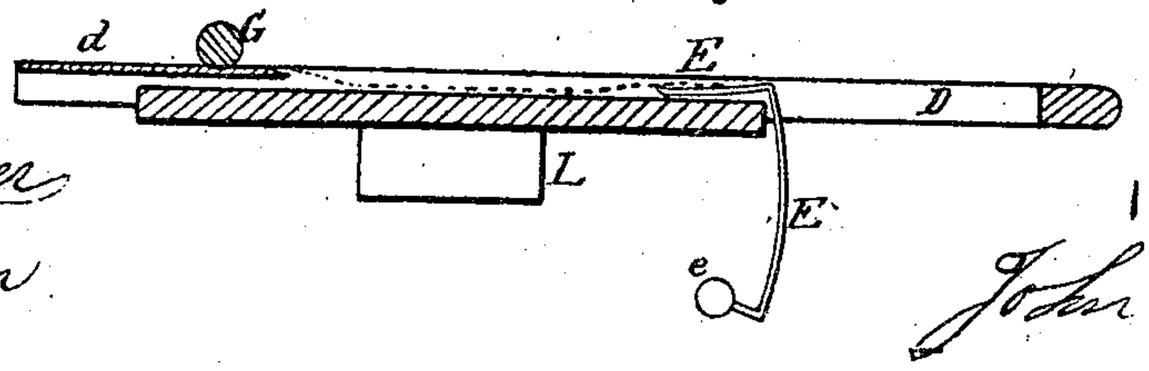


Fig: 4

Fig: 5





Witnesses:
Chas. Henry H. Collyer
D. W. Stetson

Inventor:
John Hunt.

UNITED STATES PATENT OFFICE.

JOHN HUNT, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND GEORGE D. SHARP, OF SAME PLACE.

APPARATUS FOR FEEDING PAPER TO PRINTING-PRESSES.

Specification forming part of Letters Patent No. **41,917**, dated November 1, 1864.

To all whom it may concern:

Be it known that I, JOHN HUNT, of New York city, in the State of New York, have invented a certain new and useful Machine for Feeding Paper to Printing-Presses; and I do hereby declare that the following is a full and exact description thereof.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation. Fig. 2 is a longitudinal section corresponding to Fig. 1, the machine having just delivered a sheet and commenced preparing to take up and deliver the next.

The remaining figures are corresponding sections through the principal parts, to show their relation at different periods.

In Fig. 3 the suction-tubes are pressed down upon the paper. In Fig. 4 these tubes are in the act of rising with a sheet of paper. In Fig. 5 these tubes have released the sheet and the delivering-roller has commenced to move it away.

Similar letters of reference indicate like parts in all the figures.

Tints are employed merely to aid in distinguishing the several parts. A thin red line indicates the sheet.

My machine is adapted to take the sheets from a pile and to feed them singly at a proper time to the printing-press. Only a portion of the feed-table of the printing-press is represented. The machine is geared to the press.

My improvements relate to a duplication of the detaching and lifting means, whereby the sheet is separated from the pile not only along its front edge, but at one or more other points, so that the risk of feeding two or more sheets at a time is lessened. They also relate to certain novel means for acting on the sheets after they are detached from the pile and lifted, whereby the sheet is seized on its upper face only, and in case two or more are lifted, all except the upper sheet are returned to the pile in good order. They also relate to certain novel means for raising and lowering the table on which the pile of paper is supported. They also relate to certain novel means of guiding the table in a vertical motion and of insuring a horizontal position of this table at all times.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings and of the letters of reference denoted thereon.

A A is a fixed framing, on which all the parts of my machine are mounted and guided. B is a stout shaft connected to the printing-press by gearing (not represented) so that the shaft B makes one revolution for each sheet of paper which is required by the press. On the near end of the shaft B is a crank, B^2, and on the other end is a crank, B′, (represented in Figs. 1 and 2,) set nearly at right angles to the crank B^2. A connection, b', connects the crank at the farther side of the machine to an arm on the rocking shaft C, so as to rock the latter at each revolution of the crank-shaft B. A connection, b^2, connects the crank B^2 to the horizontal frame D, so that the latter reciprocates horizontally forward and backward on its guides *a a* at each revolution of the shaft B. The rocking of the shaft C elevates the uppermost sheet of paper and holds it above the pile without moving it horizontally, and the reciprocating motion of the frame D introduces suitable parts between the sheet and the remainder of the pile. The shaft C carries two wheels, C′ and C^2. To the periphery of the former are attached the ends of two straps, M′ and N′, which pass over pulleys in the top of the framing A and descend to the bellows M and N, and are adapted to operate them. These bellows are mounted, respectively, in slides M^2 and N^2, which slides are adapted to move vertically in suitable ways in the framing A. These slides are operated by straps M^3 and N^3, which pass over pulleys in the framing, as represented, and are attached to the wheel C^2. This wheel C^2 is smaller than the wheel C′, and is of nearly elliptical form, as represented. Their arrangement, as described, causes the bellows M and N to be both expanded simultaneously before the slides in which they are mounted commence to lift, and to expand further during the lifting motion. They are provided each with a system of vertical pipes, through which the air is drawn when the bellows are expanded. The bellows N draws air up through the pipes *n*. Only a very little air is actually drawn in through these pipes, because their office is to retain against their lower ends the topmost

sheet of paper, causing it to adhere thereto by the pressure of the air while they rise. They are, therefore, so nearly stopped up by the presence of the sheet of paper that only a very little air finds its way in. That little is discharged at the top of the bellows during the closing motion of the bellows, which motion, as will be readily understood, takes place during the descent. The frame D carries a broad piece of metal, *d*, which is very smooth on its upper surface, and is by the motion of D interposed under the front edge of each sheet of paper as soon as it is well lifted. The reciprocating movement of the frame D, which effects this interposition, acts through the connection D′, which is on the farther side of the machine, and rocks the arm E′ and shaft *e*, and consequently the broad holding clamps or fingers E. These latter are consequently introduced under the sheet at its rear edge at the same time that the plate *d* is introduced under the sheet at the front and pressed upon the remainder of the pile.

G is a small roll, covered with rubber or the like. It is rotated by the belt H from the pulley I. This pulley is rotated by the belt J from the pulley B^3 on the shaft B.

The frame K is adapted to raise and lower the roll G and pulley G′ without disturbing its rotary motion. It supports the bearings of the roll G, and is hinged to the fixed frame A by hinges *k* at the back side. Its front end rests on cams *b* on the shaft B during a portion of each revolution, but after the sheet of paper has been raised by the suction-tubes *m n*, and the shuttle or dividing-plate *d* has been introduced under it at the front edge and the holding-clamp E at the back edge, the cams *b* allow it to sink down so as to bring the roll G down upon the loose sheet of paper by pressing it between itself and the piece or plate *d*. The roll G is made of rubber or analogous material of a soft and strongly-frictional character, and moves the paper forward with certainty and promptitude, provided but one sheet is so embraced, and in case two sheets chance to be so embraced the device at the rear edge holds the under one and prevents it from moving, and the top one moves forward alone. It may be observed that the tubes *m* and *n* relax their hold on the sheet of paper immediately before the roll G touches it, so that little resistance is offered to its motion. This is due to the form and relation of the wheels C′ and C^2, which at this juncture lift on the bellows M and N very slowly, while they lift on the slides M and N rapidly, and thus close the bellows and relieve them from their vacuum. It will now be understood that the sheet is lifted by "suction," generally so called—that is to say, it is taken from the pile of paper by its adhesion to the tubes *m* and *n*, in which a partial vacuum is formed, and, by the opening of the bellows M and N, it is so lifted, not only at its front edge, but also at its rear edge, and it is permanently divided from the pile by the plate *d* and the clamps E. The means for conveying it away then come into action at the front edge and commence to draw the sheet forward, while the clamps E, at the rear edge, by pressing down upon the pile, prevent any sheet from being moved which has not been lifted and divided from the pile at the rear edge as well as the front edge. It follows that in case I chance to lift two sheets at the front edge, only the uppermost sheet of the two is drawn forward and fed to the printing-press, because the lowermost of the two is held by the device at the rear edge. Two sheets cannot be delivered at once, except in the very rare case of two chancing to be lifted at both the front and the rear edge at the same time.

L is a table, on which the pile of paper is deposited and gradually lifted to compensate for the removal of sheets from the top. The weight of the table and of its load rests on the bent lever O, which turns on the shaft *o* by the agency of the chain P. This chain P is slowly wound upon the shaft Q during the working of the machine. At each revolution of the shaft B, one sheet of paper having been removed from the pile, the remainder of the pile is raised by a very slight turning of the shaft Q through the locking of the wheel b^4 (indicated by dotted lines in Fig. 1) into the wheel Q′ during a small portion of the revolution of B, and the turning of Q by winding the chain P turns the bent lever O and raises the table L equal to the thickness of the sheet of paper removed.

Instead of a single gear-wheel, Q′, a train of gearing may be employed, and some of the wheels may be changeable after the manner of change-wheels in a lathe, so as to vary the motion to adapt the table to rise with proper speed for different thicknesses of paper. The pawl R retains the wheel Q′, or train of wheels which it represents, but whenever it is desired to lower the table L to supply more paper it is readily effected by raising this pawl while the tooth b^3 or b^4 is out of gear with the train.

Additional mechanism (not represented) may be supplied to control the descent of the table L and to adjust its height on commencing again to work. The table L should maintain a strictly horizontal position as it rises and sinks. I attain this end and also guide it vertically by hinging to its edge strips of board, which fold upon each other somewhat like the folding parts of the familiar musical instrument known as the "accordion." They may be provided on all of the four edges, or only on two or three edges. I have represented them on three edges. Common butt-hinges *v w x* connect three edges of the table to the outer edges of three boards, Y W X. Hinges *v′*, *w′*, and *x′* connect the inner edges of these boards V W X with the inner edges of similar boards, V′ W′ X′, lying directly below them, and similar hinges, v^2, w^2, and x^2, again connect the other edges of the boards Y′, W′, and X′ either to a further continuation of the

series of hinged parts or to a fixed portion of the framing A. In either case the table is free to rise and sink by the boards turning on their hinges. The boards have parallel edges, and are of uniform width. The hinges are well fitted, and compel a strictly vertical motion and a horizontal position of the table K at all times.

I am aware that it is common to remove sheets from a pile by producing a partial vacuum in small pipes pressed down upon the sheets successively, and that machines intended to perform all the useful purposes of mine have been introduced with some degree of success; but I believe that mine operates differently in several important respects, and that these differences produce appreciable advantages.

Operation: The shaft B, rotating in proper time by reason of its being geared to the printing-press, operates all the several parts in their proper order through the connections represented. The vertical tubes *m* descend upon the pile of paper (which pile is represented in the drawings as very low) and press their lower ends upon the upper surface of the upper sheet. The bellows M now partially open and form a partial vacuum in these tubes *m* and *n*. Next the tubes *m* commence to rise. The pressure of the air beneath tends to hold the front edge of the uppermost sheet tightly up against the ends of the tubes *m* and to compel it to rise with it; but as there is only a little air in the very thin space between the topmost sheet and the next, the elastic expansion of this air is only sufficient to raise the sheet a small distance, and although the flow of additional air inward from the edge of the pile to perfect the separation of this sheet from the pile is rapid, it sometimes happens that the front edges of two or more sheets may chance to be thus taken up at the same time. Let us suppose two sheets to have been thus unintentionally taken at the front edge and then see what has been meanwhile taking place at the back edge. We find that a precisely similar operation has been there performed by the tubes *n* and bellows N and that the rear edge has been also lifted. But a similar accident has not probably occured there, and we find that the uppermost sheet alone has been taken up at the rear edge. So soon as the tubes *m* and *n*, with their attached parts, have lifted the front and rear edges to a sufficient height, the plate *d* is introduced under the front edge and the clamp E under the rear edge. Next they advance farther inward, the clamp E presses down upon the rear of the pile, the bellows M and N partially collapse so as to allow the sheet to be easily pulled away from the tubes *m* and *n*, and the roll G drops down and seizes the two sheets which have been lifted at the front edge. The roll G by its friction immediately commences to remove the topmost sheet, but not to remove the next sheet, because the next sheet is held beneath the clamp E at the rear edge. The top sheet on being carried forward by the friction of the roll G is delivered upon the feed table of the printing-press and is thence delivered into the press to be printed and removed in the ordinary manner. So soon as the uppermost sheet has been fully delivered, the roll G rises, the clamp E relaxes its hold, and both itself and the plate *d* are moved away. The sheet which had been accidently lifted at the front edge and retained by the clamp at the rear edge now resumes its original place on the pile, and the tubes *m* and *n* descend and cause it to adhere and be lifted and removed properly, like its predecessor. In case a sheet is lifted properly, at the front edge while two are by accident lifted at the rear edge, only the one which is lifted at the front edge will be removed; because the other will be below instead of above the plate *d*, and consequently will not be subjected to any action of the roll G. As each sheet is removed the shaft Q is turned a very little, and chain P taken up and the lever O turned a very little. The effect is to lift the table L a space equal to the thickness of the sheet of paper removed, and when the pile is consumed a removal of the detent or pawl allows the parts to resume their places and a new pile to be placed on the table. As the table rises or sinks, the boards V V′ and W W′, allowing only a motion around their axes, the table L cannot move or incline forward or back, but must move vertically and maintain a horizontal position.

Some of the advantages due to certain features of my invention may be separately enumerated, as follows:

First. By reason of my employment of the rear suction-tubes, *n*, and my clamp E, independently of the tubes *m* and the parts corresponding therewith, I am able to better insure the delivery of only one sheet of paper at a time, because, in case two or more sheets of paper should by chance be lifted to be taken off at the front edge, all except the top one would be held by the clamps or retainers E at the rear edge. It is rare to have a similar accident occur in the independent mechanism at the two edges at the same time, and my machine will, by reason of these devices at the rear edge, very rarely if ever feed forward more than one sheet at a time. It may be remarked that the duplication of the sets of vacuum tubes *m* and *n* may be carried still further, if desired, so as to have three or more sets of tubes acting on different parts of the sheets with retainers corresponding in function to my clamps E, to retain at each point all that is not lifted; but I believe the two represented to be sufficient.

Second. By reason of my reciprocating shuttle or plate *d* and revolving roll G, arranged relatively to the lifting-tubes *m*, as represented, I am able to take the sheet up and convey it away without requiring any other

than a vertical movement in the suction or vacuum devices. In ordinary machines of this character the suction-tubes are required to move forward and drag the sheet along a certain distance, and the hold by suction is illy adapted to perform such a function and is liable to slip.

Third. By reason of my widely-separated teeth b^2 b^3, wheel or train of wheels Q, pawl R, chain P, and lever O, or their equivalents, I am able to lift the table L at a proper rate and to lower the same with great facility, as required. It may be observed that the teeth b^2 may be duplicated by inserting others in suitable holes, (not represented on the periphery of the wheel,) so as to increase the number of rates at which the table L may be raised, but the teeth b^2, &c., must in all cases be so wide apart as to leave the train of wheels Q′ free at some period in the revolution, so as to allow the table to be lowered at such period by lifting the pawl R.

Fourth. By reason of my jointed or hinged guides V and W and hinges v w, arranged relatively to the lower guides, V′ W′, and hinges v' v^2 w' w^2, in the manner represented, I am able to guide the table L and to retain it always in a perfectly horizontal condition with very little mechanism and without sensible friction. I term these parts, taken collectively, an "accordion motion," because of its analogous appearance, but there is not any similarity of function thereto.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In paper-feeding machines, the suction devices n and retaining-clamp E, for the purpose of guarding against feeding too many sheets at once, as herein set forth.

2. The reciprocating plate or divider d and friction device G, or its equivalent, arranged relatively to the lifting device m, so as to require a simply vertical motion of the latter, substantially in the manner and for the purpose herein set forth.

3. In combination with a paper feeding-machine, a table-motion composed of the widely-separated teeth b^2, wheel Q′, pawl R, and the chain and lever P and O, or their equivalents, arranged substantially in the manner and for the purpose herein set forth.

4. The accordion-like mechanism composed of the parts V V′ and W W′, or their equivalents, hinged together and adapted to guide the motion and compel the horizontal position of the table L, substantially in the manner and for the purpose herein set forth.

JOHN HUNT.

Witnesses:
D. W. STETSON,
HENRY M. COLLYER.