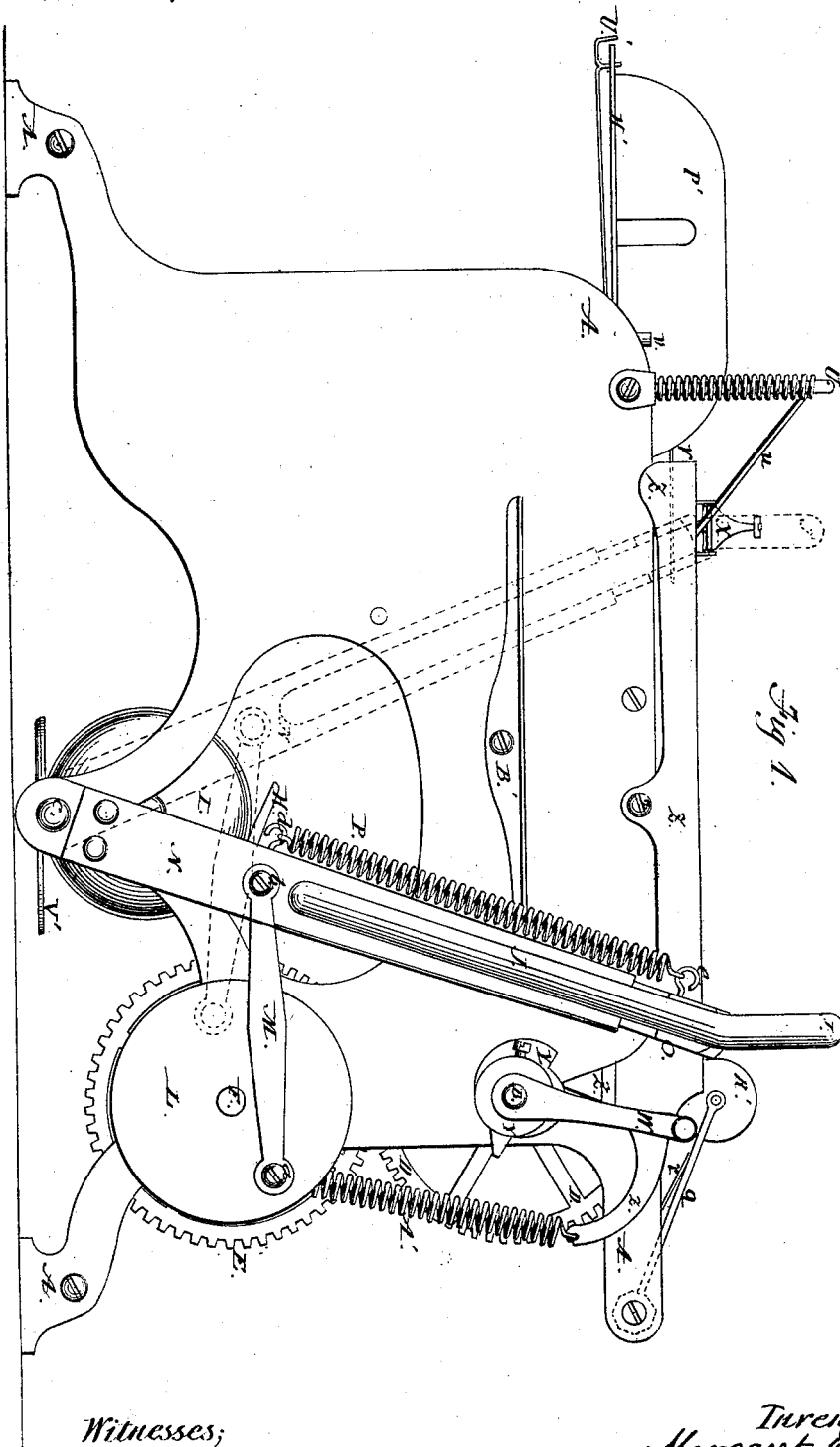


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PAPER FEEDING MACHINE.

No. 109,224.

Patented Nov. 15, 1870.



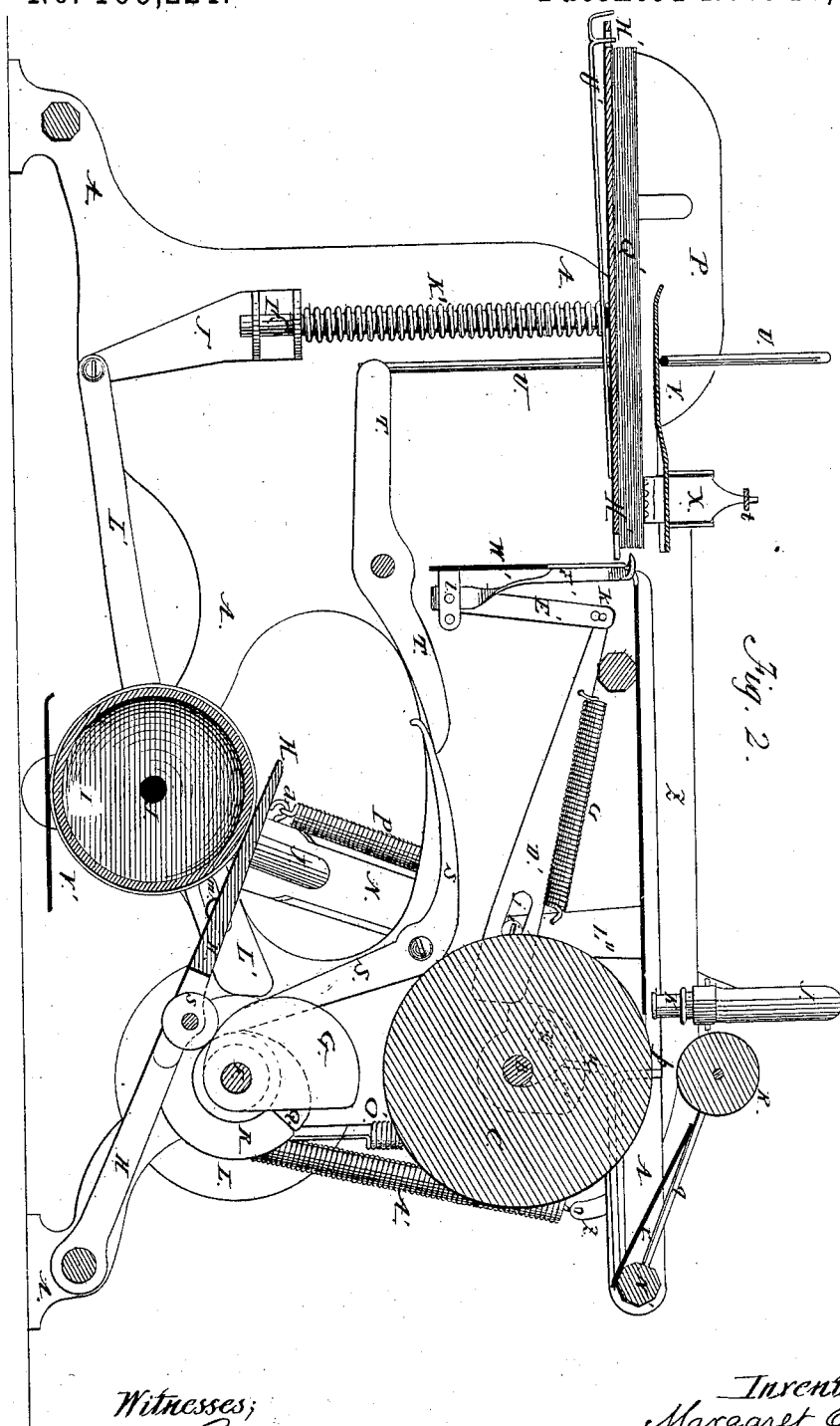
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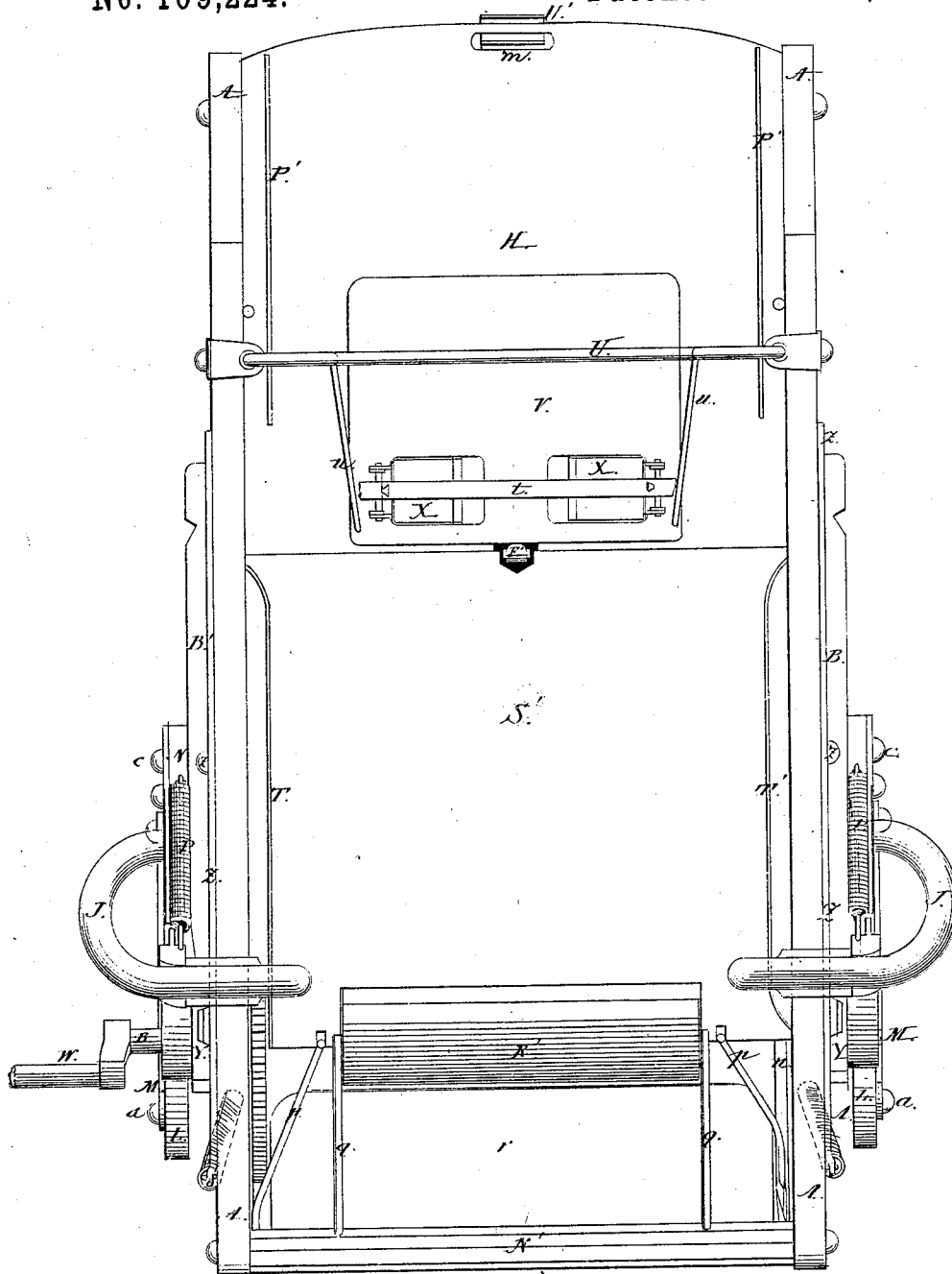


Fig. 3.

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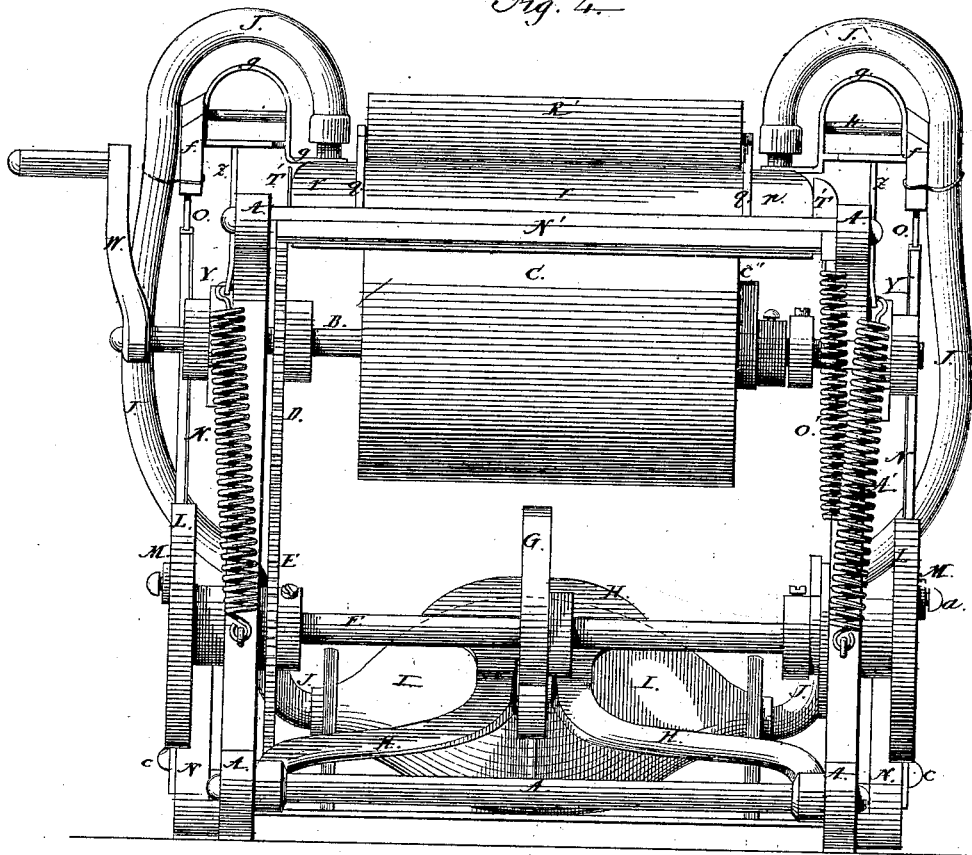
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Fig. 4.



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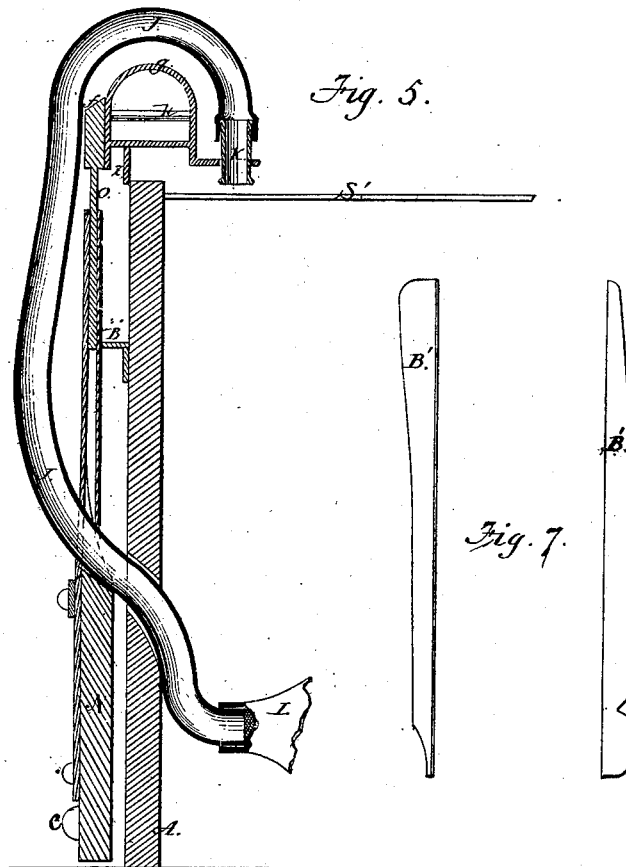


Fig. 7.

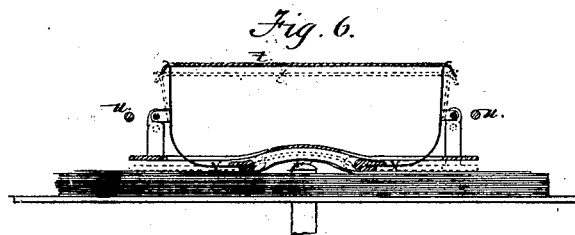


Fig. 6.

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United States Patent Office.

MARGARET E. KNIGHT, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 109,224, dated November 15, 1870.

IMPROVEMENT IN PAPER-FEEDING MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, MARGARET E. KNIGHT, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful machine, which I call a Pneumatic Paper-Feeder; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation of the machine.

Figure 2 is a vertical, central, longitudinal section of the same.

Figure 3 is a top view or plan.

Figure 4 is an elevation of the delivery end of the machine.

Figure 5 is a vertical section of the flexible tubes.

Figure 6 is a transverse section of the upper plate.

Figure 7 is a top view of the side guides.

The same letter indicates the same part wherever it occurs.

The nature of the invention consists in the construction and operation, as hereinafter described, of mechanism for feeding sheets of paper to a printing-press or other machine, in which mechanism atmospheric pressure, acting through a suction-tube, is made to lift each sheet from the bank and carry it to the proper point for delivery to the press, and to present it to the press or other machine in proper position for its action.

To enable others skilled in the art to make and use my paper-feeding apparatus, I will proceed to describe its construction and operation, referring to the accompanying sheets of drawing by the figures and letters marked thereon.

A marks a stout metallic frame, by which the operative parts of the machine are supported.

A winch, W, indicates the point of application of the driving power on the end of the main shaft B, which supports and carries the large cylinder C, which represents the cylinder of a printing-press, the apparatus shown in the drawing being applied to the feeding of sheets to a printing-press. It will be obvious, however, that it could be applied, without any substantial change, to the feeding of bag-machines, envelope-machines, or other machines requiring sheets of paper to be successively fed to any particular part of their mechanism.

On shaft B, just within the side framing, is the gear-wheel D, which meshes into a similar wheel, E, on a lower shaft, F, which I call the cam-shaft.

This shaft carries a cam, G, which operates an oscillating lever, H, having a broad extension at its end, which is applied to, and operates, the suction-bulb or blower I.

The blower rests upon a transverse plate, V, run-

ning across the lower part of the frame. It is alternately compressed and released by the action of the lever H at proper times for expelling and drawing in air.

To the ends of the blower I are attached the flexible tubes J J, whose upper ends terminate in the suction-mouths K K. These tubes are both operated in the same way, and at the same time, they being one on each side of the machine, as shown.

Each tube passes through and is supported by an oscillating arm, N, which is pivoted at c to the lower part of the frame, and receives motion from the crank-wheel L on the end of shaft F by means of the rod M, pivoted by the pins a and b.

In addition to the oscillating movement imparted by rod M, the arm N is capable, by reason of its elasticity, of a slight motion at right angles to the plane of its oscillation, said movement being produced by the guide B', against which the inner side of the arm N bears.

The upper part of arm N is hollow, and receives the rod O, which is held in it by the spiral spring P, attached at its ends to the hooks d and e.

To the enlarged head f of rod O is pivoted, by bolt h, a stirrup, g, whose lower surface rests and slides upon the guide Z.

The suction-mouth K of tube J is affixed to the inner end of this stirrup.

The stirrup g has an oscillating movement on h, which adapts it to the varying positions of the librating guide Z, and serves to keep the mouth K always in the proper position relatively to the platform S', as the mouth traverses back and forth above it.

The librating guide Z, upon which the stirrup g traverses, is pivoted at z to the side of the frame, and is operated by a cam, Y, on the main shaft B.

The spring A', attached to one end of the guide Z, counteracts the operation of cam Y.

The foregoing description of the construction and mode of operating one of the suction-tubes is equally applicable to either.

C indicates the printing-cylinder, to which the sheets of paper are fed, and R' the drop-roller above it.

The cylinder is fixed on shaft B. The drop-roller R' is pivoted to arms g projecting from the rock-shaft N', hung in the end of the frame.

This shaft is operated by a cam, M', on shaft B, which raises an arm, n, attached to shaft N', said arm being drawn down by spiral spring O', whose lower end is hooked to the end framing.

To shaft N' are also attached the lifting-wires or paper-gauges p.

The bank or sheets Q' is supported upon a platform or feed-table, H', having raised sides P'.

This platform rests on spring rods I', and has an up-and-down movement on guide-rods attached to the inside of the frame. At its rear end is a slot, *m*, through which the end of spring U' projects upward.

At the middle of the forward end of platform H' is a notch, in which the separator F' plays.

One of the spring-rods I' rests in a vibrating step, J', (see fig. 2,) which alternately stops and starts the rod by the action of an arm, L', pivoted to it, and operated by a cam, R, on the end of shaft F.

Above the feed-table H', and in contact with the top of the bank of sheets Q', is the upper plate V, supported by the bent wires U and the braces *u u*, fig. 3. It has two openings in it, through which project the lower surfaces of the fingers X, which are hung by pivots to uprights attached to the plate V. Their upper ends are united by an elastic band, *t*, fig. 6, which draws their lower extremities apart, when the plate V rises and frees them from contact with the surface of the paper.

When the plate V descends, the lower surfaces of the fingers, which have a friction covering, come in contact with the paper, and are pressed toward each other, so as to cockle the upper sheet of paper, and raise the middle of it above the separator F', in readiness to pass forward over it.

The rods U, which support the upper plate V, are held up by spiral springs surrounding them, (see fig. 1.) They are drawn down at the proper times by the operation of two levers S T, shown in fig. 2, operated by cam Q on crank-shaft F.

The separator F' holds down the sheets which are to be retained while the upper sheet is fed forward.

It is in the form of a hook or lip, which is applied to the front edge of the bank of sheets. It is operated by a cam, C', on shaft B, which drives back a sliding rod, D', drawn forward by spring G', which operates a bell-crank lever, E', connected with the separator F'.

The lever E' is hung in lugs *l*, attached to the turned-down end W' of the fixed platform S', over which the sheets pass in going from the bank to the press-cylinder. The raised sides T' of this platform guide the paper in its passage.

The sliding rod D' has a slot, *j*, in one end, which receives a pin, *i*, by which the rod is held to a depending plate, L'. Its other end is pivoted at *k* to lever E'.

Operation.

The operation is as follows:

The bank of paper is placed on the feed-table H', beneath the upper plate V, the lower surface of which is in contact with the upper sheet of paper. When in this position the upper sheet is "cockled" in the middle by the approach of the fingers X toward each other, so as to pass over the separator F', when the sheet is fed forward, (see fig. 6.) The upper plate presses down upon the paper until the cockle is made, and rises away from it to release the upper sheet at the instant when it is taken hold of by the feed-mechanism to be drawn forward toward the cylinder.

The instant the upper plate rises, the suction-mouths of the tubes T are applied to the two forward corners of the sheet, the blower being then collapsed and empty. The blower then begins to expand and draw in air, which causes the suction-mouths K to

adhere firmly to the sheet, and carry it to the end of the stationary table S' next the printing-cylinder. Here the sheet passes under the drop-roller R' and plate *r*, and is applied to the surface of the printing-cylinder in the usual way.

While the upper sheet is passing forward, the front edge of the bank of sheets below it is tightly held down by the separator which clamps them.

As the bank of sheets diminishes in thickness, by the removal of the sheets from above, the platform is gradually pushed up from below by the spring-rods I', so as to keep the level at the top of the bank of paper constantly the same.

The guides B', fig. 7, serve to give direction to the sheet, and, by slightly spreading the arms N apart, as they approach the delivery-end of the machine, enable them to take up the wrinkle in the paper, and present it smooth to the printing-cylinder.

As the suction-mouths K move back toward the bank of paper, the compression of the bellows takes place, and air is expelled from the mouths K. The expulsion of air ceases when the mouths reach the sheet for a repetition of the operation.

The librating guides Z give the proper position to the suction-mouths K at every point in their course, by reason of the operation of said guides on the oscillating stirrups *g*, as heretofore described.

Having thus fully described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. The arrangement and combination, in the manner described, of the bellows, flexible tubes J, compound arms N, guides Z and B', and suction-mouths K, for the purpose stated.
 2. The compound arms N, made flexible laterally, and having an external case, receiving the spring-rod O, the construction being for the purpose of simultaneously controlling and yielding to the movements of the suction-mouths, as described.
 3. The oscillating stirrup *g*, for supporting the upper end of the tube J, and holding the suction-mouths K in proper position at every point in their course, as stated.
 4. The librating guides Z, arranged for conjoint operation with the stirrups *g*, to regulate the movements of the suction-mouths K, as set forth.
 5. The side guides B', in combination with the elastic arms N, to regulate the lateral movement of those arms and of the sheet, as and for the purpose stated.
 6. The combination, with the upper plate V, operating as described, of the oscillating fingers X, united by the elastic band *t*, and operated by the movements of plate V, to cockle the paper, in the manner and for the purpose specified.
 7. The combination of the cam R, slide-bar L', vibrating step J', rod I', and spring K', for the purpose of operating the movable feed-table H', as described.
- The above specification of my said invention signed and witnessed at Boston, this 29th day of August, A. D. 1879.

MARGARET E. KNIGHT.

Witnesses:

AUSTIN DAVIS,
JAMES PADDOCK.