

J. T. ASHLEY.
PAPER FEEDING APPARATUS.

No. 107,851.

Fig. 1 Patented Oct. 4, 1870.

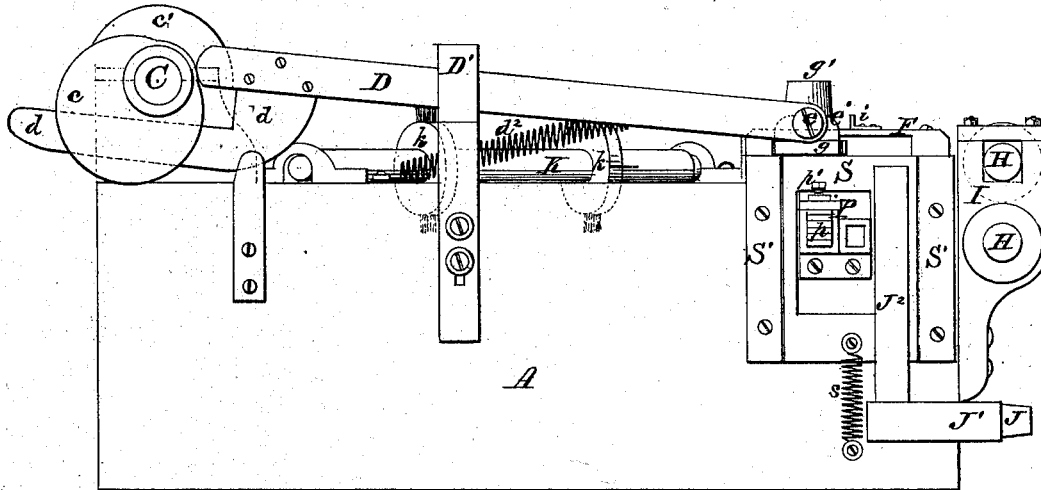
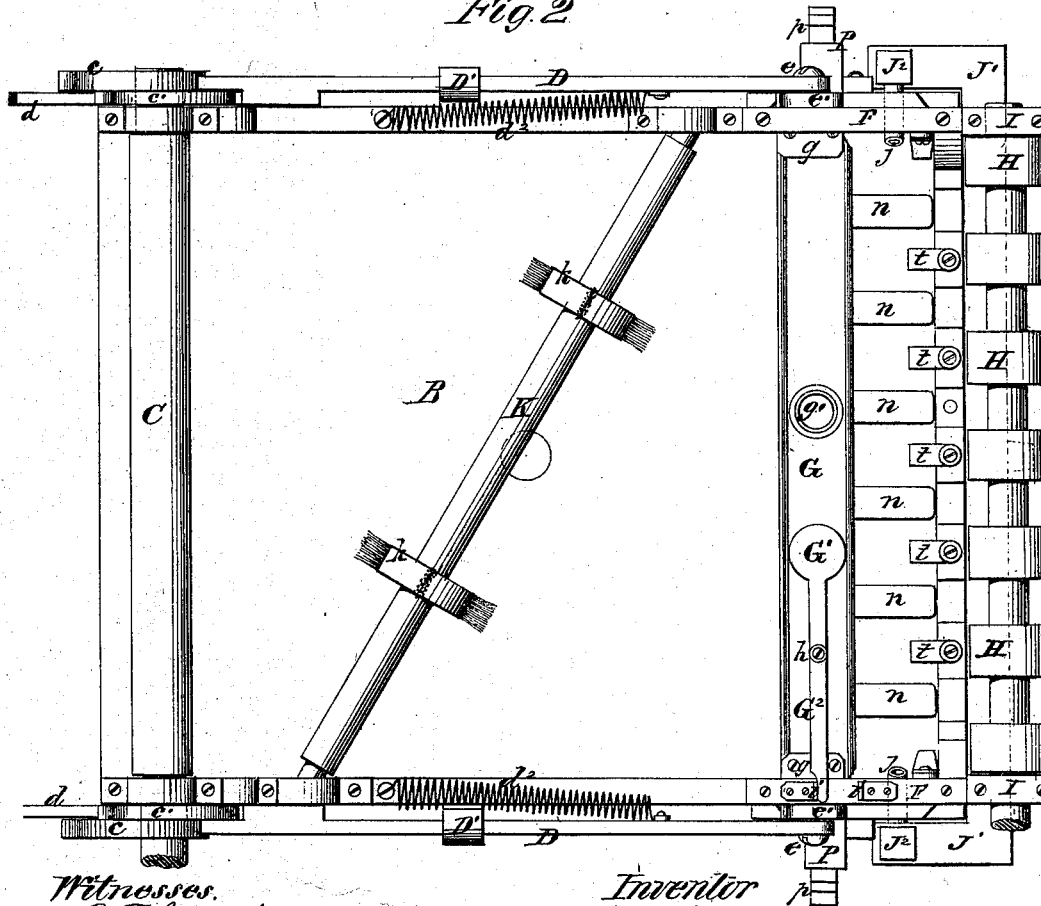


Fig. 2



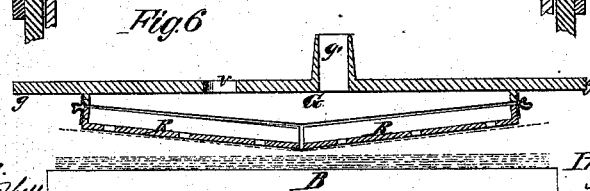
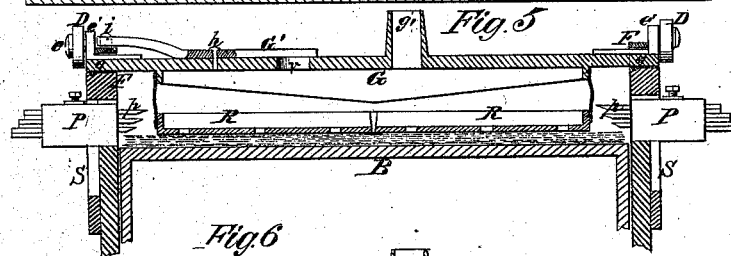
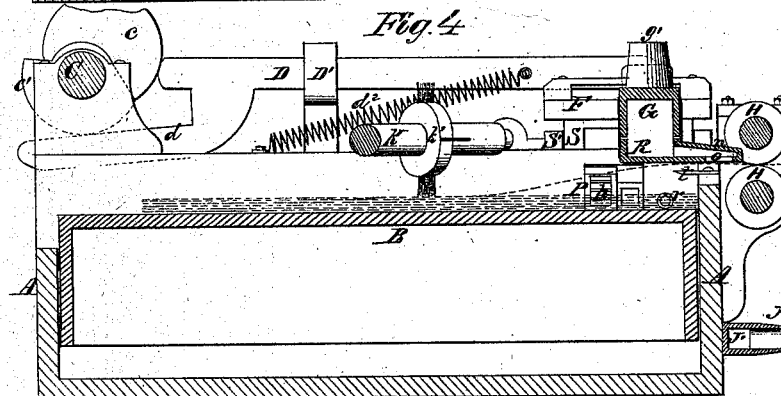
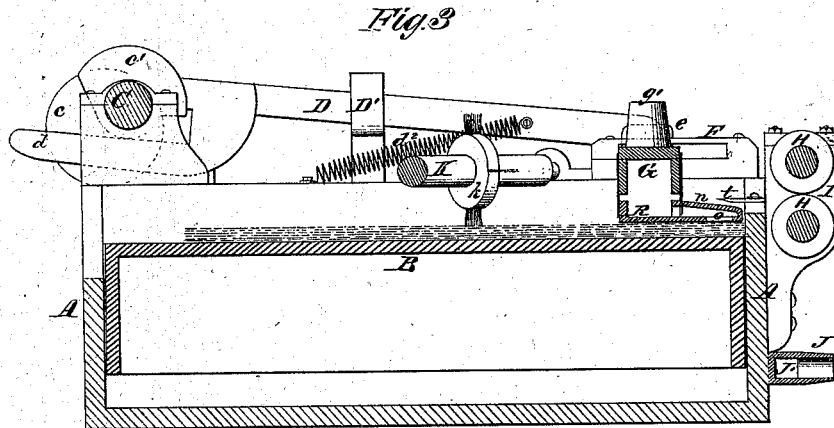
Witnesses.
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Fig. 7.

Patented Oct. 4, 1870.

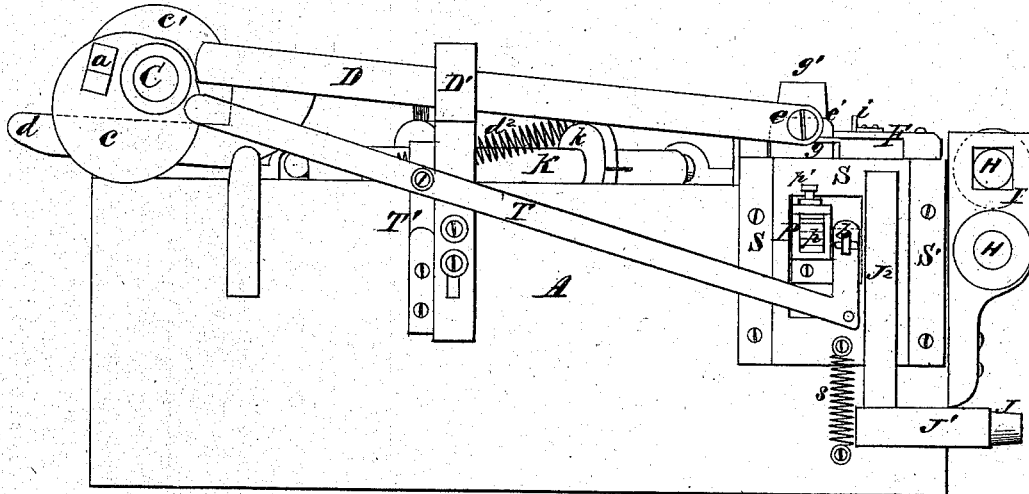


Fig. 9

(Modifications.)

Fig. 8

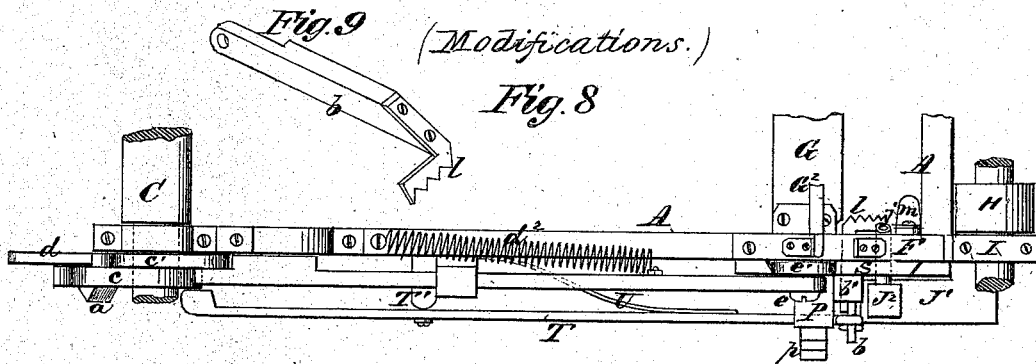


Fig. 10

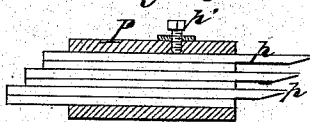
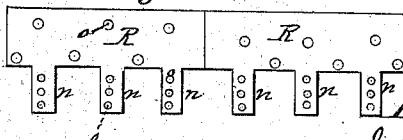


Fig. 11.



Witnesses.

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Letters Patent No. 107,851, dated October 4, 1870.

IMPROVEMENT IN PAPER-FEEDING APPARATUS.

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, JOHN T. ASHLEY, of Brooklyn, E. D., in the county of Kings and State of New York, have invented certain new and useful Improvements on Paper-feeding Machinery; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, plate 1, is an elevation of one side of the improved machine, indicating the position of the several parts for picking up a sheet from the pile upon the table.

Figure 2, plate 1, is a top view of the machine with the several parts in the same relative positions as indicated in fig. 1.

Figure 3, plate 2, is a section taken longitudinally through the center of the machine, with the several parts in the same relative positions as indicated in figs. 1 and 2, plate 1.

Figure 4, plate 2, is a similar view of the same parts shown in fig. 3, indicating them in the act of delivering a sheet of paper between the feed-rollers.

Figure 5, plate 2, is a transverse vertical section, taken centrally through the suction-box and its immediate connections, when in the position indicated in figs. 1, 2, and 3.

Figure 6, plate 2, is a vertical section through the suction-box after it has picked up a sheet, and just before it is elevated and moved forward to deliver the sheet between the feed-rolls.

Figure 7, plate 3, is an elevation of one side of the machine, showing a cam and lever applied to it for operating a laterally-movable foot upon the sheets.

Figure 8, plate 3, is a top view of one side of the machine, with the said foot and its actuating parts applied.

Figure 9, plate 3, is a perspective view of one of these feet, which may be used to assist in separating the lateral edges of the topmost sheets from the pile.

Figure 10, plate 3, is a section view, showing one set of flexible strippers, which may be used to assist in separating the lateral edges of the topmost sheets of paper from the pile during the operation of lifting the sheets.

Figure 11 is a bottom view of the suction-box.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on machinery for feeding calenders, presses, and other like machines with sheets of paper, wherein a pneumatic apparatus is employed for lifting the sheets, one at a time, from a pile, and delivering the same between feed-rollers, gripping devices, or other equivalent receiving and carrying devices.

The nature of my invention consists—

First, in a pneumatic suction-box or chest, which receives a vertical, and also a horizontal movement, and which is so arranged, guided, and controlled as to pick up sheets of paper, one at a time, from a pile of paper, and deliver the sheets between rollers, grippers, or other equivalent receiving and carrying devices, as will be hereinafter explained.

Second, in a pneumatic suction-box or chest, which is constructed with a flexible bellows bottom in such manner that, in the act of picking up the topmost sheet of a pile, the edges of such sheet will be lifted somewhat higher than the central portion, to allow blasts of air to be directed laterally beneath the sheet, and thereby facilitate the separation of the sheet from the succeeding lower one, as will be hereinafter explained.

Third, in the construction of a pneumatic suction-box, with rigid or flexible hollow fingers projecting from its flexible bottom, which fingers are arranged at suitable distances apart, and adapted, by the action of draughts of air, to pick up the sheets of paper, one at a time, and deliver the same either between rollers or other equivalent gripping devices, as will be hereinafter explained.

Fourth, in the employment in a paper-feeding machine, of stripping-devices, which will, when arranged in proper relation to the edges of the pile of sheets, offer such resistance to the edges of a sheet, in the act of lifting it from the pile, as will prevent two sheets rising together, as will be hereinafter explained.

Fifth, in the employment of flexible or rigid picking-up fingers applied to and communicating with a suction-box, in combination with annularly-grooved feed-rollers, whereby each sheet is firmly held until it is delivered between the said rollers, as will be hereinafter explained.

Sixth, in providing for keeping the sheets of paper upon the table in proper position for presentation to the feed-rollers, or other equivalent devices, by means of pushing-rollers, brushes, and other equivalent devices, applied to a rotating shaft, which is arranged diagonally to the length of feed-movement of the sheets, which devices will move the topmost sheets laterally and forward against a straight edge or guide upon the frame of the machine, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe the best means known to me for carrying it into effect.

In carrying my present invention into effect, I shall employ means for automatically elevating the table upon which the pile of paper is supported, so that the upward movement of this table shall be commensurate with the gradual diminution of the height of the

pile of paper, by the removal of the sheets therefrom, thereby keeping the topmost sheet always at a given distance from the picking-up device. For this purpose, the elevating device described and shown in my application for a paper-feeder, marked case A, may be employed, although I do not confine myself to such elevating device, as other means may be adopted, such, for instance, as weights and pulleys, arranged to act constantly upon the table.

The frame A of the machine, shown in the accompanying drawing, is of a rectangular form, consisting of vertical sides and ends, suitably connected together, and adapted for receiving and supporting the devices which I shall now describe.

Within the frame A is a vertically-movable table, B, upon which the pile of paper (indicated by dotted lines, figs. 3, 4, and 5,) is supported. This table B is moved upwardly by suitable mechanism during the operation of removing sheets of paper from the machine between the annularly-grooved feed-rollers H H.

C is a horizontal shaft, which extends transversely across that end of frame A into which the pile of paper is introduced, which shaft is supported by elevated bearings, and provided on its ends with two segmental cams, *c c*, and two eccentric cams, *c c*.

D D are two levers, which are provided with arms *d d*, and which pass freely through fulcrum guides D' D', applied to the sides of frame A.

The segments *c c*, in their revolution, depress the rear ends of levers D D by their action upon the arms *d d* of these levers, and the eccentrics *c c*, by acting upon the rear ends of said levers, move them forward.

The front ends of levers D D are connected by pivots *e* to blocks *e'*, which are secured to and rise perpendicularly from the ends *g* of a suction-box G.

The ends *g* of the top board of suction-box G are fitted to slide horizontally in guides F F, which guides are fixed to the upper ends of vertically-movable sashes S S; the suction-box G is thus guided horizontally in its forward and backward movement, and also guided vertically by the sashes S. These sashes are applied on the outer sides of the frame A, and guided between the side pieces S' S', as shown in fig. 1.

The segments *c c*, operating on the arms *d d* of levers D D, raise the sashes S S, and with them the suction-box G; and, while in this elevated position, the eccentrics *c c*, operating on the ends of said levers, move the suction-box G forward far enough to allow a sheet of paper to be taken hold of by the rollers H H.

The springs *s* will cause the depression of the sashes S S and the suction-box, and the springs *d' d'* will cause the retraction of the suction-box, by holding the ends of the levers D D forcibly against the peripheries of the eccentrics *c c*.

The object of elevating the suction-box G is, to raise the topmost sheet of the pile of paper some distance above the pile, so as to free it therefrom; also, to bring the forward part of the sheet into proper relation with the height of the feed-rollers H H, so that, when the succeeding forward movement of the said suction-box terminates, the sheet will be delivered in the bite of said rollers.

It will be seen, by reference to fig. 1, that the peripheries of the lifting-cams *c* are concentric to the axis of shaft C; consequently, the suction-box will be sustained at a given invariable height, when elevated, during its full forward stroke.

It will also be seen that the eccentrics *c c* are so constructed, with a portion of their peripheries concentric with their axes that, after the first picking-up movement of a sheet occurs, there will be a repose before the further elevation of the sheet, sufficient to allow the action of lateral blasts of air, to effect a positive separation of such sheet from the pile. This is done by making a small part of the periphery of the cams concentric with the arm on which they turn.

The suction-box is arranged transversely across the frame A, and supported by the guides F F of sashes S S, as above described. This box, which receives bodily movement both vertically and horizontally, is constructed with a flexible bottom, R, composed of two stiff pieces connected together at the center of the box, and also connected to the sides and ends of the top board G by means of any suitable flexible material, impervious to air.

The lower edges of the longitudinal side-pieces of the upper portion of this box, are inclined from their ends to a point at the middle of their length, as shown in figs. 5 and 6, plate 2, so that when air is exhausted from the box G, the bottom sections R will assume the inclined positions indicated in fig. 6, plate 2, thereby raising a sheet of paper higher from the pile at its side edges than at its central portion.

When the air is not exhausted from the box G, the sections R will assume the position indicated in fig. 5, either by their own gravity or by the aid of the springs. If the bottom edges of the sides of the upper portion of box G were inclined from the center of this box downwardly, then the sheets would be lifted higher at the middle of their width than at their lateral edges. To this flexible bottom, hollow fingers *n* are applied, having openings, *o*, in their bottoms. These fingers *n* extend forward of their box a suitable distance, and, by the exhaustion of air from this box they are caused to pick up the topmost sheet from the pile of paper on the table beneath them.

Apertures are also formed through the bottom of the box, as shown in fig. 11.

By this manner of using a suction-box with narrow fingers, a two-fold object is secured, viz:

First, the sheet, when lifted by suction against the bottom of the box and fingers, will be sustained and kept from drooping, as is the case when no such support is afforded for the sheet.

Second, the narrow extended fingers will permit the sheet to be carried close up to the grooved feed-rollers, or between the grippers of a press, such fingers, when grooved rollers are used, entering into the grooves thereof; or, in other words, I am enabled to hold the sheets by their extreme front edges, and, while thus held, deliver them between the annularly grooved rollers H, whereas, if such narrow extensions were not used, the forward edge of the paper would be left unsupported, and could not, with precision, be delivered between the said rollers, and would bend down when damp.

In figs. 3 and 4, the fingers *n* are represented as being rigidly applied to the flexible sections R R of the suction-box, and are thus dependent for their movements on the movements of said sections; but if desirable, each finger may be made movable independently of another finger, by connecting each finger with flexible material to the front lower corner of the box.

The independently flexible fingers *n*, will accommodate themselves, as well as the box, to any irregularities of surface upon which they rest, and thus operate uniformly to pick up a sheet from a pile of paper.

The feed-rollers, which receive the sheets one at a time from the fingers *n*, and deliver the sheets to a press, or other machine, are annularly grooved, as shown in the drawing, for the purpose of admitting between them the said fingers during the act of delivering a sheet between these rollers.

The exhaustion of air from the box G is continuous, and may be effected by means of any suitable exhausting-fan, put in communication with said box by means of a flexible pipe applied to the nozzle *g'*.

On one side of the nozzle *g'* is a valve, G', the stem G' of which is pivoted at *h* to the top of the box G, and its outer end is arranged between two lugs *i i*, on one of the guides F, as shown in fig. 2.

Beneath valve G^1 , a hole, v , is made through the top of box G , which hole, when uncovered, will allow air to rush into this box, and thus counteract the upward tendency of air through the fingers n .

The lugs i , on guide F , are so adjusted that when the suction-box G reaches the terminus of its forward stroke, the forward lug i will cause valve G to uncover hole v , and thus free the sheet from the finger n , and when the box G returns to the terminus of its back stroke, the rear lug i will cause the valve to close, opening v .

In rear of the suction-box G , and arranged in a horizontal plane, is a shaft, K , which extends diagonally across frame A , over the table B . This shaft carries friction-wheels k , which may have brushes applied to their peripheries, or which may be provided with cloth or other frictional material. These wheels, thus arranged, will move the topmost sheets laterally and forward, and keep the edges evenly in contact with one side, and the front end of the frame A , thereby automatically adjusting the sheets on the table in proper position to be fed to a press, or other machine.

For the purpose of positively separating the topmost sheet from the pile, during the act of lifting this sheet, I employ blasts of air directed inwardly from opposite sides of the frame A . To do this effectually, tubes j pass through the sides of the frame A , from a trunk, J , J^1 , J^2 , and are inclined, so as to direct the currents downwardly upon the pile of paper, and inwardly between the sheet which is being raised and the pile.

These blasts are continuous, and consequently operate during the act of moving forward each sheet. By arranging the blast-pipes on opposite sides of the frame, two edges of the pile of paper are acted upon by the currents of air, whereas an arrangement of a blast-pipe or openings in front of the pile of paper would direct the currents upon one edge only of the pile.

I also employ in conjunction with the suction-box, adapted for picking up the sheets singly, frictional strippers, which I prefer to make of India-rubber pieces p , suitably secured in boxes P , and, if desirable, made adjustable lengthwise. The pieces p are arranged one above another, so as to overhang the lateral edges of the pile of paper on the table B , and thereby operate with some degree of resistance upon the edges of each sheet while it is being freed from its pile, and also upon the edges of the succeeding lower sheets. These strippers will in this manner hold down the sheets by their edges, so that only the topmost sheet can be raised at a time.

The single strips t , of rubber, or other suitable material, which are secured to and extend inwardly from the front end of the frame A , operate to assist in separating the topmost sheet of the pile from the succeeding lower sheet, during the act of lifting the sheets.

In figs. 7 and 8, plate 3, I have represented a mode of separating or loosening the lateral edges of the topmost sheet from the pile by the direct action, upon the topmost sheet, of two inclined feet, l , which receive lateral movements from cams a , on the faces of

the eccentrics c , acting through the medium of a lever, T , and rod, b .

The lever T is acted upon by a spring, U , which forces its forward end outwardly. The cam a moves this end of the lever inwardly. The feet lie upon the topmost sheet of the pile, and, when moved inwardly, will, by a serrated or frictional edge, press inwardly the edges of the topmost sheet, thus sliding these edges upon the sheet below, so that, when the feet retract, the edges of the paper will spring back, and, in doing so, will rise over the elevated lips m , and thus allow currents of air to pass beneath the up-turned edges of the topmost sheet, and, in this way, prepare this sheet for being separated or freed from the pile, and carried forward to the feed-rollers H .

Having described my invention,

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

1. A suction-box, G , provided with fingers n , which has both a vertical and horizontal movement, and is constructed to pick up the sheets itself and afford a continued support across the whole width of the box and fingers, such box being adapted for application to the extremities of a flexible tube of a suction apparatus, substantially as described.

2. In a paper-feeding machine, constructing the suction-box with flexible sides, which allow the bottom of the box a freedom to rise and fall independently of the top thereof, so as to accommodate its under surface to the surface of the paper, substantially in the manner described.

3. The suction-box, or pneumatic picking-up device, made with a jointed bottom R , or the equivalent thereof, the ends of which are capable of rising, while its intermediate or central portion remains in a given position, substantially in the manner described.

4. Frictional stripping-devices, formed of a series of fingers arranged one above another on a paper-feeding machine, at the sides, or both at the sides and front thereof, substantially as described.

5. In a paper-feeding machine which has a vertically and horizontally-guided suction-box, or pneumatic picking-up device, a combination of mechanism which will, in imparting to said suction-box or pneumatic picking-up device, the vertical and horizontal movements, allow said box or picking-up device to remain stationary for a short period, substantially as and for the purpose set forth.

6. The picking-up fingers, extending out from the suction-box, in combination with annularly-grooved feed-rollers H , or their equivalents, substantially as described.

7. Diagonally-arranged pushing-devices, applied above the feed-table, substantially as described.

8. A suction-box, which itself picks up the sheets, supported directly upon vertically-movable sashes S , and applied directly to horizontal guides F , which are upon the vertically-movable sashes, substantially as described.

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Witnesses:

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