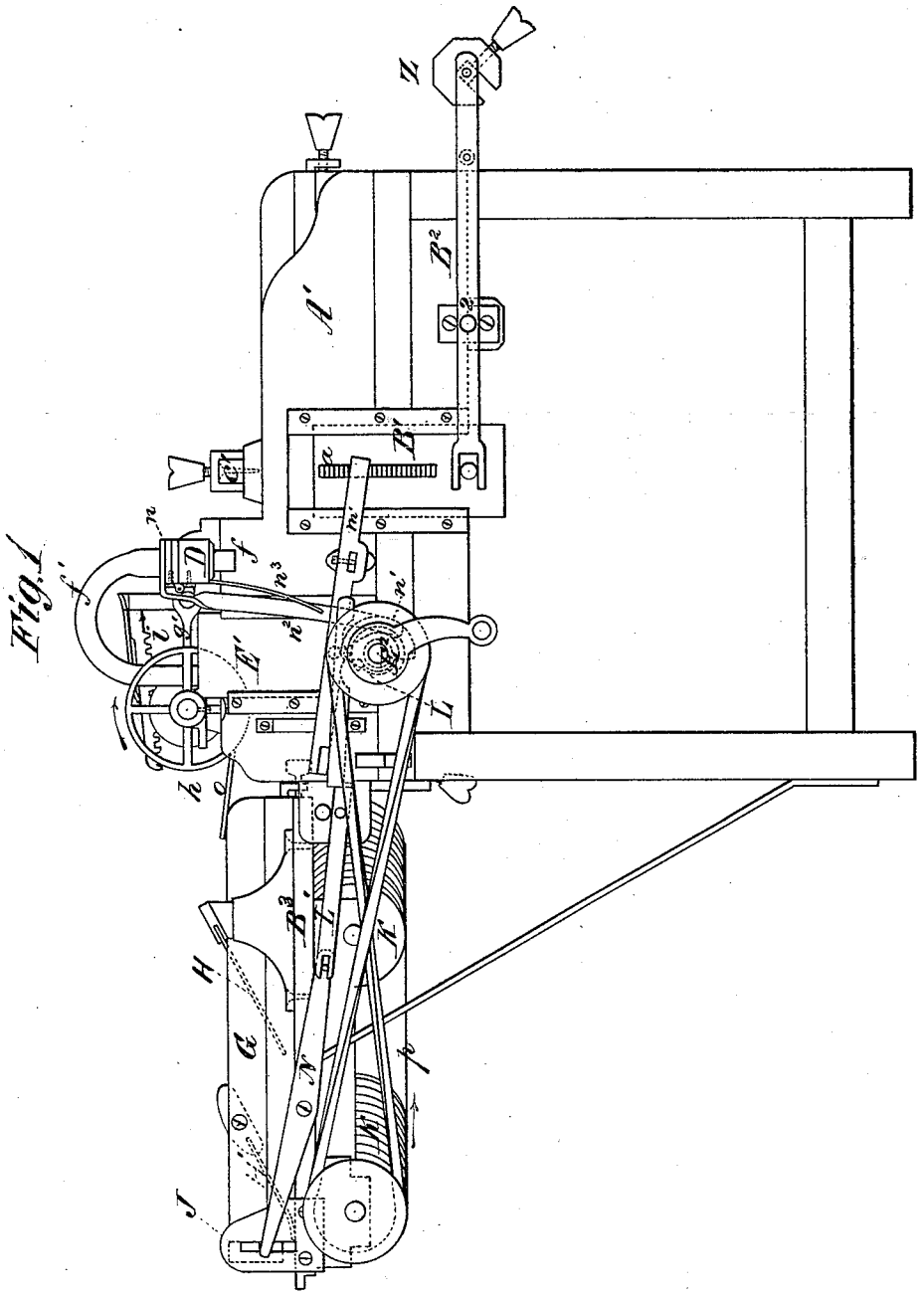
5 Sheets—Sheet 1.

J. T. & F. ASHLEY.

PAPER FEEDING MACHINE.

No. 181,895. Patented Sept. 5, 1876.

Fig. 1.



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5 Sheets—Sheet 2.

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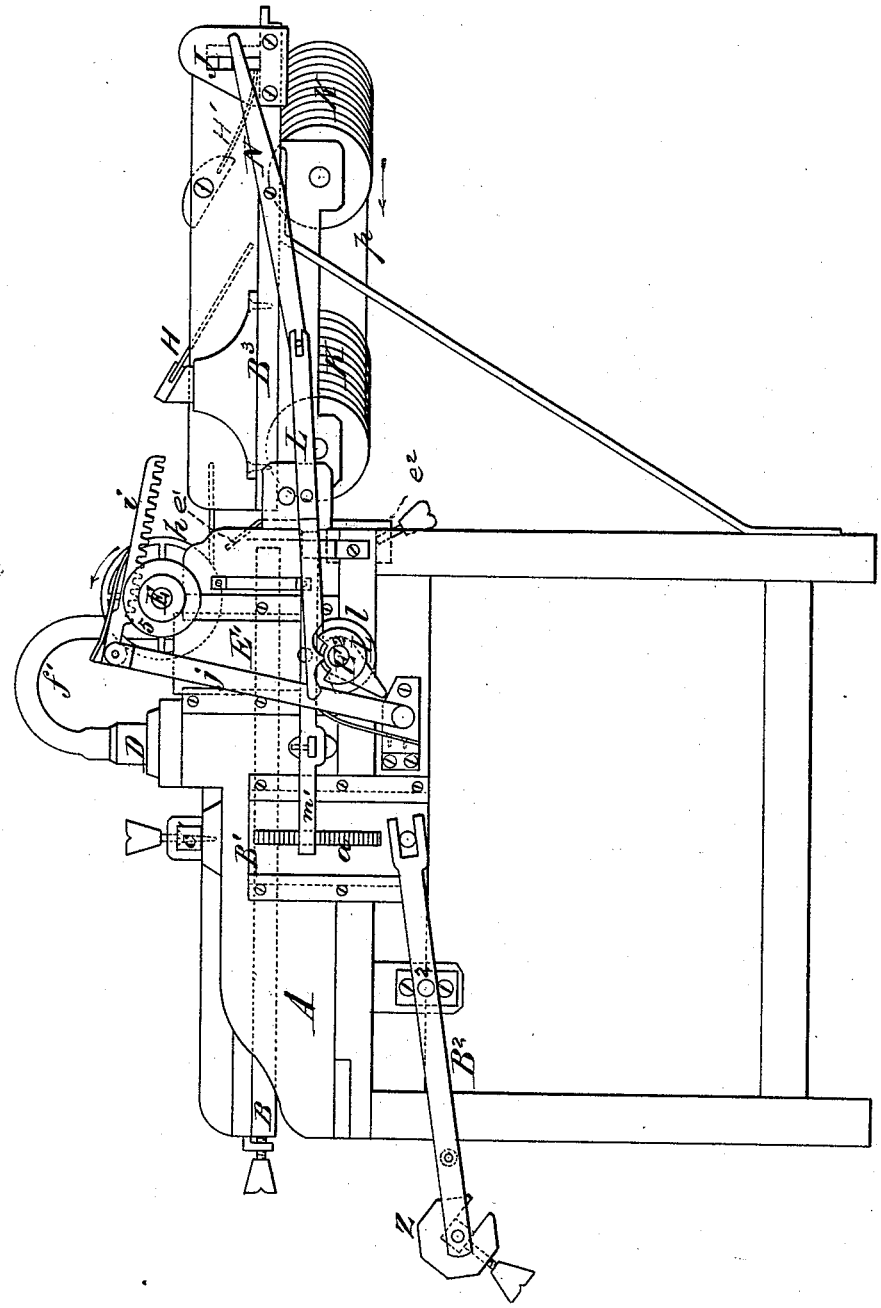
PAPER FEEDING MACHINE.

No. 181,895. Patented Sept. 5, 1876.

Fig. 2



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5 Sheets—Sheet 3.

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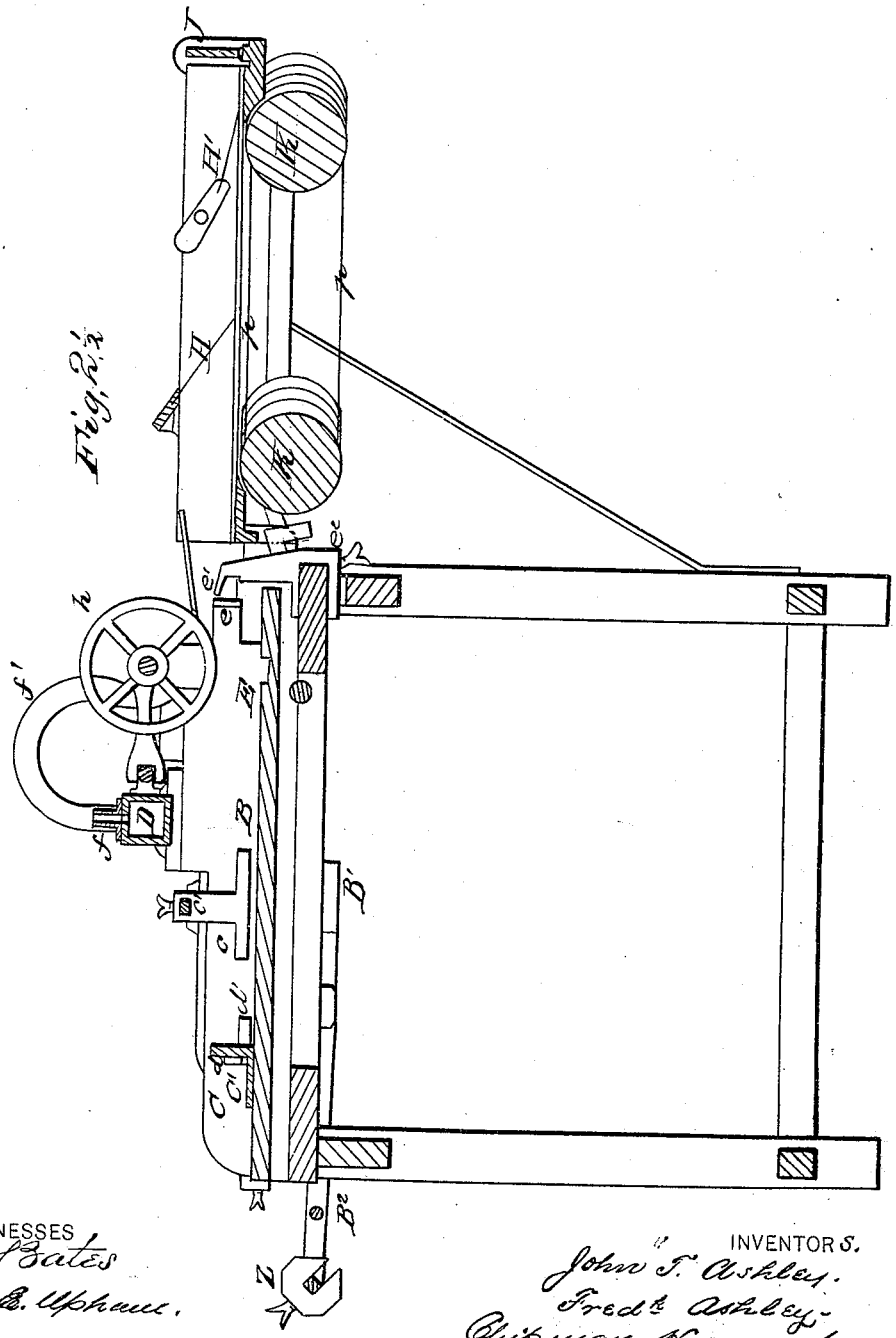
PAPER FEEDING MACHINE.

No. 181,895. Patented Sept. 5, 1876.

Fig. 2.



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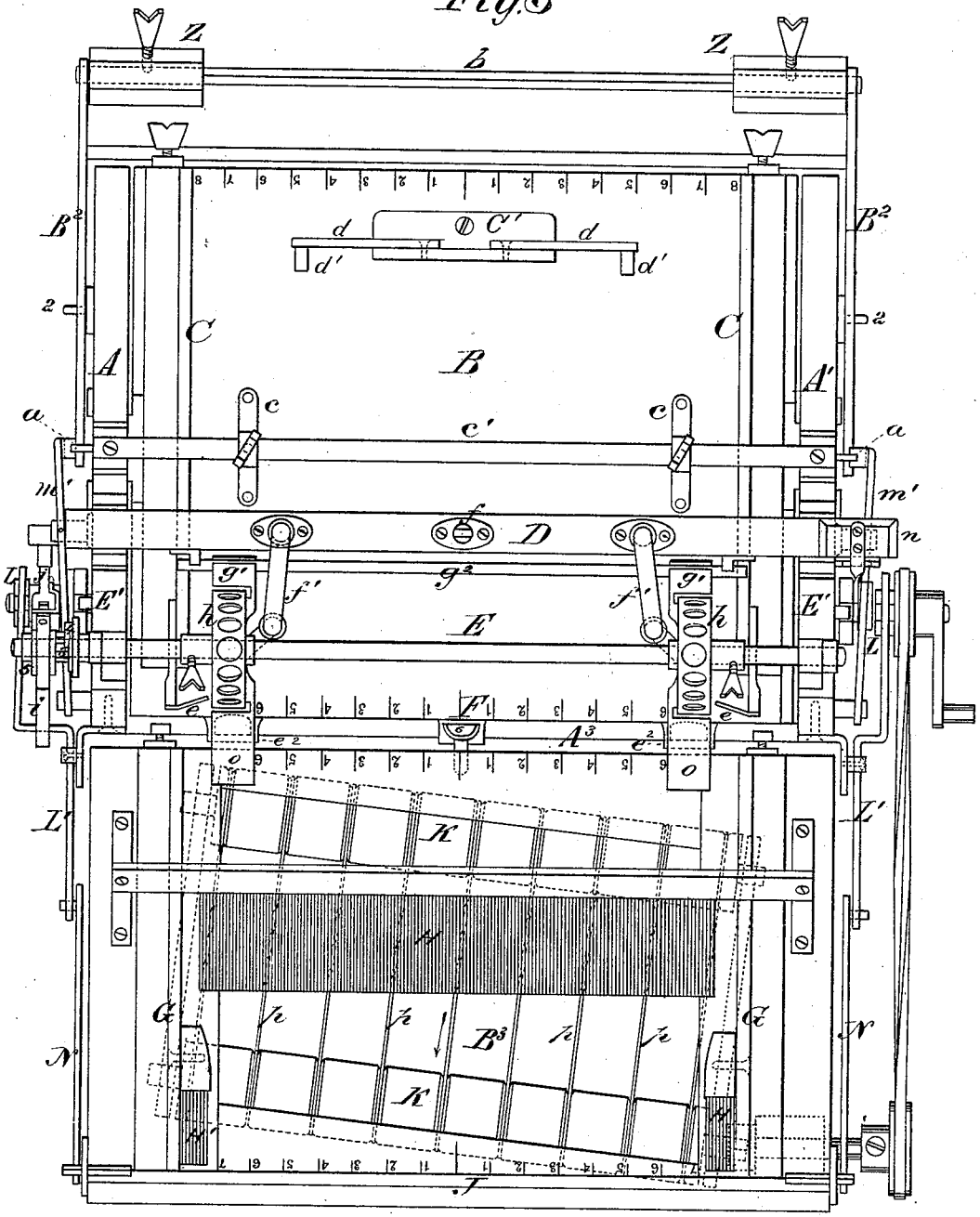
PAPER FEEDING MACHINE.

No. 181,895. Patented Sept. 5, 1876.

Fig. 3



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PAPER FEEDING MACHINE.

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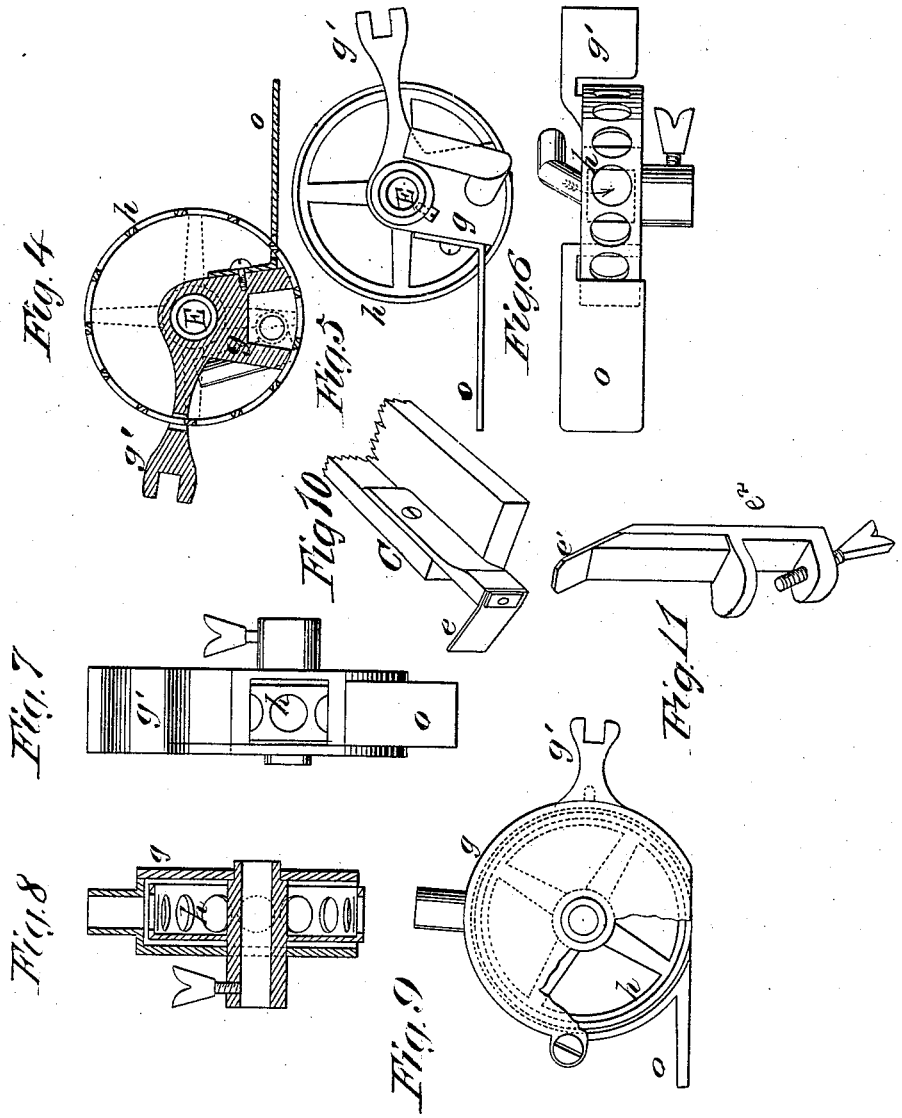

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UNITED STATES PATENT OFFICE.

JOHN T. ASHLEY AND FREDERICK ASHLEY, OF WILLIAMSBURG, NEW YORK.

IMPROVEMENT IN PAPER-FEEDING MACHINES.

Specification forming part of Letters Patent No. **181,895**, dated September 5, 1876; application filed January 8, 1876.

To all whom it may concern:

Be it known that we, JOHN T. ASHLEY and FREDERICK ASHLEY, of Williamsburg, in the county of Kings and State of New York, have invented a new and valuable Improvement in Paper-Feeders; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figures 1 and 2 of the drawings are representations of side views of our paper-feeding machine, and Fig. 3 is a plan view of the same. Figs. 4, 5, 6, 7, 8, 9, 10, and 11 are detail views thereof.

This invention has relation to improvements in pneumatic machinery for feeding sheets of paper consecutively and with certainty to printing-presses, and other machinery requiring to be fed with paper one sheet at a time.

The nature of our invention consists, first, in a vertically-movable horizontal feed-table, on which the pile of paper to be fed is placed, which table is caused to rise and hold the topmost sheet up against one or more stops by means of weights or their equivalents applied to two levers having their fulcra on the sides of the main frame, as will be hereinafter explained; second, in one or more rigid stops arranged over a feed-table at or near the middle of the length thereof, in combination with a feed-table which is vertically adjustable by means of weights and levers, or their equivalents, and which is held horizontally at all times, said stop or stops being laterally adjustable or fixed, as will be hereinafter explained; third, in certain novel devices, hereinafter explained, which will depress the feed-table and relieve the top sheet from pressure against the overlying stop or stops during the operation of removing each sheet; fourth, in the employment of laterally-adjustable thin flexible fingers at the front of the feed-table, for aiding in the separation of one sheet from the other during the act of moving off each topmost sheet, as will be hereinafter described; fifth, in the combination of a perforated feed-wheel, which acts on the margin of the sheet, with a chamber which communicates with an air-exhausting engine, for the purpose of taking from the pile of paper on the feed-table one sheet at a time, and moving it forward upon a registering feed-board, as will be hereinafter explained; sixth, in combining with a feed-wheel and its exhaust-chamber a projection or lip, which will give each sheet a downward direction while being moved forward from the pile, as will be hereinafter explained; seventh, in combination with a vertically-reciprocating feed-table, a blast-pipe, which is arranged at the front of the feed-table, and so constructed that it will spread and throw upward and backward a current of air below the topmost sheet while it is being moved off the pile, and thus separate said sheet from the succeeding lower one, and so prevent a tendency to drag the latter along with it, as will be hereinafter explained; eighth, in the employment of one or more lines of bristles, or their equivalents, which are extended across the feed-board, and which are adjustable or rigidly fixed, for the purpose of pressing the sheets of paper lightly upon endless tapes or other equivalent feeders, so that these feeders will move it forward, and at the same time move it laterally against a registering-board, as will be hereinafter explained; ninth, in the employment of brushes, which will press upon the margins of the sheets, in combination with a registering-board, as will be hereinafter explained; and, finally, consists in the general construction and arrangement of the parts, as will be hereinafter more fully set forth.

The frame of the improved machine consists of two side cheeks, A A^1, connected together by cross-bars in a substantial manner. B designates a horizontal table, on which the pile of paper, to be fed off one sheet at a time, is placed. This table B, which we shall denominate the "feed-table," is rigidly secured to two slides, B^1 B^1, which are allowed to receive vertical motion between guides in the sides A A^1 of the main frame, and on the exterior sides of these slides saw-toothed racks *a a* are secured, for a purpose hereinafter explained.

B^2 B^2 designate two levers, which have their fulcra at 2 on the sides of the frame, and are loosely attached, by their front ends, to the slides B^1 B^1. The rear ends of said levers B^2

B^2 are connected together by a rod, *b*, on which two or more weights, Z, are removably applied, the object of which is to raise the table as the sheets are removed from the pile of paper on it, and to keep the next topmost sheet up against the stops *c c*, which are adjustably applied to cross-bar *c'*.

For some kinds of work the stops or feet *c c* may be omitted, and the bar *c'* used alone as the stop. When the stops *c c* are used, they are adjusted so as to impinge on the side margins of the sheets.

C C are side guides, which are perpendicular to the surface of the table B, and which can be adjusted laterally and set at any desired distance apart, according to the size of the sheets of paper to be fed. The front and rear ends of the table B are marked off, as are also the front and rear ends of the feed-board, for facilitating the setting of said guides. At or near the rear end of the table B is a gage or back-stop, C', to the ends of which two arms, *d d*, are pivoted, carrying friction-fingers *d' d'*, which lie upon the rear edge of the pile of paper, and prevent the topmost sheet, while being carried off, from dragging up the rear edge of the sheet lying next below it. At the front corners of the table B are thin flexible fingers *e e* e^1 e^1, two of which are applied to the side guides C C at right angles thereto, for the purpose of acting on the front corners of the sheets, and the other two are applied to laterally-adjustable clamps e^2 on a cross-bar, A^3, of the main frame, which act on the front edges of the sheets, so as to prevent the topmost sheet, while being carried off, from starting the sheet next below it.

D designates a horizontal trunk, which is secured upon raised portions of the sides A A^1 of the main frame, and *f f* are tubes, one or the other of which communicates with an exhausting-engine. From this trunk spring two flexible tubes, *f' f'*, which communicate with boxes *g g* inside of wheels *h h*, whose rims are perforated. The boxes *g g* are segments of circles, and their perforated bottoms are fitted snugly against the interior surfaces of the rims of wheels *h* at the lowest point thereof. These boxes are hung from a shaft, E, and rear extensions g^1, formed on them, receive a rod, g^2, fixed to the trunk D, and are free to vibrate about this rod when shaft E is raised and depressed. The perforated wheels *h* are secured on the shaft E, and the latter has its bearings in sashes or slides E^1 $E,^1$ which are vertically movable between guides in the sides of the main frame. The boxes *g* and their wheels *h* are applied to the shaft E by means of set-screws passed through the hubs of the wheels, by loosening which screws these wheels can be adjusted at any desired distance from each other, according to the size of sheets to be fed. This lateral adjustment is necessary in order to bring these narrow feed-wheels to act upon the blank or marginal parts of the sheet, such narrow wheels being required from the fact that a continued cylinder, to extend across the sheet, could not be used where printing is to be repeated, as with colored work, because such cylinder, so extending, would make "set off," and so spoil the work. Instead of using boxes inside of the wheels *h*, these wheels may be inclosed in cases, as shown in Figs. 7, 8, 9, from which cases the air is exhausted through the flexible pipes and trunk above described. On one end of the shaft E a flanged pinion, 5, is loosely applied, having a ratchet-wheel, 3, on one end, with which a pawl, 4, engages. The pawl 4 is pivoted to a plate fixed to the shaft E. A rack, *i*, is pivoted to the upper end of an arm, *j*, which receives vibration from a single-throw cam on one end of the main driving-shaft E^2. The rack *i* is held in gear with the pinion 5 by means of a spring, and the forward stroke of this rack is caused by means of a spring. The parts thus described are so constructed and timed that at every revolution of the main shaft E^2 the wheels *h* will receive one revolution, and will move a sheet of paper from the pile on the table B and deliver it upon a feed-board, hereinafter described.

This is the action when one revolution affords a sufficient feed, as in many cases it does; but in much of the feeding that is to be done the wheels must continue this action on the sheet until the back edge leaves them, whereupon they act immediately upon the next sheet below, and so continue feeding the sheets in as quick succession as the machine being fed may require. In such case, as is obvious, the feed-wheels do not rise, but rest with their shaft upon the top edges of the side frame, and the rack and pinion gear are not used, only the feed-wheels driven by a simple pulley.

As preparatory to the act of the forward movement of the sheets by the feed-wheels, a blast of air is kept upon the front edges of the upper sheets of the pile of paper. This blast requires to have an upward direction at an angle of about twenty-seven degrees, by which arrangement several sheets will be raised at one time, and yet each will be so acted on as to be separate from the next below it. This blast is continuous, such being found to be better than when intermittent.

The act of final separation takes place as the tape and paper move upward toward the stops, and is necessary to break the vacuum between the sheets, and to relieve them of friction preparatory to their being moved by the feed-wheels. Previous to the movement of the feed-wheels to feed the sheet, cams *l l* on shaft E^2 raise the front arms of the pawl-levers *m' m'*, which then engage with the racks on the slides, and depress the table B, thereby freeing the top sheet of the pile of paper from the upward pressure of the weights. Immediately after the cessation of this pressure, cams *l l* on the shaft E^2 raise the shaft E, and thus pick up the front part of the top sheet from the pile.

The wheels *h* now move the sheet forward

upon the feed-board a proper distance, when it is released by the admission of air into the trunk D through an opening, which is provided with a hinged valve, *n*. This valve *n* is opened, when the sheets are fed out far enough upon the feed-board, by means of a cam, n^1, on shaft E^2, which presses against an arm, n^2, fixed to said valve. A spring, n^3, which is fixed to the trunk, closes the valve, when the wheels descend upon the pile of paper. In practice, a valve, *n*, will be applied at each end of the exhausting-trunk.

During the act of moving forward a sheet by the rotation of the wheels *h*, there is a tendency to throw up its front edge. To prevent this, depressing-lips *o* are secured to the shells of the exhausting-chambers, which lips extend forward a short distance over the front end of the feed-table.

The feed-board B^3 is secured to the front end of the main frame, and on this board are two registering-guides, G G, three brushes, H H′ H′, and a front clamping-bar, J. The bed of this feed-table is formed mainly of endless tapes *p*, which are arranged diagonally and passed around rollers K, that receive rotation from the main driving-shaft E^2. The two guides G G are laterally adjustable, and only one of them is used at a time, against which the sheets are moved by the endless tapes *p* while being fed to a printing-press or other machine.

The rollers K will, in some cases, be made reversible, so that the sheets can be moved either to the right or left hand registering-guide G, as circumstances require.

It is important that the sheets be held down upon the tapes *p*, that sufficient friction be induced to cause these tapes to move the sheets with certainty; and to this end we use the long brush H, which is arranged at or near the middle of the length of the feed-board, and inclined, as shown, so that the ends of the bristles will gently press the sheets down upon the moving tapes. In advance of the long brush H are the two narrow brushes H′ H′, which are adjustably applied to the vertical portions of the registering-guides G, and lightly press the margins of the sheets upon the smooth horizontal ledges of the said guides. These narrow brushes can be turned up out of the way or made to press with more or less force upon the sheets, as may be required.

The bar J, which extends across the front or discharging end of the feed-board, is designed to arrest a sheet which would, if allowed to pass, not be taken by the gripers on the cylinder of a printing-press; that is to say, said bar will drop and hold a sheet until the gripers are in a position to take it, after the front guides of the press have left it. The clamping-bar J receives, at proper times, vertical movements, which are imparted to it by the following means: L L designate cams on the main shaft E^2, which operate on levers L′ N on each side of the machine, and give vertical movements to bar J, which harmonize with the forward movements given to the sheets on their way to the cylinder of the printing-press, and drops on the front edge of the sheet.

It will be seen from the above description that the exhausted feeding-wheels *h* have a vertical movement and revolve intermittently. When greater speed is required than for superior printing, said wheels are caused to revolve continuously, and are not vertically movable.

The rod g^2 at the back of the feed-wheels serves the purpose of keeping the open parts of the air-exhausting chambers in proper relation to the top surface of the pile of paper on the table B. Said rod also prevents the air-chambers from binding on the shaft E, and allows them to be readily adjusted laterally for sheets varying in size.

Instead of using the rack and pinion for revolving the feed-wheel shaft E, geared wheels, friction-wheels, or other equivalent means may be adopted for this purpose; and instead of using brushes H H′ H′ for keeping the sheets down upon the endless diagonal feeders, this may be done by blasts of air directed downward upon the sheets.

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

1. The feed-table B, vertical slides B^1 B^1, and weighted levers B^2 B^2, combined as described, and for the purpose set forth.

2. The combination, with the feed-table B, of the racks *a*, pawl-levers *m′*, cam *l*, and weighted levers B^2, having their fulcra on the sides of the main frame, all constructed and arranged as shown and described.

3. The feet or stops *c c*, laterally adjustable upon bar *c′*, for the purpose of being brought to bear upon the margin of the sheets of paper when the bar of itself cannot be used.

4. Gravitating friction-fingers *d′ d′*, in combination with a back-stop, C′, and the feed-table B, substantially as described.

5. The laterally-adjustable thin flexible fingers e^1 e^1 e^2 e^2, combined with the feed-table B, substantially as described.

6. The feed-wheel *h*, for operating on the margin of the sheet, in combination with segmental exhaust-chamber, and an extension for holding said chamber in a proper relation to that part of the feed-wheel in immediate contact with the sheets of paper, to enable said feed-wheel to act substantially in the manner and for the purpose specified.

7. The combination, with the perforated wheel *h* and air-chamber *g*, of the depression extension *o*, substantially as and for the purpose set forth.

8. The combination, with a reciprocating feed-table, B, of the blast-pipe F, delivering a continuous blast in an upward direction, for separating the sheets of paper preparatory to their being moved by the feed-wheels *h*, substantially as and for the purpose described.

9. Brush H, in combination with the tapes of a feed-board, substantially as described.

10. Brushes H′, combined with the registering-guides G G, substantially as described.

11. The bar c', for the purpose of stopping the vertically-reciprocating feed-table and the paper thereon in their ascent, and holding the same in proper position previous to the act of feeding, in combination with said feed-table, substantially as described.

12. In combination with the exhausting-trunk D, one or more valves, n, their arms n^2, springs n^3, and cams n^1 on shaft E^2, substantially as described.

13. Rear bifurcated extensions g^1 on the exhausting-chambers g, in combination with the rod g^2 on the trunk D, substantially as described.

14. The flexible pipe, in combination with the chamber g and the perforated feed-wheel h, substantially as and for the purpose described.

15. The exhausting-chamber g, provided with the extension g^1, for the purpose of holding said chamber in its proper relation to that part of the wheel immediately in contact with the paper, as described.

16. The perforated feed-wheels h, in combination with a revolving shaft, said wheels being laterally adjustable thereon, in order to set said wheels at a greater or less distance apart, to accommodate sheets of paper of different widths.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

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Witnesses:
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