

(No Model.)

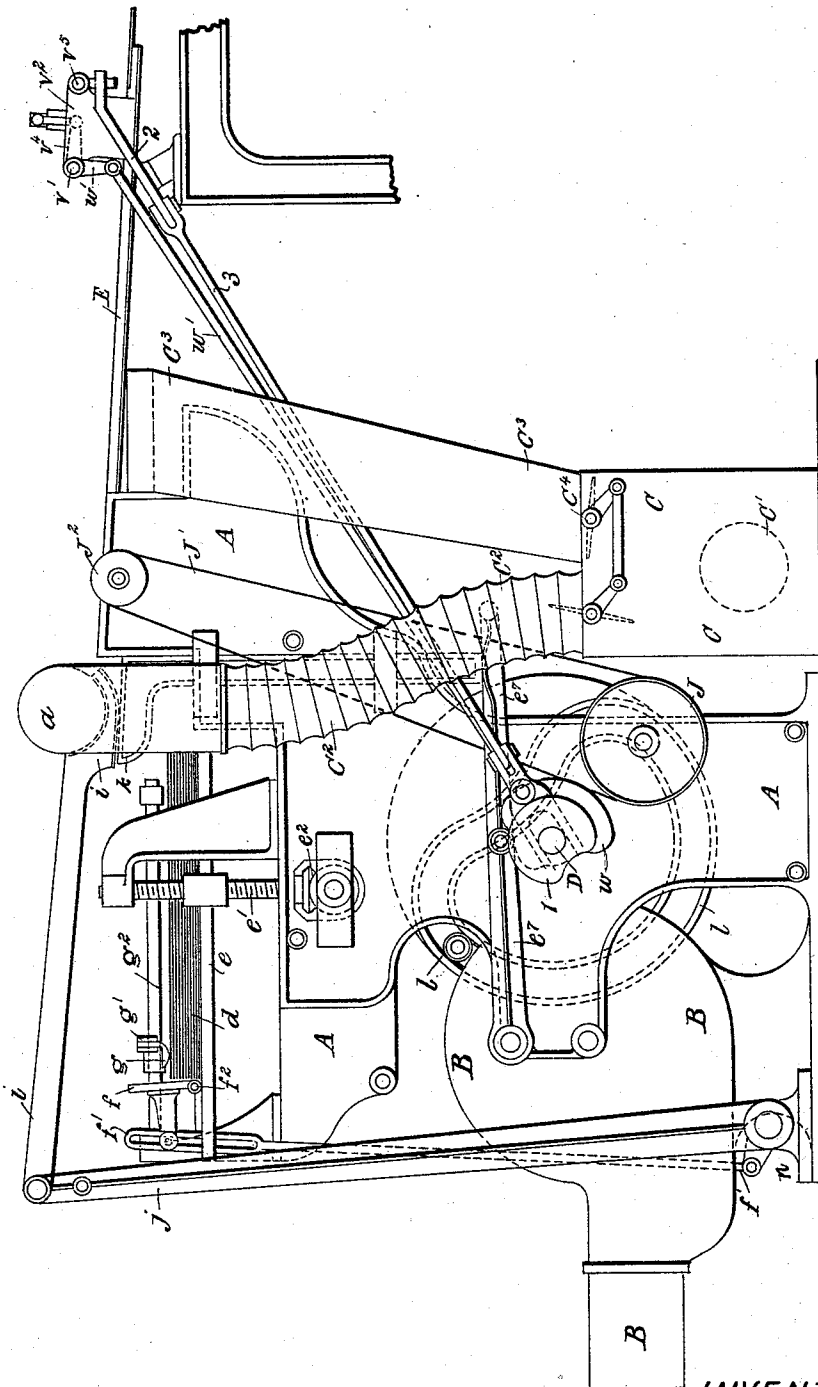
6 Sheets—Sheet 1.

F. HOYER.
PAPER FEEDING DEVICE.

No. 534,717.

Patented Feb. 26, 1895.

Fig. 1.



WITNESSES
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(No Model.)

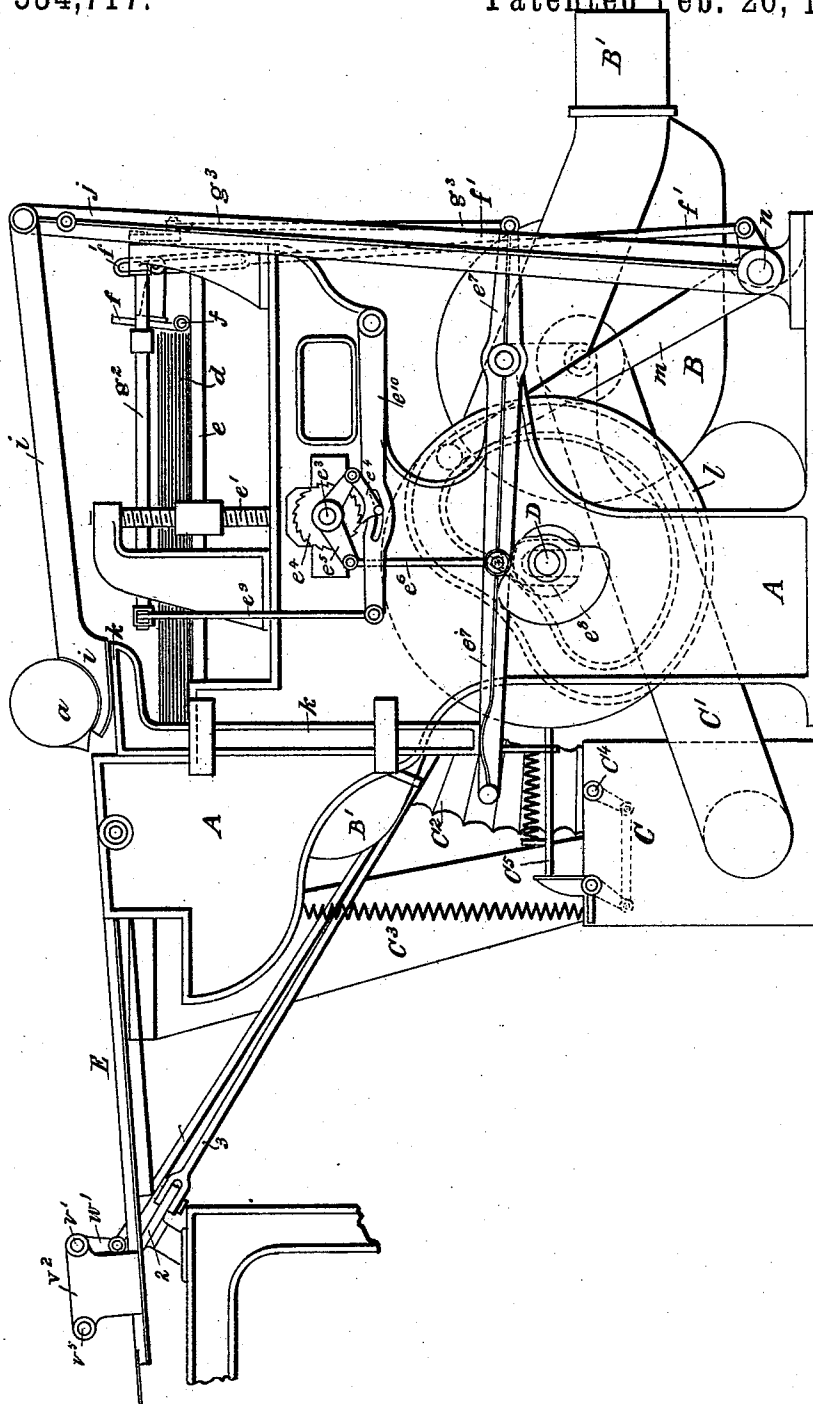
6 Sheets—Sheet 2.

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Fig. 2.



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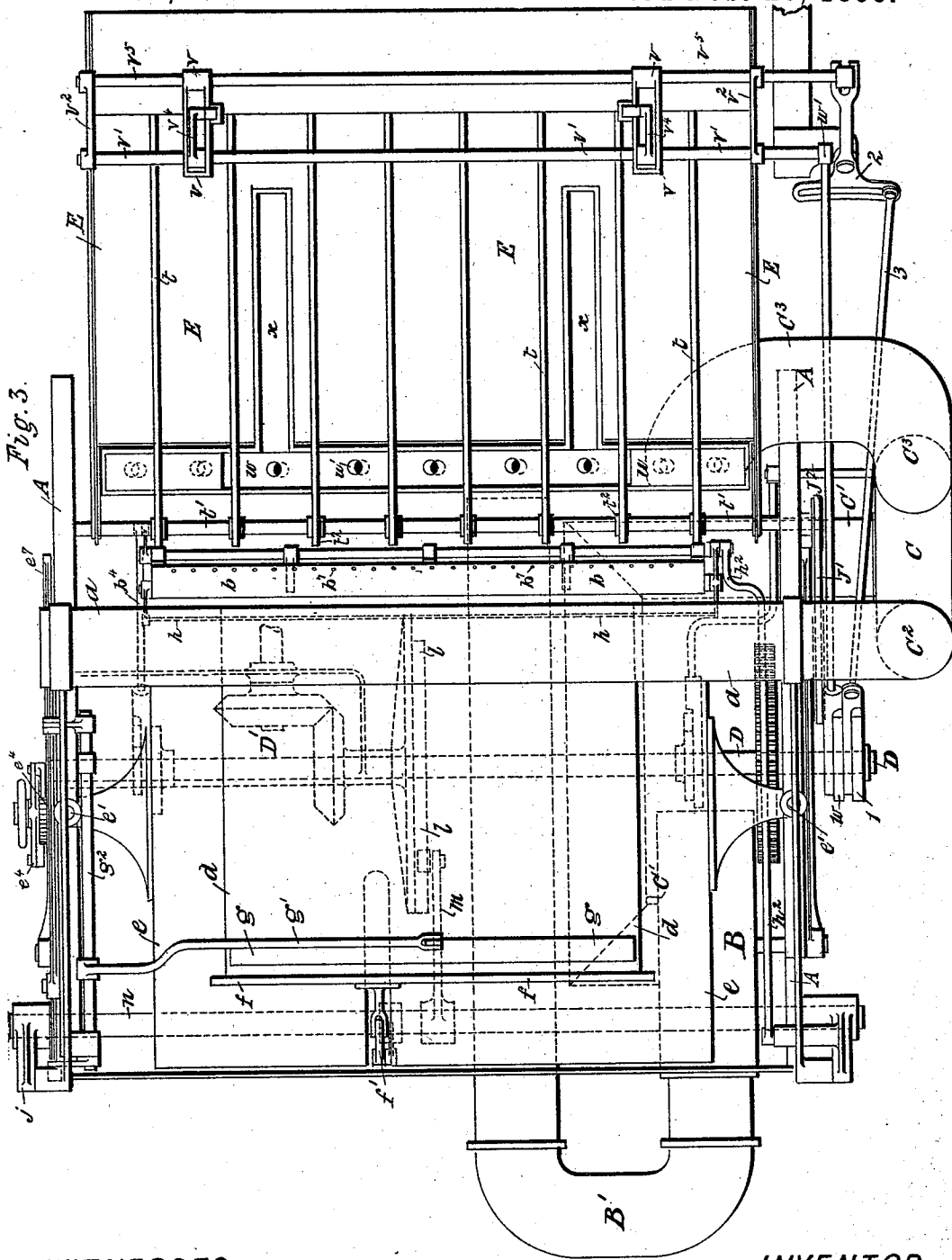
(No Model.)

6 Sheets—Sheet 3.

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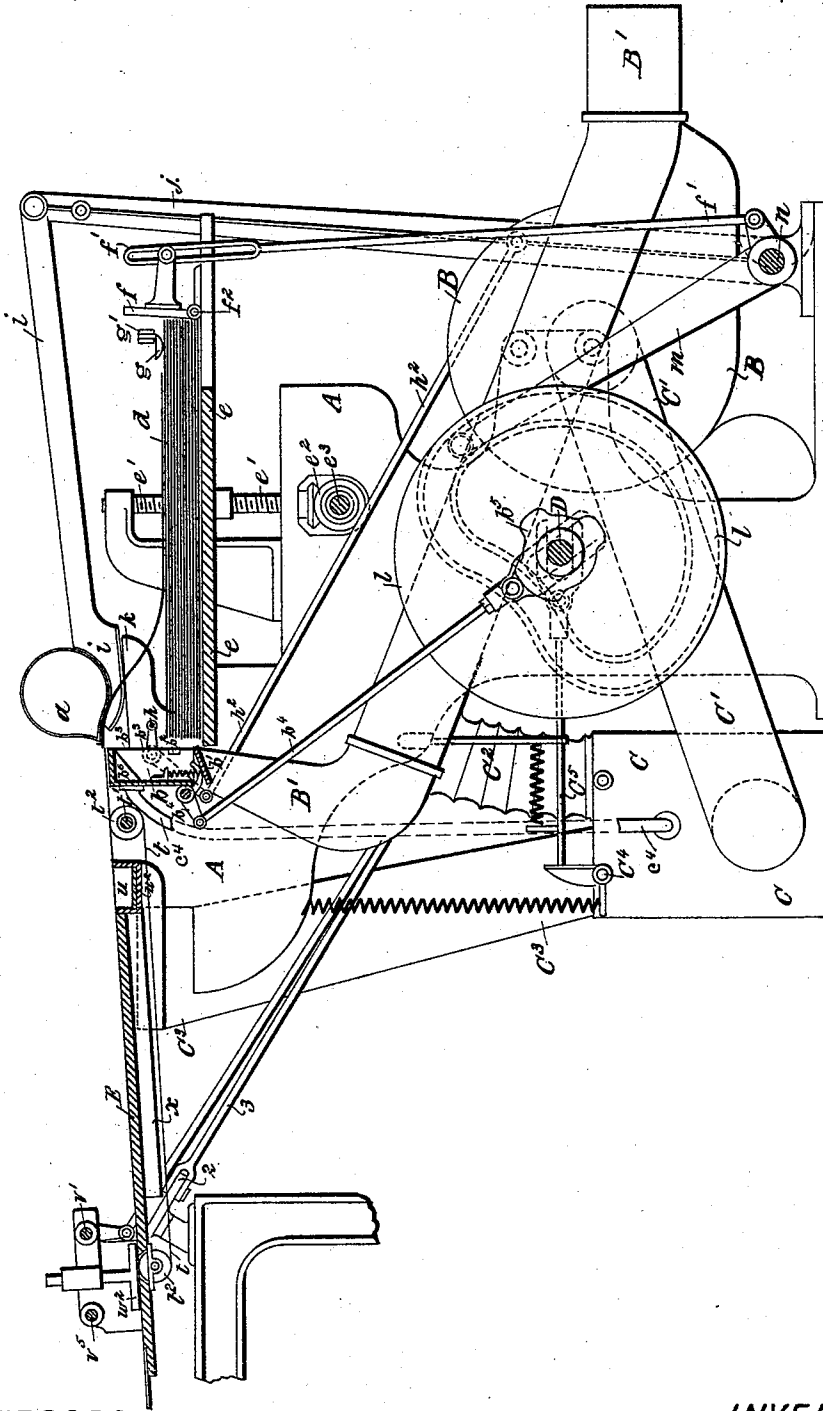
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Fig. 4.



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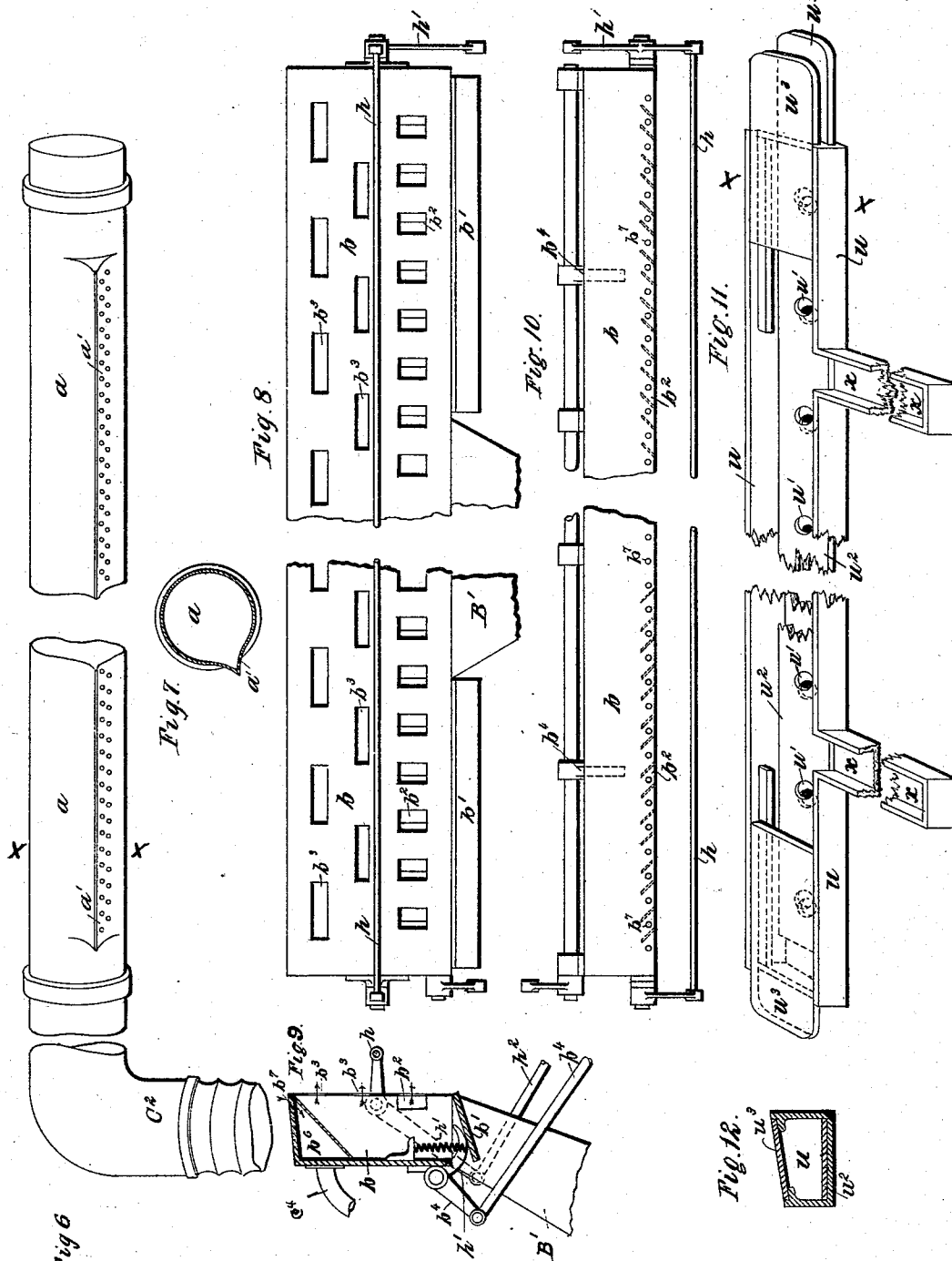
(No Model.)

6 Sheets—Sheet 6.

F. HOYER.
PAPER FEEDING DEVICE.

No. 534,717.

Patented Feb. 26, 1895.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

FREDERICK HOYER, OF LIVERPOOL, ENGLAND.

PAPER-FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 534,717, dated February 26, 1895.

Application filed November 25, 1887. Serial No. 256,053. (No model.) Patented in England January 23, 1886, No. 1,032; in France October 30, 1886, No. 179,357; in Belgium November 2, 1886, No. 75,071, and in Germany November 10, 1886, No. 40,611.

To all whom it may concern:

Be it known that I, FREDERICK HOYER, engineer, a subject of the Queen of Great Britain, and a resident of the city of Liverpool, in the county of Lancaster, England, have invented new and useful improvements in feeding paper or other material to printing and other machines and mechanism employed therefor, (for which I have obtained a patent in Great Britain, No. 1,032, bearing date January 23, 1886; a patent in France, No. 179,357, dated October 30, 1886; a patent in Belgium, No. 75,071, dated November 2, 1886, and a patent in the German Empire, No. 40,611, dated November 10, 1886,) of which the following is a specification.

My invention has for its object certain improvements in feedings sheets of paper, or other material to printing and other like machines and apparatus employed therefor whereby the action of such apparatus is rendered more effective and reliable and the cost is reduced.

The following is a description of my invention in such full, clear and distinct language as to enable any one skilled in the art to which it belongs to put the same into practice, reference being had to the accompanying drawings which make a part of this specification and to the letters and figures of reference marked thereon, like letters and figures being used to denote the same or corresponding parts throughout the drawings.

In the drawings, Figure 1 is a side elevation of an apparatus with my improvements applied thereto, for feeding sheets of paper to printing machines. Fig. 2 is a side elevation showing the reverse side of the apparatus shown at Fig. 1. Fig. 3 is a plan of the apparatus. Fig. 4 is a sectional elevation of the apparatus. Fig. 5 is an elevation of the gear for operating the delivery tapes. Fig. 5^a is an end view of the gear for operating the delivery tapes shown in Fig. 5. Fig. 6 is an elevation showing the suction chamber. Fig. 7 is a section of the suction chamber through X X Fig. 6. Fig. 8 is an elevation of the front blowing chamber. Fig. 9 is a sectional end view of same showing the air valve and gear. Fig. 10 is a plan of the blowing chamber. Fig. 11 is a perspective view of a portion

of the front suction chamber. Fig. 12 is a section through X X Fig. 11. Fig. 13 is a side elevation of the side registering device. Fig. 14 is an end view of Fig. 13. Fig. 15 is a plan of Fig. 13.

My invention consists of certain novel methods and certain novel parts and combinations of parts specified in the concluding claims.

The class of machine with which the above set forth appliances are used is that in which the sheets of paper are lifted sheet by sheet by suction from a pile of paper, and fed by tapes as lifted to the printing, or other machine. My said improved appliances are all mounted on a suitable frame, working in conjunction with an air exhaust and blowing apparatus and valves and rods, levers, cams, eccentrics, driving shafts and pulleys, as usual and common in this type of apparatus.

I will now describe the apparatus and the appliances and their features, reference being had to the drawings.

A is the framework of the apparatus. B is the exhaust fan. C is the exhaust chest connected to the fan B by the duct C' and connected to the lifting suction chamber *a* by the expanding duct C². D is the main shaft of the apparatus. D' is the bevel wheel gearing by which motion is imparted to the main shaft D. E is the feed table of the apparatus. These parts are common to machines of this type.

I will now describe the apparatus and the appliances according to my present invention.

b is a front blowing or blast chest. This consists of a chamber having suitable air supplying ducts from the blowing fan and provided with a valve *b'* for controlling the blast of air. This blast of air is obtained from the discharge of the exhaust fan B through the duct B'.

The front, or blowing face of the chamber *b* is constructed as shown in Figs. 8, 9 and 10, with diagonal openings or leads, being blowing orifices *b*², whereby the blast is delivered in streams converging toward each other.

The blowing face of the chamber *b* extends across the whole machine and is of greater width than the pile of paper *d* to be acted upon so that the outside currents of the blast

of air passing through the leads b^2 will diagonally strike the front corners of the pile of paper d . This feature of my invention is an important one, inasmuch as the leading edges 5 of the pile of paper d are, when trimmed by a "guillotine," often "burred" into each other or curled up or down and the sheets are thus difficult of separation.

By causing the blast of air from the blowing chamber b to strike the pile of paper d diagonally on the side of the front corners as well as on the front, I secure a means of striking the edges of the pile which may not be thus "burred" together, or curled up, or down 15 and I thus gain a passage for the separating blast between every sheet.

The upper portion of the sheet blowing face of the chamber b , namely the portion which acts on the paper while being lifted by the suction cylinder a is provided with interspaced blowing orifices b^3 , namely, the orifices c^3 are so placed that the lower row of these orifices b^3 act only on a portion of the edge of the paper d , and the upper orifices b^3 act on the 25 other portions of the edge of the paper d , thus giving an intermediately directed blast. The diagonal nature of the leads is confined to the orifices b^2 , the orifices b^3 having direct leads.

The blast of air through the whole of the face of the blowing chamber b is of an intermittent or pulse nature, which is effected by the valve b' operated by the rod and lever and spring pawl connection b^4 . This is worked by a cam b^5 on the main shaft D, which when in operation opens and closes the valve b' and so allows the air to escape when open. This action causes the sheets to rise and fall on the pile and by this motion a better separation of the sheets is effected.

The top of the chest b is partitioned off at b^6 to form a suction chest connected to chest C. e is the table for carrying the pile of paper. f is the back gage on the table e for the pile of paper d . When feeding paper apt to break 45 when buckled I make this back gage f as shown at Figs. 1, 2 and 4, with the vertical part hinged at f^2 and I work it from the shaft n by the rod f' so that it may have a backward rocking movement about the hinge f^2 so that when treating classes of paper which are particularly apt to break when buckled, the upper part of the back gage will have been moved away from the edges of the upper sheets of the pile when the upper sheet is 55 moved toward said gage, thus overcoming the danger of the paper breaking.

g is a separator for the rear edges of the pile of paper d . It consists of a cross bar which rests on the top of the paper d at the rear end of the pile. This separator is carried by the arm g' on the shaft g^2 by a jaw-joint which is made with so much slackness as to allow of the bar g having a small amount of movement in the horizontal plane. The 65 shaft g^2 receives a rocking motion from the lever e^7 to which it is connected by the rod g^3 . This rocking motion of the shaft g^2 gives

the separator g an intermittent upward movement and by attaching the separator g off its center to the arm g' as shown, and loosely as 70 just specified it has also a slight forward rocking movement when moved onto and off the pile which separates the top sheet from the sheet next below on the pile. The separator g also acts as a gage weight and brings into action the ratchet gear e^4 by means of the rod e^9 and the slotted arm e^{10} . The lever e^7 receives motion from the cam e^8 on the main shaft D. The table e is actuated or raised to compensate for the feed of paper by means 80 of the screws e' , the feeding action of which is obtained by means of the bevel wheel gear e^2 carried by the shaft e^3 operated by the ratchet gear e^4 receiving motion from the rocking arm e^5 and the rod e^6 which receives motion from the lever e^7 and the cam e^8 on the main shaft D. This action is also utilized for operating the tapes and is hereinafter set forth particularly with reference to Figs. 5 and 5^A. Thus the table is raised by the action 90 of the cam e^8 to compensate for the feed of paper.

h is a rocking bar, or guard on the front of the blowing chamber. It is carried and worked by the bell crank levers h' and the rod h^2 from the lever j . As the suction chamber a moves back it is raised, and returns to its normal horizontal position as the suction chamber a passes forward to deliver the sheet of paper. The lifting chamber a 100 consists of a chamber, or casing which extends across the apparatus. The under side of the chamber a is formed with a lip a' curled up at the front, the bottom of which is provided with a suction orifice, or orifices. 105 One end of the suction chamber a is connected to the expanding duct C² and thereby to the suction chamber C and to the exhaust fan B. The suction chamber a is carried by the two horizontal brackets i the outer ends of which are carried by the vertical levers j and the other ends of which have horizontal movement on the vertical carrying brackets k which have vertical movement. The horizontal movement of the brackets i and the suction lifting chamber a is caused by the cam l on the shaft D which imparts movement to the lever m and through the shaft n to the levers j and the brackets i . Vertical movement is imparted to the brackets k by 120 the levers e^7 which are worked by the cams e^8 on the main shaft D. The suction chamber is placed immediately behind the blowing chest b and over the front edge of the pile of paper d , the sheets of which have to be lifted. Assume the suction to be on and the upper sheet of the pile of paper to have been drawn by such suction to the upper lip a' of the chamber a , the chamber a receives a backward movement by the action of the cam l and the lever j , the suction chamber a taking with it the upper sheet of the pile of paper d and slightly buckling it over the pile. This buckling together with the di-

agonal blast through the orifices b^2 of the chambers b effectually separate the upper sheets of paper. The suction chamber a with the sheet of paper adhering is then lifted by an upward movement of the bracket k obtained from the levers e^7 and cams e^8 . After being raised the chamber a receives a forward horizontal movement up to the face of the blowing chest, when there is a momentary rest given by reason of the shape of the cams l to allow any sheet which may be adhering to drop off (or this rest may be given when the sheet has been lifted to the full height before it moves forward to the feeding table). It then has a second vertical movement up and past the face of the blowing chest, during which the edge of the paper is operated upon by the blast from the upper orifices b^3 of the blowing chest b which blast acts to separate any second adhering sheet. The backward stroke of the chamber causes the bar h to be raised so that any superfluous adhering sheets may fall back onto the pile d , which is further insured by an under suction from the chamber b^6 through the orifices b^7 , the chamber b^6 being connected by a duct c^4 to the chest C. After the upward movement past the blowing chest b , the lifting suction chamber a has a further horizontal movement forward which brings the leading edge of the sheet of paper onto the tapes t of the feed table E and on the suction being cut off from the lifting chamber a the sheet of paper is carried by the tapes t to the printing machine.

To cause the sheets of paper to adhere to the delivery tapes t and to insure their carrying action I provide a second suction chamber, or trough u which extends across the machine just behind the table E. This trough u is open at the top to the under surface of the tapes t , so that when the lifting suction chamber a places the leading edge of the sheet of paper over the suction trough u , the suction being cut off from the lifting chamber a and at the same instant the suction being opened to the suction trough u , the latter, acting on the sheet delivered onto the tapes t which pass over the trough u , will draw the sheet of paper down against the tapes t which are then started running by the tape operating gear J. The suction trough u is connected to the suction chamber C by the duct C^3 and is provided with orifices u' on the under side of the regulating shutter valve u^2 . The top of the trough u is provided at each end with adjustable shutters u^3 to enable the width of the open portion of the trough to be regulated to suit different widths of paper. The suction through the duct C^3 is regulated by a valve and spring C^4 which is worked by a rod C^5 operated by a cam on the main shaft D. The sheet of paper is then caused to move down the table to the front register and also comes under the action of the side register hereinafter described. In some instances, for example in lithographic printing, the table E

is required to be set at a considerable incline and there is considerable danger to the sheets of paper buckling in their passage down the table. To obviate this objection I continue the suction trough u down the table E by the branches x , or I provide the lower end of the table E with a suction trough similar in all respects to the suction trough u . This suction trough holds the paper and prevents the papers buckling by coming too suddenly against the ordinary printing machine front register.

The front side register by which the sheets are adjusted, or registered sidewise, is illustrated in detail in Figs. 13, 14 and 15. It consists of a bracket v mounted and adapted to move laterally on the shafts or rods v' , v^5 , held and supported by the table E by brackets v^2 fixed thereon. The bracket v has a foot piece w^3 which comes in contact with the surface of the table E, that is, just touches it. The attachment of the foot-piece w^3 with the bracket v is made by a horizontal upper flange thereon fitting in a corresponding slot 5 in the bracket v and is held frictionally by being a tight fit therein. The adjustment is made by thumb set screws h^8 working and screwing through the end of the projecting part of the bracket v in which the foot-piece w^3 is supported. By operating these thumb screws h^8 , the foot piece w^3 can be pressed outward, or adjusted in that direction to the required degree, while the opposite movement into the slot 5, is done by pressing the foot-piece w^3 inward with the hand. By this the finest adjustment of the device and registering of the paper can be given; which is very important in color printing where several colors have to be put upon the same sheet, and the following colors have to fall in their right places. The base of the foot-piece w^3 as will be seen, has a rise at the leading end and a fall from the top of said rise to the back edge. The paper passing down the table meets the rise and passes up over same, thereby causing one edge or side of the sheet to be raised off the table, thereby enabling the sheet to be more readily moved laterally. The leading edge of the foot plate and the back edge thereof, just touch the surface of the table E. The gripper by which the sheet of paper is gripped and held on the foot piece w^3 is designated w^2 ; and this gripper is supported by a boss of the bracket v through which its shaft works, and said shaft is connected to the transverse shaft v' by a lever v^4 mounted on the shaft v' and a connecting rod connecting the end thereof with the upper end of said gripper rod. The shaft v' is rocked or vibrated in its bearings by the cam w and lever w' ; and thus at each rotation of said cam the shaft v' is vibrated in one direction and then back, and in each action the gripper w^2 is lowered and raised onto and off the paper on the foot-piece w^3 by the means just described.

The shaft v^5 has a to and fro motion longitudinally through its bearings, namely, the

brackets v^2 , this motion being imparted to it by the crank 2 which is connected to the ends of said shaft, and is operated by the cam l on the shaft D, and connecting rod 3. The bracket v when adjusted to the right position along the shafts $v'v^5$, is fixed in position by a set screw (not shown in the drawings) which passes through the boss of said bracket and presses on the shaft v^5 , and so grips it.

The action of the apparatus is as follows: Each sheet as it passes down the table E passes over the foot piece w^3 of the registering device, against and by which it is to be registered sidewise, and travels forward until it reaches the ordinary stops of the printing machine, which, of course, in the ordinary way registers the front edge of the sheets. When the sheet has arrived at this position, the shaft v^5 , which carries the registering apparatus, is given a longitudinal movement by the means above described, whereby the sheet is first pushed outward by the edge which will be bearing upon the vertical side of the foot-piece w^3 . Then the gripper w^2 is brought down upon it by the means above described, whereby the sheet is gripped upon the foot-piece w^3 ; and then the whole device is brought back again by the reverse movement of the shaft v^5 and pulled sidewise and registered in the right position, prior to its being removed by the printing machine mechanism in the ordinary way. When the leading edge of the sheet has been caught by the ordinary grippers of the printing machine in the ordinary way, the side registering gripper w^2 is raised and releases the sheet, which is then drawn off by the printing machine. As each successive sheet is fed forward down the table E, all the operations just described are performed. By this arrangement I combine the pushing, or drawing motion for side registration and for use as a holding device, and I provide a means whereby the sheets of paper are to be held in position after registration for delivery to the printing machine.

As previously set forth J is the driver for the tape rollers which receive motion as hereinafter described and communicates such motion to the driving pulley J^2 (mounted in the tape roller shaft t') through a belt J' . The tapes t run on rollers t^2 mounted on the shaft t' in the ordinary way. The tapes receive intermittent motion, such motion being imparted when each sheet is fed onto them from the suction chamber a and are stopped when the sheet has been registered by the front side registers and during the time just prior to the sheet being taken away by the printing, or other like machine. The mechanism by which the alternate movement and stoppage is effected consists of the gear shown in Figs. 5 and 5^A in which J is the driver pulley placed outside the frame of the machine and mounted over a shaft j' , on the other end of which a toothed wheel j^2 is keyed. This toothed wheel j^2 gears into a second toothed wheel j^3 . This wheel j^3 is mounted loosely

on the main shaft D. To the side of the wheel j^3 is cast a ring j^4 round which takes a strap k' . The strap k' is carried by a bell crank lever k^2 (in a similar manner to a winch brake strap) which is mounted in the end of the lever k^3 keyed to the main shaft D and revolves with it. On the end of the bell crank lever k^2 there is a roller k^4 which works at certain portions of its revolutions on the inner surface of a guide k^5 which is mostly of circular form but has a splayed out entrance as shown.

The operation is as follows: As soon as the roller k^4 of the bell crank k^2 in its revolution reaches the circular portion of the guide k^5 the strap k' grips the rim j^4 and carries it round with it and so the wheels j^2 and j^3 . When the roller leaves the guide the tension and pressure of the strap on the surface of the rim j^4 are released and the motion of the wheel j^3 and so the tapes are arrested. This cessation is continuous until the roller k^4 again enters the guide k^5 and is timed to take place at the time when the sheet is registered and ready to be taken up by the printing machine.

I have shown a side registering device at each side of the machine. The object of this construction is that in printing the printer sometimes requires to register at one side and sometimes at the other side. For example, when he requires to register on the right hand side he uses the right hand register and when he requires to register on the left hand side he uses the left hand register.

Having thus described my invention, what I claim is—

1. The method of separating sheets of paper in a pile, for feeding such sheets from a pile, which consists in subjecting the front edges and corners of the pile of paper to a diagonal blast of air, whereby their separation is facilitated.

2. In a machine for feeding sheets of paper from a pile, a pneumatic blast chest having three tiers of blast apertures, the lower one of such tiers being adapted to direct such blast diagonally on the edges of the pile combined with a table for supporting the pile of paper, lifting means acting on the upper sheet to raise its front end successively in front of the second and third tier of said apparatus and means for producing the blast.

3. The method of separating sheets of paper in a pile, for feeding such sheets from the pile, which consists in subjecting the pile of paper to an intermittent or pulsatory blast of air directed diagonally onto the front corners and edges of the pile of paper.

4. The method of feeding separate sheets of paper from a pile, which consists in first pneumatically lifting a sheet; then imparting to it a backward movement over the pile of paper; then an intermittent upward movement while it is subjected to an intermittent blast of air and a forward movement whereby the sheet is delivered to the conveying or feeding mechanism.

5. In a machine for feeding sheets of paper from a pile, a pneumatic blast chest the lower apertures of which are adapted to direct the blast diagonally upon the edges of the sheet
5 or sheets and the upper apertures of which are adapted to direct it in right lines combined with a table for supporting the pile of paper, means for lifting the forward end of the upper sheet successively in front of the
10 different rows of apertures and means for producing the blast.

6. In a machine for feeding sheets of paper from a pile a pneumatic blast chest having converging apertures adapted to direct the blast in converging lines upon the pile, means
15 for supporting the pile of paper and means for producing the blast.

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Witnesses:

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