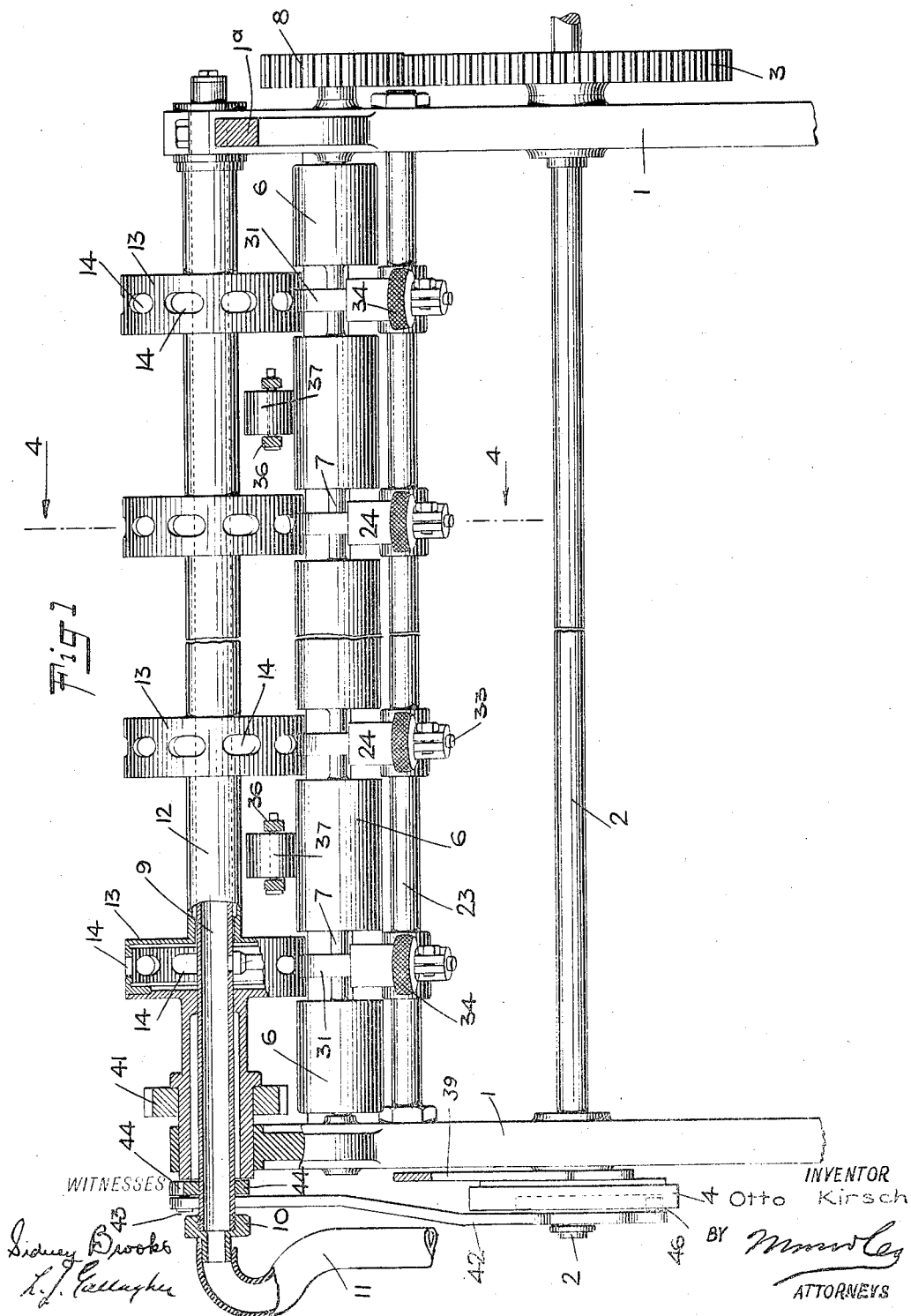


O. KIRSCH.
PNEUMATIC PAPER FEED MECHANISM.
APPLICATION FILED JUNE 22, 1912.

1,105,352.

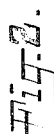
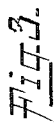
Patented July 28, 1914.

3 SHEETS—SHEET 1.



1,105,352.

3 SHEETS—SHEET 2.



WITNESSES

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3 SHEETS—SHEET 3.

Fig. 4.

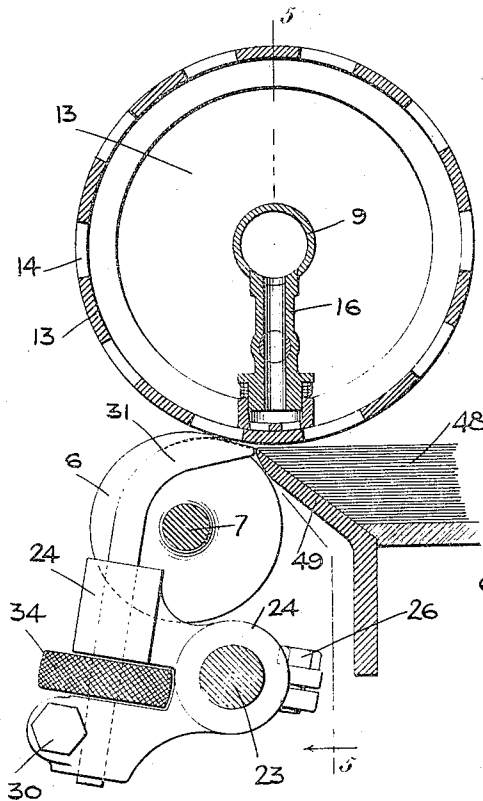


Fig. 5.

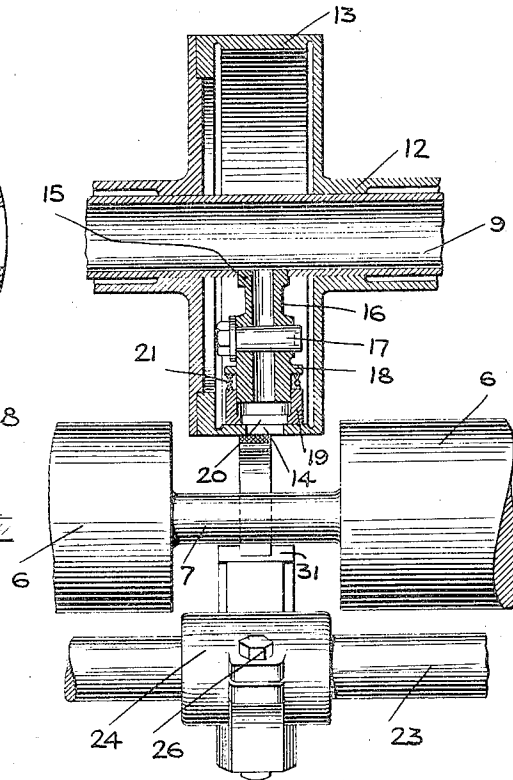


Fig. 6.

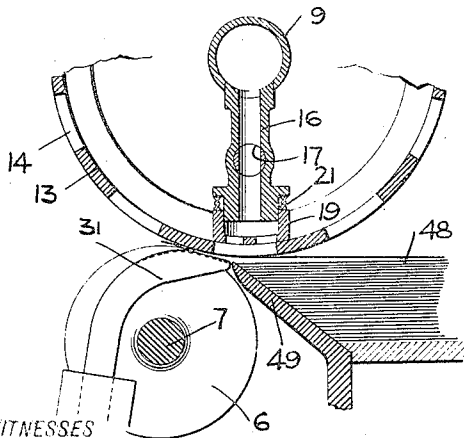
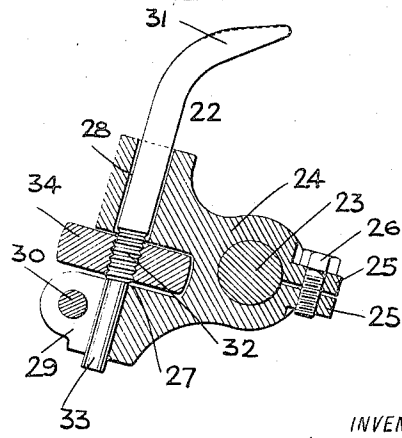


Fig. 7.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC-PAPER-FEED MECHANISM.

1,105,352.

Specification of Letters Patent.

Patented July 28, 1914.

Application filed June 22, 1912. Serial No. 705,329.

To all whom it may concern:

Be it known that I, OTTO KIRSCH, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Pneumatic Paper-Feed Mechanism, of which the following is a full, clear, and exact description.

My invention relates to a new and improved pneumatic paper feed mechanism characterized by the fact that the pneumatic pressure is applied intermittently to the succeeding sheets of paper adapted to be singly fed forwardly.

The design of the present invention is the provision of a new and improved pneumatic paper feed mechanism comprehending the use of a fixed element in which the reduction of pressure is maintained with a co-operating, intermittently movable element, having a number of openings therein adapted to successively register with the part maintaining the reduction of pressure, whereby the succession of sheets may be fed forwardly at proper intervals.

The design of the invention further comprehends the provision of a paper feed mechanism which will be dependable in its operation and at the same time of not undue complexity of construction, which characteristics are of some importance in the production of a successful machine.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a front view, partly sectional, of the mechanism on the line 1—1 of Fig. 2; Fig. 2 is an end view from the right of Fig. 1; Fig. 3 is an end view of Fig. 1 from the left; Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 1; Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 4; Fig. 6 is a partial vertical sectional view similar to Fig. 4 but showing the parts in a different relative position; Fig. 7 is a detail view of the caliper adjustably mounted in position, whereby it may be adapted to sheets of varying thicknesses.

Referring particularly to Figs. 1 to 3 inclusive, any suitable form of frame 1 is pro-

vided with a transversely extending shaft 2 which is the main driving shaft of the mechanism to be described, one end of this shaft being provided with a gear 3, the other end carrying a plate 4 having a cam groove therein; the shaft may be mounted in any suitable manner which means that the bearings may be those most desirable in a machine of this class. Extending transversely of the frame 1 are a number of rollers 6, these rollers being integrally formed with a shaft 7, or being adjustably and removably mounted on such shaft, the outer end of the shaft, however, being provided with a pinion 8 meshing with the aforesaid gear 3, whereby the rollers are turned. Suitable mounted in position adjacent the top of the frame 1 and relatively rigid thereto in the operation of the mechanism is a hollow member 9 having one end thereof open, the said open end carrying a removable nozzle or equivalent device 10, terminating in a pipe or tube 11, the tube communicating with any suitable form of pressure-reducing apparatus, whereby the pressure within the hollow member 9 may be reduced. Revolvably mounted on the hollow member 9, which may be termed a cylinder, is a second hollow cylindrical member 12 carrying a number of drums 13, each drum being provided with a number of openings 14 in the circular side. Referring particularly to Figs. 4 and 5, it will be noted that the first hollow member 9 is provided with an opening 15 into which the normally extending and relatively short tube 16 is fitted, the tube being preferably provided with any form of suitable valve 17; it will be noted on reference to Fig. 1 that the mechanism there shown comprehends the use of four drums 13 and, hence, there will be as many short normally extending pipes 16 as there are drums, and in Fig. 1, four of such parts. It is, of course, obvious that the number of drums may be increased or reduced depending on the machine with which the mechanism is to be used.

Referring particularly to Figs. 5 and 6, it will be noted that intermediate of its ends the tube 16 is provided with a circular shoulder 18 and that the lower end of this tube is fitted into a sleeve 19 which has an opening 20 registering with the open

end of the tube or pipe 16 and also registering in certain positions of the parts with the openings 14 in the drum 13. In order to maintain a close and substantially non-leakable contact between the tube or pipe 16 and the inside of the drum 13 between the openings 14, a helical spring 21 is preferably employed, which engages the said circularly extending shoulder 18 and the top of the said sleeve 19. Positioned between the said rollers 6 and opposite the said drums 13 and adjustable with respect to the said drums are a number of calipers 22, shown particularly in Figs. 4 and 7; these calipers are carried on a fixed rod 23 maintained in position on the main frame 1 in any suitable and desirable manner, each caliper comprising a body member 24 having an opening therein through which the said fixed rod 23 extends, the side of the body member being provided with a plurality of registering ears 25, through which a lock screw 26 extends, whereby the body member may be securely fastened in desired position on the said rod. The body member is further provided with an inwardly extending recess 27, which recess communicates with a passageway 28 extending normally thereto, the dimension of the lower end of the said passageway being adjustable by means of the ears 29 carried by the body member, through which ears a lock screw 30 extends; within the passageway 28 is the caliper proper, which is preferably of the shape shown in Fig. 7, having a curved upper end 31, a threaded intermediate portion 32, and a lower shank portion 33. Within the said recess 27 in the body member 24 is a knurled thumb nut 34 engaging the threaded portion of the caliper so that, when the parts are in the positions shown in Fig. 4, turning the thumb nut will adjust the position of the upper knurled end 31 of the caliper with respect to the outer surface of the drum 13; when the caliper has been thus adjusted such position is maintained by tightening the lock screw 30, whereby the lower end of the passageway 28 is constricted, the side walls tightly gripping the shank 33 of the caliper. Extending laterally in front of the frame 1 are the arms 1^a which may be preferably formed integral with the frame, the outer ends of these arms providing bearings for a transversely extending shaft 35 having rearwardly extending arms 36 thereon, (Figs. 2 and 3) the inner ends of the said arms providing bearings (Fig. 1) for rollers 37 which cooperate with the beforementioned rollers 6 in order to engage opposite sides of the sheets and pass them forwardly; one end of this shaft 35 is preferably provided with a crank 38 with which a pitman 39 pivotally engages at 40, the other end of the pitman being mounted on a cam 39^a secured to the first mentioned main driving shaft 2, serves to actuate the shaft 35 at the proper intervals and to bring the rollers 37 into coöperative position with the rollers 6 at proper times. The drums 13, which are provided with the openings 14, whereby the succession of sheets are successively fed forwardly, are intermittently turned automatically, the means therefor being preferably of the following construction. Fixed to the hollow tubular member 12, which surrounds the fixed tubular member 9, is a ratchet 41 adapted to be periodically operated by means of the rod 42, the upper end of which is in pivotal engagement at 43 with a crank 44 freely mounted at the outer end of the first tubular member 9. The crank 44 carries a pawl 45 which is adapted to engage the different teeth of the ratchet 41 when the rod 42 is moved in the direction of the arrow, as shown in Fig. 3. The periodic movement of the rod 42 is obtained by means of the beforementioned cam groove 5 in the plate 4 which is fixed to the shaft 2 by means of a pin or roller 46 carried by the lower end of the rod 42, which pin or roller engages in the cam groove or slot 5; in order to insure proper relative movement of the parts, it will be noted that the rod 42 adjacent its lower end is provided with an opening 47 into which the outer end of the shaft 2 moves, turning of the shaft then operating the rod 42 at proper times to actuate the ratchet 41 and thereby turn the drums 13 into proper positions relatively to the lower ends of the short tubes or pipes 16, as shown particularly in Figs. 4 and 6. The frame 1 preferably comprises a portion adapted to serve as a support or rest for a number of sheets of paper or equivalent articles 48, the table or support having an inclined head 49 (Figs. 4 and 6) adjacent its forward end and in the neighborhood of the said calipers 31, the rollers 6 and the lower end of the short pipe or tube 16; of course the particular form of this support and head may be such as is best suited for the purposes, the particular inclination or angle of the head being such that forward feeding of the sheets 48 one at a time is facilitated.

The operation of the machine is as follows: The sheets 48 having been placed in position on the frame and having been combed so that they occupy the positions shown in Figs. 4 and 6, the machine being running, the rotation of the main power shaft 2 (which may be accomplished by any suitable motive power) will cause the rod 42 to intermittently bring the pawl 45 into engagement with the teeth on the ratchet 41; the purpose of this intermittent movement is to bring the openings 14 in the outside of each drum 13 into successive registration with the lower open end of the short tubes or pipes 16 car-

ried by the relatively stationary cylindrical inner member 9. It will be remembered that the pressure within this member 9 is kept as low as possible by any suitable pressure-reducing mechanism so that, as the drums 13 are intermittently moved, there will be successive rushes of air through the openings 14 in these drums into the short tubes or pipes 16, which rushes of air carry closely adjacent these drums the top sheet of the succession of sheets 48, the position being shown in Fig. 6. Of course the timing of the intermittent mechanism is such that the drums 13 are moved at such intervals as correspond to the length of the sheets then being passed through the machine. The opening in the drum 13 remains in registration with the open end of the short pipe or tube 16 long enough to insure that the turning of the drums with different portions of the sheet adhering thereto because of the air pressure will come forwardly and be engaged between the rollers 37 on one hand and the rollers 6 on the other, it being noted that the calipers 31 have been previously adjusted with respect to the outside of the drums so that only a single sheet can be passed between the drums and the calipers. After the sheet is once started between the rollers 37 and 6, there is no further necessity of the action of the air pressure, and, hence, the actuating mechanism turns the drums and brings them into the position shown in Fig. 4, whereby the open end of the tube or pipe 16 is adjacent the closed inner portion of the drum and between two of the openings therein. The pressure maintained between the top sheet and the outside of the drums may be varied by adjustment of the valve 17 contained in each pipe or tube 16; in order to insure that the paper will be securely gripped between the rollers 37 and 6, and to further insure such gripping, the rollers 37 are brought adjacent to and remote from the rollers 6 at stated intervals, the mechanism being shown particularly in Fig. 3, so that after a sheet has been passed between the outside of the drums and the calipers into position for engagement by these rollers, the rollers will be moved into co-operative relation, there being no further necessity for the application of air pressure to carry the sheets forwardly.

The inventive idea herein disclosed then contemplates the use of a fixed member, or a number of such fixed members, wherein pressure is maintained at less than atmospheric pressure, and a cooperating, intermittently movable perforated member, whereby the said parts are adapted to successively feed forwardly sheets of paper or similar articles at proper intervals; of course the relative sizes and shapes of the parts shown in the drawings are typical of one form of the mechanism, it being obvious that in the

making of such machine it may be found desirable to vary such relative sizes and shapes, such departures, however, not lying without the spirit of my invention.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:—

1. In a pneumatic paper feed mechanism, a fixed member having a passageway, there being an opening in the fixed member leading to the passageway, a tube secured to the member and communicating with the opening, a drum in which the tube is disposed for rotating around the tube, a sleeve mounted on the tube, resilient means for holding the sleeve yieldingly against the drum, there being an opening in the drum which periodically communicates with the sleeve when the drum is rotated relatively to the fixed member.

2. In a pneumatic paper feed mechanism, a fixed member having a passageway, there being an opening in the fixed member leading to the passageway, a tube secured to the member and communicating with the opening, a drum in which the tube is disposed for rotating around the tube, a sleeve mounted on the tube, resilient means for holding the sleeve yieldingly against the drum, there being an opening in the drum which periodically communicates with the sleeve when the drum is rotated relatively to the fixed member, and a valve for commanding the passageway in the tube.

3. In a pneumatic paper feed mechanism, an inclined head, a feed drum disposed above the head and adjacent thereto, a roller disposed below the feed drum, a member spaced from the inclined head and having a terminal disposed below the feed drum and extending in the direction of and substantially to the top of the inclined head, and an adjustable means for holding the member rigid relatively to the axis of the drum.

4. In a pneumatic paper feed mechanism, a head, means disposed above the head for feeding paper over the head, an adjustable member disposed below the said means, spaced from the head and extending forwardly and in the direction of and substantially to the head and means for securing the member rigid relatively to the first means.

5. In a pneumatic paper feed mechanism, a head, a fixed member having a passageway extending therethrough, the said member being provided with an inlet, a revoluble member having a number of openings therein, the said openings being adapted for successive and intermittent registration with the inlet whereby when the pressure within the member having the inlet is reduced successive sheets of paper may be engaged by the said revoluble member and carried forward by reason of the reduction of pressure,

the revoluble member being adapted to feed paper in one direction, and over the head, and a member having a terminal disposed below the revoluble member and extending in the opposite direction for determining the thickness of the paper to be passed by the revoluble member.

6. In a pneumatic paper feed mechanism, means for feeding paper in one direction, a body having a recess and a passageway communicating with the recess, a member disposed in the passageway and having a terminal disposed below the means and extending in the opposite direction at the means, the member having a threaded portion, and a nut disposed in the recess with which the threaded portion of the member meshes for the purpose specified.

7. In a pneumatic paper feed mechanism, a means for feeding paper in one direction, a body having a recess and a passageway communicating with the recess, a member disposed in the passageway, and having a terminal extending in the opposite direction for regulating the feed, the member having a threaded portion, a nut disposed in the recess, with which the threaded portion of the member meshes, the body having ears with holes for engaging the member, and a lock screw disposed in the holes for securing the member relatively to the body after the member has been adjusted by the nut.

8. In a pneumatic paper feed mechanism, a roller for rotating, a roller for cooperating with the first roller and adapted to be moved to and from the first roller, a drum in advance of the rollers adapted to be rotated intermittently in one direction, and means for rotating the first roller and the drum synchronously, and a member having a terminal extending in the opposite direction for determining the thickness of the paper passed by the drum.

9. In a pneumatic paper feed mechanism, a main shaft, a roller, means by which the main shaft is adapted to rotate the roller, a drum, a ratchet wheel secured to the drum, a pawl for operating the ratchet wheel, a cam member rotatable with the shaft, means by which the cam member is adapted to operate the pawl, a second shaft, a crank secured to the second shaft, a second cam member on the first shaft, a pitman connecting the second cam member and the crank, an arm secured to the second shaft, and a roller mounted for rotating on the arm and adapted to cooperate with the first roller.

10. In a pneumatic paper feed mechanism, a main shaft, a roller, means by which the main shaft is adapted to rotate the roller, a drum, a ratchet wheel secured to the drum, a pawl for operating the ratchet wheel, a cam member rotatable with the shaft, means by which the cam member is adapted to operate the pawl, a second shaft, a crank se-

cured to the second shaft, a second cam member on the first shaft, a pitman connecting the second cam member and the crank, an arm secured to the second shaft, a roller mounted for rotating on the arm and adapted to cooperate with the first roller, and a member having a terminal extending against the feed, for determining the thickness of the paper passed by the drum.

11. In a pneumatic paper feed mechanism, a main shaft, a roller, means by which the main shaft is adapted to rotate the roller, a fixed member having a passageway, the said fixed member being provided with an inlet, a revoluble drum having an opening therein, the said opening in the drum being adapted for successively and intermittently registering with the said inlet, whereby when the pressure within the fixed member having the inlet is reduced successive sheets of paper may be engaged by the said revoluble member, and carried forward by reason of the reduction in pressure, a ratchet wheel secured to the drum, a pawl for operating the ratchet wheel, a cam member rotatable with the shaft, means by which the cam member is adapted to operate the pawl, a second shaft, a crank secured to the second shaft, a second cam member secured to the first shaft, a saddle connecting the second cam member and the crank, an arm secured to the second shaft, and a roller mounted for rotating on the arm and adapted to cooperate with the first roller.

12. In a pneumatic paper feed mechanism, a main shaft, a roller, means by which the main shaft is adapted to rotate the roller, a fixed member having a passageway, the said fixed member being provided with an inlet, a revoluble drum having an opening therein, the said opening in the drum being adapted for successive and intermittent registration with the said inlet, whereby when the pressure within the fixed member having the inlet in reduced successive sheets of paper may be engaged by the said revoluble member, and carried forward by reason of the reduction in pressure, a ratchet wheel secured to the drum, a pawl for operating the ratchet wheel, a cam member rotatable with the shaft, means by which the cam member is adapted to operate the pawl, a second shaft, a crank secured to the second shaft, a second cam member secured to the first shaft, a saddle connecting the second cam member and the crank, an arm secured to the second shaft, and a roller mounted for rotating on the arm and adapted to cooperate with the first roller, and a member having a terminal extending in a direction against the feed, for determining the thickness of the paper passed by the revoluble drum.

13. A sheet feeder including a suction wheel having a perforated periphery; a sub-

stantially non-rotating shoe within the wheel and movable radially thereof to maintain engagement with the inner portion of the wheel rim and with whose interior the
5 perforations in the suction wheel are brought into communication; and a spring for maintaining the shoe and wheel in engagement.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OTTO KIRSCH.

Witnesses:

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PHILIP D. ROLLHAUS.