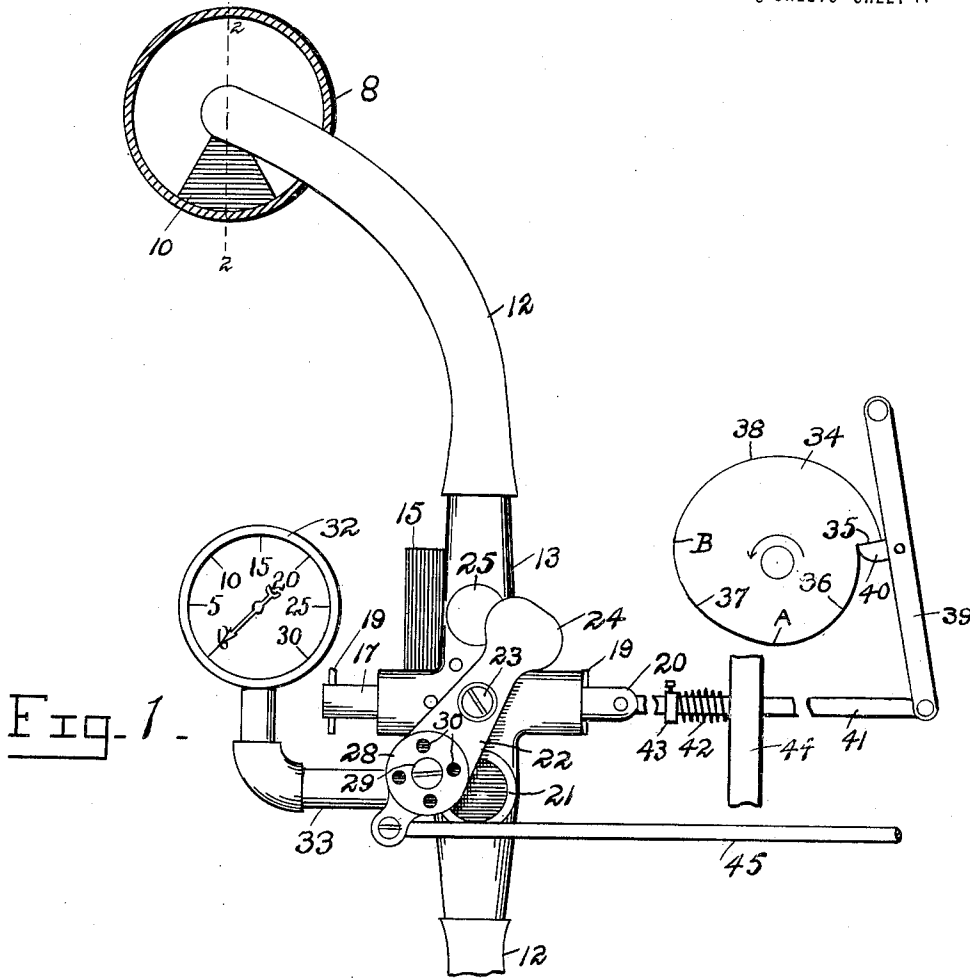
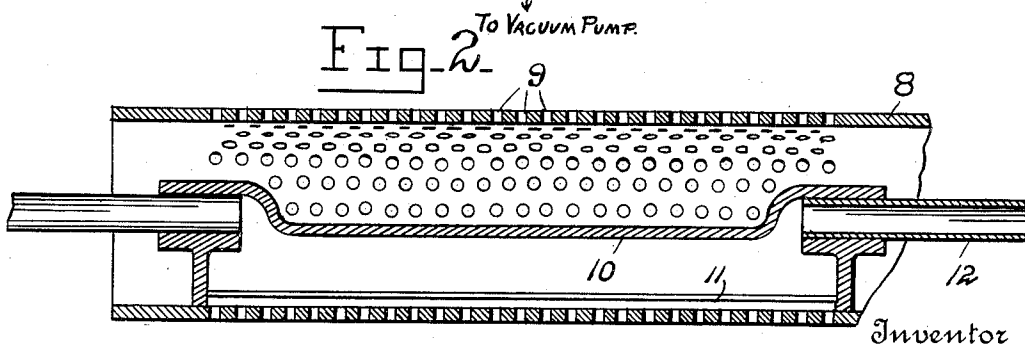


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APPLICATION FILED FEB. 6, 1923.

1,408,688.

Patented Mar. 7, 1922.

3 SHEETS—SHEET 1.



Inventor

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By

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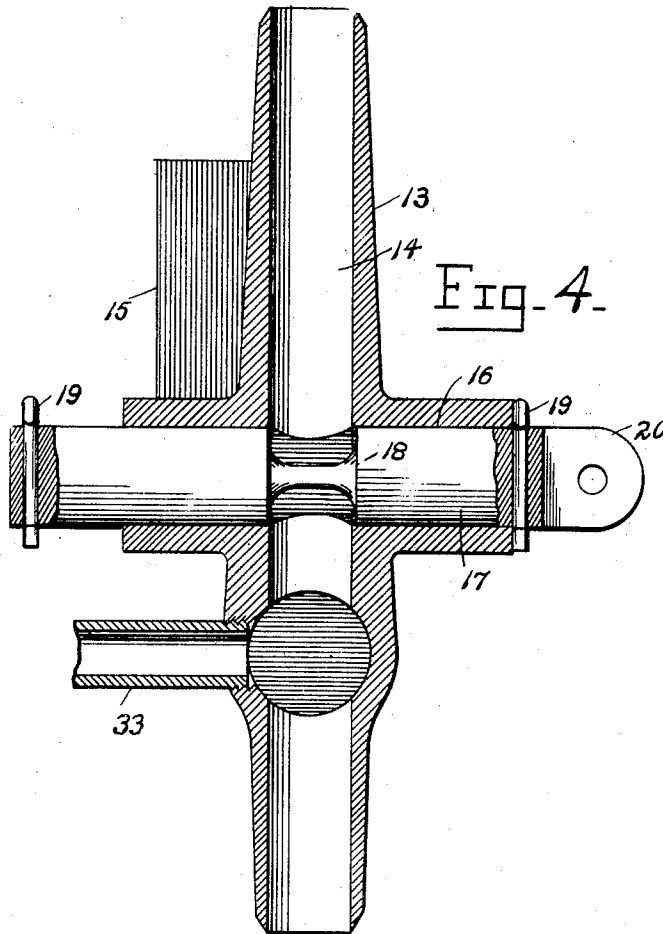
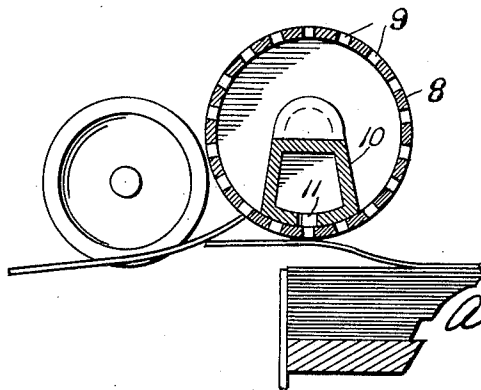


Fig. 4.

Fig. 3.



Inventor

Albert Broadmeyer

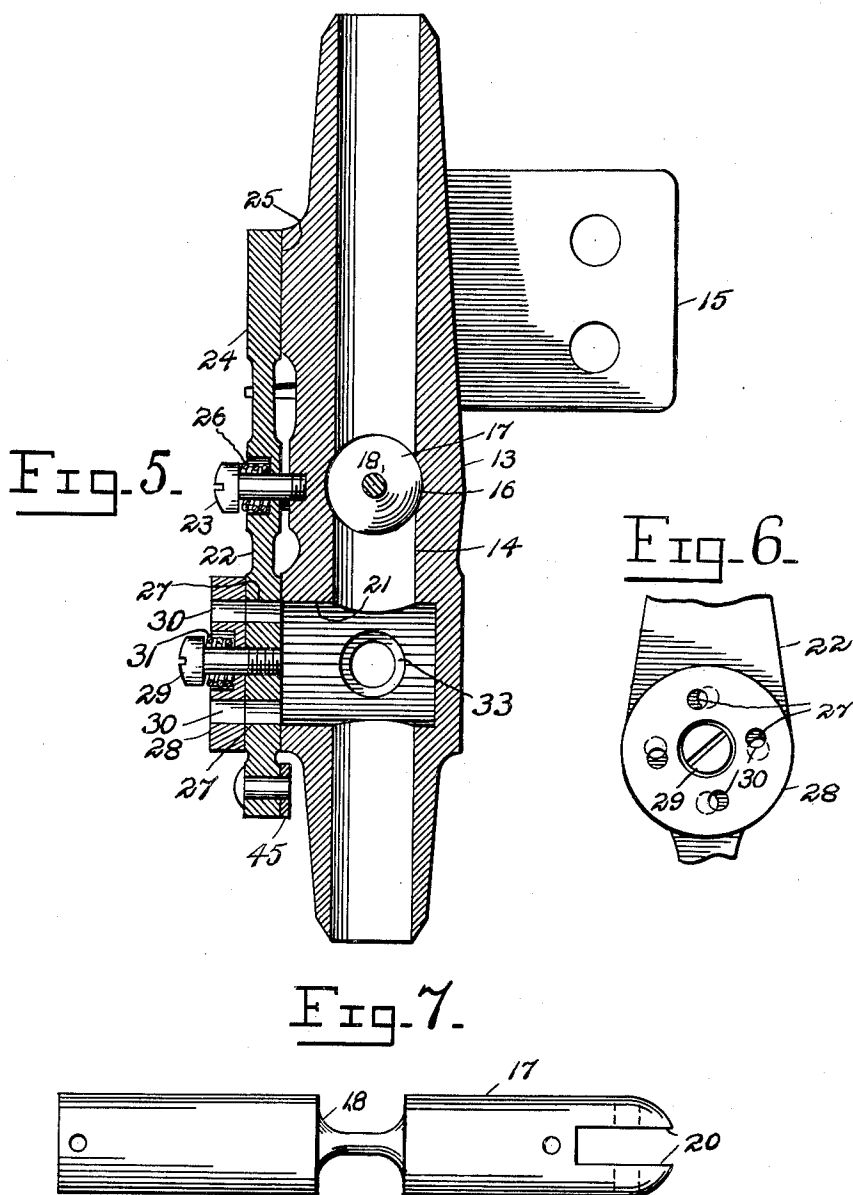
by *R. H. Koster* Attorney

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3 SHEETS—SHEET 3.



334

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UNITED STATES PATENT OFFICE.

ALBERT BROADMEYER, OF HARRISBURG, PENNSYLVANIA, ASSIGNOR TO W. O. HICKOK MANUFACTURING COMPANY, OF HARRISBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SHEET-FEEDING APPARATUS.

1,408,688.

Specification of Letters Patent.

Patented Mar. 7, 1922.

Application filed February 6, 1920. Serial No. 356,685.

To all whom it may concern:

Be it known that I, ALBERT BROADMEYER, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Sheet-Feeding Apparatus, of which the following is a specification.

The present invention relates to sheet feeding means, and more particularly to mechanism for feeding paper sheets to ruling mechanism and the like. In a more specific aspect, the invention may be considered as an improvement on my former Patent, No. 1,183,626, May 16, 1916.

The object is to provide feeding means using air suction or vacuum controlling means that is exceedingly quick and accurate in action.

A further object is to provide convenient means whereby the amount of vacuum can be readily regulated and maintained, thereby making the apparatus variable in its action, so that it will properly feed heavy cardboard or thin light paper.

A still further object is to provide a structure that is compact, readily accessible, and simple in construction.

In the accompanying drawings:—

Figure 1 is a view in elevation and somewhat diagrammatic in its character, illustrating the invention,

Figure 2 is a sectional view on the line 2—2 of Figure 1,

Figure 3 is a cross sectional view indicating the action of the feeding means,

Figure 4 is a longitudinal sectional view through the controlling valve mechanism,

Figure 5 is a similar view at right angles to Figure 4,

Figure 6 is a detail face view illustrating the operation of the vacuum controlling valve,

Figure 7 is a plan view of the plunger valve.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

The feeding apparatus generally may be of the type disclosed in the former Patent, No. 1,183,626, and to simplify the present disclosure as far as possible, only parts essential to the present invention have been illustrated. As in the patented structure,

a rotatable feeding cylinder 8 is employed, having a central perforated portion 9 enclosing a suction or vacuum box 10. The underside of this box fits the inner face of the perforated portion of the cylinder 8, and is provided with a longitudinal slot 11, across which the rows of perforations pass, as will be readily understood by reference to the afore-mentioned patent, and to Figures 2 and 3 of the present drawings. Connected to the box at one end, is an exhaust conduit 12 that is coupled to a vacuum pump (not shown), which may be of any desired character.

This conduit includes a valve casing 13 having a passageway 14 extending longitudinally therethrough, and forming a part of the passageway of the conduit 12. The valve casing is provided with an integral ear or bracket 15, by which it can be readily fastened to any suitable part of the frame of the machine. Intersecting the passageway 14 is a valve chamber 16 in the form of a transversely disposed open-ended bore, and in this chamber is fitted a reciprocatory plunger valve 17 having a central reduced portion 18, constituting a port that is movable into and out of register with the passageway 14. The valve 17 is held against removal by cotter pins 19 passing therethrough and located on opposite sides of the valve casing. One end of the valve is furthermore bifurcated to provide a pair of ears 20. It will be evident, particularly by reference to Figure 4 that the valve may be shifted to the right to close the passageway 14, and when moved to the left, as illustrated in Figure 4, the passageway is opened.

The valve casing 13 is furthermore provided at the side of the valve 17 which is opposite to the sheet actuating suction means with a relief port 21 that is in communication with the passageway 14. This port is controlled by a swinging valve plate 22 pivoted between its ends upon the valve casing, as illustrated at 23, and thus adapted to cover and uncover the port 21. The upper end of the valve plate 22 is provided with an enlarged friction head 24 that slides against the friction surface 25 formed on the valve casing 13, and to insure frictional contact a coiled spring 26, surrounding the pivot 23, bears against the valve plate, and thus yieldingly urges it against the friction

surface 25 and the flat seat surrounding the port 21. The portion of the valve plate 22 which constitutes a closure for the port 21, is provided with a plurality of supplemental ports 27 that are in communication with the port 21 when the valve is closed, and these supplemental ports in turn are controlled by a rotary valve disk 28 journaled on a pivot screw 29 fixed in the valve plate, the disk 28, having ports 30 that are movable into and out of register with the ports 27. The valve disk 28 is held frictionally against the face of the valve plate 22 by a spring 31 surrounding the pivot 29 and bearing against said disk.

A vacuum gauge or register 32 is mounted on the valve casing 13, being connected by a pipe 33 to said casing, and communicating with the passageway 14 on the side of the valve 17 that is opposite to the sheet actuating suction means.

The plunger valve 17 is adapted to be periodically actuated in synchronism with the apparatus to which the paper is to be fed, and any suitable mechanism may be employed. Thus in Figure 1, a cam 34 is illustrated, having a drop shoulder 35, a dwell portion 36 extending from the drop shoulder to the point A, a raise portion 37 from the point A to the point B, and a dwell portion 38 from the point A to the drop shoulder 35. A swinging arm 39 is provided with a bearing element 40 that rides on the periphery of the cam. The swinging arm furthermore has a suitable link connection 41 with the ears 20 of the plunger valve 17. Surrounding the link 41 is a coiled spring 42 having a bearing at one end against a collar 43 on the link, and at its other end against a portion 44 of the frame of the machine. The valve plate 22 is connected to a link 45 that may be in turn coupled to any suitable manual actuating means.

Briefly described, the operation of the structure is as follows. If the air is withdrawn from the conduit 12, it will be obvious that a partial vacuum will be created in the box 10, providing the valve 22 is closed and the plunger valve 17 is open. If, however, the plunger valve is closed, the vacuum in the box 10 will be destroyed, but the vacuum will remain in the conduit 12 between the vacuum producing means and said valve 17. The amount of this vacuum is indicated on the gauge 32, and can be controlled by turning the valve disk 28, so that the ports 30 thereof are more or less in alignment with the ports 27, as will be readily understood. Assuming both the valves 22 and 17 closed, with vacuum in the conduit 12, it will be evident that if the cam 34 is rotated, the plunger valve will be periodically opened, consequently withdrawing air periodically from the box 10 and successively picking up the sheets, as indicated in Figure 3, the ro-

tating cylinder moving them on to the feeding mechanism. The amount of vacuum can, as already disclosed, be controlled by the disk valve, so that the action of the mechanism can be varied to properly pick up either heavy cardboard or the thinnest paper. Whenever it is desired to stop the action of the mechanism, it is only necessary to operate the rod 45 and throw the valve plate 22 to open position, whereupon air can freely enter through the port 21 and substantially eliminate any suction in the box 10.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In apparatus of the character set forth, the combination with sheet actuating suction means, of vacuum mechanism therefor including a valve casing located adjacent to the suction means and having a passageway therethrough and a relief port that communicates with the passageway, a valve supported by the valve casing and controlling the passageway, and another valve also supported by the valve casing and controlling the relief port.

2. In apparatus of the character set forth, the combination with sheet actuating suction means, of vacuum mechanism therefor including a valve casing having a passageway therethrough and a relief port that communicates with the passageway, a valve supported by the valve casing and controlling the passageway, and another valve also supported by the valve casing and controlling the relief port, said latter valve also having a port that communicates with the relief port when the said valve is in closed position thereover.

3. In apparatus of the character set forth, the combination with sheet actuating suction means, of vacuum mechanism therefor including a valve casing having a passageway therethrough and a relief port that communicates with the passageway, a valve supported by the valve casing and controlling the passageway, and another valve also supported by the valve casing and controlling the relief port, said latter valve also having a port that communicates with the relief port when the said valve is in closed position thereover and a third valve movably mounted on the second valve and controlling the port in said second valve.

4. In sheet feeding means, the combina-

tion with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, a valve for closing and opening the passageway through the conduit, said conduit having an inlet port contiguous to the valve, and manual means that will maintain itself where placed for controlling the port.

5. In sheet feeding means, the combination with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, a valve for closing and opening the passageway through the conduit, and means for continuously admitting a variable amount of air to the conduit on the side of the valve opposite to the suction means.

6. In sheet feeding means, the combination with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, said valve including a valve casing having a valve chamber and a relief port, a valve in the chamber controlling the passageway of the conduit, and means for controlling the port and maintaining it more or less open.

7. In sheet feeding means, the combination with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, said conduit including a valve casing having a passageway provided with an inlet connected to the suction means and an outlet for connection with vacuum producing means, said casing having a valve chamber intersecting the passageway, and a relief port communicating with the passageway, a valve in the chamber controlling the passageway of the conduit, and means mounted on the valve casing for controlling the port.

8. In sheet feeding means, the combination with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, said conduit including a valve casing having a passageway provided with an inlet connected to the suction means and an outlet for connection with vacuum producing means, said casing having a valve chamber intersecting the passageway, and a relief port communicating with the passageway on the side of the valve chamber opposite to the inlet, a valve in the chamber controlling the passageway, and means controlling the relief port and maintaining it more or less open.

9. In sheet feeding means, the combination with sheet actuating suction means, of a conduit connected to the sheet actuating means for withdrawing air from the suction means, said conduit including a valve casing having a passageway provided with an inlet connected to the suction means and an outlet for connection with vacuum

producing means, said casing having a valve chamber intersecting the passageway, and a relief port communicating with the passageway, a valve controlling the passageway, and a rotary valve operating over the port and having a port that is movable into and out of register therewith.

10. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a valve chamber communicating with the passageway of the conduit, and a relief port also communicating with the passageway, a valve controlling the passageway, and a valve adapted to be fixed in different positions for controlling the amount of air that passes through the port.

11. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a valve chamber communicating with the passageway of the conduit and a relief port also communicating with the passageway, a valve controlling the passageway, and a swinging valve controlling the port and movable to different fixed positions partly across the same.

12. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a valve chamber communicating with the passageway of the conduit and a relief port also communicating with the passageway, a valve controlling the passageway, a valve pivoted on the casing at one side of the port and having a portion swinging across and controlling the port, and means for frictionally holding the pivoted valve in different positions.

13. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, a swinging valve controlling the port, a pivot for the valve mounted on the conduit at one side of the port, a friction surface against which the valve bears, and means for yieldingly holding the valve against said surface.

14. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, a swinging valve pivoted between its ends and having one end movable over the port, a friction surface against which the other end bears, and a spring operating against the valve to hold it against said surface.

15. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, a valve movable over the port, and means carried by said valve for admitting a variable amount of air to

the conduit when the valve is in closed position.

16. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, and a valve movable over the port and having a relief port that communicates with the first port when the valve is in closed position.

17. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, a valve movable over the port and having a port that communicates with the first port when the valve is closed, and means on the valve for controlling the second port.

18. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and having a relief port, a swinging valve movable to and from a position over the port and having a port communicating therewith, and a rotary valve on the swinging valve for controlling the second port.

19. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a valve chamber intersecting the passageway of the conduit and a relief port communicating with said passageway, a valve in the chamber controlling the passageway, means for periodically actuating the valve, a valve controlling the port and having a port that communicates with said port, and a valve on the first valve controlling the second port.

20. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a valve chamber intersecting the passageway of the conduit and a relief port communicating with said passageway, a reciprocatory plunger valve in the chamber controlling the passageway, means for periodically reciprocating the plunger valve, a swinging valve pivoted on the casing and controlling the port, said swinging valve having a supplemental relief port, and a valve journaled on the

swinging valve and controlling the supplemental port.

21. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto, a valve movable to close and open the passageway of the conduit, said conduit having a relief port on the opposite side of the valve to the suction means, means movable to different fixed positions for controlling the relief valve to maintain the same continuously open to a greater or less extent, and a vacuum indicator connected to the conduit on the side of the valve having the relief port.

22. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a relief port communicating with the passageway of the conduit, a valve in the casing between the port and the suction means, mechanism for periodically actuating the valve, means adjustable to different fixed positions for controlling the port and leaving it open to a greater or less degree, and a vacuum indicator connected to the valve casing on the opposite side of the valve to the suction means.

23. In sheet feeding means, the combination with sheet actuating suction means, of an exhaust conduit connected thereto and including a valve casing having a relief port communicating with the passageway of the conduit, a reciprocatory plunger valve in the casing between the port and the suction means, mechanism for periodically reciprocating the valve, a swinging valve pivoted in the casing and controlling the port, said valve having a supplemental port that communicates with the first port, a rotary valve on the swinging valve controlling the supplemental port, and a vacuum indicator connected to the valve casing adjacent to the port.

In testimony whereof, I affix my signature in the presence of two witnesses.

ALBERT BROADMEYER.

Witnesses:

C. M. BUFFINGTON,
Ross A. HICKOK.