

W. A. LORENZ.
SHEET SEPARATING AND FEEDING MACHINE.
APPLICATION FILED JAN. 31, 1912.

1,048,713.

Patented Dec. 31, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

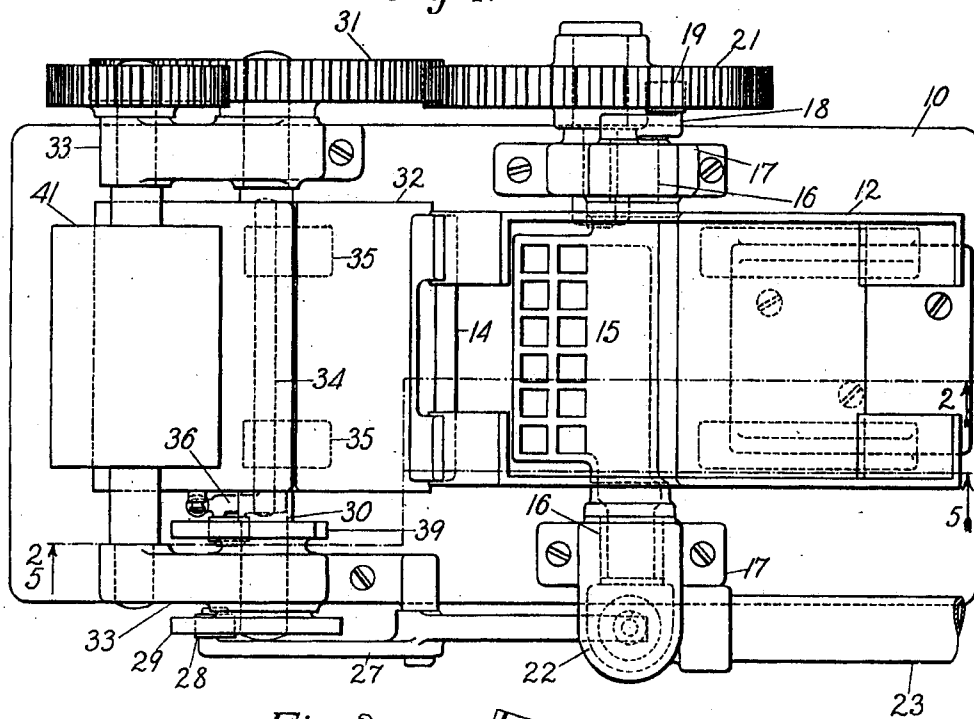
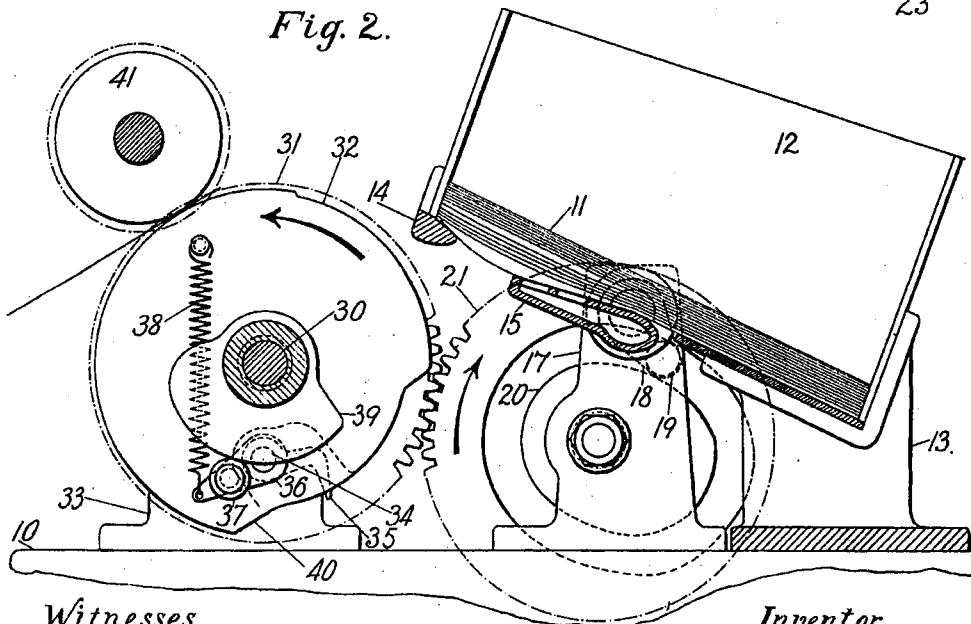


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

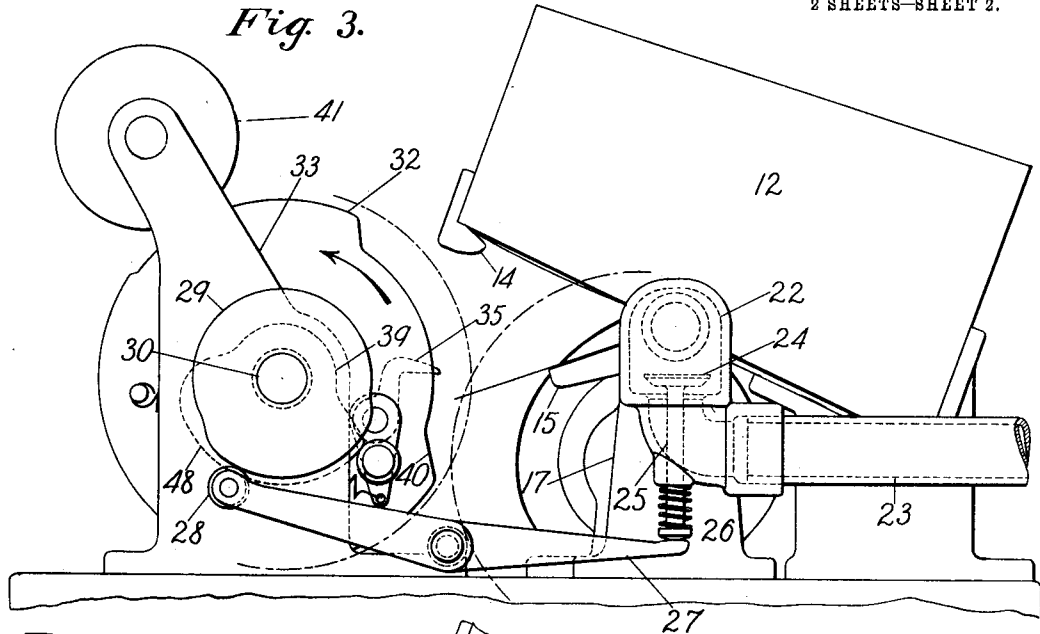


Fig. 4.

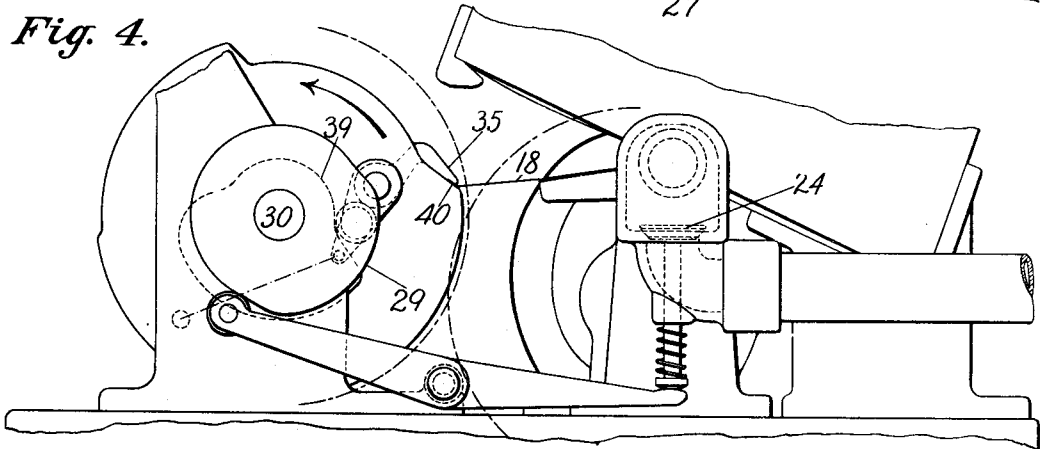
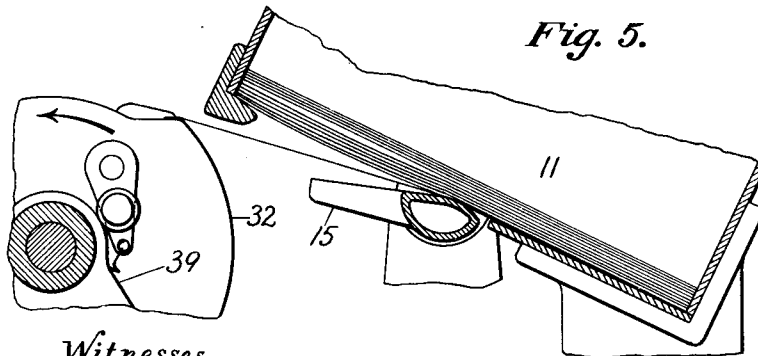


Fig. 5.



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UNITED STATES PATENT OFFICE.

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SHEET SEPARATING AND FEEDING MACHINE.

1,048,713.

Specification of Letters Patent.

Patented Dec. 31, 1912.

Application filed January 31, 1912. Serial No. 674,503.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Sheet Separating and Feeding Machines, of which the following is a specification.

This invention relates to a machine which is adapted to automatically separate sheets of paper or paper blanks, bags, envelopes, and similar articles, one at a time from a pile and continuously feed them in succession to other machinery for subsequently printing, stamping, pasting, folding, or otherwise operating upon them.

The object of the invention is to provide a simple machine which, while acting surely and rapidly, will always grip the sheet or blank at the same locality, regardless of slight variations in the relative times of action of the separating and feeding mechanisms, and will begin to draw out the sheet or blank to be separated slowly and with a gradually increasing speed, so that the sheet or blank will not be subjected to a sudden pull or shock, which would be liable to tear it as it is started from the bottom of the pile in the magazine, or which might cause such dislocation that the subsequent operations upon the sheet or blank would be inaccurate or misplaced. To attain this object the machine is so designed that the front edge of the lowest sheet or blank of a pile in a magazine is separated from those above and presented to a gripper on a transfer cylinder in a plane that is practically radial to the cylinder, and is then moved, during the time it is being gripped, at substantially the same speed as the surface of the cylinder at the locality where the edge is being gripped.

Figure 1 of the accompanying drawings shows a plan of a machine which embodies the invention. Fig. 2 shows a vertical section on the dotted line 2—2 on Fig. 1, looking in the direction indicated by the arrows. Fig. 3 shows an elevation of the machine with the parts in an advanced position from that in which they are shown in Fig. 2. Fig. 4 shows an elevation with the parts in a further advanced position. Fig. 5 is a section on the dotted line 5—5 on Fig. 1,

showing the parts in a still further advanced position.

The machine illustrated has a base plate 10 upon which are mounted brackets that carry the various mechanisms. The sheets 11 to be separated and fed by this machine are stacked or piled one above another in a magazine 12, the sides, ends and bottom of which are arranged in a suitable manner to hold the particular articles to be operated upon. The form of this magazine of course will be varied according to the shape of the articles it is to hold. This magazine is shown with its bottom extending obliquely, and it is supported at its rear edge by a bracket 13 mounted upon the base plate. A section of the bottom of the magazine is left open, and the front edges of the sheets are supported by a ledge 14 that extends across the front end of the opening in the bottom of the magazine.

Below the open section of the bottom of the machine illustrated is an oscillatory suction box 15. This box, which is hollow and has a perforated top, has trunnions 16 which are supported in bearings in brackets 17 that are mounted on the base plate. The axis of the trunnions and the perforated top of the suction box are desirably in the plane of the upper surface of the bottom of the magazine. Outside of the supporting bracket on one side, one of the suction box trunnions is provided with a rocker arm 18 which carries a roll 19 that is located in the cam groove 20 in the face of the gear 21. The rotation of this gear by means of the cam and rocker arm oscillates the hollow trunnion box up and down below the open section of the bottom of the magazine. The suction box trunnion on the other side has a passage that connects the opening in the suction box with the valve chamber 22 on the side of the supporting bracket. This valve chamber is designed to be connected by a pipe 23 with any suitable type of pump or other form of suction producing apparatus. In the valve chamber and controlling the opening thereto is a poppet valve 24. The stem 25 of this valve extends downwardly and outside of the chamber is provided with a spring 26 which normally holds the valve to its seat. Engaging the lower end of the

valve stem is one end of a lever 27. The other end of this lever bears a roll 28 which is in engagement with a cam 29 on the shaft 30, on which is the gear 31. The rotation of this gear and shaft through the cam and lever lifts the valve and thus at the proper time opens the passage from the suction pipe to the chamber that communicates through the hollow trunnion with the suction box.

The gears 21 and 31 intermesh so the mechanisms will work synchronously.

In front of the magazine is a transfer cylinder 32. This cylinder is borne by the shaft 30 that is held in bearings in the brackets 33 mounted on the base plate. The cylinder carries an arbor 34, attached to which are the fingers 35 of a gripper. One end of this arbor has an arm 36 which is provided with a roller 37 that is held by a spring 38 in engagement with the cam 39 which is fixed to the bracket. As the cylinder rotates, the fixed cam and the spring cause the gripper, at the proper time, to open and close with relation to the gripping surface 40 on the periphery of the cylinder, which surface is at the end of a recess in the cylinder.

Above the transfer cylinder there may be mounted a printing or delivery cylinder 41 for printing, stamping, or embossing the sheets or blanks drawn out from the magazine by the transfer roll. This cylinder may simply act as a delivery roll to pass the sheets or blanks on, or to perform such other operation as is desired.

The mechanisms described are so arranged that the suction box is swung up into contact with the under surface of the lowest sheet in the magazine and the valve is opened so that the bottom sheet will be sucked against the top of the box. The box is then swung downward, and as the front portion of the lowest sheet of the pile is firmly held thereto by suction, its front edge is drawn off the ledge at the front of the open section of the bottom of the magazine, as shown in Fig. 2. The suction box continues to move downward until it is in such position that the sheet is presented toward the transfer cylinder in a plane that is a little below the axis of that cylinder, as shown in Fig. 3. In the meantime the transfer cylinder, which revolves uniformly in the direction indicated by the arrow, has come into the position shown in Fig. 3, with the grippers opened from the gripping surface and extending above the front edge of the sheet that is carried by the suction box. As will be seen in Fig. 3, the front edge of this sheet swings into a recess and is within the path of the outer surface of the transfer cylinder. As the transfer cylinder continues to turn, the grippers begin to close and the suction box begins to move upward with the sheet it carries, and at the time that the

gripping surface on the transfer cylinder comes in contact with the under side of the sheet, the suction box is moving at such speed that the end of the sheet moves upwardly substantially in coincidence with the gripping surface for a short distance. The gripper is then closed so as to bind the front edge of the sheet against the gripping surface on the transfer cylinder, and at this time the valve is closed so as to release the sheet from the hold of the suction box, as shown in Fig. 4, and the continued revolution of the transfer cylinder withdraws the sheet as shown in Fig. 5. When the rear edge of the sheet thus withdrawn has passed beyond the suction box, the latter is moved up to the bottom of the pile of sheets to take hold of the next sheet to be separated and fed.

It is apparent that by this mechanism the sheet will be gripped always at the same locality on the sheet, regardless of any slight variation one way or the other in the time of gripping, or in the time of relieving the suction. And because the sheet is gripped when in a plane that is practically radial to the transfer cylinder, the sheet is first drawn out very slowly and then its speed of withdrawal is gradually increased. This results because of the fact that when the edge of the sheet is first gripped, the sheet is approximately in the plane which passes through the axis of the suction box and the axis of the transfer cylinder, and the gripping surface and grippers are at that time moving transversely of the sheet, and with the least movement away from the axis of the suction box—this movement of course increasing as the transfer cylinder revolves. As a consequence there is no sudden pull or shock imparted to the sheet when it is started out of the magazine from beneath the pile. Therefore, the machine as a whole may be run rapidly without danger of tearing the sheets or having them so dislocated or misplaced on the transfer cylinder that subsequent operations will be inaccurately performed. After the sheet has passed beneath the printing or delivery cylinder and has been acted thereon as required, it is released from the grippers and discharged to a pile or to other mechanisms, as desired. (Fig. 2). This action is accomplished and the advantages incident thereto result from the presentation of the sheet to the gripper in a plane substantially radial to the transfer cylinder, and moving the sheet while it is being gripped at substantially the same speed and in the same direction as the transfer cylinder.

The invention claimed is:

1. A separating and feeding machine having a continuously rotating cylinder, means for rotating said cylinder, grippers carried by said cylinder, means for actuating the grip-

pers, a magazine, and means for withdrawing a sheet from the bottom of the magazine and presenting it in a plane substantially radial to the cylinder.

5 2. A separating and feeding machine having a continuously rotating cylinder, means for rotating said cylinder, grippers carried by said cylinder, means for actuating the grippers, a magazine, and means for with-
10 drawing a sheet from the bottom of the magazine and presenting it in a plane substantially radial to the cylinder, and for moving the edge of the sheet substantially coincident with the periphery of the cyl-
15 inder while that edge of the sheet is being gripped.

3. A separating and feeding machine having a continuously rotating cylinder, means for rotating said cylinder, grippers carried
20 by said cylinder, means for actuating the grippers, a magazine, a suction box movable toward and from the bottom of the magazine, means for causing a suction in said box, and means for moving said box so that
25 it will withdraw the lowest sheet from the magazine and present it in a plane substantially radial to the cylinder.

4. A separating and feeding machine having a continuously rotating cylinder, means
30 for rotating said cylinder, grippers carried by said cylinder, means for actuating the grippers, a magazine, an oscillatory suction box movable toward and from the bottom of the magazine, means for causing a suction
35 in said box, and means for oscillating said box so that it will withdraw a sheet from the bottom of a pile in the magazine and present it in a plane substantially radial to the cylinder and move the front edge of the
40 sheet substantially co-incident with the periphery of the cylinder while that edge of the sheet is being gripped.

5. A separating and feeding machine having a continuously rotating cylinder, means for rotating said cylinder, grippers carried
45 by said cylinder, a fixed cam for opening said grippers, a spring for closing said grippers, a magazine, an oscillatory suction box movable toward and from the bottom of the magazine, a cam for oscillating the suction
50 box, a valve chamber communicating with the suction box, a valve for opening and closing an air passage to said chamber, a lever for opening the valve, and a cam for oscillating said lever. 55

6. A separating and feeding machine having a continuously rotating cylinder, means for rotating said cylinder, grippers carried
60 by said cylinder, means for actuating the grippers, a magazine and means for drawing the front edge of a sheet from the bottom of the magazine and presenting that front edge of the sheet into the path of the periphery of the cylinder at the time that the surface movement of the cylinder at the
65 point of gripping is the slowest with relation to the direction of withdrawal of the sheet from the magazine.

7. A separating and feeding machine having a continuously rotating cylinder, means
70 for rotating said cylinder, grippers carried by said cylinder, means for actuating the grippers, a magazine, and means for withdrawing the front edge of a sheet from the magazine and presenting that edge in a
75 plane radial to the cylinder and in the path of the periphery thereof, and then moving that edge in the direction of the movement of the periphery of the cylinder at substantially the same speed until it is gripped. 80

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