

Aug. 19, 1930.

H. HALLSTREAM
PAPER FEEDING MACHINE

1,773,266

Filed Sept. 3, 1925

3 Sheets-Sheet 1

Fig. 1

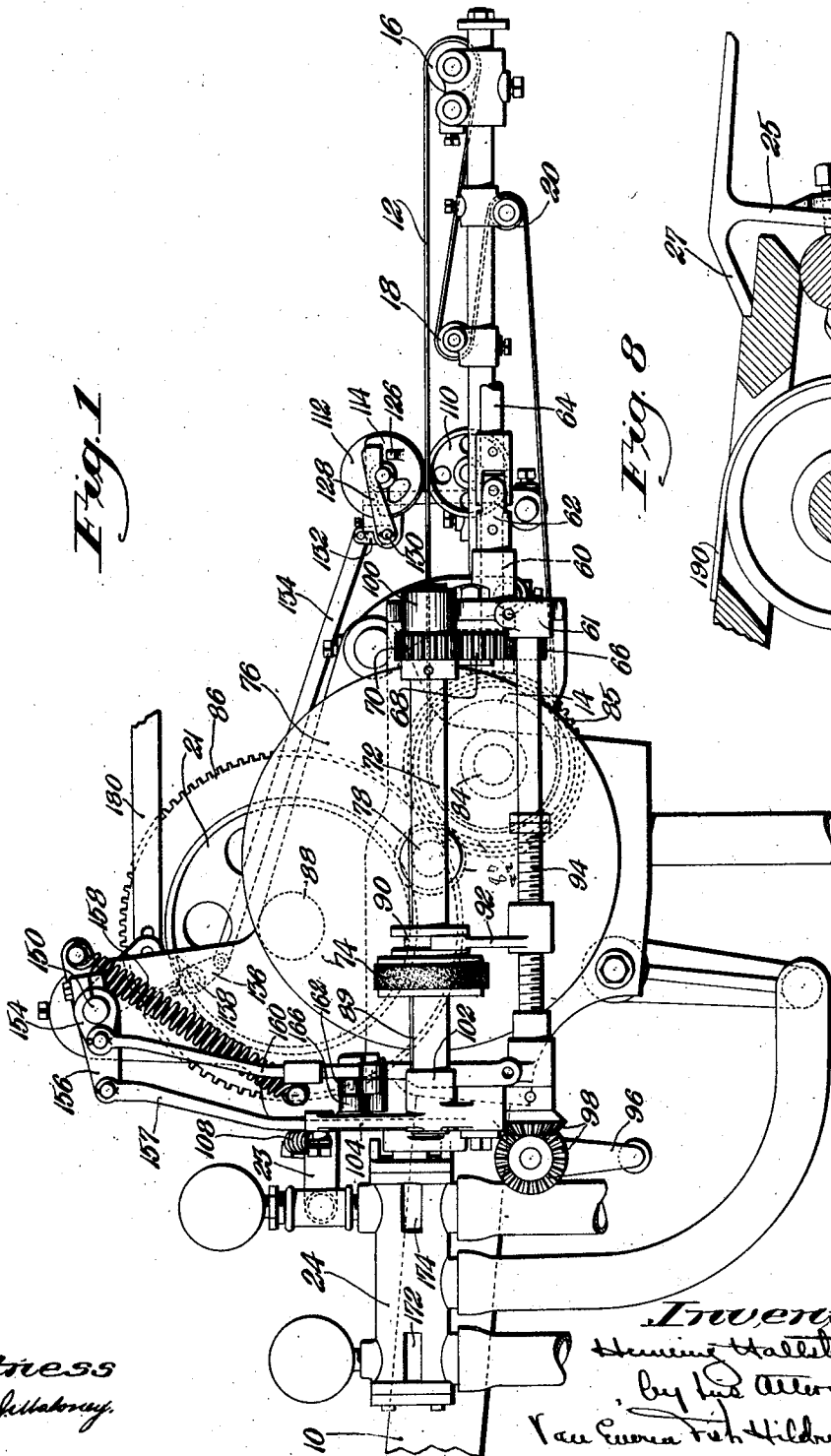
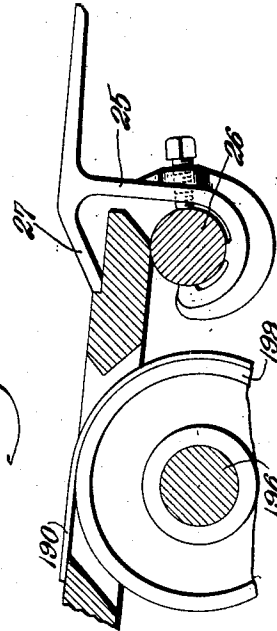


Fig. 8



Witness
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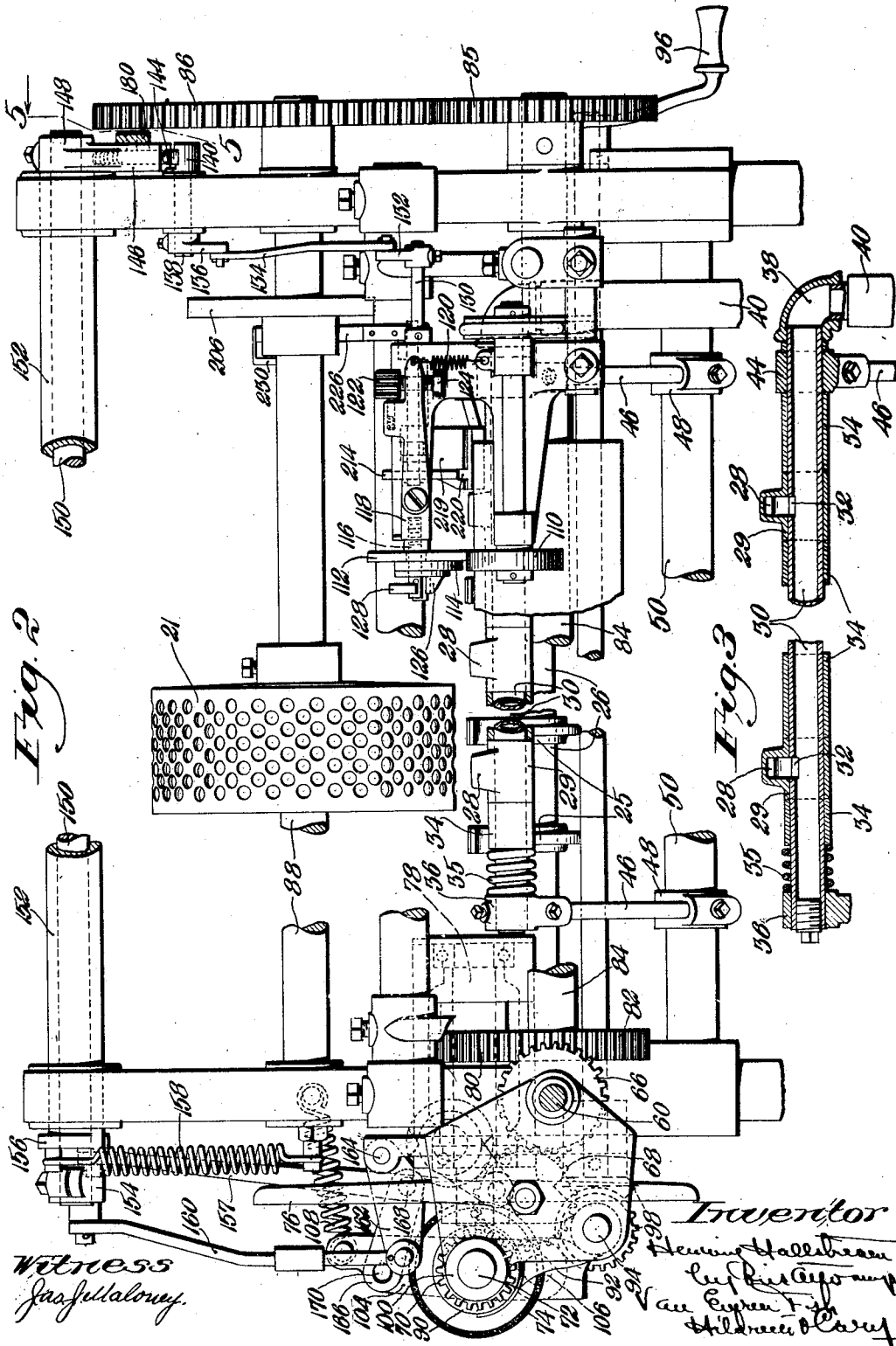
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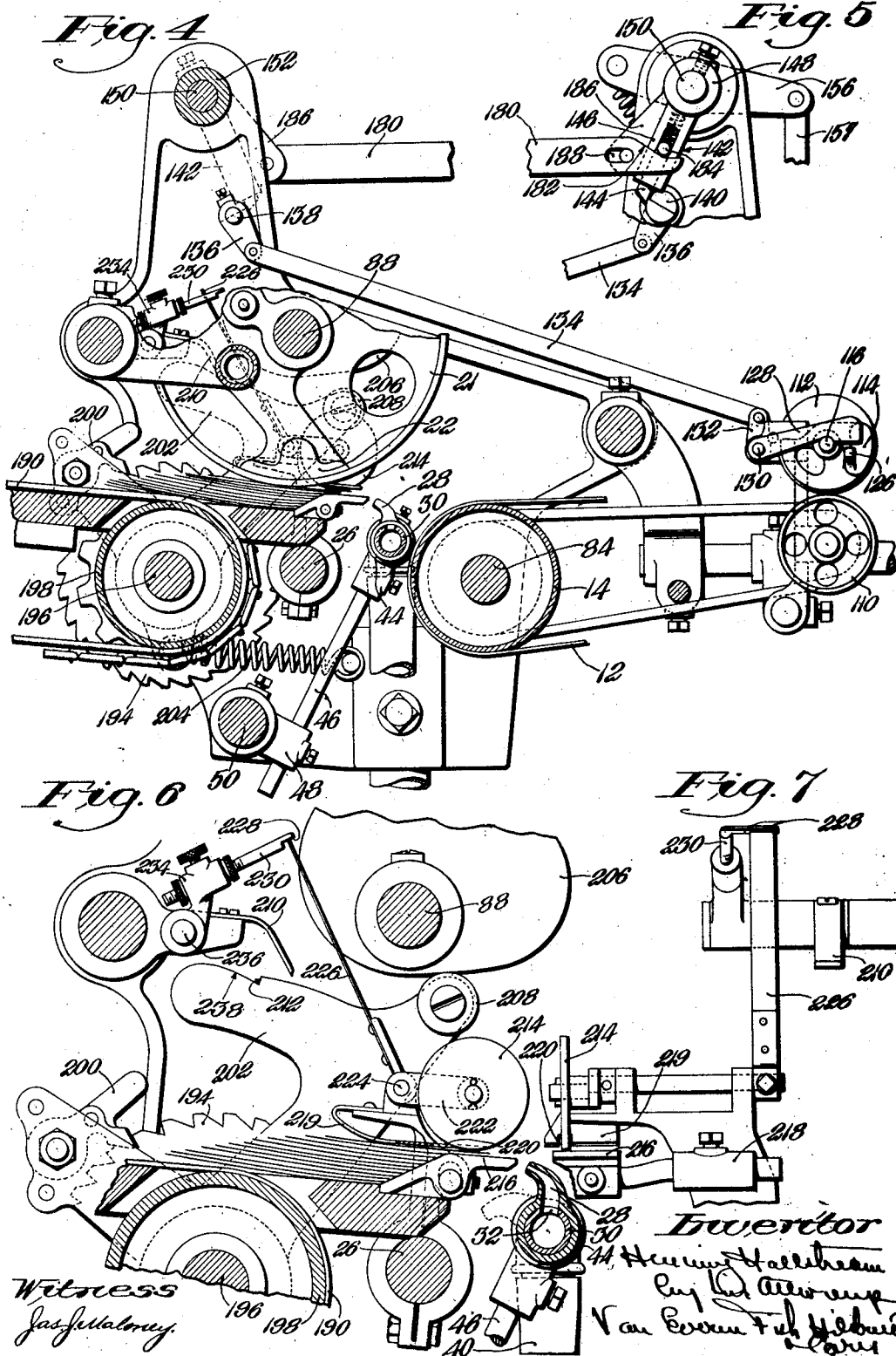
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UNITED STATES PATENT OFFICE

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PAPER-FEEDING MACHINE

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The present invention relates to paper feeding machines, and more particularly to machines which separate individual sheets from a continuous bank and forward them in succession to a printing press, folder or other machine for operating thereon.

The object of the invention is to reorganize and improve paper feeding machines, with a particular view to providing efficient devices for detecting and preventing an attempted simultaneous or overlapping feed of two or more sheets by the delivery means. With this and other objects in view, as will hereinafter appear, the present invention consists in the paper feeding machine hereinafter described and particularly defined in the claims.

In the accompanying drawings, Fig. 1 is a side elevation showing so much of a continuous paper feeding machine as is necessary to illustrate the application of the present invention thereto; Fig. 2 is a front elevation of the machine shown in Fig. 1; Fig. 3 is a detail sectional view showing the arrangement of the air blast nozzles; Fig. 4 is a detail view showing the operation of the caliper mechanism and the bank feeding means; Fig. 5 is a detail view on line 5—5 of Fig. 2; Fig. 6 is a detail view of the bank feeding means; Fig. 7 is a front view of a part of the mechanism shown in Fig. 6; and Fig. 8 is a detail of the guide fingers.

The illustrated embodiment of the invention comprises a continuous feeder in which a bank of feathered or fanned out sheets is fed from an upper supply table through a reversing throat and onto a lower feed table, the forward end of which is indicated at 10. The individual sheets are separated from the front end of the bank and presented to a continuously acting delivery mechanism, which comprises a series of tapes 12 passing over a continuously rotated rear pulley 14, an adjustable front roll 16 and intermediate adjustable take-up rolls 18 and 20. This delivery mechanism serves to present the individual sheets successively to a folder or other machine for operating thereon.

The means for separating the individual sheets from the bank comprises a perforated continuously rotating suction wheel 21,

against the inner rim of which presses a suction box 22 connected by a pipe 23 to a suction controlling valve in the valve casing 24, which in turn communicates with any suitable exhausting means whereby a suction may be applied to the top sheet of the bank through the rim of the wheel. Effective separation of the sheets is assisted by a plurality of guide fingers 25 which are arranged at intervals across the machine on a fixed transverse shaft 26, and which have inclined rear surfaces 27 to present the sheets to the action of an air blast directed upwardly from a plurality of nozzles 28. As shown in Fig. 3, each nozzle is formed on a short sleeve 29 received on a central tube 30 extending across the machine, the tube having spaced openings 32 communicating with the nozzles. The nozzles are separated by spacer bushings 34 which are maintained with the nozzles in proper position on the tube by a spring 35 taking against a collar 36 at one end of the tube. It will be seen that any of the nozzles may be turned from normal operating position into the dotted line position of Fig. 6 to cut off communication thereof with the interior of the tube, the spring 35 acting to retain the nozzles in any position to which they may be moved without preventing convenient manual movement thereof whenever necessary. This provision for rendering one or more of the nozzles ineffective is desirable in operating on narrow sheets of paper, not only because it saves power but also because of the fact that while the suction separating means may tend to pick up more than one sheet of paper the increased blast from the smaller number of blowers will effectually prevent such action.

The tube 30 connects by an elbow 38 with a flexible hose 40 leading through the valve 24 to a suitable blower. The tube 30 is supported at one end by the collar 36 and at the other by a similar collar 44, both of which are secured to rods 46 adjustably received in collars 48 which are rotatively adjustable on a fixed transverse shaft 50.

The means for driving the parts above described comprise a stud 60 journaled in a bracket 61 and connected by a universal joint 62 with a shaft 64 operated from the

folder or other machine to which the sheets are delivered. A pinion 66 mounted on the stud 60 connects through an intermediate gear 68 with a gear 70 on a shaft 72 which carries a friction disk 74 forming one member of a friction clutch, of which the disk 76 is the other. The disk 74 is mounted for movement radially of the disk 76 to effect variations in speed and also has provision for moving axially or away from the plane of the disk 76 to disconnect the feeder from the source of power. The disk 76 is mounted on a stud 78 which is connected by gears 80 and 82 with the shaft 84 on which the delivery roll 14 is mounted, the latter shaft being connected at the other side of the machine through gears 85 and 86 with the shaft 88 on which the suction wheel 21 is mounted. In order to provide for a movement of the disk 74 radially of the disk 76, the shaft 72 has a spline 89, and the disk 74 is mounted on a hub 90 which is embraced by a yoke 92 adapted to be moved by a screw 94 which is journaled in suitable bearings in the machine and rotatable by a hand lever 96 on the side of the machine through bevel gears 98. The shaft 72 is journaled at opposite ends in bearings 100 and 102, the former being arranged adjacent to the gear 70 and the latter being formed in an arm 104 which is pivoted to the frame at 106 and which is urged by a spring 108 to hold the disks in frictional engagement.

Provision is made for opening the clutch by separation of the clutch members upon failure of the suction wheel to separate the sheets so that two or more sheets are fed simultaneously or in overlapping relation by the delivery means. To this end a caliper mechanism is associated with the delivery mechanism and comprises a bottom idler roll 110, a cooperating upper idler roll 112 and a caliper roll 114, which latter is adapted to rotate only when two or more sheets overlap in passing over the delivery tapes. As shown in Fig. 2, the rolls 112 and 114 are mounted on the shaft 116, the former being loosely received on the shaft as indicated in Fig. 2 and the latter being secured thereto. The shaft is received in a pivoted arm 118 which may be adjusted for different thicknesses of paper against the tension of a spring 120 by means of a milled thumbscrew 122, the end of which bears against a fixed bracket 124. A lug 126 on the caliper roll 114 strikes a normally stationary arm 128 when the roll 114 is caused to rotate by the presence of an additional thickness of paper. The arm 128 is secured to a rock shaft 130 journaled in a bracket of the machine, and the rock shaft has secured to it a link 132 connected by a rod 134 with a rock lever 136. The rock lever 136 is mounted on a rock shaft 138 which has a slabbed upper portion 140, as shown in Figs. 2 and 5. Associated with

the rock shaft 138 is a latch, indicated generally at 142, which is adapted to be retained in the position shown in Fig. 5 during normal operation of the machine and to be moved across the slabbed surface 140 of the shaft when the caliper roll is operated upon overlapping feed of two or more sheets. This latch comprises a spring pressed plunger 144 received within a sleeve 146 which is formed with an integral collar 148 secured to a rock shaft 150 extending across the machine and journaled in a sleeve 152. Secured to the opposite end of the rock shaft 150 are two rock levers 154 and 156, the former of which connects with the friction clutch and the latter with the valve 24. A heavy spring 158 is connected between the lever 156 and the frame of the machine and urges the latch 142 against the shaft 140. The rock lever 154 connects by a link 160 with a toggle joint comprising a lever 162 pivoted at 164 on the machine frame and connected by a link 166 with the arm 104, the link 166 being pivoted at 168 on the arm 162 and pivoted on a stud 170 secured to the arm 104. As shown in Fig. 2, a slight amount of lost motion is provided between the link 166 and the stud 170 to allow for wear on the friction disk 74 in order that the latter may always be firmly pressed by the spring 108 against the disk 76. The rock lever 156 is connected by a rod 157 with suitable means for operating the valve 24 to open both the air blast and the suction means to the atmosphere through vents 172 and 174. It will be seen that upon operation of the caliper roll the rock shaft 140 will be turned in a counter-clockwise direction, as viewed in Fig. 5, and under the tension of the spring 158 the latch will swing over the upper end of the slabbed portion of the shaft, thus permitting a counter-clockwise rotation of the rock shaft 150. This movement of the shaft 150 lifts upon the link 160 to open the toggle, thus swinging the bracket 104 on its pivot 106 and moving the friction disk 74 away from the disk 76, the slight movement necessary for this separation of the clutch members being permitted by a loose fit of the shaft 72 within the bearing 100. It will be seen that upon operation of the caliper rolls to detect an overlapping feed the entire machine is stopped. The friction clutch controlling the operation of the delivery tapes and the suction wheel stops operation of both, while the valve is opened to prevent lifting of the top sheet by the suction or forcing of the air blast against the front end of the bank. The operation of the machine may then be resumed by resetting of the parts, which may be manually effected by moving the latch 142 to its original position, thus breaking the toggle and permitting the spring 108 to move the friction disks into engagement, at the same time opening

the valve 24 to operate the suction means and the air blast.

Provision is made for manually stopping the machine through operation of the latch 142. To this end there is provided a lever 180 adapted for longitudinal movement and having a cam surface 182 cooperating with a pin 184 on the plunger 144. The lever 180 has provision for a limited longitudinal movement by being mounted on a bracket 186 through a pin and slot connection 188, so that upon movement of the lever to the right, as viewed in Fig. 5, the plunger 144 will be raised and the latch permitted to swing into a position to stop the machine, as described above.

The bank of feathered or fanned out sheets is fed over the feed table by feed tapes 190 which are actuated by feed mechanism controlled by the thickness of the bank to maintain a suitable number of sheets in proper position with relation to the suction wheel. The feed mechanism comprises a ratchet wheel 194 secured to the shaft 196 which carries the pulleys 198 for the front end of the feed tapes and the feed pawl 200 which is given a feeding stroke only when the front end of the bank beneath the suction wheel has decreased below a predetermined thickness. The feed pawl is carried on one arm of a lever 202 which is acted upon by a spring 204 to retract the pawl when permitted to do so. Whenever the pawl is retracted it is then advanced to feed forward the bank by a cam 206 secured to the shaft 88 and arranged to act on a roll 208 on the lever 202. The retracting movement of the pawl is normally prevented by a pivoted pawl 210 which is arranged to engage a stop shoulder 212 on the lever 202 when the cam roll 208 rides off the high part of the cam and registers with the low part. The action of the stop pawl 210 is controlled by a measuring wheel or detector wheel 214 arranged to rest upon the top of the bank directly above a detector plate 216, which is mounted in a bracket 218 on the machine frame. A spring plate 219 having a slot 220 through which the wheel 214 passes, serves to press lightly against the top sheet of the bank and hold the sheets in proper position to be measured by the detector wheel 214. The wheel 214 is mounted for free rotation on the end of a lever 222 which is mounted on a shaft 224 journaled in the frame and which has secured to its end a controlling arm 226. This controlling arm, while the bank is of sufficient thickness, lies in the rear of a flattened under surface 228 of a stop pawl lifting arm 230. As shown in Fig. 7, the part 228 is extended at right angles from the part 230 which is adjustably received in a block 234 integrally connected with the stop pawl 210. The block 234, together with the stop pawl, is pivoted at 236 at one side of the machine. Each time the cam roll 208 passes on to the

high part of the cam 206, the pawl 210 is raised out of the notch 212 by virtue of the cam surface 238 formed in back of the shoulder 212 on the pawl carrying arm 202. At this time, the controlling arm 226 is free to pass under the surface 228 unless prevented by the engagement of the detector wheel 214 with a sufficient thickness of paper. So long as the bank presents a sufficient number of sheets to the separating devices, the pawl 210 will be free to engage the notch 212 during each cycle of the machine and no feed of the bank will take place, the slight movement which is imparted to the pawl carrying arm 202 being insufficient to retract the feed pawl over one notch of the ratchet wheel. As the front end of the bank becomes depleted, the arm 226 will swing to the right until finally it supports the member 230, as shown in Fig. 6, so that when the lower part of the cam 206 registers with the roll 208 the latter will follow the cam and permit a retracting movement of the feed pawl, thus permitting a feeding movement to be imparted to the ratchet when the roll 208 subsequently engages with the high part of the cam. The feed pawl will continue to advance the bank during each cycle until the controlling arm 226 is swung into a position in the rear of the part 228 of the stop pawl lifting member. The number of sheets for which a feeding action of the bank may be caused to take place may be adjusted by varying the position of the member 230 in the block 234.

Having thus described the invention, what is claimed is:

1. A paper feeding machine having, in combination, suction sheets separating devices, means for advancing a continuous bank of fanned out sheets to the separating devices, sheet delivery means, driving means for the separating devices and the delivery means including a clutch, means for applying a suction to the separating devices, a valve for controlling the suction, a caliper mechanism associated with the delivery means for detecting overlapping feed of more than one sheet, and connections operating upon actuation of the caliper mechanism to open the clutch and actuate the valve to cut off the suction.

2. A paper feeding machine having, in combination, sheet separating devices, bank feeding means, delivery means, caliper mechanism, driving means including two friction disks, one of which is mounted for movement radially and axially of the other, manual means for effecting radial movement of said disk to vary the speed, and connections between said disk and the caliper mechanism for effecting axial movement of the disk to stop the machine upon actuation of the caliper mechanism to detect simultaneous feed of more than one sheet by the delivery means.

3. A paper feeding machine having, in combination, sheet separating devices, means for feeding a continuous bank of fanned out sheets to the separating devices, delivery means, driving mechanism including a clutch having two members, means tending normally to hold the members of the clutch in engagement, a toggle mechanism adapted to disengage the clutch members, a caliper mechanism, and connections between the caliper mechanism and the toggle for operating the latter upon detection of simultaneous feed of more than one sheet by the delivery means.

4. A paper feeding machine having, in combination, sheet separating devices, continuous bank feeding means, delivery means, a caliper mechanism associated with the delivery means for detecting simultaneous feed of more than one sheet, driving means for the machine including a clutch having friction disks, a spring normally holding the disks in engagement, a toggle adapted to act against the spring to disengage the clutch members, and connections between the toggle and the caliper mechanism.

5. A paper feeding machine having, in combination, sheets separating devices, continuous bank feeding means, delivery means, a caliper mechanism associated with the delivery means for detecting simultaneous feed of more than one sheet, driving means for the machine including a clutch having friction disks, a spring normally holding the disks in engagement, a toggle adapted to act against the spring to disengage the clutch members, and connections between the toggle and the caliper mechanism including a toggle operating lever and a latch mechanism normally holding the toggle operating lever in inoperative position.

6. A paper feeding machine having, in combination, air blast devices including a sleeve having a plurality of openings, a plurality of nozzles mounted on the sleeve and having openings communicating with the openings of the sleeve, spacing bushings between the nozzles, and a spring surrounding the sleeve and pressing axially on the nozzles for yieldingly maintaining the nozzles in position on the sleeve, the nozzles being adapted to be rotated on the sleeve to cut off communication with the sleeve.

In testimony whereof I have signed my name to this specification.

HENNING HALLSTREAM.