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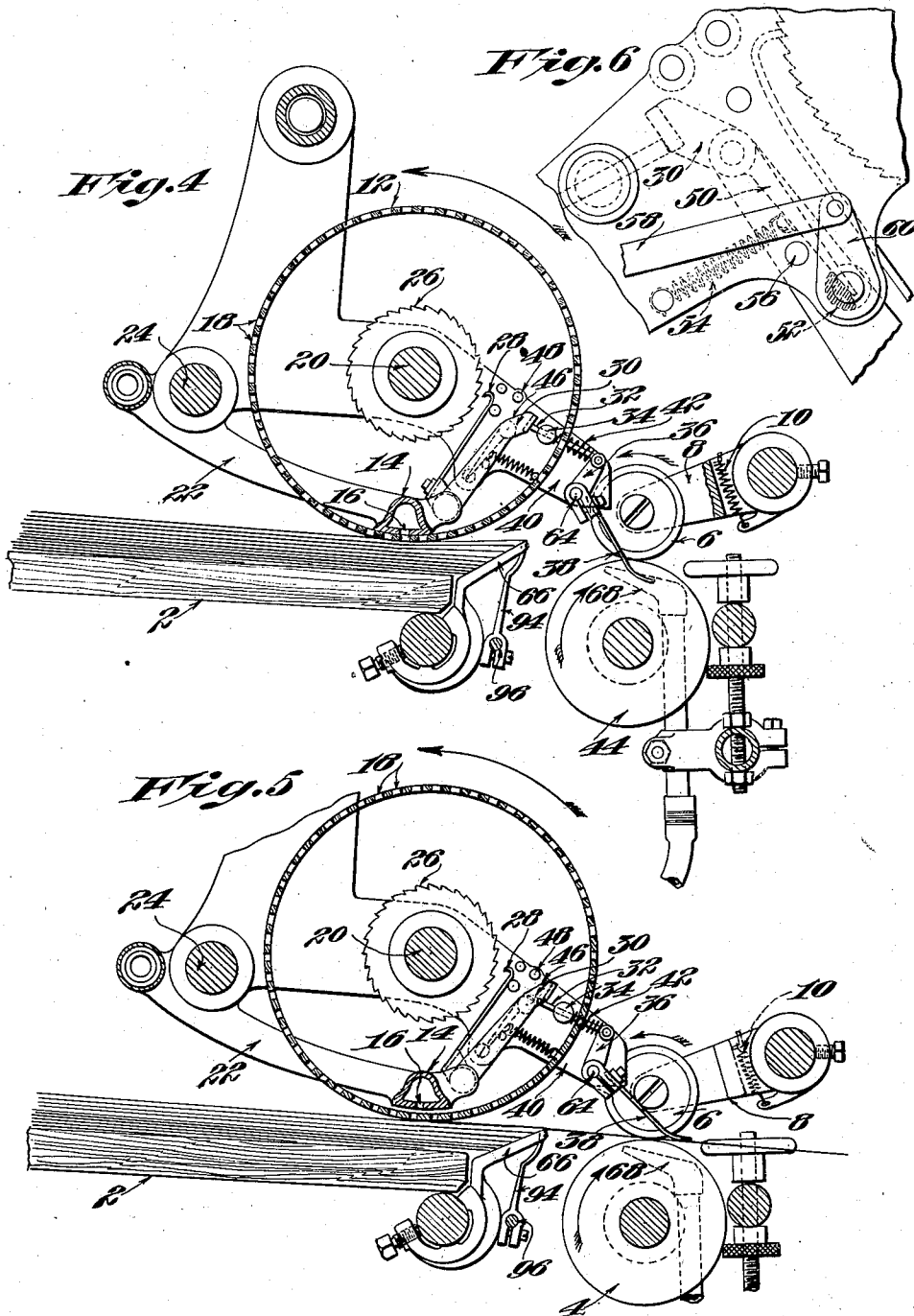
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PAPER FEEDING MACHINE

Filed Jan. 16, 1924

3 Sheets-Sheet 2



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Fig. 7

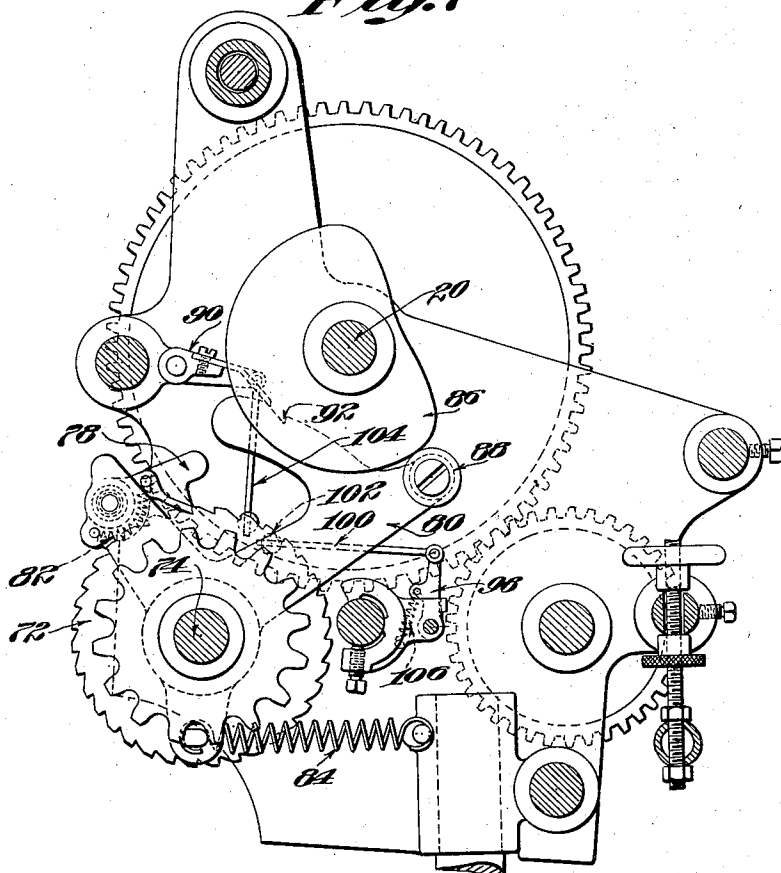
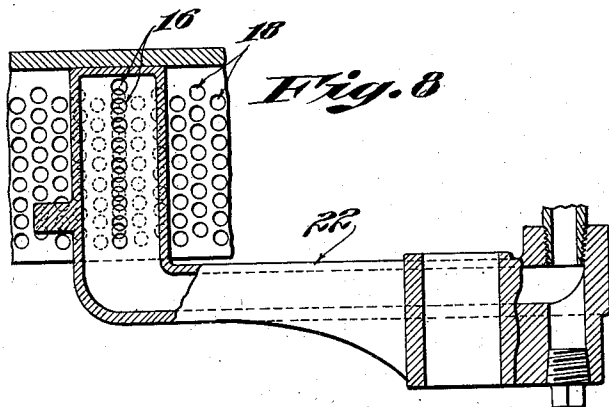


Fig. 8



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UNITED STATES PATENT OFFICE.

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PAPER-FEEDING MACHINE.

Application filed January 18, 1924. Serial No. 686,528.

The invention relates to paper feeding machines which separate individual sheets from a pile or bank and forward them in succession to a mechanism or machine for operating thereon.

The object of the invention is to provide a sheet separating and feeding mechanism of the suction feed wheel type which is well adapted for high speed operation in separating sheets of any size from a bank or pile and delivering them in regular succession to a folder or other machine for operating upon the sheets. To this end the invention comprises features of construction and combinations of parts hereinafter described and referred to in the claims.

The invention will be readily understood from inspection of the accompanying drawings and the following detail description of the mechanisms illustrated therein.

In the drawings Figure 1 is a vertical longitudinal section 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 sectional detail on line 2-2, Fig. 1; Fig. 3 is a sectional detail on line 3-3, Fig. 1; Figs. 4 and 5 are vertical sectional views showing the parts at the front end of the feed table in different positions; Fig. 6 is a detail showing a part of the cutout mechanism on a larger scale; Fig. 7 is a vertical section showing parts of the bank feeding mechanism; and Fig. 8 is a detail sectional view of the suction nozzle and perforated rim of the feed wheel.

In the drawings the invention is shown embodied in a paper feeder of the "continuous" type in which a bank of feathered or fanned out sheets are fed from an upper delivery table through a reversing throat and onto a lower feed table, the forward end of which is indicated at 2. The individual sheets are separated from the front end of the bank and presented to continuously acting delivery devices comprising the lower continuously rotating rolls 4 and the upper rolls 6 which are carried in arms 8 and are continuously pressed against the lower rolls by the springs 10.

The means for separating individual sheets from the forward end of the bank and feeding them to the delivery rolls comprises a suction feed wheel 12 having its rim perforated to cooperate with an internal suction nozzle 14 in creating a suction through the rim for feeding forward the top sheet. The suction through the rim is controlled by the advancing sheet so that as the forward edge of the sheet enters between the delivery rolls or reaches a predetermined point, the suction through the rim of the wheel is cut out or stopped and is again restarted as the rear edge of the sheet passes from between the delivery rolls or beyond said point. By thus controlling both the stopping and starting of the suction by the sheet, sheets of any length may be separated and delivered in rapid succession without requiring adjustment or re-timing of the separating mechanism for different lengths of sheets. This feature of controlling, by the sheet, the throwing into and out of action of sheet separating devices which separate and advance individual sheets, is not confined in its application to machines in which the sheet separating devices comprise a suction feed wheel and suction nozzle and may be embodied with advantage in machines in which other forms of sheet separating and advancing devices are employed.

In the construction shown, the suction nozzle is in continuous communication with the pump or other mechanism for creating a partial vacuum therein and the suction through the rim is stopped or cut out by lifting the nozzle away from the rim and is re-started by returning the nozzle into position against or close to the inner surface of the rim. As shown, the nozzle is in the form of a box adapted to fit snugly against the inner surface of the wheel rim and provided with a series of port holes adapted to register with rows of perforations 18 which extend substantially from side to side of the rim, as indicated in Fig. 8. The suction wheel is secured to a continuously rotating shaft 20 so mounted that the rim of the wheel is slightly above the

forward end of the bank and the nozzle is carried on the end of a hollow lever 22 pivotally supported on a transverse shaft 24 and having its rear end connected through
5 suitable pipe connections with a suction producing device.

The cut-out mechanism comprises a ratchet wheel 26 secured to the shaft 20 and a pawl 28 connected with the suction nozzle
10 and movable into and out of engagement with the ratchet wheel. The pawl is secured to a pawl lever 30, the lower end of which is pivotally connected to the suction nozzle and the upper end of which is arranged to
15 be engaged by the rear end of a rod 32. The rod is guided in a stud 34 and its front end is pivotally connected to one arm of a bell crank lever 36, the other arm of which carries the cut-out finger 38 which is arranged
20 across the path of the sheet. The lever 36 is pivoted on the bracket 40 which also supports other parts of the cut-out mechanism and the lever is pressed in a direction to maintain the cut-out finger in position across
25 the path of the sheets by a light spring 42. The lower end of the cut-out finger projects into a grooved roll 44 which is secured to the shaft which carries the lower delivery rolls 4 and as a sheet is advanced by the
30 suction feed wheel, its front edge is directed against the cut-out finger by the grooved roll and rocks the cut-out finger so that the rod 32 swings the pawl lever 30 to engage the pawl 28 with the ratchet wheel 26. When
35 this occurs, the tooth of the ratchet wheel which is engaged by the pawl acts to positively lift the pawl and through it the suction nozzle and thus cut out the suction through the rim of the wheel. The upward
40 movement of the pawl lever brings a cam surface 46 on the upper end of the lever into engagement with a pin 48, so that the pawl is disengaged from the ratchet wheel. The spring of the parts when the suction is
45 broken by the forcible lifting of the suction nozzle tends to throw the parts upward so that the pawl is readily disengaged from the ratchet wheel. When the suction nozzle is lifted, it is retained in raised position by a
50 trip pawl 50, the upper end of which is pivoted on the pawl lever 30 and the lower end of which is arranged to engage a trip pin 52 which is mounted in the bracket 40. The trip pawl is acted upon by a light spring 54
55 which tends to hold the lower end of the pawl either in engagement with the side of the trip pin 52 or in engagement with a stop pin 56 on the bracket 40. The side of the trip pin engaged by the pawl is flattened or
60 cut away as indicated by the dotted section lines in Figure 6 and the stop pin 56 is so arranged with relation to the trip pin that as the pawl lever 30 is raised, the lower end of the trip pawl will swing in over the upper
65 edge of the trip pin, as indicated in Fig-

ure 5. The parts will remain in this position while the sheet which operated the cut-out mechanism is passing under the cut-out finger 38. When the rear end of the sheet passes from beneath the cut-out finger, the
70 finger will drop down into the position indicated in Figure 4. This movement of the cut-out finger rocks the trip pin 52 to disengage the lower end of the trip pawl 50 so that the suction nozzle is lowered into active
75 position. This movement of the cut-out finger and suction nozzle brings the off-set upper end of the pawl carrying lever 30 into position to be engaged by the rear end of the rod 32, as indicated in Figure 4, thus re-setting the cut-out mechanism. The connection
80 between the cut-out finger and the trip pin 52 comprises a link 58 connecting an arm 60 on the end of the trip pin with an arm 62 on the rock shaft 64 which carries the trip
85 finger lever 36.

The front edges of the sheets at the forward end of the bank rest against and are supported by upwardly inclined guide fingers 66 and the upper sheet is raised into
90 engagement with the rim of the feed wheel by the action of air blasts directed by nozzles 68 in an upwardly inclined direction against the front edge of the bank. The air blasts also serve to ensure the separation
95 of the top sheet from the sheets beneath it when the top sheet is drawn against the rim of the wheel by the suction therethrough and also serves to wind the top sheet so that it may be readily removed from the bank
100 and carried away by the delivery rolls.

The bank of feathered or fanned-out sheets is fed forward over the feed table by feed tapes 70 which are actuated by feed
105 mechanism controlled from the front end of the bank to maintain it in proper relation to the suction feed wheel as the fanned-out sheets are successively removed. The feed mechanism comprises a ratchet wheel 72 secured to the shaft 74 which carries the pulleys 76 for the front ends of the feed tapes
110 and a feed pawl 78 which is given a feeding stroke only when the front end of the bank is back of a predetermined point. The feed pawl is carried on one arm of a lever 80 and is held in engagement with the ratchet wheel
115 by a spring 82. The pawl carrying lever is acted upon by a spring 84 which acts to retract the pawl when permitted to do so. Whenever the pawl is retracted it is advanced to feed forward the bank of sheets
120 by a cam 86 secured to the shaft 20 and arranged to act on a roll 88 on the lever 80. The retracting movement of the pawl is normally prevented by a pivoted pawl 90 which
125 is arranged to engage a stop shoulder 92 on the lever 80 when the cam roll 88 rides off of the high part of the cam and registers with the low part. The action of the stop
130 pawl 90 is controlled by a finger 94 mounted

below the front end of the bank and arranged to play through a slot in one of the guide fingers 66. The finger 94 is secured on a rock shaft 96, the outer end of which is provided with an arm 98. A rod 100 is pivoted to the arm and its rear end passes through a guide pin 102 and is so arranged that it may pass under the lower end of a rod 104, the upper end of which is pivotally connected to the pawl 90. The controller finger 94 is held against the front edge of the bank by a light spring 106 connected with the arm 98.

Each time the cam roll 88 passes onto the high part of the cam 86, the pawl 90 is raised out of the notch 92, as indicated in Figure 7, and at this time the rod 100 is free to pass under the rod 104 unless prevented by the engagement of the finger 94 with the front end of the bank of sheets. So long as the front end of the bank holds the finger in the position indicated in the drawings, the pawl 90 will be free to engage the notch 92 during each cycle of the machine and no feed of the bank will take place. As the front end of the bank recedes, the finger will swing to the left in Figure 6 until the rod 100 is moved to the left in Figure 7 sufficiently to bring it under the rod 104 when this rod is lifted as the pawl 90 rides out of the notch 92. When this occurs, the pawl will be rendered inactive and the cam roll 88 will be permitted to ride down onto the low part of the feed cam so that the feed pawl will be retracted into position to engage a new tooth in the ratchet wheel 72 and will impart a feeding movement to the bank as the roll rides onto the high part of the cam. The feed pawl will continue to advance the bank during each cycle until the controlling finger 94 is swung into such position that the rod 100 is withdrawn from under the rod 104, thus again rendering the pawl 90 active.

The suction feed wheel 12 and the delivery rolls 4 are driven at the same surface speed by gearing indicated in Figure 7 so that the suction feed wheel feeds forward the sheets at the same speed at which they are carried forward by the delivery rolls. The sheets are thus separated and delivered in rapid succession with one sheet following but slightly separated from the preceding sheet regardless of the length of the sheets which are presented to the suction feed wheel.

While it is preferred to employ the construction and arrangement of parts shown and described in embodying the invention in a feeder of the continuous type, it will be understood that this construction and arrangement is not essential to the broader features of the invention and may be varied or modified as found desirable or best suited to the construction and mode of operation

of the feeding mechanism in which it is to be embodied or of the mechanism to which the sheets are to be fed.

What is claimed is:

1. A sheet feeding machine having, in combination, a suction sheet separating device, and mechanism controlled by the sheet for rendering said device active and for rendering said device inactive.

2. A sheet feeding machine having, in combination, a suction sheet separating device, and mechanism controlled by the front edge of the sheet for rendering said device inactive and controlled by the rear edge of the sheet for rendering it again active.

3. A sheet feeding machine having, in combination, a sheet separating device, a cut-out finger arranged to be engaged by the suction sheet, cut-out mechanism thrown into operation by engagement of the front edge of the sheet with the finger to render the separating device inactive, and means thrown into operation by the disengagement of the finger by the rear edge of the sheet for rendering the sheet separating device active and re-setting the cut-out mechanism.

4. A sheet feeding machine having, in combination, a sheet separating device including a member which is raised to render the device inactive, a pawl connected to move with said member, a ratchet traveling in a direction to lift the pawl and member when engaged by the pawl, a sheet operated cut-out finger connected to engage the pawl with the ratchet, a trip pawl for holding the member in raised position, and means for releasing the trip pawl to lower said member.

5. A sheet feeding machine having, in combination, a sheet separating device including a member which is raised to render the device inactive, a pawl connected to move with said member, a ratchet traveling in a direction to lift the pawl and member when engaged by the pawl, a sheet operated cut-out finger connected to engage the pawl with the ratchet, a trip pawl for holding the member in raised position, and means for releasing the trip pawl by the movement of the cut-out finger when disengaged by the rear end of the sheet.

6. A sheet feeding machine having, in combination, a sheet separating device including a member which is raised to render the device inactive, a pawl connected with the member, a ratchet wheel rotating in a direction to lift the pawl and member, a trip pawl mounted to move with the ratchet pawl, a trip pin for supporting the trip pawl when raised by the ratchet, and means for rocking the pin to release the trip pawl.

7. A sheet feeding machine having, in combination, a sheet separating device including a member which is raised to render

the device inactive, a pawl connected with the member, a ratchet wheel rotating in a direction to lift the pawl and member, a trip pawl mounted to move with the ratchet pawl, and a trip pin supporting the trip pawl when raised by the ratchet and rocked by the cut-out finger.

8. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, means operated by the front end of the sheet advanced by the feed wheel for interrupting the suction through its rim, and means operated by the rear edge of said sheet for restoring the suction.

9. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, and sheet controlled mechanism for disengaging the nozzle from the rim to cut out the suction on the sheet and for re-engaging the nozzle to restore the suction.

10. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, means for creating a suction through the rim along its sheet engaging element, sheet controlled means for rendering the suction inactive on the sheet, and sheet controlled means for rendering the suction again active on the succeeding sheet.

11. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, sheet controlled means for lifting the nozzle, continuously acting delivery devices, and means controlled by the rear end of the sheet presented to the delivery devices by the feed wheel for lowering the suction nozzle.

12. A sheet feeding machine having, in

combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, and mechanism controlled by each sheet for positively disengaging the nozzle from the rim to intermittently cut out the suction on successive sheets.

13. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, a pawl connected with the nozzle, a ratchet traveling in a direction to lift the pawl and nozzle when engaged by the pawl, and a sheet operated cut-out finger connected to engage the pawl with the ratchet.

14. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, a pawl connected to the nozzle, a ratchet traveling in a direction to lift the pawl and nozzle when engaged by the pawl, a cut-out finger connected to engage the pawl with the ratchet, a trip pawl connected with the nozzle to support it when raised by the ratchet, and means for releasing the trip pawl to lower the nozzle.

15. A sheet feeding machine having, in combination, a suction feed wheel having a perforated rim, a suction nozzle within the rim over which it travels, a pawl connected with the nozzle, a ratchet traveling in a direction to lift the pawl and nozzle when engaged by the pawl, a trip pawl connected with the nozzle, a trip pin engaged by the trip pawl when raised by the ratchet, and a sheet operated cut-out finger connected to engage the pawl with the ratchet and to rock the trip pin.

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