No. 880,197. PATENTED FEB. 25, 1908.

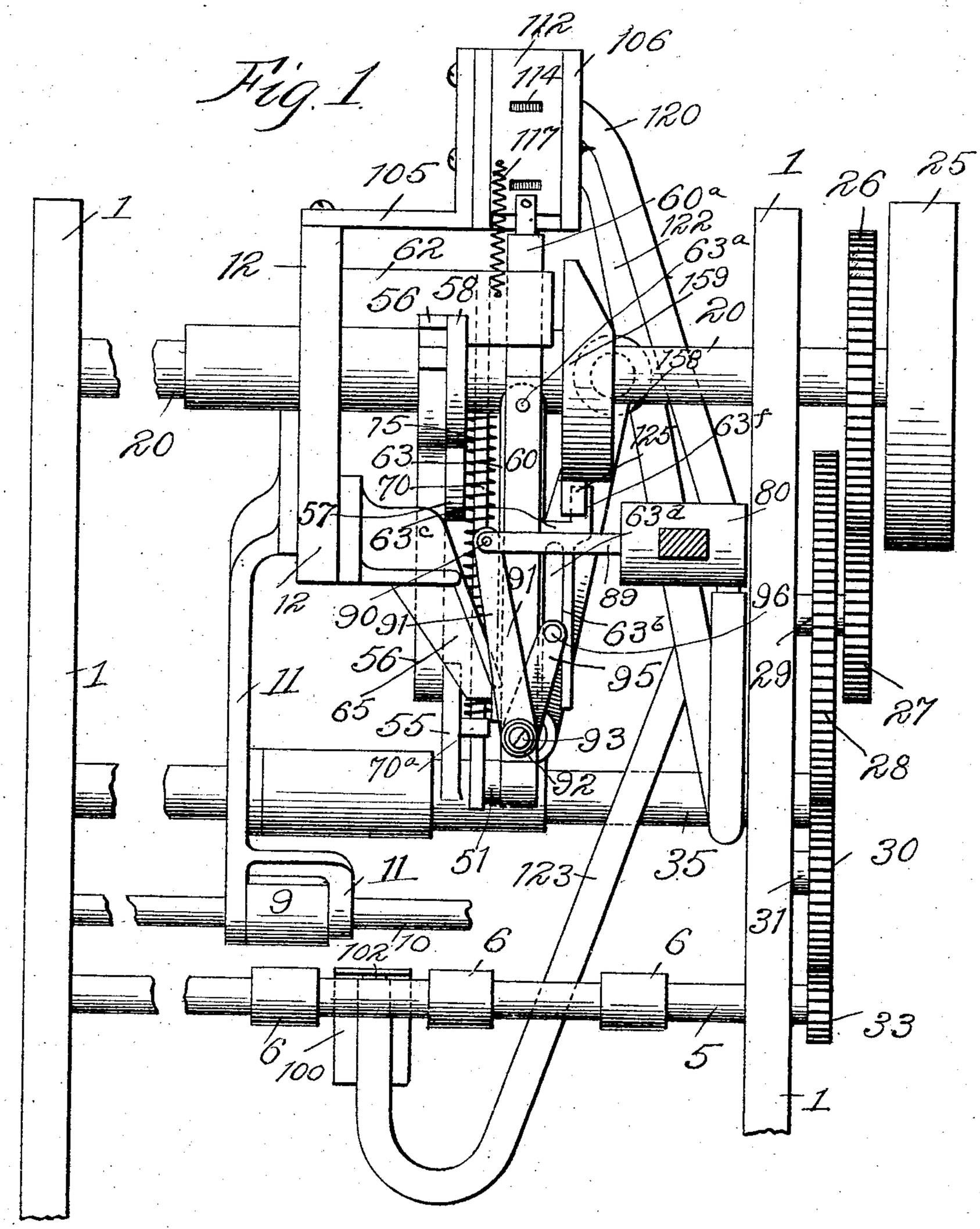
T. C. DEXTER.

PAPER FEEDING MACHINE.

APPLICATION FILED MAR. 1, 1907.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses
Wm. P. Hammond
R. F. Tourek

Talbot C. Dexter
Inventor,
By his Attorneys Knight Bros.

No. 380,197. PATENTED FEB. 25. 1908.

T. C. DEXTER.

PAPER FEEDING MACHINE.

APPLICATION FILED MAR. 1, 1907.

3 SHEETS—SHEET 2.

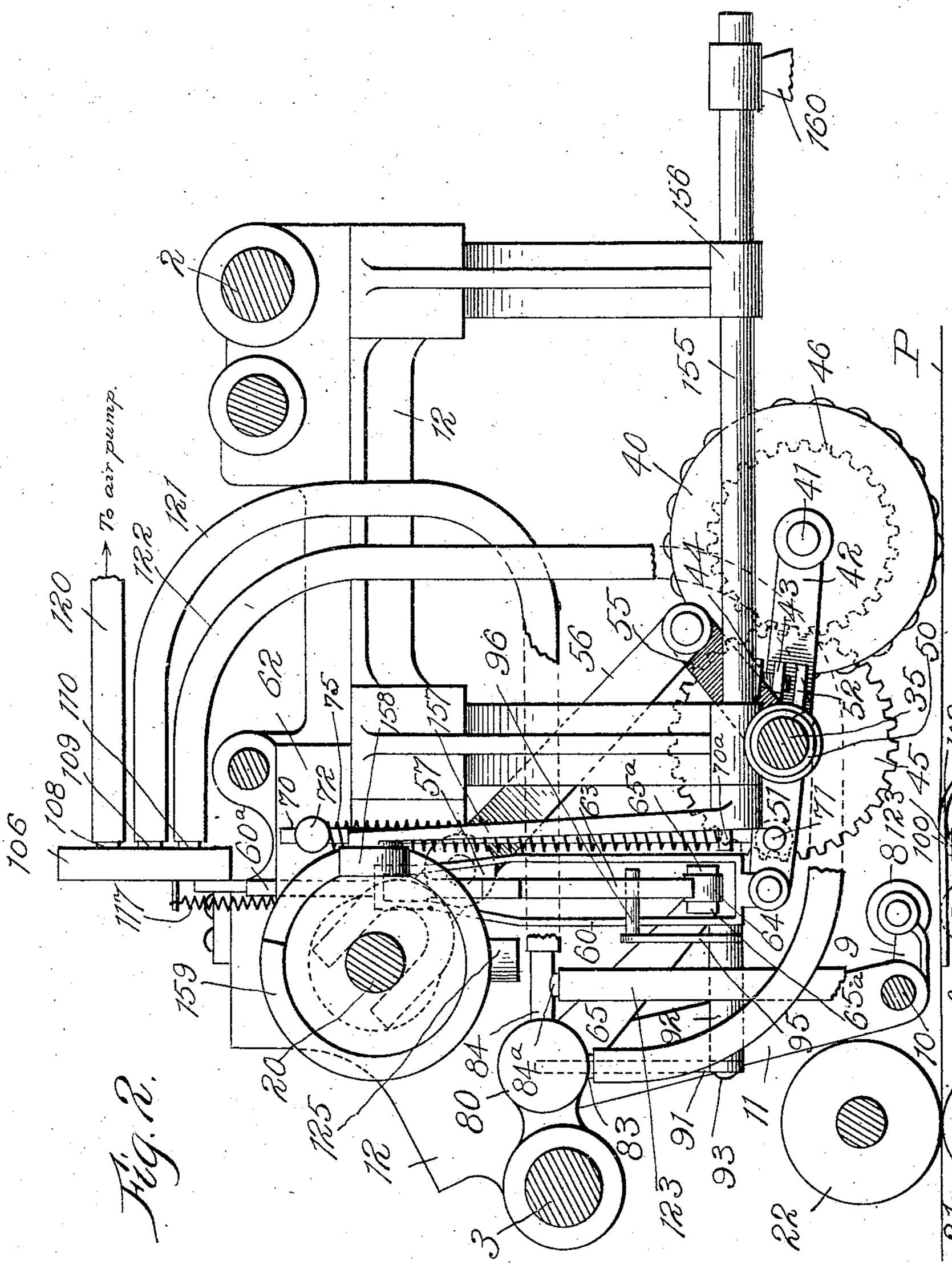


Fig. 2.

Witnesses
Wm. P. Hammond
R. F. Tonnek

Talbot C. Dexter
Inventor,
By his Attorneys Knight Bros.

No. 880,197. PATENTED FEB. 25, 1908.

T. C. DEXTER.

PAPER FEEDING MACHINE.

APPLICATION FILED MAR. 1, 1907.

3 SHEETS—SHEET 3.

Fig. 3.

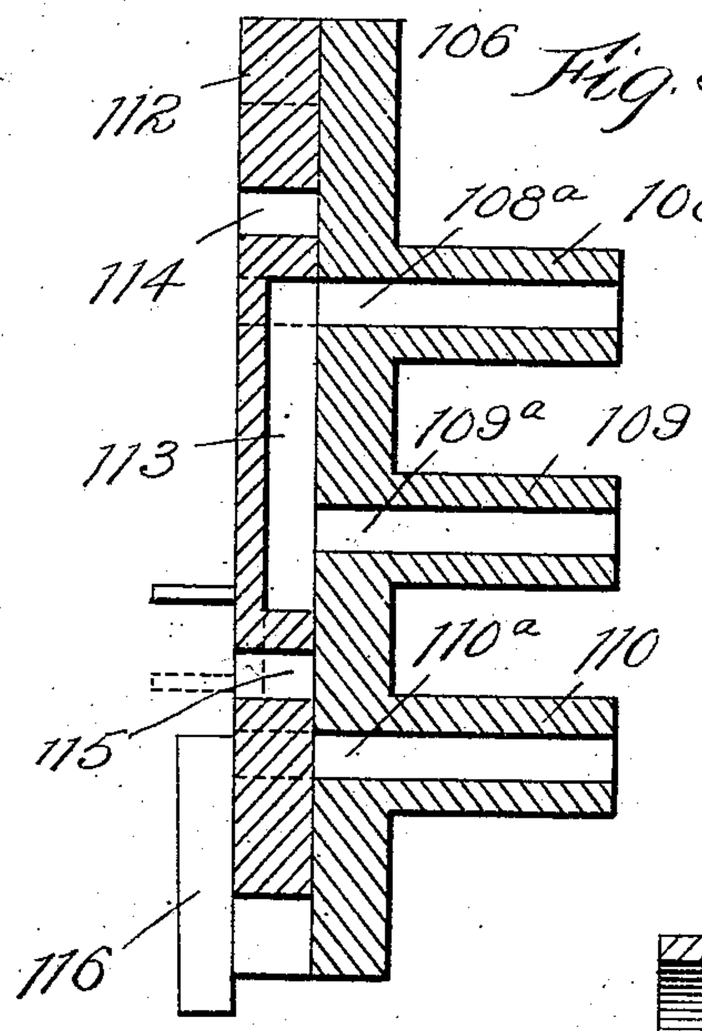


Fig. 4.

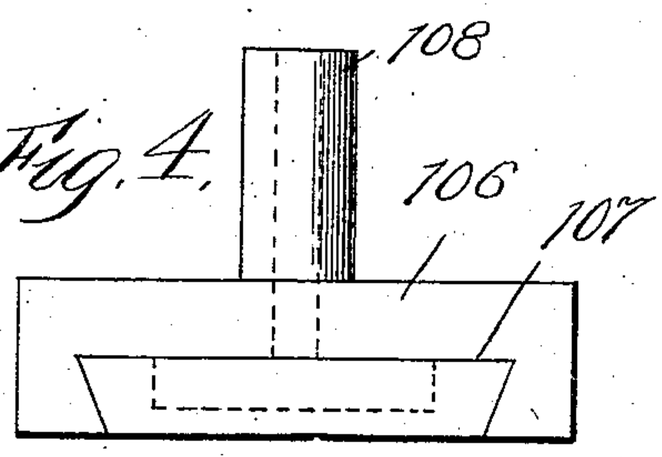


Fig. 5.

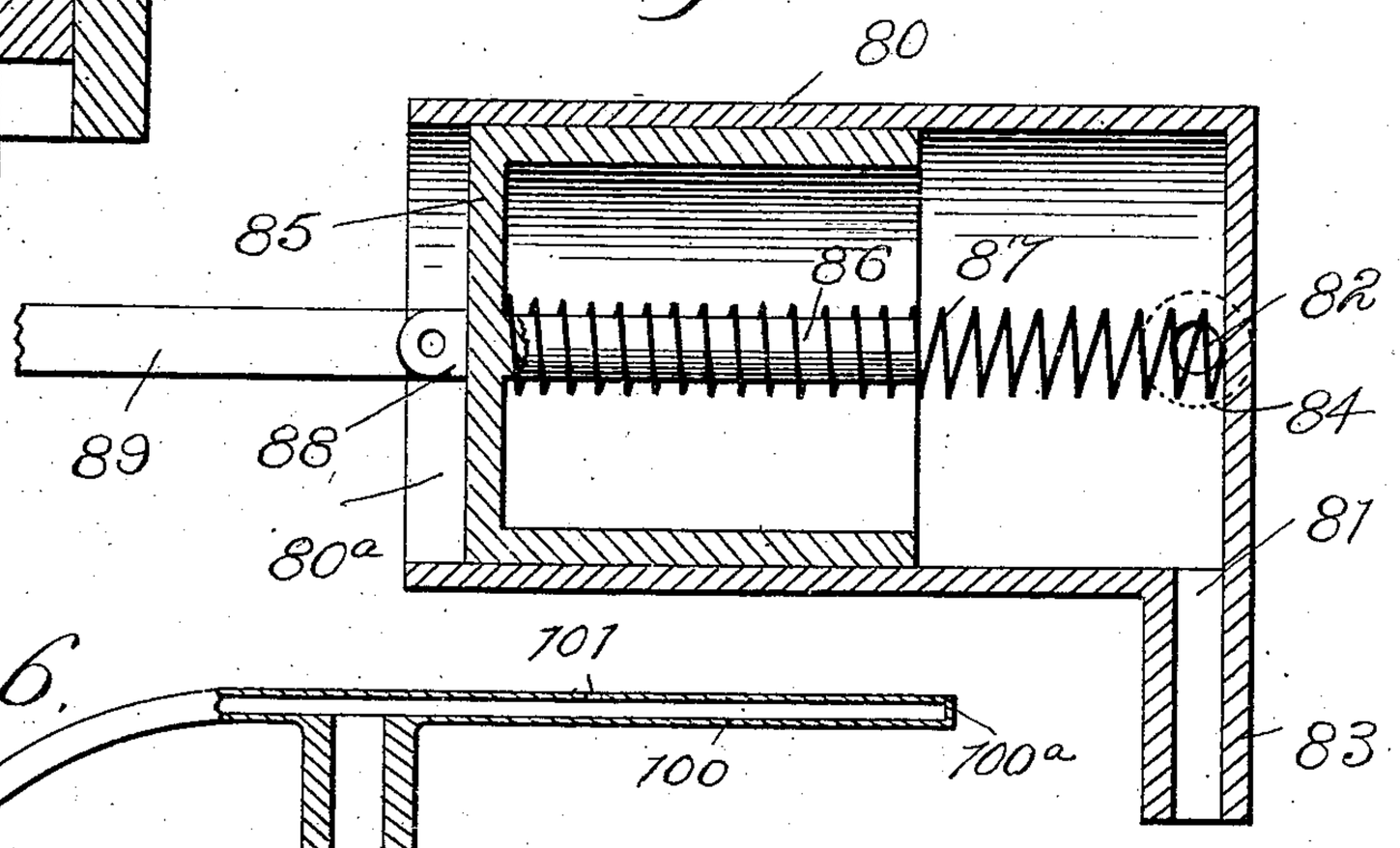


Fig. 6.

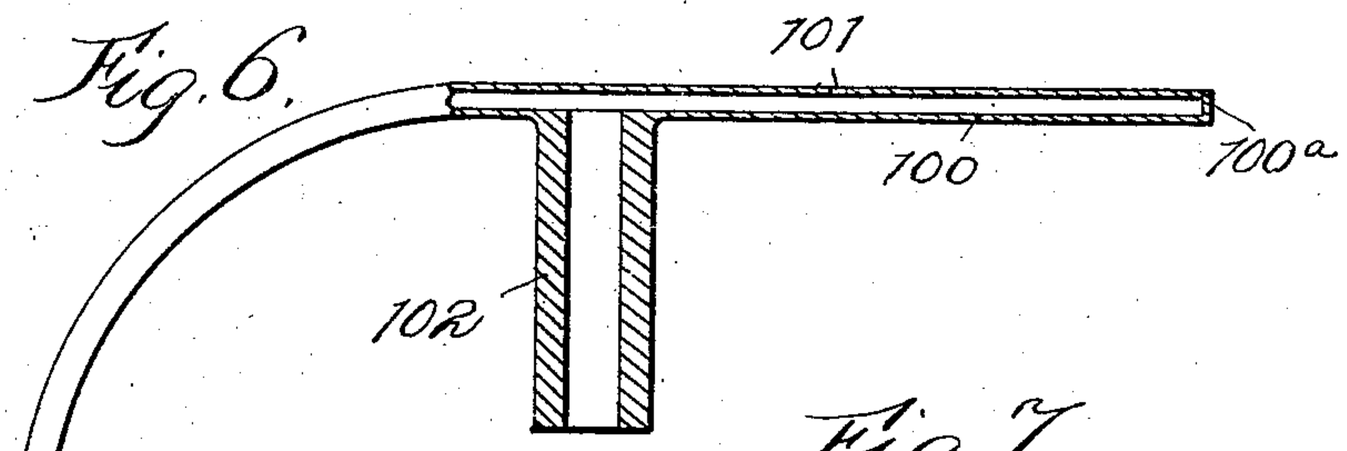
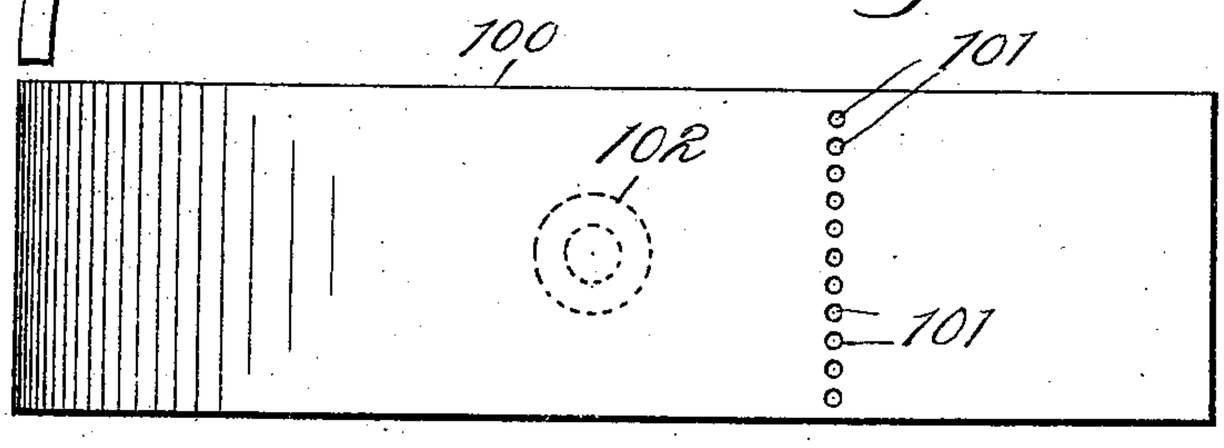


Fig. 7.



Witnesses:
Wm. P. Hammond
R. F. Jonuck.

Talbot C. Dexter
Inventor,
By his Attorneys Knight Bros

UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER, OF PEARL RIVER, NEW YORK.

PAPER-FEEDING MACHINE.

No. 880,197. Specification of Letters Patent. Patented Feb. 25, 1908.

Application filed March 1, 1907. Serial No. 360,000.

To all whom it may concern:

Be it known that I, TALBOT C. DEXTER, a citizen of the United States, and a resident of Pearl River, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

My present invention relates generally to improvements in paper feeding machines, and particularly to feeding machines of the sheet combing type, in which the pile of sheets is acted upon by combing feeding devices which comb or feather out the top sheets of the pile to gradually separate the successive sheets near the top so they may be drawn from the pile periodically and fed to any machine arranged to operate upon the individual sheets. A machine of this type is set forth in Letters Patent No. 829,854, granted to me August 28th, 1906, and my present invention may best be considered in the light of an improvement upon the mechanism for raising and lowering the sheet combing devices and the sheet actuated devices which control the operation of the combing devices in a machine such as covered by the said patent.

It is well known to those skilled in the manufacture of paper feeding machines that to meet the modern requirements of such machines, it is necessary to construct a machine which will be able to feed with reasonable accuracy, various kinds and grades of paper. Accuracy in feeding is usually provided for by means of feed controlling devices actuated by the movement of the sheet. It is also well known that many efforts have been made in the past to improve the operation of paper feeding machines with particular reference to the adaptation of such machines to the accurate handling of all kinds of paper, and further that such efforts have not been altogether successful with respect to the accurate feeding of some grades of thin and soft papers, mainly because dependence has been placed upon the engagement of the uncertain and unreliable edge of the sheet of paper with a movable trip arm supported in the path of the sheets for the control of the sheet moving devices.

Feed-controlling tripping devices which include trip arms hung in the path of the sheets are objectionable in paper feeding machines when operating upon thin or soft paper because of the lack of strength and stiffness in the edge of the sheet which is depended upon for actuating the trip arm. Such devices are also objectionable in feeding any kind of paper because of the objectionable drag upon the sheets as they pass from the machine. This last named objection is sometimes obviated by providing means for elevating the trip arm out of contact with the sheet immediately after it has performed its tripping function, but such arrangements necessarily increase the complexity of the structure and are objectionable from this standpoint.

My present invention entirely obviates the above mentioned difficulties and enables me to produce a paper feeding machine of extremely simple construction which will accurately feed all kinds of paper. I have done away with the objectionable trip arms supported in the path of the sheets, and have arranged to control the feeding action of the sheet moving instruments through the medium of sheet controlled suction devices.

More specifically considered, my present invention comprises in a paper feeding machine, a suitable sheet moving instrument having means for throwing it into action and for arresting its operation, and suitable suction means controlled by the sheet acted upon and arranged to cause the operation of the arresting means.

In carrying my invention into practical use, I have provided a paper feeding machine with two independently acting sheet moving devices (preferably sheet combing wheels), an independent spring device for raising each combing wheel out of contact with the pile of sheets, suitable cam mechanism for lowering the combing wheels into active relation with the pile of sheets, an independent latching device for restraining each spring device when the combing wheels are operating, a suction cylinder connected with each latching device for tripping it, independent suction nozzles communicating with the independent suction cylinders and supported beneath the path of the sheets in position to be closed by a sheet when it reaches registered position, and independent suction pumps communicating with the suction cylinders and controlled by suitable valves for the purpose explained. I prefer to employ a three-way valve in the communication between each pump and its suction cylinder in such relation to the raising mechanism of the sheet moving instrument that the elevation of said

instrument will operate the valve for breaking the suction in the cylinder and suction nozzle. Each of these three-way valves is preferably actuated by a separate pump for automatically moving it into its active position as each sheet moving instrument is thrown into operation.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings, and afterwards point out the novelty more particularly in the annexed claims.

Figure 1 is a front elevation of a paper feeding machine embodying my invention, one-half of the machine being omitted. Fig. 2 is a vertical longitudinal sectional view of the same. Fig. 3 is a detail vertical sectional view of the suction controlling valve. Fig. 4 is a detail plan view of the same. Fig. 5 is a detail longitudinal sectional view of one of the suction cylinders. Fig. 6 is a detail sectional view, partly in elevation, of one of the sheet controlled suction nozzles, and Fig. 7 is a detail plan view of the same.

Sheet feeding machines of the type to which my present invention relates are provided with two sets of sheet moving devices arranged to operate at opposite sides of the machine. In the accompanying drawings, I have shown only one-half of the machine, including only one of these sheet moving devices, but it will be understood that two such devices of the same construction are employed, each being independently controlled by a sheet actuated, or controlled suction device, as hereinafter explained.

The frame-work of my improved machine may be of any suitable construction to properly support the working parts hereinafter referred to. In the drawings 1, 1, represent the vertical side frames. These side frames are suitably braced to make them rigid by means of stay rods 2, 3, and other frame parts not shown, and within the frame is provided a suitable table or support for carrying a pile of sheets, indicated by the reference letter P. At the front of the pile of sheets, I provide a series of vertical guide rods or strips, (not shown) for confining the pile.

5 is a constantly driven shaft bearing the lower feed rollers 6, said shaft 5 being braced at intervals by suitable bearing brackets, (not shown).

8 are drop rollers journaled in the bifurcated rock arms 9, mounted upon the transverse rock shaft 10. The rock shaft 10 extends transversely of the machine, above the constantly running lower shaft 5, and is suitably braced between its ends by two or more bracket arms 11 rigidly secured to the auxiliary longitudinal frame pieces 12. The rock shaft 10 is operated by the usual mechanism, whereby the series of drop rollers 8 are peridically raised and lowered for performing their function.

21 and 22 are respectively the under feed roller and drop-roller of a folding machine to which the feeder is to pass the sheets.

The main cam shaft 20 extends transversely of the machine and is suitably journaled in the main side frames 1 and the auxiliary longitudinal frame pieces 12. This shaft 20 is provided with a driving pulley 25, as shown, or it may be driven in any other suitable manner, said shaft being the shaft from which all other parts of the machine are driven.

The cam shaft 20 carries a large gear 26, which meshes with a smaller gear 27, secured to a larger gear 28, journaled upon a stud 29, projecting from the side frame of the machine. The gear 28 meshes with and drives a smaller gear 30 journaled upon a stud 31, projecting from the side frame of the machine, and this gear 30 in turn drives a smaller gear (not shown) keyed to the projecting end of the comber driving shaft 35 hereinafter referred to, and a smaller gear 33 keyed to the projecting end of the constantly rotating feed shaft 5 above referred to.

40 is one of a pair of combing wheels. Each of these combing wheels is freely journaled at 41 upon a rock arm 42, which is freely journaled upon a sleeve 50 which is in turn journaled upon the shaft 35. This shaft 35 has keyed to it a gear 45 which meshes with a gear 46 (shown by dotted lines) secured to the combing wheel 40, by which the combing wheel is constantly rotated.

Projecting from one face of the comber-supporting rock-arm 42 is an integral lug 43 in which is mounted an adjustable tappet screw 44. Secured upon the sleeve 50 to one side of the rock arm 42 is a rock arm 51 which is provided with a finger 52, which projects beneath the tappet screw 44 just referred to, and by its engagement therewith lifts the combing wheel away from the pile. By adjusting the screw 44, the limits of rise and fall of the combing wheel can be fixed.

The rock arm 51 is moved in one direction for lifting the combing wheel by a spring mechanism which is normally restrained by a latching device which is periodically released by the sheet actuated suction device hereinafter explained. The rock arm 51 is moved in the opposite direction to allow the combing wheel to move by gravity into engagement with the pile of sheets by the action of a cam as will now be explained.

Sleeve 50 has at its end, adjacent to the rock arm 51, another rock arm 55 to which is pivotally connected a pitman 56, formed with a yoke-shaped upper end, which straddles the shaft 20. The shaft 20 carries a peripheral cam 58, which engages an anti-friction roller 57 journaled upon the pitman 56, whereby the rock arm 56, sleeve 50, and finger 52 are moved once in each revolution

of the shaft 20 to reset the spring and latching mechanisms (hereinafter described) and allow the combing wheel to rest upon the pile.

The rock arm 51 projects forwardly from the sleeve 50 and has pivotally connected to its forward end a yoke-shaped latching bar 60 extending vertically and formed at its upper end with a contracted guide-bar portion 60[a] which rides in a socket formed in a bracket 62 extending laterally from one of the central auxiliary frames 12. Pivoted at 63[a] in the upper end of the loop of the yoke-shaped latching bar 60, is a latching arm 63. The lower end of the latching arm 63 is recessed slightly to fit over an antifriction roller 64 freely journaled between the ears 65[a] projecting from an angular bracket arm 65, which is secured to one of the frame pieces 12. The ears 65[a] and antifriction roller 64, are supported within the lower end of the loop of latching bar 60 so that when the latching arm 63 is in engagement with the antifriction roller, said arm will be in proper position to maintain the downward thrust of the latching bar to withstand the pressure of the spring device (presently to be referred to), with the result that the combing wheel will be allowed to rest in its lower operating position. The latching arm 63 is moved into and out of active position during the operation of the machine by the means hereinafter described, under the control of the sheets fed from the pile.

A rod 70 is pivoted at 71 to the rock arm 51 and projects therefrom vertically through a guide pin 72 projecting from the bracket 62. Surrounding the rod 70 and confined between a collar 70[a] above the rock arm 51 and the guide pin 72 is an expansion spring 75, which tends to throw down the arm 51 and move up the finger 52 for raising the comber away from the pile of sheets. This spring tendency is normally restrained by the latching arm 63, and the latching bar 60.

Turning now to the sheet controlled suction mechanism for releasing the comber elevating means, it will be observed that a suction cylinder 80 is formed integral with or otherwise securely mounted upon the casting or part of the frame projecting rearwardly from the front stay rod 3. This suction cylinder 80 is preferably formed with two inlet and outlet ports 81 and 82 adjacent to its rear closed end, tubular bosses 83, 84, projecting from the cylinder and forming continuations of the said ports for the convenient connection of rubber hose as hereinafter explained. The suction cylinder 80 has an open inner end 80[a]. A hollow cylindrical piston 85 rides freely in the cylindrical bore of the suction cylinder 80, and has projecting inwardly from its head a guide pin 86 upon which is mounted an expansion spring 87 which engages the inner closed head of the cylinder, giving the piston a tendency to move outwardly in the cylinder.

The piston 85 has formed on the outer face of its head the perforated ears or lugs 88 between which is pivoted a link or pitman 89 having pivotal connection at its opposite end 90 with the upper end of a rock arm 91, which is secured to or formed integral with a tubular rock shaft 92 which is freely journaled upon a pin 93 projecting outwardly from the forwardly presented face of the yoke-shaped latching bar 60. Secured to or formed integral with the inner or rearward end of the tubular rock shaft 92 is a shorter rock arm 95 carrying at its upper end a rearwardly projecting pin 96 which engages a finger 63[b] formed integral with or secured to the edge of the latching arm 63. This finger 63[b] is attached to the latching arm 63 at a point 63[c], from which it projects downwardly parallel with the arm 63, and forms with the arm, a vertical slot 63[d], as shown. From this arrangement it will be observed that the movement of the piston in its cylinder will rock the tubular shaft 92 and force the latching arm 63 outwardly for releasing the spring device above referred to.

Supported directly beneath the plane of feed of the sheets adjacent to the delivery drop roller mechanism is a suction nozzle 100. Two of these suction nozzles are arranged at the delivery end of the machine, one being directly in front of each of the combing wheels. Each of these suction nozzles is preferably in the form shown in Figs. 6 and 7 of the drawings, in which it consists of a flattened tubular structure closed at its ends 100[a] and having in its upper wall a transverse series of small perforations 101. Depending from the lower wall of the suction nozzle is a tubular boss 102. The nozzle curves downwardly toward the rear to form guiding surface for the combed out forward edge of the pile of sheets. These suction nozzles are mounted in any suitable manner with their upper surfaces approximately in the same plane as the upper edges of the under feed rollers 6 above referred to, the nozzles also serving as sheet guides to assist in guiding the successive sheets from the pile. The transverse series of perforations are arranged approximately in line with the bite of the drop roller mechanism.

Mounted upon a bracket arm 105 projecting from one of the frame pieces 12 is a three-way valve casing 106 having a vertical dovetail recess 107 cut in its forward face, and three tubular projections 108, 109 and 110 extending from its rear face and forming continuations of the ports 108[a], 109[a] and 110[a], which pass through the rear wall of the valve casing and are in open communication with the recess 107.

112 is the vertically reciprocating valve

plate, formed on its inner face with the recess or pocket 113 which is adapted to form a communication between the ports 108[a] and 109[a]. Valve plate 112 also has an air supply port 114, which is adapted to communicate with port 108[a] and an exhaust port 115, which is adapted to communicate with the port 110[a]. An arm or lug 116 rigidly secured to the outer face of valve plate 112 projects downwardly into engagement with the upper end of the reduced guide portion 60[a] of the yoke-shaped latching bar 60. A spring 117 connects the valve plate 112 with the bracket arm 62, causing the valve plate to follow the movements of the latching bar 60.

A hose or pipe 120 leads from the tubular projection 108 to any suitable air pump or other suction apparatus. I prefer to employ a simple form of rotary air pump suitably operated from any source of power, such for instance as a part of the feeding machine, so arranged as to continually exhaust air through the hose or pipe 120. A hose or pipe 121 leads from the central tubular projection 109 of the valve casing to the tubular connection 84 projecting from the suction cylinder 80. A hose or pipe 122 communicates between the lower tubular projection 110 and the tubular projection 83 of the suction cylinder 80.

The tubular connection 84 of the cylinder 80 has a branch tubular connection 84[a], from which a hose or pipe 123 extends and is connected with the tubular projection 102 of the suction nozzle.

The latching arm 63 is also provided with an upwardly projecting lug 63[f], which is normally in the path of a cam shaped projection 125 projecting from the periphery of the face cam 159 for the purpose of positively disengaging the latching device once for every revolution of the shaft 20 independently of the automatic sheet controlled suction mechanism. This cam projection 125 is effective only in case the sheet has not been fed forward sufficiently far to cause the tripping action of the suction mechanism, in which event the lug 63[f] remains in the path of and is acted upon by the part 125.

Extending longitudinally of the machine, at each side is a rock shaft 155 journaled in bracket arms 156 extending down from the auxiliary frame pieces 12. At the forward end of each of these rock shafts is a rock arm 157 carrying at its upper end an antifriction roller 158, which operates in engagement with a face cam 159, keyed to the cam shaft 20. Each of the rock shafts 155 carries a horizontal rock arm which is adjustable longitudinally of the machine, and carries a weighted tail gripper 160 of the same construction as fully set forth in my above named patent.

The following brief explanation will make clear the operation of my improved machine:

It being understood that a machine embodying my improvements is provided with two sets of sheet combing mechanisms, each independently controlled by a sheet actuated suction device as described, the machine is started in operation with the combing wheels resting upon the top of the pile of sheets, the combing wheels being driven through the gears as above explained. In this normal operative position of the machine, the spring elevating mechanisms for the combers are held out of section by the latching arms 63 and latching bars 60, which being in their elevated positions, will hold the valve plates 112 in their elevated position as shown in the drawings, with the result that the air pump in connection with pipe 120 will continually exhaust air through the valve casing, pipe 121, cylinder 80 pipe 123 and suction nozzle 100. The capacity of these pipes and the series of openings of suction nozzle 100 are sufficient to supply the pump, which of course must be of the proper size and adjusted to suit the particular requirements. It will, of course, be understood that an independent air pump is employed for each set of suction controlling devices, that is one for each side of the machine, or a suitable double or two compartment pump may be employed in which one compartment is utilized for each independent suction device. The two combing wheels will continue to operate until the forward edge of the top sheet in front of one of the combing wheels is moved forward sufficiently to close the openings 101 in one of the suction nozzles 100. The instant this happens these openings are closed by the sheet (the sheet being held to the suction nozzle by the suction) and the supply of air to the pump is cut off with the result that a partial vacuum will be formed in the suction cylinder 80. The suction in cylinder 80 pulls in the piston 85, and through the connections with rock shaft 92 trips the arm 63 from the antifriction roller 64 to release the spring mechanism which immediately acts and raises the combing wheel away from the pile of sheets, and thereby arrests its action upon the sheets. This action is immediately followed by the same operation on the other combing wheel as the edge of the sheet in front of such other combing wheel reaches registered position above its controlling suction nozzle. As each combing wheel is raised from the pile by the mechanism described, the latching bar 60 moves downwardly and permits the spring 117 to move the valve plate 112 downwardly to thereby break the communication between pipes 120 and 121, and open up communication between pipe 120 and the open air through port 114, and to open up communication between pipe 122 (leading from cylinder 80) and the open air through port 115 for breaking the suction in cylinder 80 and the suction nozzle

100. When both combing wheels have been arrested by these independent suction devices, the sheet will be in registered position in readiness for the operation of the drop roller mechanism, which comes into play to feed the sheet from the pile. As the sheet is engaged by the drop roller mechanism the tail grips 160 engage the under sheet just back of the rear edge of the top sheet for holding the pile in place. As soon as the top sheet has completely left the pile, the cams 58 will forcibly rock the sleeves 50 to permit the combing wheels to again fall into operative engagement with the top of the pile of sheets, and at the same time to reset the spring devices and latching mechanisms and shifting the suction controlling valves to their normal positions of operation. In this resetting operation it will be observed that the spring 87 within the cylinders 80 acting upon pistons 85, will cause the latching arms 63 to move back into engagement with their supporting antifriction rollers 64 for maintaining the parts in their normal operative positions.

The great advantages resulting from my above explained invention are mainly the simplicity in construction and adaptability for use with all kinds of paper, in addition to the avoidance of the objectionable use of tripping devices which project into engagement with the sheet being fed. Any required amount of power may be generated in the suction cylinders for tripping or arresting the operation of the feeding instruments without subjecting the sheets to any objectionable strain, since the sheet is only called upon to cover up a series of small openings for shutting off the supply of air. Each of the suction nozzles, in addition to its function of controlling the action of the suction cylinder for arresting the feeding operation, also serves an important purpose as a sheet registering device. The moment that the forward edge of the sheet is moved over the series of perforations in the suction nozzle, the sheet is firmly gripped by the suction and held against further forward movement. This action taking place successively on the two suction nozzles will accurately register the forward edge of the sheet. These suction nozzles are so completely reliable as registering devices that I have found it unnecessary to provide other forms of front guides or registering devices in my feeding machine, but have been able to rely entirely upon the suction nozzles, thereby further simplifying the feeding machine. I consider this feature of the registering devices formed of suction nozzles operating as described, to be a very important one.

While I have illustrated and described my invention as applied to a feeding machine of the sheet combing type, I would have it understood that I do not intend to limit the scope of my invention to this application, but consider my invention sufficiently broad and novel to include its application to any form of paper feeding machine in which the active operation of a sheet moving instrument of any construction is controlled by the position of the sheet acted upon through some suitable form of suction device involving the principle above set forth.

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

1. The combination, in a paper feeding machine, of a sheet moving instrument, means for operating the sheet moving instrument, means for arresting the operation of said instrument, sheet controlled suction means controlling said arresting means, and means operated by the arrest of operation of said instrument for throwing out of action the suction means.

2. The combination, in a paper feeding machine, of a sheet moving instrument, means for operating the sheet moving instrument, means for arresting the operation of said instrument, sheet controlled suction means controlling said arresting means, a relief valve for releasing the suction, and means for operating said valve actuated by the movements of the sheet moving instrument into and out of operation.

3. The combination in a paper feeding machine, of a sheet moving instrument adapted to be moved into and out of engagement with a sheet, a spring device adapted to elevate the sheet moving instrument, means for restraining the action of the spring device, and sheet controlled suction means adapted to release said restraining means.

4. The combination in a paper feeding machine, of a sheet moving instrument, a driving shaft operating said sheet moving instrument, spring mechanism for elevating the sheet moving instrument, means normally restraining the action of the spring mechanism, and sheet controlled suction means adapted to release the restraining means.

5. The combination in a paper feeding machine, of a sheet moving instrument, a driving shaft operating said sheet moving instrument, spring mechanism for elevating the sheet moving instrument, a latching device normally restraining the action of the spring mechanism, and sheet controlled suction means adapted to release the latching device.

6. The combination in a paper feeding machine, of a sheet moving instrument, a driving shaft operating said sheet moving instrument, spring mechanism for arresting the operation of the sheet moving instrument, a latching device normally restraining the action of the spring mechanism, sheet controlled suction means adapted to release the latching device, and means adapted to

throw into operation the sheet moving instrument and reset the spring mechanism and latching device.

7. The combination in a paper feeding machine, of a sheet moving combing wheel, a driving shaft operating said combing wheel, spring mechanism for elevating the combing wheel, a latching device normally restraining the action of the spring mechanism, sheet controlled suction means adapted to release the latching device, and means adapted to lower the combing wheel and reset the spring mechanism and latching device.

8. The combination in a paper feeding machine, of a sheet moving instrument adapted to be moved into and out of engagement with a sheet, a spring device adapted to elevate the sheet moving instrument, means for restraining the action of the spring device, a suction cylinder having communication with suitable means for exhausting air therefrom, an air supply nozzle in the path of and adapted to be closed by a sheet, communication between said nozzle and said suction cylinder, and a piston operating in said cylinder and suitably connected with and adapted to release said restraining means.

9. The combination in a paper feeding machine, of a sheet moving instrument adapted to be moved into and out of engagement with a sheet, a spring device adapted to elevate the sheet moving instrument, means for restraining the action of the spring device, a suction cylinder having communication with suitable means for exhausting air therefrom, an air supply nozzle in the path of and adapted to be closed by a sheet, an air pipe communicating between said nozzle and said suction cylinder, a piston operating in said cylinder and suitably connected with and adapted to release said restraining means, and a cam adapted to reset said spring device and restraining means and lower the sheet moving instrument into engagement with the sheet.

10. The combination in a paper feeding machine, of a sheet moving instrument, means for operating the sheet moving instrument, means for arresting the operation of the sheet moving instrument, means for restraining the action of the arresting means, sheet controlled suction means adapted to release said restraining means, and an automatic valve actuated by the movements of the sheet moving instrument for releasing the suction in the suction means.

11. The combination in a paper feeding machine, of a sheet moving instrument, means for operating said sheet moving instrument, means for elevating the sheet moving instrument from the pile, means for lowering the sheet moving instrument upon the pile, sheet controlled suction means adapted to cause the operation of the elevating means, and means actuated by the elevating means for throwing out of action the suction means.

12. The combination in a paper feeding machine, of a sheet moving instrument, means for operating said instrument, spring mechanism for elevating said instrument, a latching bar connected with the spring mechanism, a latching arm mounted upon the latching bar, a stationary support with which the latching arm is adapted to engage, and sheet controlled suction means adapted to disengage said latching arm.

13. The combination in a paper feeding machine, of a sheet moving instrument, means for operating said instrument, spring mechanism for elevating said instrument, a latching bar connected with the spring mechanism, a latching arm mounted upon the latching bar, a stationary support, an anti-friction roller mounted upon said support with which the latching arm is adapted to engage, and sheet controlled means adapted to disengage the latching arm from its stationary support.

14. The combination in a paper feeding machine, of a sheet moving instrument, means for operating said instrument, spring mechanism for elevating said instrument, a latching bar connected with the spring mechanism, a latching arm mounted upon the latching bar, a stationary support with which the latching arm is adapted to engage, a rock shaft having a rock arm engaging said latching arm, a suction cylinder, a piston operating in said cylinder, suitable connections between said piston and said rock arm, means for exhausting air from said cylinder, and a suction relief nozzle in communication with said cylinder and supported in the path of the sheets.

15. The combination in a paper feeding machine, of a sheet moving instrument, spring mechanism for elevating the sheet moving instrument from the pile, latching mechanism for normally restraining the action of the spring mechanism, sheet controlled means for automatically releasing the latching mechanism, and a cam mechanism adapted to periodically release said latching mechanism.

16. The combination in a paper feeding machine, of a sheet moving instrument, spring mechanism for elevating the sheet moving instrument, a latching bar connected with the spring mechanism, a latching arm mounted upon the latching bar and adapted to engage the stationary support, sheet controlled automatic means for disengaging the latching arm from the support, an arm projecting from the latching arm, and a rotary cam adapted to engage said arm for periodically releasing the latching arm.

17. The combination in a paper feeding machine, of a sheet moving instrument,

means for elevating the sheet moving instrument from a pile, sheet controlled suction means for controlling the elevating mechanism, means for exhausting air from the suction means including a controlling valve, and means for operating said valve by the elevating means.

18. In a paper feeding machine, the combination of a sheet moving instrument, elevating means therefor, means for restraining the action of the elevating means, a suction cylinder, a piston operating in said cylinder and suitably connected with said restraining means, a suction nozzle in the path of the sheets communicating with the suction cylinder, means for exhausting air from the suction cylinder, a three-way valve included in the air exhausting means, and means for operating said valve.

19. In a paper feeding machine, the combination of a sheet moving instrument, means for elevating the sheet moving instrument from a pile, suction means controlling the elevating means and including a communicating suction cylinder and relief nozzle, air exhausting means, a three-way valve communicating with the air exhausting means and with the suction cylinder, and means for operating said valve.

20. The combination of a sheet moving instrument, means for operating said instrument, spring mechanism for elevating said instrument, a latching device normally restraining the action of the spring mechanism, a suction cylinder, a piston operating in said cylinder and suitably connected with the latching device, a spring in the suction cylinder engaging the piston, means for exhausting air from said cylinder, and a suction relief nozzle communicating with the cylinder and supported in the path of the sheets.

TALBOT C. DEXTER.

Witnesses:
WM. P. HAMMOND,
WM. E. KNIGHT.