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PNEUMATIC DEVICE FOR SEPARATING THE UPPERMOST
SHEET FROM A PILE IN SHEET FEEDING APPARATUS

Filed Oct. 14, 1959

2 Sheets-Sheet 1

Fig. 1.

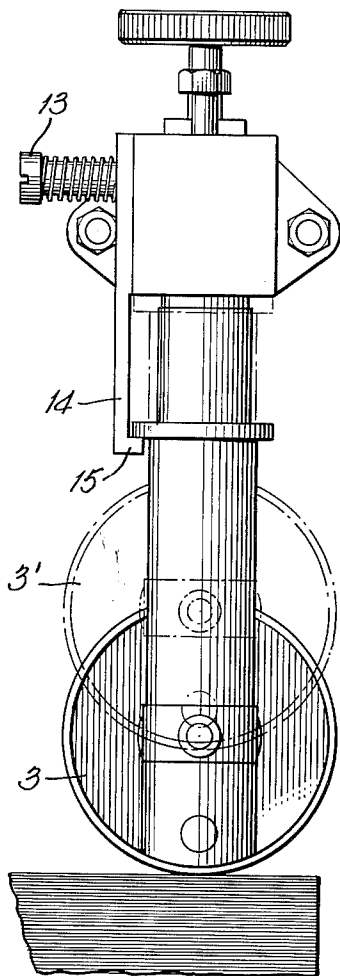
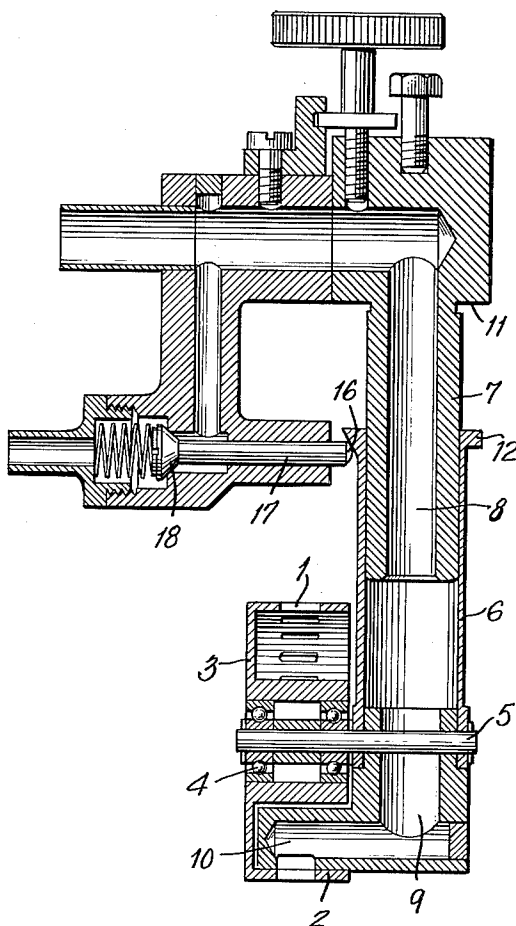


Fig. 2.



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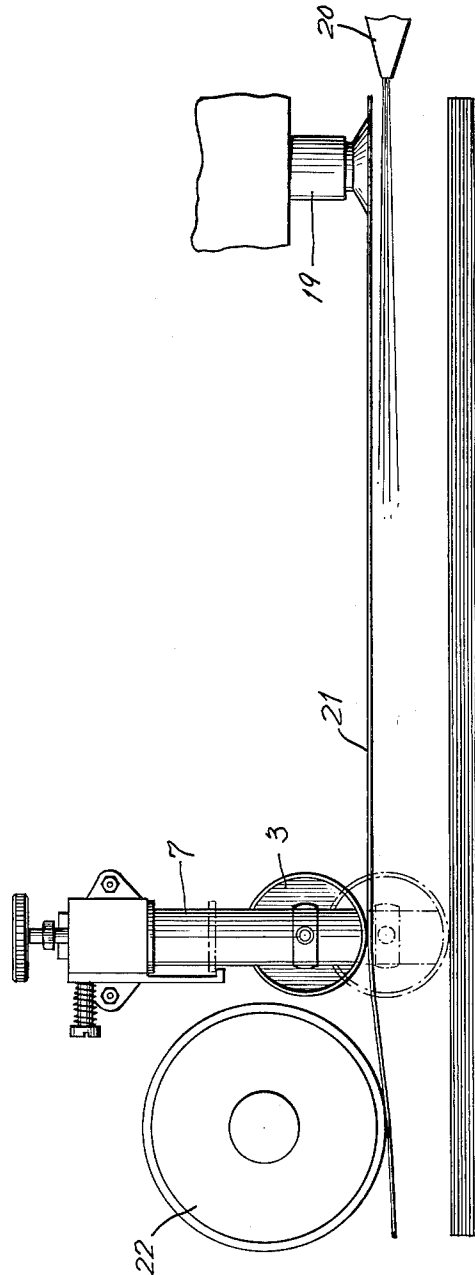
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Fig. 3.



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PNEUMATIC DEVICE FOR SEPARATING THE UPPERMOST SHEET FROM A PILE IN SHEET FEEDING APPARATUS

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1 Claim. (Cl. 271-27)

The separation and lifting of the uppermost sheet from a pile is generally effected in known sheet feeding apparatus by means of a suction nozzle, of which various types or constructions are known, which engages and lifts the sheet by a suction cup.

In these circumstances, the problem is to remove the lifted sheet from the suction nozzle for the purposes of further feeding said sheet. If high feed speeds are required, as is the case especially in modern folding machines, then even where intensive throttling of the suction air and corresponding reduction of the suction effect is achieved at the moment of removal of the sheet, the removal of the sheet from the suction nozzles causes inevitable obstructions and hence delays in the travel of the sheet, in consequence of the friction between the sheet and the nozzle suction surface that has to be overcome during the removal.

The object of the invention is to eliminate this friction and this is achieved by mounting a suction cylinder so as to be freely rotatable on a part of the machine which performs a lifting and lowering movement, and by providing known means of transport which remove the sheet from the freely rotatable suction cylinder by its movement in the desired take-off direction, e.g. towards a subsequent processing machine.

The raising and lowering of the suction cylinder which will be equipped with a suction chamber may be effected in known manner by suitable mechanical driving means. The suction cylinder is preferably mounted rotatably on a telescopic device of a form already known in relation to separating devices using suction cups, so that suction acting on the suction cylinder when the suction openings therein are closed by a sheet adhering thereto, causes raising of the cylinder.

In consequence of the fact that, in accordance with the invention, the pneumatically acting separating and lifting element for the uppermost sheet is formed by one or more suction cylinders which are freely rotatable (preferably on ball-bearings), the removal of the sheet during its further feed is greatly facilitated and is almost completely free of frictional resistance at the point of contact of the sheet on the separating means, because the separating means formed by the cylinder can rotate to follow the sheet. To this end, the suction cylinder is made with the minimum possible mass.

Further features and advantages of the invention will be apparent from the following description of the exemplified embodiment shown in the drawings, in which:

FIG. 1 shows a suction cylinder and the appertaining pneumatic lifting device in its two end positions, in side elevation,

FIG. 2 shows the same device turned through 90° and in vertical section,

FIG. 3 is a side view showing the arrangement of the pneumatic device for separating and lifting the uppermost sheet adjacent a driven suction wheel which serves as feed means.

In the drawings a suction idler roller or cylinder 3, which is equipped with orifices or perforations 1 on its outer curved surface 2 is journaled on a shaft 5 by means

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of a ball-bearing 4. This bearing shaft 5 is laterally fastened in the lower end of a guide cylinder or sleeve 6 of a lifter mechanism, which slides on a piston 7, into the lower end of which a suction line 8 discharges. The latter is connected by way of the cylinder 6 to an elbow 9 and one limb of this elbow 9 forms a suction chamber 10 situated within the suction cylinder 3.

To limit the upward stroke of the guide cylinder 6 and consequently the possible vertical movement of the suction cylinder 3, use is made of a fixed upper stop 11, which is constructed on the suction line and which a collar 12 on the guide sleeve 6 encounters at the end of the stroke. Lower stroke limiting means comprises an arm 14 disposed adjacent the piston 7 and which is removable or adapted to swing out away from the piston 7 after a screw 13 has been released. A hook-shaped end 15 on the arm 14 engages with the collar 12 of the guide sleeve 6.

A stop formed by an inclined surface 16 and controlling a tappet 17 of a valve 18 is also provided at the upper edge of the guide sleeve 6. The valve 18 actuates, in known manner, a pile transport or raising device which operates by means of suction. This arrangement affords the advantage that the otherwise necessary pile sensing means for the control of the pile transport is now controlled by the suction cylinder or the mechanism whereon the wheel is carried and is actuated according to the position of the suction cylinder 3 on the surface of the pile.

FIG. 3 shows the application of the pneumatic separating and lifting device just described to a sheet feeding apparatus operating with a driven suction wheel 22 which serves as feed means. In this case, the pneumatic separating and lifting device is disposed directly in front of the suction wheel 22 in the direction of travel of the uppermost sheet which is indicated at 21. This affords the advantage that when large-format sheets 21 are to be processed, contact thereof against the suction wheel 22 is always ensured. In the case of large-format sheets it easily happens that the uppermost or topmost sheet would, hitherto, be lifted only at its rear edge by conventional separating nozzles 19 and carried by blast air emerging from blast nozzles 20, does not dependably come into contact by its front part against the suction wheel 22, and this frequently renders necessary readjustment of the suction wheel 22. These complications are obviated according to the invention by the fact that the pneumatic lifting device 3, 7 disposed in front of the suction wheel 22 ensures that the front part of the sheet is lifted also until it bears against the suction wheel 22, the suction cylinder 3 of the lifting device being adjusted with its lower edge at a somewhat higher level than the lower edge of the suction wheel 22.

In the exemplified embodiment shown in FIG. 3, the separating suction nozzle 19 may, if desired, be replaced by a pneumatic separating and lifting device 3, 7 of the construction according to the invention. On the other hand, a separating nozzle 19 would not be usable conversely as an auxiliary device beside the conveying suction wheel 22, because the removal would be obstructed by friction of the sheet at the suction nozzle, and in the case of printed sheets, the print would be smeared practically over the entire length of the sheet.

I claim:

A pneumatic device for separating the topmost sheet from a stack of sheets, comprising a support; a stack of sheets on said support; a suction idler roller rotatable on said support about an axis and formed with a plurality of circumferentially spaced suction orifices; lifting means for moving said roller on said support in a vertically ex-

tending radial direction toward and away from a position of engagement of said orifices with the topmost sheet of said stack for raising said sheet; a suction operated transport roller horizontally spaced from said suction roller and spaced from said stack in a direction parallel to said radial direction for engagement by said raised sheet; and drive means for actuating rotation of said transport roller for drawing the engaged sheet away from said suction roller.

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