Aug. 23, 1932. M. A. DROITCOUR 1,873,316

DELIVERY MECHANISM

Filed Dec. 8, 1928 4 Sheets-Sheet 1

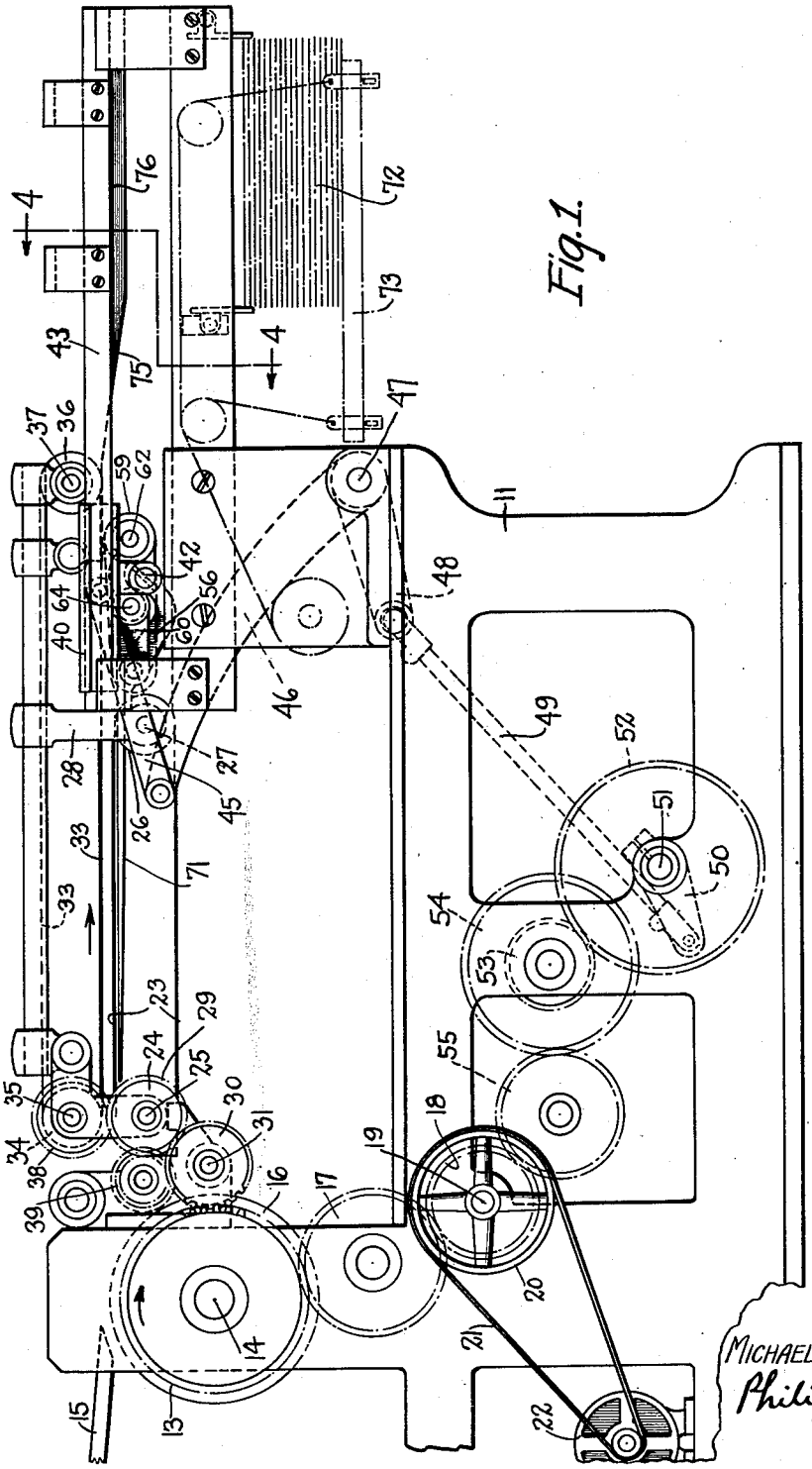


Fig. 1.

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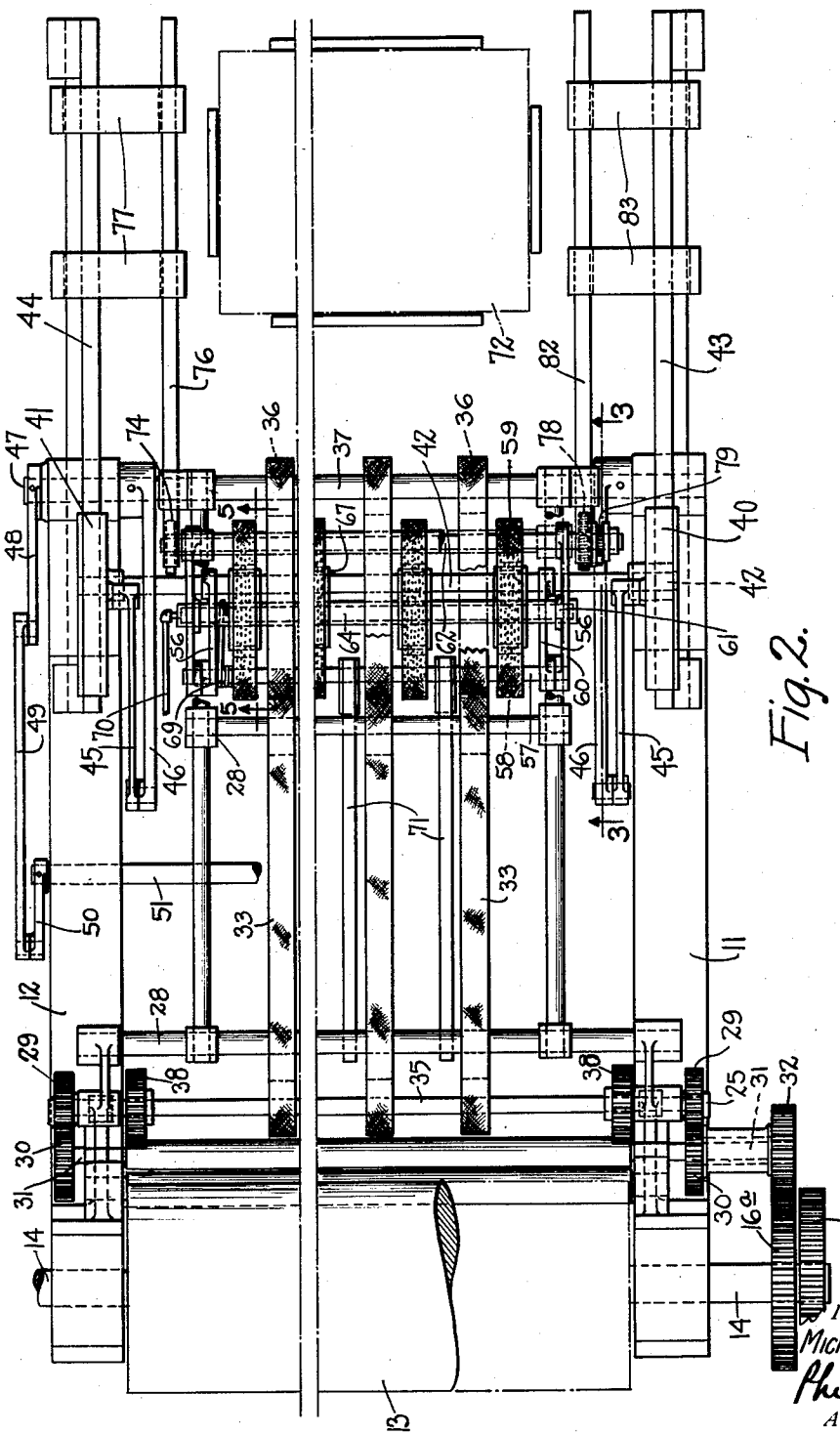


Fig. 2.

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DELIVERY MECHANISM

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Fig. 3.

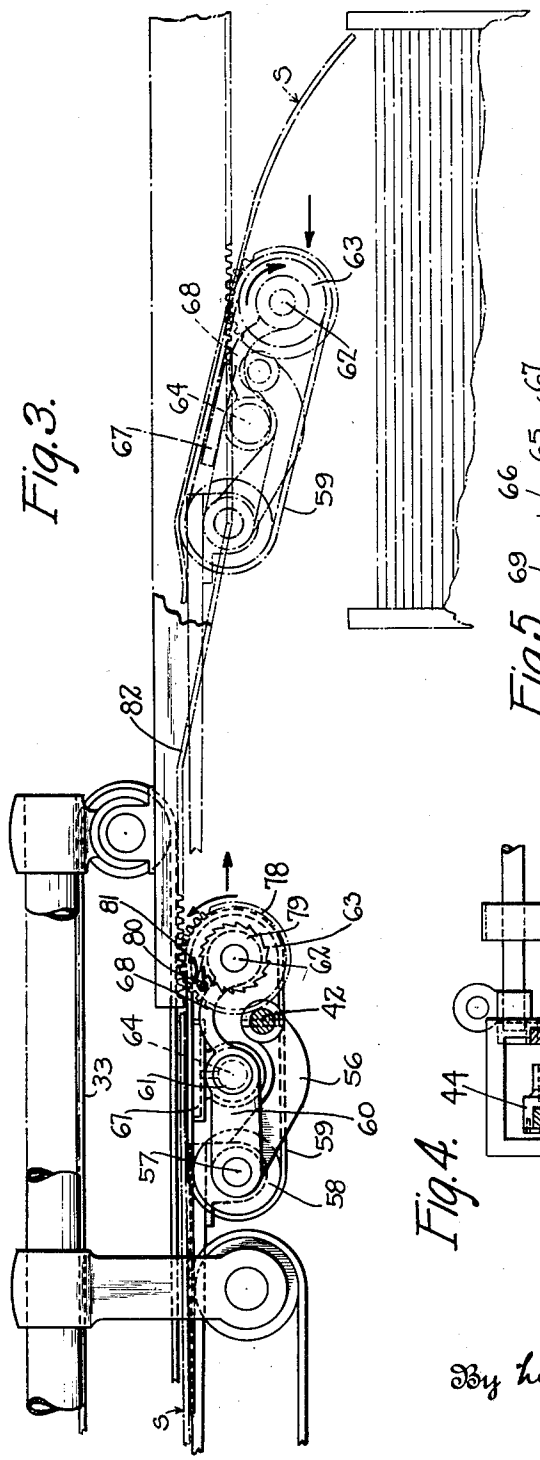


Fig. 5.

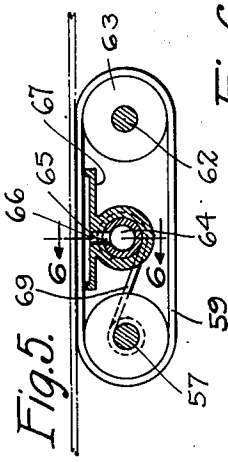


Fig. 6.

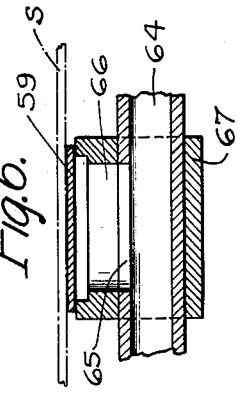
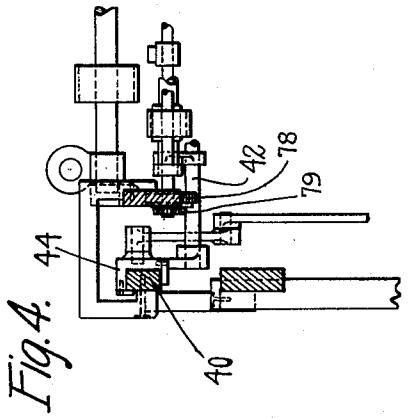


Fig. 4.



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DELIVERY MECHANISM

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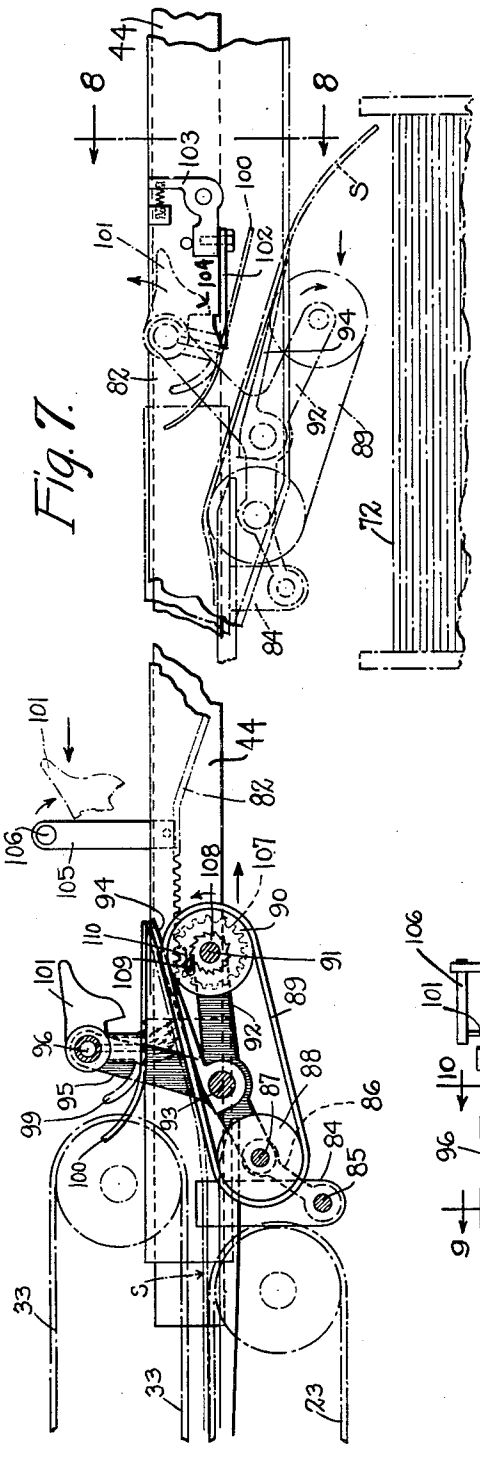


Fig. 7.

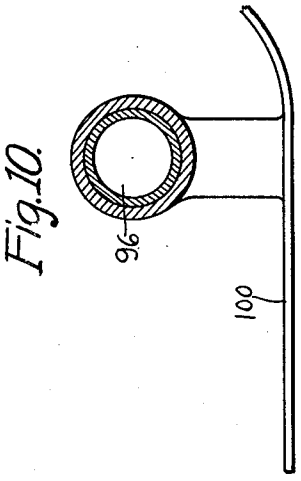


Fig. 10.

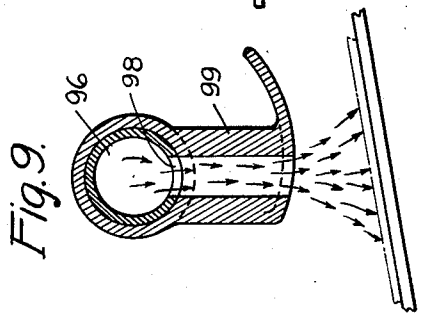


Fig. 9.

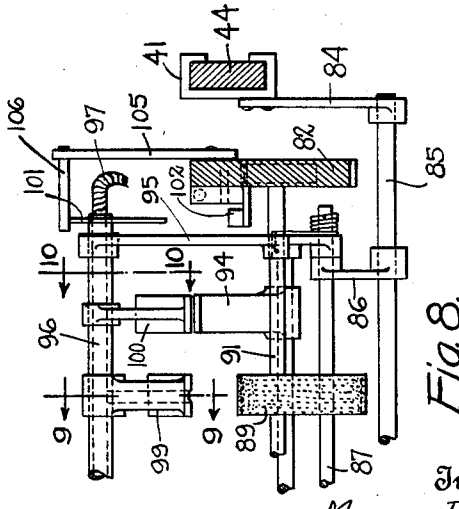


Fig. 8.

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UNITED STATES PATENT OFFICE

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DELIVERY MECHANISM

Application filed December 8, 1928. Serial No. 324,672.

My invention relates to certain improvements in delivery mechanisms which are used in connection with printing or like machines for taking the sheets or stock in succession from the press or machine and then transferring or delivering same to a pile-receiving table automatically lowerable to accommodate for the growth of the pile of sheets.

The objects of my invention are, among other things, to provide an improved delivery mechanism of this type whereby the successive sheets are first taken from a cylinder of the press or other machine, and are thereafter carried smoothly therefrom and ultimately deposited on the pile so that the chance of injuring such sheets as received on such pile is reduced to a minimum.

A further object of my invention is to embody in the delivery an improved tilting tape carrier in conjunction with means for holding the sheets on the tapes during their forward and downwardly-inclined travel on the carrier with the front edge of the sheet having a bend toward the pile so that such sheet is gently placed in position with an oblique movement allowing the air beneath same to flow backwardly as the sheet is deposited on the pile. By my improved construction the sheets are handled easily and naturally and all danger of offset from the printing is avoided.

With these and other objects in view, the invention comprises the structure and operating parts forming the delivery mechanism hereinafter set forth as one embodiment of my invention which is then particularly pointed out in the appended claims.

The accompanying drawings show this embodiment in connection with a cylinder printing-press, but the invention is not restricted to any particular form or type of printing-press, and my improvements may also be embodied in a sheet-feeder construction.

In the drawings, Fig. 1 is a side elevation of the sheet delivery mechanism showing a portion of a cylinder press;

Fig. 2 is a plan view of the mechanism shown in Fig. 1;

Fig. 3 is an enlarged view taken on the line 3—3 of Fig. 2;

Fig. 4 is a view taken on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged view taken on the line 5—5 of Fig. 2;

Fig. 6 is an enlarged detail view on the line 6—6 of Fig. 5;

Fig. 7 is a side elevation of a modified form of tilting tape carrier utilizing an overhead air blast to hold the sheets on the carrier tapes;

Fig. 8 is an end view on the line 8—8 of Fig. 7; and

Figs. 9 and 10 are enlarged detail views taken on the lines 9—9 and 10—10 respectively of Fig. 8.

Similar numerals refer to similar parts throughout the several figures.

Referring to Figs. 1 and 2, the side-frames 11 and 12 support the bearings of the press-cylinder 13 mounted on the shaft 14, such cylinder 13 receiving the sheets S (Fig. 3) from the sloping feed-board 15 (Fig. 1). The cylinder 13 is rotated in a clockwise direction by the gear 16 keyed to the shaft 14, which gear is driven by the intermediate gear 17 which engages the drive gear 18 on the power shaft 19.

The shaft 19 carries the pulley 20 driven by the belt 21 from any suitable source of power, such as the electric motor 22, all as shown in Fig. 1.

The cylinder 13 delivers the printed sheets S on the horizontal delivery tapes 23 (three being indicated in Fig. 2) which pass around the drive pulleys 24 on the cross-shaft 25 and also around the idler pulleys 26 mounted on the shaft 27 journalled in the delivery frame 28. The shaft 25 carries drive gears 29 which engage the gears 30 keyed to cross-shaft 31 journalled in the side-frames 11 and 12 (Figs. 1 and 2), and the shaft 31 also carries the gear 32 which is driven from gear 16a on the cylinder shaft 14. By such mechanism the tapes 23 are driven from left to right in Figs. 1 and 2 to carry the sheets from the cylinder 13 to the tilting tape carrier to be described.

Arranged above the delivery tapes 23 are the rider tapes 33 (Figs. 1 and 3) which pass around the drive pulleys 34 on the cross-shaft

35 journalled in the delivery frame 28 and also around the forward idler pulleys 36 mounted on the cross-shaft 37. The shaft 35 carries gears 38 (only one being shown in Fig. 1) which are driven from the gears 29 keyed to the shaft 25 adjacent the side-frames 11 and 12 (Fig. 2). The rider tapes 33 moving to the right in mutual parallelism with the delivery tapes 23 so as to keep the sheets S confined between them to advance such sheets to the tilting carriage or carrier which delivers the sheets in a superposed pile.

The tape carrier comprises the slide members 40 and 41 connected by the cross-shaft 42, the members 40 and 41 sliding backward and forward on the ways 43 and 44 respectively mounted on the side-frames 11 and 12. A joint reciprocating movement is imparted to the slide members 40 and 41 forming the tape carrier for the sheets by the links 45 connecting the members 40 and 41 with the rock-arms 46 pinned to the rock-shaft 47 journalled in the side-frames 11 and 12.

The shaft 47 is actuated by the lever 48 pinned to the shaft 47, the lever 48 being connected by the pitman 49 to the crank-arm 50 on the shaft 51 to which is keyed the drive gear 52. The gear 52 is rotated by a train of intermediate gears 53, 54 and 55, the gear 55 meshing with the drive gear 18 on the power shaft 19 (Fig. 1).

Inside the side-frames 11 and 12, the shaft 42 has keyed thereto a pair of brackets 56 in which is journalled the cross-shaft 57 upon which are mounted the rear pulleys 58 for the perforated carrier tapes 59 (four being shown in Fig. 2) which are arranged between and outside the delivery tapes 23 and rider tapes 33 and slightly above the plane of the delivery tapes 23 as shown in Figs. 2 and 3. Extending forwardly from the ends of the shaft 57 are the arms 60 which carry the bearings 61 for the shaft 62 on which are mounted the forward pulleys 63 around which the carrier tapes 59 travel in a looped path (Figs. 3 and 5).

Between the shafts 57 and 62 is the hollow tubular shaft 64 having the ports 65 which register with the openings 66 in the four open-faced suction boxes 67 housed about the shaft 64 (Fig. 5), which boxes 67 coact with the under surfaces of the perforated carrier tapes 59 along their upper run as shown in Figs. 3 and 5. The ends of the shaft 64 are mounted in the arm ends 68 (one being shown in Fig. 3) which are journalled on the shaft 57. The spring 69 coiled about the shafts 57 and 64 (Figs. 2 and 5) holds the cams 74 and 78 pressed against the bars 76 and 82 with a yielding spring engagement. One end of the tubular shaft 64 is connected by the hose 70 with any suitable source of exhaust air-pressure (not shown). Mounted on the shaft 57 and extending rearwardly are a pair of fly-sticks 71 which are arranged between and below the delivery tapes 23 (Figs. 1 and 2).

As the delivery tape carrier is moved forwardly, it is tilted and moved downwardly toward the pile of sheets 72 on the receiving table 73 as shown in Figs. 1 and 3. To attain such downwardly inclined movement for the carrier, the shaft 62 carries on one of its ends the roller 74 (Figs. 1 and 3) which rides along the cam-surface 75 formed in the bar 76 mounted on the brackets 77 secured to the side-frame 12 (Fig. 2). The carrier with the sheet S held on the tapes 59 is advanced from the full line to the dotted line position shown in Fig. 3, during which movement the tapes 59 do not travel beneath the sheet S which is held close to the tapes by the suction boxes 67 and is then delivered to the pile 72 as the carrier is retracted (toward the left in Figs. 1 and 3).

The tapes 59 are caused to revolve to deliver the sheet S as the carrier begins to move rearwardly by the rotation of the gear 78 connected to the shaft 62 by the ratchet 79 and pawl 80 held in engagement with the ratchet 79 by the spring 81 (Fig. 3). The gear 78 is operated by the horizontal rack 82 (Figs. 2 and 3) carried by the brackets 83 mounted on the side-frame 11 so that the forward travel of the tapes 59 delivers the sheet S easily and gently on the pile 72. The travel of the sheets from the delivery tapes 23 to the tapes 59 is up a slight incline so that the sheets will have a close contact with the tapes 59 as the suction boxes 67 draw the sheets onto the tapes 59.

Referring to Figs. 7–10 showing a modified form of tilting tape carrier for depositing the sheets in which an air blast is used to hold the successive sheets on the carrier tapes in conjunction with fingers that tilt and lift with the tapes, the sliding members 40 and 41 carry depending brackets 84 (only one being shown in Figs. 7 and 8) in which is mounted the cross-shaft 85.

Secured to the shaft 85 are the arms 86 (only one being shown) in which the cross-shaft 87 is journalled, the shaft 87 carrying the rear pulleys 88 around which pass the carrier tapes 89. The tapes 89 also pass around the drive pulleys 90 journalled on the cross-shaft 91 which is mounted on the carrier frame 92. Midway on the frame 92 is the cross shaft 93 on which are mounted the tilting fingers 94 which project forwardly substantially in the plane of the upper run of the carrier tapes 89 as shown in Fig. 7. The carrier frame 92 has the upwardly-extending arms 95 in which is journalled the hollow tubular shaft 96 connected by the hose 97 with any suitable source of compressed air (not shown). The shaft 96 has suitably spaced-apart air ports 98 which register with the depending air-nozzles 99 carried by the shaft 96 (Figs. 8 and 9). Also mounted on the

shaft 96 are spaced apart sheet stops 100 having their forward ends adapted to coact with the fingers 94 to register the leading edge of the sheet S on the carrier tapes 89 as shown in Figs. 7 and 8.

Affixed on the outer end of the shaft 96 adjacent the hose 97 (Figs. 7 and 8) is the latch-plate 101 which is adapted to engage the pawl 102 mounted on the rack 82 at the forward end of the machine as indicated in Figs. 7 and 8, such rack 82 also carrying the yielding pawl pivot-block 103 which, when the pawl 102 is engaged by the nose 104 of the latch-plate 101, rocks the latch-plate 101 anti-clockwise on the rearward stroke of the carrier. The rack 82 also carries the bracket 105 on which is mounted the cross-pin 106 which engages the latch plate 101 to push the fingers 94 and stops 100 back into their co-acting sheet-registering position with respect to the carrier tapes 89 on the reverse stroke of the tilting carrier as shown in Fig. 7.

The sheet S is advanced onto the carrier tapes 89 from the delivery tapes 23 and is registered in proper position between the fingers 94 and sheet stops 100. The carrier is then moved to the right in Fig. 7 and tilted downwardly as indicated by dotted lines by the mechanism hereinbefore described in the construction shown in Figs. 1–6. Upon the return travel of the carrier the latch plate 101 is engaged by the pawl 102 so as to raise the sheet stops 100 away from the fingers 94 which allows a clear space for the sheet S to be advanced off the carrier onto the pile 72 as shown. The tapes 89 are caused to revolve to deliver such sheet to the pile as the carrier starts to move rearwardly by the gear 107 meshing with the rack 82 and connected to the shaft 91 by the ratchet 108 and pawl 109 held in engagement with the ratchet by the spring 110. The air blast from the air nozzles 99 (Fig. 9) maintains the sheet S on the carrier tapes 89 in flat position and then aids in gently delivering same on the pile 72 as the carrier tapes 89 are actuated forwardly (Fig. 7).

In both forms of the tilting tape carrier which advances the sheets from the delivery tapes 23 and deposits same on the pile 72, I have utilized pneumatic means for holding the sheet flat upon the carrier tapes 59 or 89, since the suction through the tapes 59 performs the same function as the air blast from the nozzles 99 in holding the sheets against the carrier tapes during the forward movement of the carrier and while the tapes are advanced to deposit the sheets on the pile.

The detailed structure herein shown and described may be varied in construction without departing from the scope of my invention or sacrificing the advantages obtainable from its use.

I claim as my invention:

1. In a delivery mechanism, a reciprocating sheet carrier including movable tapes to support the sheet tiltable downwardly to deposit the sheet from said tapes on a pile.

2. In a delivery mechanism, a reciprocating sheet carrier tiltable downwardly to deposit the sheet on a pile, and pneumatic means for holding the sheet on the carrier.

3. In a delivery mechanism, a reciprocating sheet carrier including movable tapes to support the sheet and means for tilting same downwardly during its forward stroke and then actuating said tapes to transfer the sheet therefrom.

4. In a delivery mechanism, a reciprocating sheet carrier, means for tilting same downwardly during its forward stroke while transferring the sheet therefrom, and pneumatic means for holding the sheet on the carrier.

5. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, and means for tilting and moving the carrier in a forward and downwardly inclined path while said tapes are at rest.

6. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, means for tilting and moving the carrier in a forward and downwardly inclined path while said tapes are at rest, and means for retracting the carrier and actuating the tapes to transfer the sheet therefrom.

7. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, pneumatic means for holding the sheet against the tapes, and means for moving the carrier in a forward and downwardly inclined path while said tapes are at rest.

8. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, pneumatic means for holding the sheet against the tapes, means for moving the carrier in a forward and downwardly inclined path while said tapes are at rest, and means for retracting the carrier and actuating the tapes to transfer the sheet therefrom.

9. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, an air blast means superposed above the sheet and tapes for holding the sheet against the tapes, and means for moving the carrier in a forward and downwardly inclined path while said tapes are at rest.

10. In a delivery mechanism, a reciprocating sheet carrier comprising a series of tapes movable in a loop path, means for tilting said carrier downwardly during its forward stroke, means comprising an air blast means superposed above the sheet and tapes to hold the sheet against the latter, and means for

actuating said tapes forwardly to deposit the sheet upon a pile.

11. In a delivery mechanism, a reciprocating sheet carrier comprising a series of tapes movable in a loop path, means comprising an air blast means superposed above the sheet and tapes to hold the sheet against the latter, means for tilting the carrier downwardly during its forward stroke, and means for actuating said tapes forwardly to deposit the sheet upon a pile.

12. In a delivery mechanism, a reciprocating sheet carrier tiltable downwardly and movable forwardly to deposit the sheet on a pile, front-registering stops on the carrier, and latch-controlled means for placing said stops in inoperative position when the sheet is transferred from the carrier.

13. In a delivery mechanism, a reciprocating sheet carrier tiltable downwardly and movable forwardly to deposit the sheet on a pile, front-registering stops on the carrier, latch-controlled means for placing said stops in inoperative position when the sheet is transferred from the carrier, and means for restoring said stops to registering position during the return stroke of the carrier.

14. In a delivery mechanism, a reciprocating sheet carrier tiltable downwardly to deposit the sheet on a pile, pneumatic means for holding the sheet on the carrier, front-registering stops on the carrier, and means for placing said stops in inoperative position when the sheet is transferred from the carrier.

15. In a delivery mechanism, a reciprocating sheet carrier comprising a series of endless tapes upon which the sheet rests, means for tilting the carrier in one direction to receive the sheet and in the opposite direction to deposit the sheet, and an air blast means superposed above the sheet and tapes to hold the sheet against the latter during the forward stroke of the carrier.

16. In a delivery mechanism, a reciprocating sheet carrier comprising a series of endless tapes upon which the sheet rests, means for tilting the carrier in one direction to receive the sheet and in the opposite direction to deposit the sheet, an air blast means superposed above the sheet and tapes to hold the sheet against the latter during the forward stroke of the carrier, and means for actuating the tapes forwardly to deliver the sheet during the return stroke of the carrier.

17. In a delivery mechanism, a sheet carrier comprising a series of movable tapes on which the sheet rests, suction means operable through the tapes upon the sheet for holding the sheet against the tapes, and means for moving the carrier in a forward and downwardly inclined path while said tapes are at rest.

18. In a delivery mechanism, a reciprocating sheet carrier comprising a series of tapes movable in a loop path, means comprising pneumatic suction devices acting through the tapes to hold the sheet against the latter, means for tilting the carrier downwardly during its forward stroke, and means for actuating said tapes forwardly to deposit the sheet upon a pile.

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