May 27, 1941. F. W. SEYBOLD ET AL 2,243,170

SHEET FEEDER

Filed March 16, 1939 2 Sheets-Sheet 1

FIG. 1.

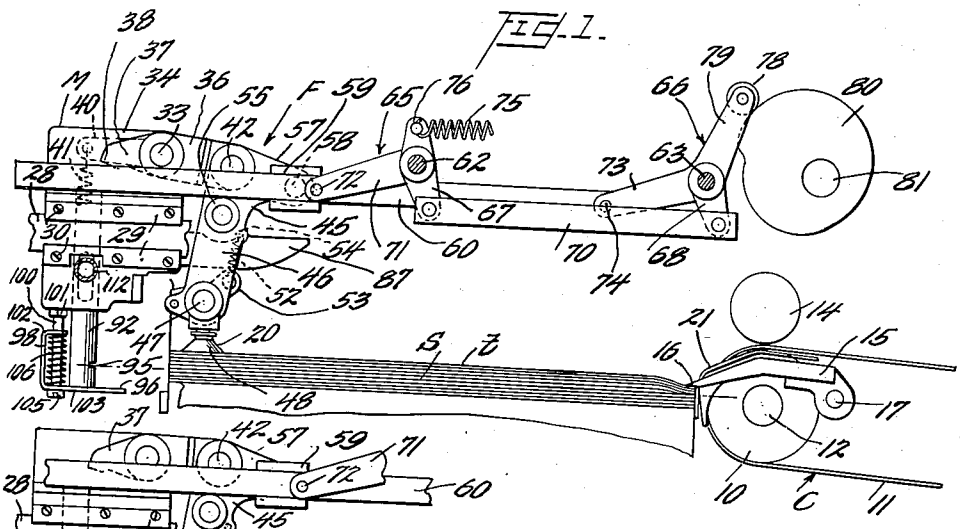


FIG. 2.

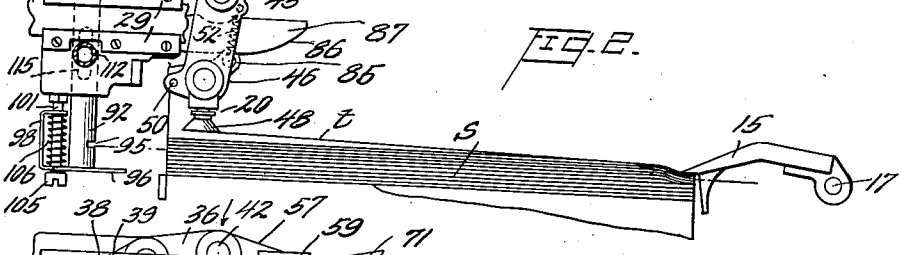


FIG. 3.

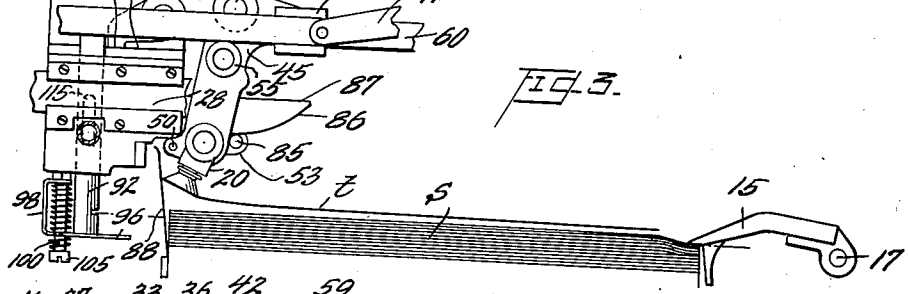
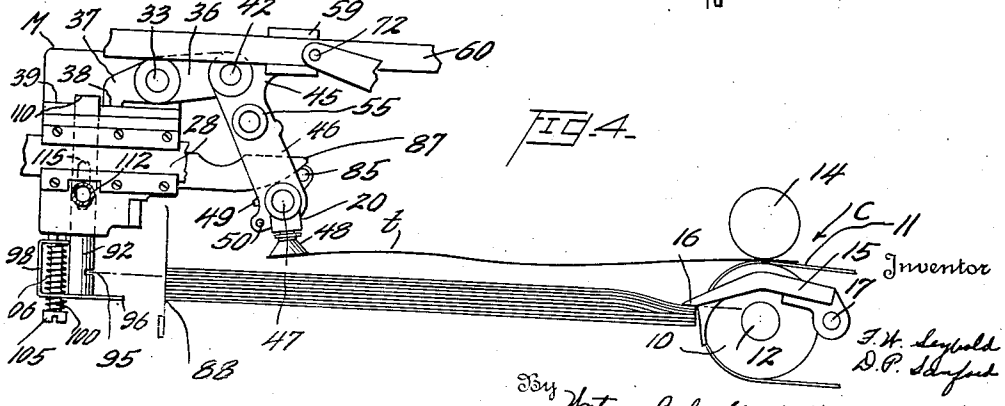


FIG. 4.



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SHEET FEEDER

Filed March 16, 1939 2 Sheets-Sheet 2

FIG. 5.

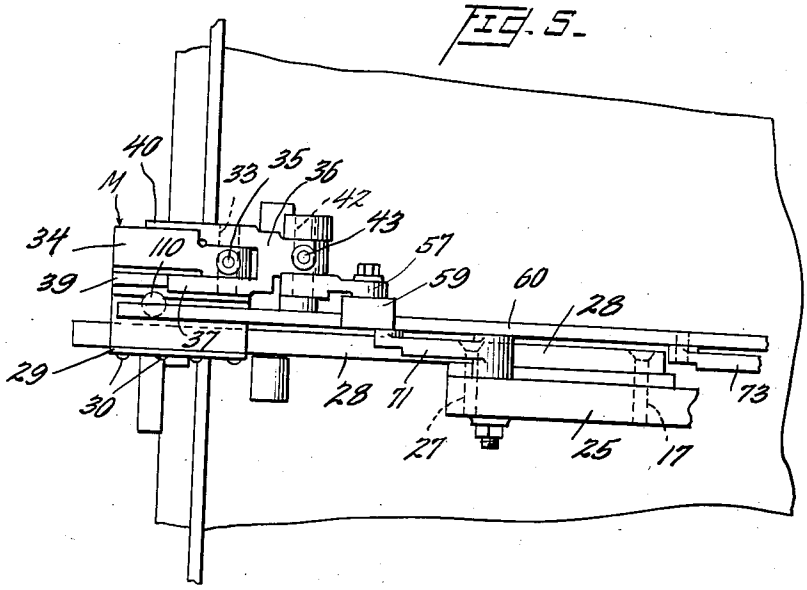


FIG. 6.

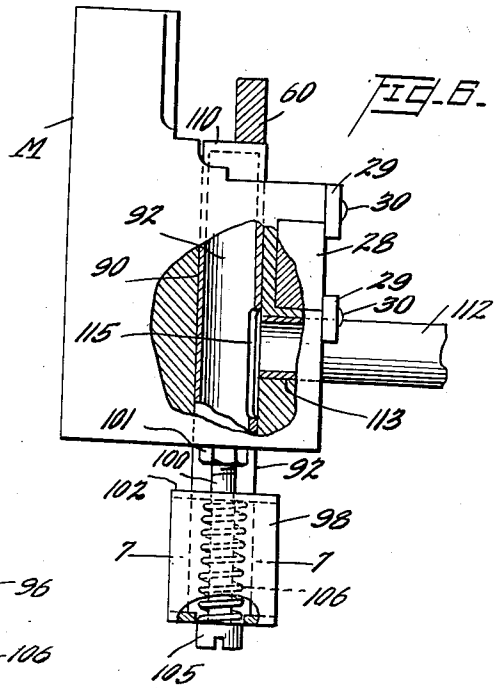
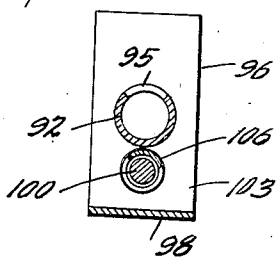


FIG. 7.



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2,243,170

UNITED STATES PATENT OFFICE

2,243,170

SHEET FEEDER

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Application March 16, 1939, Serial No. 262,260

16 Claims. (Cl. 271—27)

This invention relates to sheet feeding apparatus and more particularly to devices for separating the sheets from a pile and forwarding them to the printing press, folder or other machine to which they are to be fed.

The general object of the invention is to provide a novel sheet feeder which embodies an improved device for winding the sheets during the separating and feeding operations.

In its broader aspects, the invention is applicable to sheet feeding devices of widely varying types, but for purposes of illustration, the preferred embodiment is shown and described herein as incorporated in a sheet feeder of the kind which forms the subject of the copending application of David P. Sanford, Serial No. 232,443, filed September 29, 1938.

The sheet feeder described in that application is one which is readily adjustable to feed sheets singly and in spaced relation, or to effect what is known as "stream feeding," that is, forwarding the sheets in a continuous line with each sheet overlapping the adjacent edge of the next succeeding one. This feeder is provided with a hold-down member disposed adjacent the forward portion of the pile, and a suction gripper which operates above the pile to withdraw the successive top sheets from beneath the hold-down member and move them forwardly to the conveyor which carries them to the printing press, folding machine, cutter, or other instrumentality in conjunction with which the feeder is employed.

As in most devices of this kind, the level of the top of the pile is maintained by means of automatically operated pile elevating mechanism; the mechanism in this particular instance being actuated by the hold-down member which presses upon the pile near the front edge thereof.

Also, in the illustrative example, the sheet lifting or separating function is performed by the same gripper member which moves the sheet forwardly to the conveyor, although the novel winding device is not limited to use with this class of feeder.

The separation of the uppermost sheet of the pile from the underlying sheets is greatly facilitated by the winding operation which comprises directing a blast of air against the rear edges of a number of the uppermost sheets, in order to separate or " fluff up" these sheets and to lift the top sheet toward the suction gripper so that it may be readily engaged by the gripper as it descends. Preferably, the action of the air blast is not interfered with or affected in any way by the provision of hold-down or pressure devices acting on the rear portion of the pile, so that the rear margins of the uppermost sheets are entirely free to rise under the influence of the blast.

The elimination of such pile engaging or pressure members acting upon the rear edge of the pile makes it unnecessary to accurately set the height control gauge, the sheets being blown upwardly to such an extent that the suction gripper may become active and effective in every instance, despite minor variations in the distance between the bottom of the suction gripper and the top of the solid pile, when the suction gripper is in its lowest position. This is an important advantage of the mechanism, especially where the pile of sheets being acted upon is irregular, having a somewhat uneven upper surface, as for instance where the pile comprises a large number of sheets certain portions only of which have been previously printed. The air blast further functions to float each sheet, after its separation from the pile, forwardly to the conveyor, the suction gripper having engagement with the rear edge of the sheet during a portion of its travel, and thus controlling its rate of movement, but the blast being active to facilitate the actual introduction of the leading edge of the sheet into the conveyor, maintaining this leading edge at such elevation that it passes freely over the hold-ing-down member at the front of the sheet.

In prior constructions of this type, the blast nozzles or mouthpieces have been disposed in a fixed relationship with the feeder supporting structure, or at best, have been adjustable to direct the separating air blast at a predetermined elevation with respect to the feeding level of the pile of sheets, this level being regulated by the pile height gauge means which actuates the pile elevator.

It frequently occurs, however, that the stack being fed is curled or wavy due to the presence of moisture or to other causes, so that the elevation of the pile at the rear end thereof is not the same as that at the forward edge or at other points where the pile height gauge finger may be applied. Furthermore, the relative heights of the front and rear portions of the pile may not remain constant even during a given run of sheets, due to the weight of the pile.

Because of these abnormal and sometimes varying conditions, the operation of feeders equipped with fixed winding devices has been subject to frequent stoppages. If the relative elevation of the pile at the height gauge and adjacent the blast mouthpiece changes during the

run so that the sheets are below the effective blast, then the device may fail to feed a sheet; and, on the other hand, if the reverse is true and too many of the uppermost sheets of the pile are above the blast level, then the feeder is likely to feed "doubles."

The present invention obviates these difficulties by providing a moving blast device, the operation of which is synchronized with the feeding cycle.

In its preferred embodiment, the invention contemplates the provision of a vertically reciprocating blast tube guided in a portion of the stationary supporting frame for the suction feeder. The lower end of the tube is provided with an orifice through which the air is directed toward the pile at a predetermined level and the tube is adapted to be intermittently depressed preferably, although not necessarily, by the descending movement of the suction gripper. By suitable modifications within the scope of the invention, the movement of the blast nozzle may be synchronized in any phase with the movement of the suction gripper. A simple and practical construction, which follows the preferred type, may be attained by the provision of a spring retracted blast tube adapted to be contacted and depressed against the resilient pressure of the spring by an operating element of the gripper.

As the suction element descends, the blast nozzle also moves downwardly and fluffs up the sheets so that the uppermost sheet is brought up to meet the suction element. When the latter element is at its lowermost point and in position for taking a sheet, the blast mouthpiece is also at its lowermost position insuring an effective blast at a relatively low level. As the suction gripper rises, the mouthpiece is also lifted, so that when the sheet is fully separated at its rear edge and is about to be moved forwardly to the conveyor, the blast is delivered at about the same level as the front of the pile. At this level, the top sheet is effectively separated from the one immediately beneath it, and a considerable portion of the blast is available to float the sheet and assist in forwarding it to the conveyor.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of my invention is illustrated by way of example.

In the drawings,

Figures 1 to 4, inclusive, are views in side elevation of a portion of a sheet feeder of the type referred to and which embodies the principles of the present invention, the views depicting successive positions of the feeding and winding elements;

Figure 5 is a fragmentary top plan view of the rear central portion of the sheet feeding mechanism shown in Figures 1 to 4;

Figure 6 is a view in rear elevation of a portion of the mechanism, a part being broken away to better illustrate the blast or winding means; and

Figure 7 is a horizontal sectional view taken on line 7—7 of Figure 6.

The general type of sheet feeder to which this invention may be applied is fully illustrated in the copending application to which reference has been made, and only so much of the feeder mechanism and supporting structure will be described herein as is necessary to a proper understanding of the present invention.

All of the feeding and separating mechanism is mounted upon a main supporting frame or base which is preferably provided with upwardly projecting side frame portions for the convenient mounting of certain transverse supporting rods, cross braces, and rotary shafting.

A vertically adjustable pile board is provided for supporting the pile of sheets S which are to be fed to the printing press, folding machine, or similar device. The pile board is gradually elevated as the pile of sheets becomes depleted, and this gradual raising of the support may be accomplished by any suitable mechanism, such as that illustrated in the application referred to; this elevating mechanism, of course, being provided with a suitable detector or control device arranged in contact with the pile of sheets, as will be more fully described hereinafter.

At the forward end of the pile S there may be disposed certain sheet forwarding devices which are adapted to carry the sheets, either successively or in stream formation, to the device to which they are ultimately fed. This mechanism in the present example is represented by the endless tape conveyor C comprising the roller **10**, the tapes **11** which are trained about this roller, and a corresponding roller at the opposite or delivery end of the conveyor (not shown). The roller **10** is mounted upon a shaft **12** which is driven in adjustable synchronism with the feeding and separating devices for the sheets. A cooperating presser roll **14** is disposed above the roller **10**, and the sheets are fed between the tape roller and the presser roll from the top of the pile S.

In order to hold down the sheets adjacent one portion of a pile so as to aid in their successive separation, and also to provide a feeler or control finger for actuating the pile elevator, there is provided the lever arm **15**, the tapered end **16** of which rests upon the extreme front edge of the top sheet of the pile. The lever is carried by the rock shaft **17** which is connected with the pile elevator mechanism as fully described in the aforesaid copending application.

A sheet separating and forwarding device, represented generally by the reference character F, and which includes the suction gripper **20**, is provided in order to separate the top sheet of the pile from the underlying sheets, withdraw the top sheet from beneath the end **16** of the hold-down member **15**, and then move the sheet forwardly in sliding relation to the upper surface of the member **15**, and of the guide plate **21**, into the bite of the rollers **10**, **14**, at which point the control of the sheet is transferred from the suction gripper **20** to the conveyor C. The conveyor C is in continuous operation and is ready to receive and forward a sheet fed into its intake end at any time, and the conveyor is furthermore preferably driven at a uniform speed so that each sheet moves toward the impression cylinder at a uniform rate after having been introduced into the conveyor. The sheet gripping mechanism F and the conveyor C, as previously indicated, are driven in synchronism with the machine to which the sheets are being fed, and the conveyor C preferably may be driven at one or the other of a plurality of predetermined speeds, depending upon whether serial feeding with various degrees of spacing, or stream feeding with various degrees of overlap, is desired.

The mechanism for effecting the removal of the uppermost sheet from the pile and for forwarding it to the conveyor will now be described. Supported by suitable means connected with the side frames of the apparatus so as to project above the top of the pile S is the longitudinally extending supporting frame or bracket shown

fragmentarily at 25 in Figure 5 of the drawings. Suitably secured to the lower edge of this member 25, as by means of the bolts or screws 27, is the rearwardly projecting supporting bar 28. Adjacent the rear end of this supporting bar there is secured the block M. The connection between the block M and the bar 28 is preferably made adjustable so that the block may be moved to and retained in any desired position longitudinally of the feeder to adapt it to sheets of different lengths. To attain this adjustment the block M may be provided with a groove or recess shaped to receive the bar and provided with overhanging plates or gibs, such as those indicated at 29, secured to the block by means of the screws 30. The block may be held in its adjusted position by means of a thumb screw or any other suitable clamping means.

A pivot shaft 33 passes through a narrowed upper portion 34 of the block M and is secured against rotation with respect to the block as by means of the set screw 35. Embracing this portion 34 and pivotally mounted upon the ends of the shaft 33 is the bifurcated end of the lever or rocker member 36. One of the bifurcations 37 is provided with a foot 38 which is adapted to abut a ledge 39 on the block M during certain portions of the cycle of operation of the feeding gripper. The other bifurcation 40 of the lever 36 is urged downwardly as by means of the spring 41, the lower end of which is secured to a portion of the block M. By this means, the forward end of the rocker lever 36 is continually urged in an upward direction. This forward end of the lever is provided with a transverse opening through which extends a shaft or axle 42 and which is secured against rotation therein by means of the set screw 43.

There is connected to the rocker 36, by means of the shaft 42, a swinging carrier 45 which is substantially of an inverted L-shape, the angle portion of which is bifurcated and pivotally mounted upon the ends of the shaft or axle 42. The longer, normally vertically extending arm 46 of the carrier member 45 is pivotally connected with the suction gripper members 20 as at 47, this pivotal connection being provided with means for transmitting the vacuum from a suitable source of suction to the flexible cup 48 carried by the gripper member 20. There are preferably two of the gripper elements 20; one or both of them is formed with a projection 49 which is adapted to contact and bear against the stop pin 50 which is carried by a projection on the lower end of the supporting member 47; and these abutments 49 and 50 are urged into contact with each other by means of the coil spring 52, one end of which is connected with a projection 53 on the gripper member 20 and the other end of which is secured as at 54 to a point on the long arm of the supporting carrier 45. The upper forwardly projecting arm 57 of the member 45 is connected by means of a pivot pin 58 with a block 59 which is slidably mounted upon a horizontally disposed bar 60, which, when the mechanism is operated, has a controlled rising and falling movement and comprises the means for transmitting driving force from the driving mechanism to the gripper element actuating device. The bar 60 remains horizontal and parallel to the supporting bar 28 throughout its movement, this arrangement permitting the adjustment of the block M and its associated mechanism longitudinally on the support 28 while maintaining at all times its driving connection with this mechanism.

This parallel motion of the bar 60 is attained by means of the following mechanism. Two parallel pins 62 and 63 project from the supporting bracket 25 and carry upon their respective outer ends two bar operating levers, a three-armed lever 65 mounted upon the pin 62, and a three-armed lever 66 mounted upon the pin 63. Parallel downwardly extending arms 67 and 68 of these levers are connected by means of a link 70 so that the levers are constrained to partake of simultaneous rocking movements through equal angles. One arm 71 of the lever 65 is pivotally connected to the actuating rod 60 as by means of the pin 72, and an arm 73 of the lever 66, of the same length and inclined at the same angle as the arm 71, is pivotally connected to the bar 60 as at 74. Thus, it is clear that rocking movements of these levers must be equal and simultaneous and will bring about very equal rising and falling movements of the actuating bar 60. A spring 75 acting upon an upwardly extending arm 76 of the lever 65 and connected to a stationary part of the device tends to rock both levers in a clockwise direction, as viewed in Figure 1, and causes a cam follower 78 rotatably mounted upon the upwardly extending arm 79 of the lever 66 to bear at all times against a cam 80, fixed upon a cam shaft 81 which is driven in proper synchronism with the conveyor C and the device to which the sheets are fed.

The bar 60, as it descends beyond a certain point, is adapted to contact with the roller 55 secured to the swinging gripper carrier 45 and cause it to move downwardly against the influence of the spring 41 so that the gripper 21 may seize the top sheet of the pile.

The various movements of the separating and feeding mechanism F during its cycle of operation will now be briefly described; reference being made to the aforesaid copending application for a more detailed disclosure of the construction and operation of this device. Figures 1, 2, 3, and 4 of the drawings show successive stages in the cycle of operation. In Figure 1 the bar 60 has, through its contact with the roller 55, caused the swinging carrier 45 to descend so that the suction gripper 20 is in contact with the top sheet *t* of the pile S adjacent its rear margin. At this point, suction is applied to the gripper device causing the sheet *t* to adhere thereto.

In Figure 2 of the drawings the actuating bar 60 has moved upwardly a short distance and has permitted the carrier 45 to rise vertically under the influence of the spring 41, thus causing the suction gripper 20 to lift the sheet *t* a slight distance from the next underlying sheet of the pile. At this point a roller 85 carried by the projection 53 of the member 20 contacts with the underneath cam surface 86 of the cam bar 87 which projects forwardly from the block M.

Further upward movement of the bar 60, as indicated in Figure 3 of the drawings, permits the carrier 45 to move still further in an upward direction until the foot 38 of the rocker lever 36 comes to rest against the ledge 39 of the block M. During this stage of the movement of the feeding elements the roller 35, being in contact with the cam surface 86, causes the suction gripper 20 to tilt rearwardly so that the abutment 49 leaves the pin 50 and tensions the spring 47 which normally maintains the suction gripper and the carrier 45 in fixed relation. This rear-

ward tilting movement of the gripper 20 causes the sheet *t* to move rearwardly and withdraws its forward edge from beneath the hold-down member 15, at the same time moving the thin flexible rear pile guide 68 momentarily rearwardly.

Further upward movement of the bar 60 causes the carrier 45 to swing forwardly about the pivot shaft 42 since the rocker 36 can rise no further due to the impingement of the foot 38 against the ledge 39. This forward movement of the carrier 45 causes the cam roller 85 of the gripper 20 to move along the curved cam surface 86 of the bar 87, and to cause the member 20 to maintain the proper angle with respect to the carrier 45 to effect the forward feeding movement of the sheet *t* into the conveyor C, as clearly shown in Figure 4 of the drawings. Upon the return movement of the actuating bar 60 in a downward direction under the influence of the cam 80, the members 45 and 36 are again rocked downwardly through substantially the same orbits until they again resume the positions shown in Figure 1 for seizing the next sheet of the pile. It will be understood of course that in the case of stream feeding the action of the feeding device F in separating and forwarding the sheets is more rapid than the carrying off of the sheets by the conveyor C, and thus successive sheets are inserted within the bite of the conveyor beneath the next preceding ones, in overlapping relation.

During the entire cycle of operation of the separating and feeding mechanism F, a continuous blast of air is directed toward the upper portion of the rear face of the pile S. For supplying this blast of air against the sheets, the following mechanism is provided. As very clearly shown in Figure 6 of the drawings, the block M in its rearward portion is provided with a vertical bore 90 within which there is disposed for vertical reciprocation the blast tube 92. The lower portion of this tube 92 is provided with the forwardly directed slot or outlet orifices 95 and the lower end of the tube is closed by means of the plate 96 which forms a forwardly extending deflector member, and is bent upwardly and inwardly at the rear of the tube 92 to provide a guiding and spring seating bracket portion 98. A guide pin 100 is threaded into the lower face of the block M and locked rigidly thereto by means of the nut 101. This pin passes through an opening in the upper portion 102 of the bracket 98 and also through an enlarged opening in the lower rearwardly extending portion 103 of the bracket. The head 105 of the pin provides suitable stop means for limiting the downward movement of the bracket and thus of the blast tube 92. A coil spring 106 surrounds the pin 100, passes through an opening in the plate 96, and is seated between the lower face of the upper portion 102 of the bracket 98 and the head 105 of the pin, thus tending to urge the bracket upwardly until the portion 102 abuts the nut 101.

The upper end of the tube is closed as at 110 and is adapted to be contacted with and depressed by the bar 60 during the final stages of the downward movement thereof. An air supply nipple 112 is seated within the bore 113 provided laterally in the block M, and the blast tube 92 is placed in communication with the tube 112 by means of the elongated slot 115 in its side wall. The slot 115 is of sufficient length so that it is at all times in communication with the tube 112 during the vertical reciprocating movement of the tube 92 in the block.

The operation of the improved blast mechanism in conjunction with the feeder device F will now be described. As the actuating bar 60 descends, the tube 92 is also moved downwardly until both of these elements have reached their lower limit as shown in Figure 1. At this point, the suction gripper 20 is seizing a sheet upon the top of the pile S, and the outlet slot or orifice 95 of the blast tube 92 is at a relatively low point as referred to the top of the pile S. As the suction gripper moves upwardly, the tube 92 is also moved upwardly under the influence of the spring 106. An intermediate position of the blast tube is shown in Figure 2 of the drawings, where the suction gripper 20 has raised the top sheet *t* preparatory to moving it rearwardly from beneath the hold-down member 15. Further upward movement of the bar 60, as shown in Figure 3 of the drawings, permits the blast tube to move to its upper limit of movement as determined by the contact of the bracket 98 with the nut 101, and at this point, the blast orifice 95 is at substantially the same level as the front edge of the pile as affected by the hold-down member 15. The blast tube remains at this level during the forward feeding of the sheet, and thus a considerable portion of the blast of air is effective in passing under the top sheet *t* and floating it above the pile and thus aiding materially in the feeding of the sheet into the conveyor C. At the same time, the elevation of the blast is sufficient to prevent the feeding of "doubles."

It will thus be seen that there has been provided by the present invention a novel and effective blast or winding means which cooperates with the sheet feeding mechanism in separating the sheets and also in feeding them forwardly from the pile. The depression of the blast device insures that the uppermost sheets of the pile will be fluffed and separated during the initial seizure of the top sheet by means of the gripper member, and also the upward movement of the blast insures that sufficient of the air is passed beneath the single top sheet being removed, and that no more than one sheet is floated toward the conveyor.

It will be understood that various changes and modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a sheet feeder for separating and forwarding sheets from a pile, in combination, the sole hold-down means for said sheets being at the forward edge of the pile, the rear portions of the pile being free from vertical pressure, means for separating the top sheet from the underlying sheets, withdrawing it from said hold-down means, and forwarding the sheet toward the device to which the sheets are being fed, vertically movable means for delivering a continuous blast of air against the upper rear edge portion of the pile, and means for moving said last named means in synchronism with the separating and forwarding means.

2. In a sheet feeder for separating and forwarding sheets from a pile, in combination, means for holding down the forward edge of the pile, means for separating the top sheet from the underlying sheets, withdrawing it from beneath said hold-down means, and forwarding the sheet toward the device to which the sheets are being

fed, and means for delivering a vertically moving substantially horizontally directed blast of air against the rear side of the pile in order to facilitate the separation and forwarding operations.

3. In a sheet feeder for separating and forwarding sheets from a pile, in combination, means for separating and forwarding the top sheet of the pile, and separately mounted means for delivering a vertically moving substantially horizontally directed blast of air against the rear side of the pile in order to facilitate the separation and forwarding operations.

4. In a sheet feeder for separating and forwarding sheets from a pile, in combination, a member movable upwardly and downwardly above said pile for separating and lifting the top sheet from the pile, an independently mounted blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a continuous blast of air against portions of the upper rear side of the pile to aid in the separation of the sheets, and means for causing said nozzle to move downwardly behind the pile when the member moves downwardly to seize a sheet, and for causing the nozzle to move upwardly as the member moves upwardly to separate the sheet from the pile.

5. In a sheet feeder for separating and forwarding sheets from a pile, in combination, a hold-down device pressing downwardly upon said pile at a point spaced from the rear edge of the pile, a member for separating and lifting the top sheet from the pile, a blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a continuous blast of air against portions of the upper rear side of the pile to aid in the separation of the sheets, and means for causing said nozzle to move downwardly behind the pile to a point below the level of the hold-down device when the member moves downwardly to seize a sheet, and for causing the nozzle to move upwardly to the approximate level of the hold-down device as the member moves upwardly to separate the sheet from the pile.

6. In a sheet feeder for separating and forwarding sheets from a pile, in combination, a hold-down device pressing downwardly upon said pile at the front edge thereof, a suction gripper operable above said pile to separate the top sheet from the underlying ones and forward it toward the device to which the sheets are to be fed, means for causing said gripper to descend toward said pile, seize the top sheet, then move upwardly and rearwardly to withdraw said sheet from beneath said hold-down device, and then forwardly to deliver the sheet for subsequent handling, a blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a continuous blast of air against a portion of the upper rear side of the pile, means for causing the nozzle to move downwardly behind the pile to a point below the level of the hold-down device when said gripper moves downwardly to seize a sheet, and means for causing the nozzle to move upwardly during the separating and retracting movements of the gripper until it reaches a level approximating that of the hold-down device and to remain at that level during the forward sheet delivering movement of the grippers, whereby the blast facilitates the separation of the successive top sheets and serves to float them above the pile during the forwarding movement.

7. In a sheet feeder for separating and forwarding sheets from a pile, in combination, a hold-down device pressing downwardly upon said pile at the front edge thereof, an automatically actuated pile elevator for maintaining the top of the pile at an approximately constant level, a suction gripper operable above said pile to separate the top sheet from the underlying ones and forward it toward the device to which the sheets are to be fed, means for causing said gripper to descend toward said pile, seize the top sheet, then move upwardly and rearwardly to withdraw said sheet from beneath said hold-down device, and then forwardly to deliver the sheet for subsequent handling, a blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a continuous blast of air against a portion of the upper rear side of the pile, means including a portion of the gripper operating means for causing the nozzle to move downwardly behind the pile to a point below the level of the hold-down device when said gripper moves downwardly to seize a sheet, and means for causing the nozzle to move upwardly during the separating and retracting movements of the gripper until it reaches a level approximating that of the hold-down device and to remain at that level during the forward sheet delivering movement of the grippers, whereby the blast facilitates the separation of the successive top sheets and serves to float them above the pile during the forwarding movement.

8. In a sheet feeder for separating and forwarding sheets from a pile, in combination, the sole hold-down means for said sheets being at the forward edge of the pile, the rear portions of the pile being free from vertical clamping pressure, a suction gripper operable above the rear portion of said pile to separate the top sheet from the underlying ones and forward it toward the device to which the sheets are to be fed, means for causing said gripper to descend toward said pile, seize the top sheet, then move upwardly and rearwardly to withdraw said sheet from beneath said hold-down device, and then forwardly to deliver the sheet for subsequent handling, a blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a continuous blast of air against a portion of the upper rear side of the pile, means for causing the nozzle to move downwardly behind the pile to a point below the level of the hold-down device when said gripper moves downwardly to seize a sheet, and means for causing the nozzle to move upwardly during the separating and retracting movements of the gripper until it reaches a level approximating that of the hold-down device and to remain at that level during the forward sheet delivering movement of the grippers, whereby the blast facilitates the separation of the successive top sheets and serves to float them above the pile during the forwarding movement.

9. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a bracket carried by said main frame so as to overhang the rear edge of said pile, a gripper member movably supported from said bracket, actuating means for said gripper member operatively connected thereto, an air blast tube carried by said bracket vertically

reciprocable with respect thereto and adapted to extend behind the upper part of the rear side of the pile, a nozzle opening in the tube directed toward the pile, a portion of said tube projecting from said bracket in a position to be contacted and moved vertically by said gripper actuating means, and spring retracting means for said tube adapted to resiliently resist the movement of said tube under the influence of said actuating means.

10. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a bracket carried by said main frame so as to overhang the rear edge of said pile, a gripper member movably supported from said bracket, actuating means for said gripper member operatively connected thereto and comprising an element projecting into close proximity to said bracket, an air blast tube carried by said bracket vertically reciprocable with respect thereto and adapted to extend behind the upper part of the rear side of the pile, a nozzle opening in the tube directed toward the pile, the upper portion of said tube projecting from said bracket in a position to be contacted and moved vertically by said element, and spring retracting means for said tube adapted to resiliently resist the movement of said tube under the influence of said element.

11. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a bracket adjustably carried by said main frame so as to overhang the rear edge of said pile, a suction gripper member movably supported from said bracket, actuating means for said gripper member operatively connected thereto and comprising an element projecting into close proximity to said bracket, an air blast tube carried by said bracket vertically reciprocable with respect thereto and adapted to extend behind the upper part of the rear side of the pile, a nozzle opening in the tube directed toward the pile, the upper portion of said tube projecting from said bracket in a position to be contacted and moved vertically by said element, and spring retracting means for said tube adapted to yield under the influence of said element.

12. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a bracket carried by said main frame so as to overhang the rear edge of said pile, a gripper member movably supported from said bracket, actuating means for said gripper member operatively connected thereto, said actuating means adapted to cause said gripper member to descend upon the pile, seize the top sheet, move it upwardly and rearwardly to separate it from the underlying sheets and then forwardly toward the machine to which they are being fed, an air blast tube carried by said bracket vertically reciprocable with respect thereto, and adapted to extend behind the upper part of the rear side of the pile, a nozzle opening in the tube directed toward the pile, a portion of said tube projecting from said bracket in a position to be contacted and moved downwardly by said element when the gripper member descends to seize a sheet, until the nozzle opening is well below the top of the pile, and spring retracting means for said tube for resiliently urging it upwardly to the point where the opening is at the approximate level of the top of the pile when the gripper member is moving the sheet forwardly, whereby the blast aids in separating the top sheet and floats it during the forward feeding movement.

13. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a sub-frame carried by said main frame and disposed above the pile for supporting certain of the feeding elements, a block carried by said sub-frame so as to overhang the rear edge of the pile, said block being provided with a vertical bore, an air blast tube slidably disposed within said bore, an outlet orifice in said tube adjacent the lower end thereof, an air passageway in said block communicating with said bore, and an elongated inlet opening in the wall of said tube adapted to communicate with said passageway at all times, resilient means for urging said tube upwardly toward the point where the outlet orifice is at the approximate level of the top of the pile, the upper end of the tube projecting above the adjacent portions of said block and adapted to be contacted by and depressed by a moving part of the feeding elements.

14. In a winding device for sheet feeders of the class described, in combination, a block supported above and rearwardly of a pile of sheets to be fed, said block being provided with a vertical bore, an air blast tube slidably disposed within said bore, an air passageway in said block connected with a source of compressed air, an inlet orifice in said tube communicating with said passageway, a laterally directed outlet orifice in the lower part of said tube, a bracket secured to the lower end of said tube and adapted to provide a spring seat and a limiting abutment for contacting the block at the upper limit of movement of the tube, a guide pin projecting downwardly from said block and passing through an opening in said bracket, a coil compression spring on said pin and adapted to be seated between the head of the pin and said bracket to urge the tube upwardly with respect to said block.

15. In a sheet feeder of the class described, in combination, a main frame, carrying a pile of sheets to be fed, a bracket carried by said main frame so as to overhang the rear edge of said pile, a gripper member movably supported from said bracket, actuating means for said gripper member operatively connected thereto and comprising a parallel motion including a horizontal bar adapted for substantially translatory movement in a vertical plane during the operation of said gripper member, said bar adapted to approach an upper surface of said bracket as it descends to cause the gripper member to lower onto the pile, an air blast tube vertically reciprocable in said block and adapted to direct a blast of air upon the rear face of the pile, a spring for resiliently projecting said tube upwardly above said upper surface of the block into the path of said bar, whereby said blast tube is depressed when said gripper means is lowered.

16. In a sheet feeder for separating and forwarding sheets from a pile, in combination, a movable member for separating and lifting the top sheet from the pile, means for actuating said member through successive cycles of operation, a separately formed blast nozzle spaced rearwardly from the rear edge of the pile and movable vertically during the operation of the feeder to deliver a vertically moving substantially horizontally directed blast of air against portions of the upper rear side of the pile to aid in the separation of the sheets, and means to actuate said nozzle in timed relationship with the cycles of movement of said member.

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