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SHEET FEED CONTROL MECHANISM

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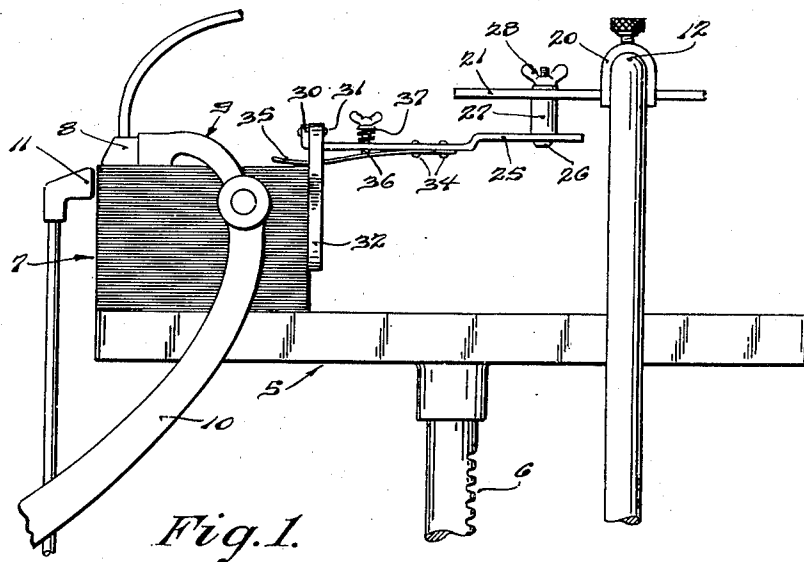


Fig. 1.

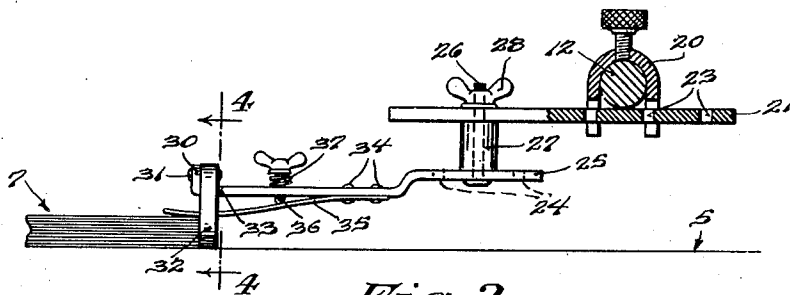


Fig. 2.

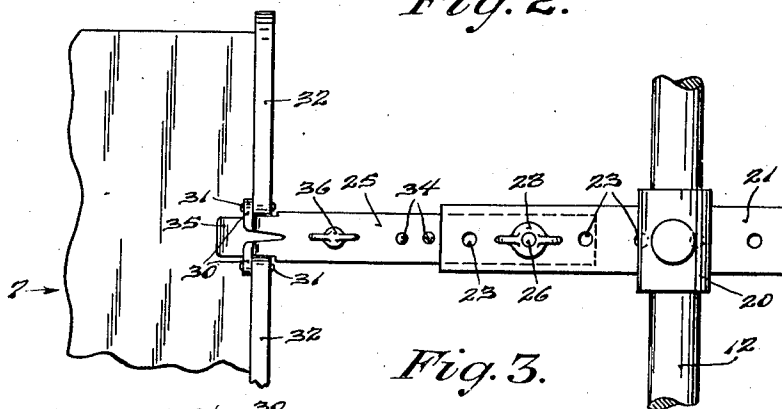


Fig. 3.

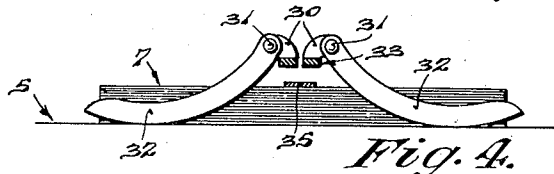


Fig. 4.

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SHEET FEED CONTROL MECHANISM

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13 Claims. (Cl. 271—27)

This invention relates to sheet-feed control mechanism, being particularly adapted for use with printing presses and more especially to that class of press conventionally known as the automatic vertical.

As regards such character of printing press and the application of the present invention thereto, the sheets constituting the work are stacked in a pile upon a feed table and individually withdrawn successively from the top down by means of suction shoes reciprocating in a relatively horizontal plane to and from the forward end of the pile. The invention is directed to structure for engaging the rear end of the pile to maintain the individual sheets in proper disposition in assuring constant relativity as regards the forward end of the individual sheets to the shoes.

It is a particular object of my invention to provide an especially efficient structure for the purpose described and one capable of being readily adjusted to position the same for use with substantially unlimited sheet sizes.

A further object is the provision of an improved design constructed such that one unit, medially disposed as regards the transverse dimension of the sheet pile, operates to replace the multiple sheet guides as heretofore used at the rear of the pile.

It is a still further object, the invention including a spring for gripping the uppermost sheet in the pile to yieldably hold the same, to provide an especially advantageous regulating structure for setting the spring to obtain the proper tension on the work.

The foregoing, together with further objects and advantages more particularly relating to an improved design of the several parts to assure uninterrupted withdrawal of the successive sheets continuously through the entire sheet pile, will become apparent in the course of the following detailed description and claims, the invention consisting in the novel construction, adaptation, and combination of parts hereinafter described and claimed.

In the drawing:—

Figure 1 is a side elevation indicating the invention in its now preferred form applied to the feed table and related parts of a conventional automatic press of the vertical type.

Fig. 2 is a similar view to an enlarged scale indicating the position of the parts as the same approach the bottom of the sheet pile, the cross-rod support for the control mechanism and a

portion of the adjusting bar being shown in longitudinal vertical section.

Fig. 3 is a top plan view of the invention in its operative disposition to the sheet pile; and

Fig. 4 is a transverse vertical section taken on the line 4—4 of Fig. 2.

Particularly referring to the sheet feeding structure of the press with reference to the drawing, the same comprises a feed table 5 which, through a train of gears including a rack or racks 6, is supported for movement in a vertical plane automatically in response to withdrawal of the successive sheets from the pile 7 carried on the table. Said pile is located at its forward end by front guides (not shown) and the sheets are withdrawn by separator shoes 8 which operate to develop a suction grip at or adjacent the forward end of the sheet, the shoes being supported by a separator frame 9 which in turn is supported for reciprocatory motion in a horizontal arc by means of feed arms 10. Co-acting with said separator shoes in preventing adherence of the upper sheets in the pile with one another are a plurality of blower nozzles 11 which project pressure jets of air horizontally of the table in proximity of the upper level of the pile. In maintaining the separate sheets of the pile against blower and vibration influenced disalignment, feed tables of the character described further provide what is generally termed "feeder pile rear guides" and "rear guide springs" supported at the rear end of the table from a stationary cross-bar 12.

Relative to such latter structure which forms the subject matter of my invention, a conventional form of bracket such as 20 is employed which is located over the cross-bar on the substantial longitudinal center line of the sheet pile. Clamped by said bracket between opposing hook terminals of the same and the cross-bar, I provide an adjustment bar 21 apertured in spaced dispositions of its length to provide plural bolt holes 23, which bolt holes act in conjunction with spaced-apart threaded openings 24 of a reach member 25 to receive a bolt 26. Thread reception of the head end of the bolt in a selected aperture 24, co-actively with a spacing collar 27 surrounding the bolt between the reach and bar members, maintains the related parts rigidly with respect to one another. A wing nut 28 acts to clamp the bar over the spacing collar.

In offset disposition below the bolt-receiving end, said reach member extends forwardly and at its outer end is bifurcated with the companion terminals 30 being turned up to provide horizontal bearings for the reception of rivets or the like

31 serving as fulcrums for arcuately conformed guide arms 32 arranged to depend from opposite sides of the reach member. Seats 33 notched in the lateral walls of the reach member normally receive the guide arms and operate to limit the gravity-influenced swing of the arms, said seats being located to normally position the arms such that tangential extensions of the arc terminals lie parallel or approximately so with the plane of the feed table.

Below the reach member and secured thereto at its inner end by rivets 34, the invention further provides a curved leaf spring, indicated at 35, located medially of the guide arms and having its free end extending longitudinally beyond the reach member. A pin 36 threaded in the reach member in advance of the fixed end of the spring operates to regulate the tension of the spring, said pin being maintained in selected tension-regulating dispositions by a coil spring 37 compressed between the reach member and the wing head of the pin.

In the use of the device, the guide arms are located to lie either forwardly or to the rear of the cross-arm 12 according to the length of the sheets in the pile 7, adjustment being afforded by the disposition of the bar 21 in the bracket 20 and the selected location of the bolt 26, with the curvature of the spring 35 accommodating extension of the reach member either forwardly or rearwardly of the connecting bolt, as may be necessary. The table is elevated manually to engage the uppermost sheet of the pile with the suction shoes, and the spring 35 is regulated according to the stock being run to provide proper tension upon the sheet. Respecting such spring tension, it is necessary in affording efficient sheet feed from the table that the paper slide readily from below the spring as the sheet is engaged by the suction shoes but the spring tension must be sufficiently strong to overcome any tendency of the sheet to become dislodged as a result of the air jet. Where desirable, ready adjustments may be made co-incidental with the operation of the shoes.

As the sheets are removed successively from the pile, the feed table elevates and as the surface of the table engages the guide arms the latter swing outwardly, the arcuate surface of the arms riding with a minimum of resistance over the table. A maximum surface bearing is afforded between the arms and the table, obviating admission of the lower sheets in the pile between the same. In every instance of which I am aware, prior rear guide structures have been rectilinear in form with point contact where the toe of the same engages the table. A further and especial advantage afforded through the use of curvilinear guide arms is the adaptability of the feed table to the delivery of narrow sheets in that the point of contact of the guide arms with the feed table progressively advances toward the fulcrum points of the arms.

The invention is believed clear from the foregoing. While disclosing my now preferred embodiment it is my intention to confine the scope only as by the expressed limitations of the here-to annexed claims.

What I claim is:—

1. In sheet-feeding structure, in combination with a table adapted to support a pile of the sheets, means for delivering an air jet between the upper sheets of the pile for separating the same, and means for withdrawing the separated sheets successively, the table being arranged for

vertical movement responsive to the successive withdrawal of the sheets to maintain the upper level of the pile on a constant plane, guide means for maintaining the individual sheets of the pile in alignment comprising a reach member supported to locate the outer end of the same in the vertical plane of the rear end of the pile, a spring carried by said reach member for yieldably engaging the uppermost sheet in the pile, means for regulating the tension of the spring, and a pair of guide arms suspended for lateral swinging movement from opposite sides of the reach member to engage the rear face of the pile, said swinging movement of the guide arms acting to accommodate table elevation as the pile rises directly of the plane of the top level of the pile responsive to the withdrawal of the sheets.

2. In sheet-feeding structure, in combination with a table adapted to support a pile of the sheets, means for delivering an air jet between the upper sheets of the pile for separating the same, and means for feeding the separated sheets successively from the table, the table being arranged for vertical movement responsive to sheet feed for maintaining the upper level of the pile on a constant plane, guide means for maintaining the individual sheets of the pile in alignment comprising a reach member supported to locate the outer end of the same in the vertical plane of the rear end of the pile, a spring carried by said reach member for yieldably engaging the uppermost sheet in the pile, and a pair of arcuate guide arms curving downwardly and outwardly suspended for lateral swinging movement from opposite sides of the reach member to engage the rear face of the pile, said swinging movement of the arms serving to accommodate table elevation as the same rises directly of the plane of the top level of the pile responsive to the delivery of the sheets from the pile.

3. In sheet-feeding structure, in combination with an elevating table adapted to support a pile of the sheets, and means for withdrawing the uppermost sheets successively, the table being arranged for vertical movement responsive to successive withdrawal of the sheets for maintaining a constant pile level, a pair of curvilinear guide arms extending downwardly and outwardly suspended above the table for lateral swinging movements oppositionally of one another, and means for adjusting the position of said guide arms longitudinally of the table for locating the same in abutting engagement to the rear face of the pile.

4. In sheet-feeding structure, in combination with an elevating table adapted to support a pile of the sheets, and means for withdrawing the uppermost sheets successively, the table being arranged for vertical movement responsive to successive withdrawal of the sheets for maintaining a constant pile level, a guide arm pivotally supported for lateral swinging movement above the table, said guide arm being formed with an arcuate underneath surface extending downwardly and outwardly from the pivotal point of suspension whereby the arcuate surface of the arm as distinguished from the free terminal of the same rides over the surface of the table in response to the elevation of the latter, said arcuate surface operating such that the point of said arcuate surface which is afforded contact with the table approaches the point of pivotal suspension of the arm progressively with the elevation of the table, and means for adjusting the position of said guide arm longitudinally of the table for

locating the same in abutting engagement to the rear face of the sheet pile.

5 5. In sheet-feeding structure, in combination with a table adapted to support a pile of the sheets, and means for withdrawing the sheets successively, longitudinally adjustable guide means adapted to abut the rear face of the pile for maintaining the individual rear edges in vertical alignment, one with another, a spring supported to yieldably grip the uppermost sheet in the pile, and means for regulating the tension of the spring.

10 6. In sheet-feeding structure, in combination with a table adapted to support a pile of the sheets, and means for withdrawing the uppermost sheets successively, a spring supported to yieldably grip the uppermost sheet in the pile, and means operative to said spring for regulating the tension of the same.

15 7. In sheet-feeding structure, in combination with a table adapted to support a pile of the sheets, and means for withdrawing the uppermost sheets successively, a pressure device operative to engage the uppermost sheet in the pile for yieldably gripping the same, and means for regulating the effective pressure of said device to the sheet.

20 8. In a feeder pile rear guide attachment for the sheet-feeding machine of a printing press of the character described, said machine including a supporting table for the sheets and a rod extending transversely above the rear end of the table, a longitudinally-extensible reach member adapted for adjustable connection with the rod to extend longitudinally of the table on the substantial medial center of the same, a leaf spring fixed at its inner end to the underside of the reach member to project beyond the outer end of the same, means for regulating the tension of said leaf spring, and a pair of curvilinear guide arms suspended for transverse swinging movement from opposite sides of the reach member in proximity of the spring.

25 9. In a feeder pile rear guide attachment for the sheet-feeding machine of a printing press of the character described, said machine including a supporting table for the sheets and a rod extending transversely above the rear end of the table, a reach member adapted for adjustable connection with the rod to extend longitudinally of the table into proximity of the rear edge of the sheet pile, a spring supported at the outer end of the reach member to overlie the rear end of the pile, and means for regulating the tension of the spring.

30 10. In a feeder pile rear guide for a sheet-feed-

ing machine of the character described having a table upon which the sheets are supported, the table being arranged for elevating movement automatically in response to the removal of the successive sheets from the pile to maintain a constant pile level, vertical devices acting to engage the surface of the table and abutting the rear edge of the pile for maintaining the sheets of the pile in vertical alignment, said devices being movable in a vertical plane to accommodate the elevation of the table with the points of bearing engagement of the devices on the table being maintained relatively constant as respects the table during the progressive elevation of the table.

35 11. In feeder pile rear guide mechanism, the combination of supporting means, a bar member carried for longitudinal adjustment by said supporting means, a reach arm carried for independent longitudinal adjustment by said bar member, and feeder pile rear guide structure carried by the reach arm to engage the rear edge of the sheets in the work pile, said independent adjustments of the bar member and the reach arm acting to increase the range of adjustment of the rear guide structure through the ability to dispose the latter at a point constituting the combined maximum adjustment of both said bar member and the reach arm.

40 12. In feeder pile rear guide mechanism, the combination of supporting means, a reversible bar member carried for longitudinal adjustment by said supporting means, a reach arm carried for independent longitudinal adjustment by said bar member and also reversible as respects its position on the bar member, and feeder pile rear guide structure carried by the reach arm to engage the rear edge of the sheets in the pile, said adjustments of the bar member and the reach arm being multiplicative as respects the possible location of the rear guide structure in that the positioning of the latter combines the independent regulations of the two adjustable members.

45 13. Mechanism for use with sheet-feeding structure comprising the combination of a support, guide means carried thereby to abut the rear face of a pile of the work sheets for resisting rearward movement of the sheets under feeding impetus, and a leaf member also carried by said support formed to project beyond the guide means and contactually engage the upper surface of the top sheet in the pile for compressing the upper sheets in the pile in obtaining a frictional grip to resist movement of a plurality of sheets in a single feeding operation.

50 55 JAY F. HORST.