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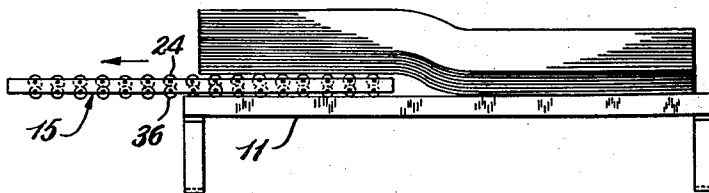
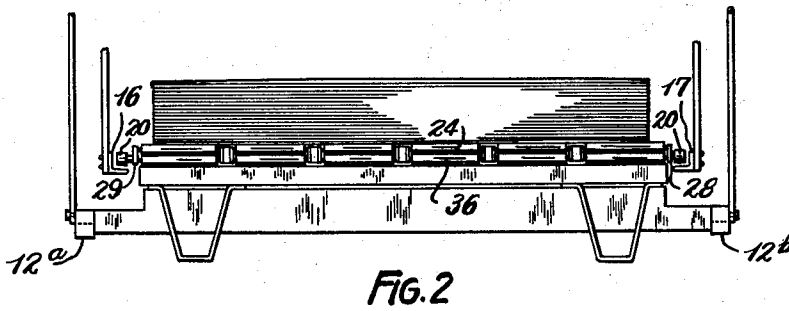
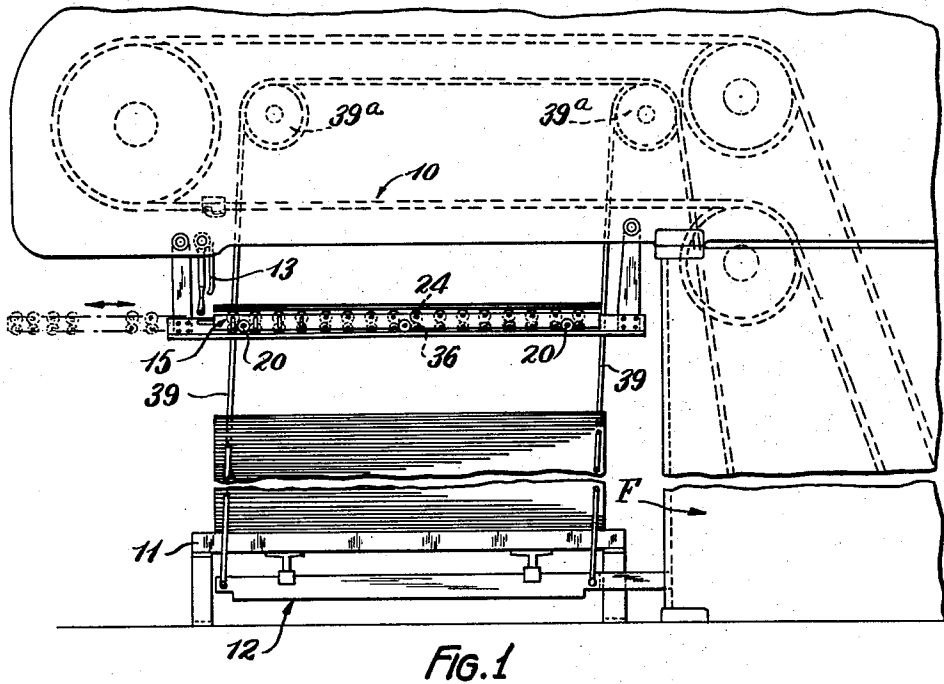
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3,148,780

METHOD AND MECHANISM FOR HANDLING PILED SHEETS

Filed May 12, 1961

2 Sheets-Sheet 1



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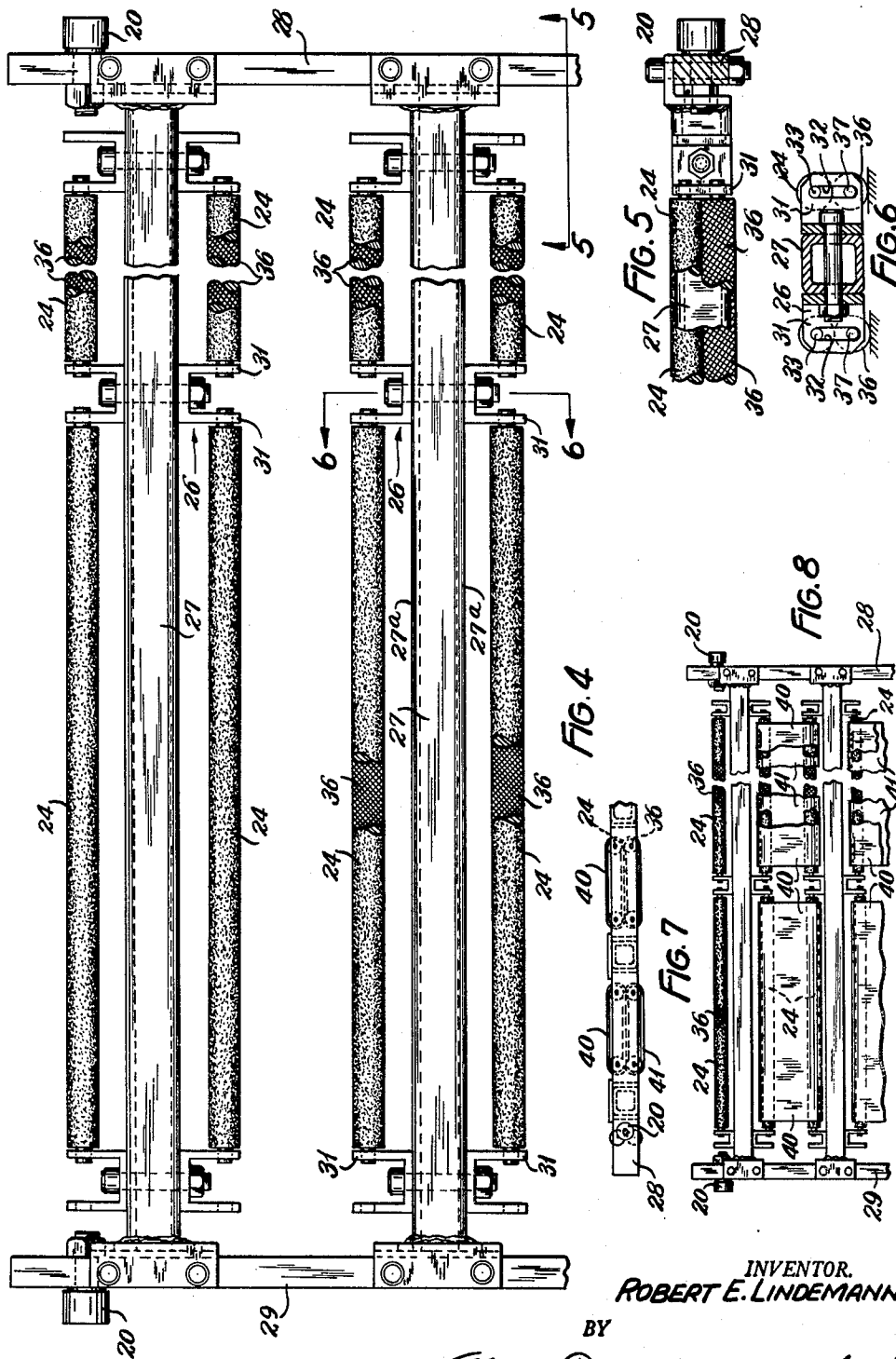
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METHOD AND MECHANISM FOR HANDLING PILED SHEETS

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6 Claims. (Cl. 214-6)

The present invention relates to a load support for handling loads and, more particularly, to such a load support which is particularly adapted for use in combination with mechanism for handling a pile of sheets which varies in height as sheets are fed relative to the pile, e.g., the delivery hoist or feeder of a printing press, for providing a temporary pile support for supporting sheets, which support is adapted to be moved relative to the pile to transfer the pile between the temporary support and a subjacent supporting surface for the pile.

In handling loads, for example, a pile of sheets, it is often desirable to be able to withdraw or insert a temporary support member from or to a load-supporting position by moving the temporary support member generally horizontally between the load and a subjacent supporting surface for the load. When the temporary support member is used in a sheet-handling mechanism to provide a temporary support for a pile of sheets whose thickness varies as sheets are fed relative thereto, it is often desirable to be able to remove or insert the temporary support member between the pile and a subjacent supporting surface therefor without moving the pile or effecting a disarrangement of the sheets of the pile.

To accommodate the insertion or withdrawal of a temporary support member to or from a supporting position with respect to a pile by generally horizontal movement of the support member, the support member can be provided with revolvable elements, for example, rollers for supporting the load, and as the support member is moved, the revolvable elements driven so that the peripheries of the revolvable elements move at their points in engagement with the load in a direction opposite to the direction of movement of the temporary support member and at the same rate as the rate of movement of the support member. This will cause the load to remain stationary as the support member is moved relative thereto. One of the problems encountered with a support member having revolvable elements as described is the problem of effecting rotation of the revolvable elements at the rate necessary to effect movement of the peripheries thereof at the same rate as the movement of the support member. If the peripheries of the revolvable elements engaging the load move at a different rate than the rate of movement of the support member, the load will move or forces will be created between the load and the support member which, if the load is a pile of sheets, will tend to disarrange the sheet pile by combing the lower sheets of the pile relative to the other sheets. Another problem with the described type of support member is that of providing such a support member which does not require large forces to effect the insertion or withdrawal of the support member in between or from between a load and a subjacent supporting surface. The frictional forces involved can become extremely large, particularly when the temporary support member is supported on a generally flat surface, for example, a skid, to which the load thereon is to be transferred, or when the support member is to be inserted under a load supported on such a flat surface.

An important object of the present invention is to provide a new and improved support member for supporting a load, with the support member being provided with revolvable elements which support the support mem-

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ber for rolling movement across a subjacent supporting surface and for effecting a driving of other revolvable elements on the support member which carry the load, with the load-carrying revolvable elements being driven in a direction and at a speed which causes the load to remain stationary relative to the subjacent support for the support member as the support member is moved relative to a supporting position for the load between the subjacent support member and the load.

Another object of the present invention is to provide a new and improved support member which is movable on a support therefor relative to a load-supporting position between a load and a subjacent supporting surface for the load to transfer the load between the support member and the subjacent supporting surface, with the friction being encountered during movement relative to the supporting surface and load being primarily rolling friction.

Another object of the present invention is to provide a new and improved temporary support member on which the load is supported by revolvable elements which are driven in response to relative movement between the support member and a support therefor to cause the load to remain stationary, the drive for rotating the revolvable elements including revolvable elements adapted to roll on the support for the support member as the support member is moved to effect a driving of the load-supporting revolvable elements, with the drive between the revolvable elements being effected by parts which are in peripheral engagement.

A still further object of the present invention is to provide a new and improved support member which includes a plurality of revolvable elements for supporting the support member for rolling movement across a supporting surface, with the elements supporting and driving additional revolvable elements adapted to support the load and wherein the weight of the load is transmitted through the peripheries of the revolvable elements directly to the surface upon which the platen is being rolled.

Yet another object of the present invention is to provide a support member as in the preceding object wherein the platen is constructed to accommodate rolling movement across surfaces which are not extremely smooth.

A still further object of the present invention is to provide a new and improved sheet handling mechanism in which a pile support member provides a temporary support for a pile of sheets and which can be operated to cause a supporting surface disposed beneath the support member to lift the support member and the latter can be withdrawn to transfer the pile thereon, without disarranging the pile, to the supporting surface by rolling the platen across the supporting surface and underside of the sheet pile without applying any substantial forces tending to disarrange the sheet pile.

It is also an object of the present invention to provide a new and improved method for withdrawing or inserting a support member from between a load and a subjacent supporting surface in which the support member rolls over the supporting surface and the load is engaged by revolvable elements which are driven from the supporting surface by relative movement between the latter and said support member.

Further objects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment thereof made with reference to the accompanying drawings forming a part of the present specification and in which:

FIG. 1 is a fragmentary side elevational view, somewhat diagrammatic, of a printing press delivery embodying the present invention;

FIG. 2 is an end view of the delivery of FIG. 1, looking at the left-hand side of the delivery as the delivery is viewed in FIG. 1;

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FIG. 3 is a side elevational view showing the withdrawal of a platen embodying the present invention from beneath a pile of sheets;

FIG. 4 is a fragmentary plan view of a platen embodying the present invention;

FIG. 5 is a sectional view taken approximately along line 5—5 of FIG. 4;

FIG. 6 is a sectional view taken approximately along line 6—6 of FIG. 4;

FIG. 7 is a fragmentary side elevational view showing a modification of the present invention; and

FIG. 8 is a fragmentary top plan view of the platen shown in FIG. 7.

The present invention is susceptible of various constructions, modifications and of use where it is desirable to withdraw, or insert, a load support relative to a load-supporting position to effect a transfer of a load between the support and a subjacent supporting surface, but the present invention is particularly useful when used with piled sheets when the pile height varies and sheets are fed relative thereto and particularly when used in combination with a printing press delivery for receiving printed sheets one at a time and forming piles of the sheets.

In accordance with the present invention, a load support member is provided with a plurality of revolvable elements that define the load-engaging and supporting surface of the load support member and the revolvable elements are driven from the support surface for the load support member when the support member is moved relative to the support surface therefor to effect a transfer of a load between the load support member and a subjacent supporting surface to cause the revolvable elements to roll across the bottom of the load, as the load support member is moved, independently of reaction forces being set up in the load which would tend to move the load laterally with the load support member, the load supporting revolvable elements being driven by revolvable elements which support the support member on its support and which roll thereon as the support member is moved, the drive to the load supporting revolvable elements preferably being effected through the peripheries of rotating parts. In the preferred and illustrated embodiment, the revolvable elements are each carried by a cooperating revolvable element which engages the support for the support member and which is revolved as the load support member is moved over the support therefor so as to roll on the support and to effect a driving of the revolvable elements which engage and support the load. The weight of the load is transmitted directly to the support for the support member through the peripheries of the cooperating revolvable elements and the frictional forces encountered by the movement of the load support member across the bottom of the load and relative to the support for the support member is primarily rolling friction since the revolvable elements roll relative to the load and to the support, and the surfaces of the revolvable elements, which are in engagement with each other, roll relative to each other as the load support member is moved. Consequently, the movement of the support member and the driving of the revolvable elements which engage the load are effected without setting up frictional forces due to sliding friction, as for example, the friction due to a shaft rotating in a sleeve-type bushing.

As hereinbefore stated, a support member involving the present invention is particularly useful in combination with a delivery wherein sheets being delivered one at a time are piled onto a skid supported on a delivery hoist and wherein a support member, such as a platen, is provided as a temporary pile support while a formed pile on the delivery hoist is being removed. FIG. 1 shows such a delivery and referring thereto, the delivery comprises a chain conveyor 10 of a conventional type which is adapted to receive printed sheets from a printing press (not shown) and to carry the sheets, one at a time, over a skid 11 supported on a delivery hoist 12. The sheets being delivered or fed to the delivery hoist by the chain

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conveyor 10 are released as they approach a position over the delivery hoist 12 and are dropped onto the skid 11. A conventional end gate 13 and conventional side and rear joggers, not shown, may be provided to arrange the sheets in a straight pile as they are delivered.

The delivery hoist 12 is shown in a lowered position in FIG. 1 and may be elevated to dispose the skid 11 immediately adjacent the end gate 13 when the skid is empty and a new pile is to be formed thereon. As the pile is built up on the skid 11, it is periodically and incrementally lowered in a conventional and well-known manner to prevent the pile from building up into the chain conveyor 10. When the pile has achieved a predetermined height, the delivery hoist 12 is fully lowered and the pile removed. The pile may be removed by picking up the skid 11 and moving it from the delivery, in which case, a new skid 11 is used for the next pile. While the pile is being lowered for removal, a platen 15 is inserted horizontally into a position above the pile on the skid 11 to intercept the sheets being delivered and to provide a temporary pile support upon which the sheets delivered by the chain conveyor 10 are piled.

In the delivery shown, a pair of rails or tracks 16, 17 extend along each side of the delivery immediately below the end gate 13 and outwardly of the sides of the skid 11. Normally, when sheets are being delivered to a pile on the skid 11, the top of the pile is maintained above the bottom of the end gate 13. Therefore, prior to inserting the platen 15 into sheet-receiving position, the pile is lowered until its top is below the bottom of the end gate and slightly below the supporting ledges of the rails 16 and 17. With the pile in this position, the operator will quickly insert the platen 15 from left to right in FIG. 1 by rolling it on rollers 20. This is accomplished by insertion just after one sheet has settled onto the top of the pile which is prior to the time the next sheet falls to the level of the rails 16, 17. The timing of insertion is dependent upon many variables such as type and thickness of stock being fed, press speed, sheet settling time, etc. The platen 15 is supported on the rails 16, 17 when it is in pile-supporting position and may be moved to the left, as viewed in FIG. 1, to be withdrawn from the sheet-receiving position illustrated in FIG. 1. The platen 15, which is described in more detail hereinafter, has the rollers 20 spaced along each side thereof and extending outwardly of the platen to engage and roll on the rails 16, 17. After the pile on the delivery hoist has been removed, the delivery hoist 12 is raised until a new empty skid 11 thereon engages the platen 15 and lifts the platen slightly from the rails 16, 17, as is shown in FIG. 2. The platen 15 is then withdrawn by moving it to the left, as illustrated in FIG. 1 and FIG. 3, to transfer the pile thereon to the skid 11 and to withdraw the platen 15 from its position where it intercepts the sheets being delivered by the chain conveyor 10. The operation of the delivery then continues until the pile thereon has reached a height where it is to be removed and then the delivery hoist is lowered and the platen 15 moved into its sheet-receiving position above the skid and pile thereon, as above described.

It will be understood that the delivery and platen 15 may be provided with conventional structure to support the platen 15 in a withdrawn position. Such structure is known and has not been shown since the present invention can be readily understood independently of the particular structure used to support the platen in a withdrawn or inoperative position. For example, the platen 15 could be connected to the rails 16, 17 so that when it is fully retracted, it can be swung to a vertical position with the right-hand end of the platen 15, as viewed in FIG. 1, being supported by the rails 16, 17.

The preferred embodiment of the platen 15 is shown in FIGS. 4-6 and, as shown therein, the platen comprises a plurality of revolvable elements 24 which are adapted to engage the underside of the load to be supported by the platen and which define the supporting surface for the

load. The revolvable elements 24 are, in the preferred and illustrated embodiment, rollers, and the rollers are arranged in rows, which rows extend across the platen 15, and in columns which extend fore and aft of the platen that is, right and left, as the platen is viewed in FIG. 1. In the illustrated embodiment, the rollers 24 of each row have their axes aligned and the adjacent ends of each pair of adjacent rollers in the row is supported in a bracket 26 secured to a side of a transverse tubular frame member 27 which is generally square in cross section and which extends across the platen 15 and is connected at its opposite ends to side plates 28, 29 which are parallel to each other and extend fore and aft of the platen 15. Each transverse frame member supports two rows of rollers 24 through corresponding revolvable elements or rollers 36 therebelow.

The brackets 26 are U-shaped brackets and the portion of the bracket forming the bottom of the U is connected to the side 27a of the adjacent transverse frame member 27 and the arms of the U provide roller supports 31, each of which have an elongated slot 32 therein for receiving a trunnion 33 formed on the adjacent end of the adjacent roller 24. The slots 32 are elongated in a vertical direction when the platen 15 is disposed in a horizontal plane.

The platen 15 is adapted to be supported on a subjacent supporting surface by a plurality of the lower revolvable elements 36 and, in the illustrated embodiment, a lower revolvable element 36 is provided for each revolvable element 24 and is disposed directly beneath the corresponding revolvable element 24. The revolvable elements 36 are, in the illustrated and preferred embodiment, rollers which are the same in size as the rollers 24. Each roller 36 has trunnions 37 on its ends which are received in the slots 32 of the adjacent brackets 26. Preferably, the slots 32 accommodate slight vertical movement or lost motion of the rollers 24, 36 relative to the platen frame. This lost motion not only prevents binding of the trunnions during rotation, but also compensates for any unevenness of the top of a skid 11 within certain limits provided by the side plate 28, 29 and the transverse frame members 27. When the platen is supported by the skid 11, the weight of the platen is transmitted to the skid through the rollers 24 and 36, attention being directed to the fact that the peripheries of the rollers 24, 36 extend above and below the transverse frame members 27 and brackets 26 so that the platen 15 is supportable on the rollers 24 and 36 and the load is supported directly on the rollers 24. When the platen is supported on the rollers 24 and 36, the trunnions 33 and 37 and the brackets 26 function to maintain the rollers 36 and their corresponding rollers 24 in vertical relation and to prevent lateral transitory movement relative to each other. The trunnions 37 support the rollers 24, 36 and the load thereon when the platen is supported at its sides on the rails 16 and 17. The brackets 26 therefore carry the load on the rollers 24 only when the platen is supported by the rollers 20. When the platen has been lifted from the rails by a new skid 11, however, the trunnions 33 of the rollers 24 support the framework of the platen.

Preferably, the rollers 36 are knurled, as indicated in the drawings, and the rollers 24 are preferably sand-blasted to provide an efficient driving surface between the rollers 36, 24. Knurling of rollers 36 provides a good gripping surface between these rollers and the skid 11 during platen movement.

When the platen 15 is supported on a skid, as in FIG. 3, and is moved laterally across the skid to deposit a pile of sheets from the platen onto the skid, the rollers 36 will be driven by the skid to effect a rotation of the rollers 24, and the rollers 24 will roll across the bottom of the pile of sheets. Since the rollers 24 are driven from the rollers 36, the bottom of the pile of sheets need not provide any reaction forces to effect a rotation of the rollers 24 and, consequently, the movement of the platen 15 has

little or no tendency to disarrange the pile by combing the bottom of the sheets of the pile in the direction of movement. The peripheral speed of the rollers 24 will be the same as the rate of movement of the platen 15 since the rollers 24 have the same peripheral speed (although in an opposite direction) as the rollers 36 which drive the former, and the peripheral speed of the rollers 36 must be the same as the speed of withdrawal of the platen 15. Consequently, when the platen is moved, the pile does not move with the platen since the rollers 24 are being revolved at the same peripheral speed as the movement of the platen 15 to effect a rolling of the platen across the bottom of the load. Since the rollers 24 are being driven by forces which tend to rotate the rollers, the load need not supply a reaction force to effect a revolving of the rollers 24; although some such reaction force might actually be present, it is not large enough to effect an appreciable disarrangement of the load.

Attention is directed to the fact that all surfaces which move relative to each other during the withdrawal of the platen 15 and which transmit the weight of the load are in rolling engagement with each other so that friction is almost negligible as compared to forces which are set up when sliding friction is involved. It has been shown in practice that a platen constructed in accordance with the present invention can be readily moved relative to a supporting position underneath a pile of sheets without any appreciable disarrangement of the sheets and without holding the pile against movement, even when the movement is a withdrawal, and the movement is at a very slow rate which normally effects movement of the pile with the platen in other types of platen construction.

Utilizing the present invention, it is possible to provide a platen which can be used in a printing press delivery and which can be picked up by a skid on the delivery hoist preparatory to transferring a pile on the platen to the skid. The rollers 36 will roll on the skid as the platen is withdrawn to drive the rollers 24 so that the upper peripheries thereof move opposite to the movement of the platen and the thickness of a platen embodying the present invention can be as small as one inch or less, enabling the drop between the pile on the platen and the skid to be kept to a minimum.

It will be appreciated that as long as the skid 11 is restrained against movement due to the forces applied to the skid when the platen is moved and the rollers 36 driven by the surface of the skid to rotate the rollers 24 at the same peripheral speed as the rate of withdrawal of the platen so that the upper peripheries of the rollers 24 will be moved in a direction opposite to the direction of withdrawal of the platen, the pile of sheets will not move relative to the skid 11. The bottom of the pile of sheets will not be disarranged by the movement of the platen, since the rollers 24 will be rolled across the bottom of the load due to the driving by rollers 36. Consequently, the driving relationship between the rollers 36 and the rollers 24 assures that the pile will not be disarranged or moved laterally during the transfer of a pile between the platen and a subjacent supporting surface. The skids which are used with printing press deliveries do not have an extremely smooth load-supporting surface but the surface is relatively rough. The floating support for each of the rollers 24 and their corresponding rollers 36 will assure that each of the rollers 24 is continuously driven as the platen is withdrawn, since each set of rollers 24, 36 will move downwardly as a unit if the lower roller tends to lose engagement with the skid.

It will also be appreciated by those skilled in the art that, if the platen 15 were restrained against movement and the skid moved in one direction, the rollers 36, 24 would be rotated to cause the pile to move in the same direction as the skid.

In the preferred and illustrated embodiment, the skid 11 has high frictional contact with the supporting structure of the delivery hoist 12 and the delivery hoist 12

preferably includes rails 12a, 12b which extend parallel to the rails 16, 17 and which have their right-hand ends, as the rails are viewed in FIG. 1, interlocked in the frame F for the delivery so that the rails are held against movement to the left as the delivery is viewed in FIG. 1. In addition, the rails 12a, 12b are supported by cables 39 which are raised and lowered to raise and lower the skid 11 and the cables pass over cooperating pulleys 39a which are displaced to the right of a vertical plane through the point of connection of the cables to the rails so that the rails 12a, 12b are biased toward the right and against the frame F.

While the present invention has been shown and described in the preferred form of the revoluble element, other types of revoluble elements can be utilized. For example, belt-type revoluble elements may be used and such a structure is shown in FIG. 7. A belt 40 extends around the rollers 24 of each pair of oppositely disposed rollers 24 of adjacent rows supported by different but adjacent transverse frame members 27. Similar belts 41 may extend between the corresponding rollers 36 so that each belt on the revolving rollers 24 engages the periphery of a corresponding belt upon which the platen is supportable. The belts will roll along the bottom of the pile and along the top of the skid and function in the same manner as peripheries of the rollers 24, 36 without the belts. The weight of the load will be transmitted through the rolling peripheries of the belts to the support for the belts.

It can now be seen that the present invention provides a new and improved load-supporting platen and a new and improved sheet delivery, and that the load-supporting platen is so constructed and arranged that the platen may be inserted or withdrawn between a load and a supporting surface for the platen with a minimum of friction being encountered and without appreciable disarrangement of the load when the load is a pile of sheets.

While I illustrate movement of the platen from left to right in FIG. 1, it is obvious that the platen may be supported for movement from right to left, provided of course, that room is available below the delivery chains for disposal of the platen when it is in inoperative or retracted position. In addition, the platen may be articulated by hinged joints in side plates 28 and 29 between certain of the frame members 27, so as to be movable along a curved track when disposed below the delivery chain.

Furthermore, while the invention has been shown in conjunction with a continuous delivery mechanism, it is obvious that its features may also be utilized in a sheet feeder.

While the present invention has been embodied in a platen adapted to provide the support for a pile of sheets, it will be appreciated that the principles of the present invention may be utilized to insert or withdraw a support member, which does not provide the entire support for a load, relative to a load-supporting position between the load and a subjacent supporting surface for the load. Moreover, while the description of the invention has been made primarily with reference to the withdrawal of such a support member from its supporting position, as indicated hereinbefore, the support member will, however, work in the same manner to facilitate insertion of the support member to a supporting position between the load and a subjacent supporting surface therefor.

The preferred embodiments of the present invention have been described in considerable detail but it is hereby my intention to cover all constructions, modifications, and arrangements which fall within the ability of those skilled in the art and within the scope and spirit of the present invention.

Having described my invention, what I claim is:

1. A sheet handling mechanism comprising means for feeding sheets relative to a pile of sheets supported at a pile position to change the height of the pile of sheets

thereat; a movable support member having a pile supporting position for supporting said pile of sheets in said position; a subjacent supporting surface positioned below said support member adapted to support a pile of sheets; said pile of sheets supported by said movable support member being adapted to be transferred vertically relative to said subjacent surface upon movement of said movable support member across the underside of said pile; said movable support member having means for effecting said vertical transfer relative to said subjacent surface without lateral movement of said pile relative to said subjacent surface and without disarranging the sheets of the pile comprising first revoluble elements supported for revolving movement about parallel first axes and defining the pile supporting surface of said movable pile support member and second revoluble elements supported for revolving movement upon axes parallel to said first axes adapted to engage said subjacent surface for rolling movement thereacross; said first revoluble elements being connected to revolve with said second revoluble elements in a direction opposite to the direction to which said second revoluble elements are revolved by movement of said pile support member across said subjacent surface; said revolving elements maintaining the lateral position of said pile of sheets supported by said support member relative to said subjacent surface and maintaining the edges of said sheets in said pile in alignment thereby providing for the transfer of said pile of sheets from said pile support member to said surface without any disarrangement of the sheets in the pile.

2. A sheet handling mechanism comprising means for feeding sheets to a pile of sheets supported at a pile position to increase the height of the pile of sheets thereat; a movable support member having a pile supporting position for supporting said pile of sheets in said pile position; a pile supporting member having a pile supporting surface positionable below and engageable with said support member when the latter is in said pile supporting position; said pile of sheets when supported by said movable support member being adapted to be transferred vertically to said pile supporting surface upon movement of said movable support member across the underside of said pile while in engagement with said pile supporting surface; said movable support member having means for effecting said transfer vertically relative to said subjacent surface without lateral movement of said pile relative to said subjacent surface and without disarranging the sheets of said pile comprising first revoluble elements supported for revolving movement about parallel first axes and defining the load supporting surface of said movable pile support member and second revoluble elements supported for revolving movement upon axes parallel to said first axes adapted to engage said pile supporting surface for rolling movement thereacross; said first revoluble elements being connected to revolve with said second revoluble elements in a direction opposite the direction to which said second revoluble elements are revolved by movement of said movable support member across said pile supporting surface; said revolving elements maintaining the lateral position of said pile of sheets supported by said support member relative to said pile supporting surface and providing for the transfer of said pile of sheets from said movable support member to said pile supporting surface without disarrangement of the sheets in the pile.

3. A sheet handling mechanism comprising means for feeding sheets to a pile of sheets supported at a pile position to increase the height of the pile of sheets thereat; a movable support member having a pile supporting position for supporting said pile of sheets in said pile position; support means for supporting said movable support member in said pile supporting position; a pile supporting member having a pile supporting surface positionable below and in engagement with said support member and adapted to support a pile of sheets; a pile of sheets supported by said movable support member

being adapted to be transferred vertically relative to said subjacent surface upon movement of said movable support member across the underside of said pile; said movable support member having means for effecting said transfer vertically to said pile supporting surface without lateral movement of said pile relative to said pile supporting surface and without disarrangement of said pile comprising first revoluble elements supported for revolving movement about parallel first axes and defining the load supporting surface of said movable pile support member and second revoluble elements supported for revolving movement upon axes parallel to said first axes adapted to engage said pile supporting surface for rolling movement thereacross; said first revoluble elements being connected to revolve with said second revoluble elements in a direction opposite the direction to which said second revoluble elements are revolved by movement of said movable support member across said pile supporting surface; while in engagement with said pile supporting surface said revolving elements maintaining the lateral position of said pile of sheets supported by said support member relative to said pile supporting surface and maintaining the edges of said sheets in said pile in their same relationship, thereby providing for the transfer of said pile of sheets from said movable support member to said surface without disarrangement of the sheets in the pile.

4. A sheet handling mechanism comprising a first pile support member having a surface for supporting a pile of sheets, feeding means for feeding sheets to said pile supported by said first support member, a pile support member for supporting a second pile of sheets, support means for supporting said second support member in a position between said means for feeding sheets and said first support member to receive sheets from said feeding means to form the second pile of sheets thereon, said second pile support member having first revoluble elements supported for revolving movement about parallel first axes and defining the pile supporting surface of said second pile support member and second revoluble elements supported for revolving movement upon axes parallel to said first axes and adapted to engage said surface of said first support member to support said second pile support member thereon and for rolling movement thereacross, said second revoluble elements being connected to revolve with said first revoluble elements in a direction opposite the direction to which said first revoluble elements are revolved by movement of said second pile support member across said surface of said first pile support member; said revolving elements maintaining the position of said second pile of sheets relative to said first support member and maintaining the edges of the sheets in said second pile in their same relationship as said second support member is moved across the underside of the pile thereon with said second revoluble elements in engagement with said surface of said first pile support member thereby providing for the transfer of said second pile of sheets from said second support to said first sup-

port without any disarrangement of the sheets in the pile.

5. A method of handling sheets comprising the steps of, feeding sheets relative to a pile-supporting member, supporting said sheets on said pile-supporting member with elements which roll on the bottom of the pile when the pile-supporting member is moved thereacross, supporting the pile-supporting member on a subjacent surface with elements which roll on said surface when said supporting member is moved thereacross while in engagement therewith, moving said pile-supporting member across said surface and across the underside of the pile and effecting a revolving of the elements engaging said surface, and driving the elements for supporting the pile from the elements engaging said surface to revolve the elements for supporting the pile in a direction opposite to the direction in which the elements engaging said surface revolve to move the upper peripheries of the pile engaging elements in a direction opposite to the direction of movement of the pile-supporting member and at the same peripheral speed as the peripheral speed of the elements engaging said surface to maintain the edges of the sheets in their same relationship and to effect transfer of the pile of sheets from the pile-supporting member to the subjacent surface without lateral movement of the pile relative to the subjacent surface.

6. A method of handling sheets comprising the steps of, feeding the sheets to a pile-supporting member to form a pile thereon, supporting the pile on said pile-supporting member with elements which roll on the bottom of the pile when the pile-supporting member is moved thereacross, supporting the pile-supporting member on a subjacent surface with elements which roll on said surface when said supporting member is moved thereacross while in engagement therewith, moving said pile-supporting member across said surface and across the underside of the pile and effecting a revolving of the elements engaging said surface, and driving the elements for supporting the pile from the elements engaging said surface to revolve the elements for supporting the pile in a direction opposite to the direction in which the elements engaging said surface revolve to move the upper peripheries of the pile engaging elements in a direction opposite to the direction of movement of the pile-supporting member and at the same peripheral speed as the peripheral speed of the elements engaging said surface to effect transfer of the pile of sheets from the pile-supporting member to the subjacent surface without lateral movement of the pile relative to the subjacent surface and without disarranging the sheets of the pile.

References Cited in the file of this patent

UNITED STATES PATENTS

2,323,174	Wikle	June 29, 1943
2,468,055	Gibler	Apr. 26, 1949
2,570,726	Smith	Oct. 9, 1951
2,958,431	Curtenius	Nov. 1, 1960

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

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September 15, 1964

Robert E. ~~Lindenmann~~

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 9, line 4, for "mean" read -- means --; line 19, after "surface" strike out the semicolon and insert the same after "surface" in line 20, same column 9; same column 9, line 25, for "sad" read -- said --; line 32, before "pile", first occurrence, insert -- second --; line 59, before "thereby" insert a comma.

Signed and sealed this 9th day of February 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents