

June 25, 1963

W. H. SORENSON

3,095,193

FILE SEPARATING DEVICE

Filed Oct. 9, 1961

3 Sheets-Sheet 1

FIG. 1

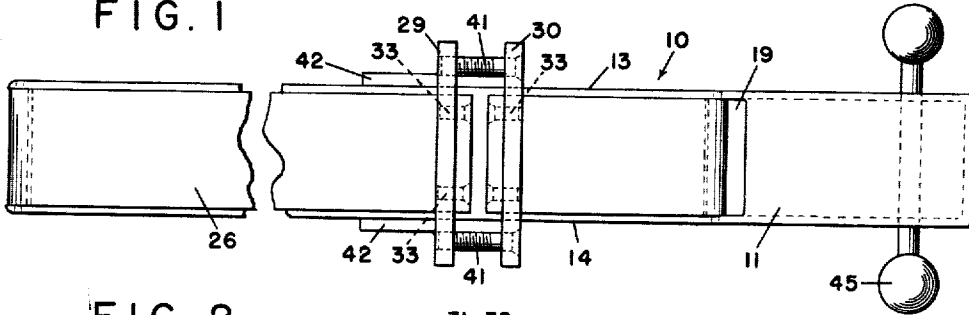


FIG. 2

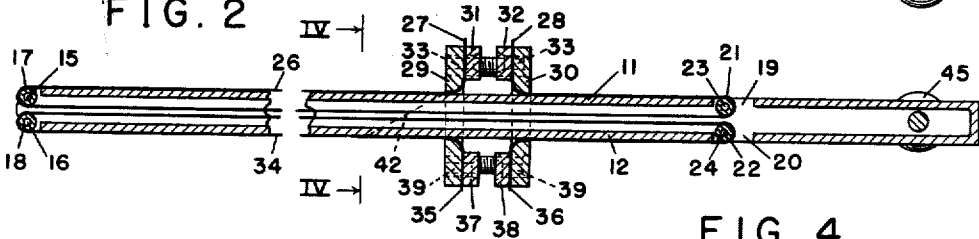


FIG. 3

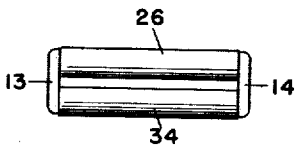


FIG. 4

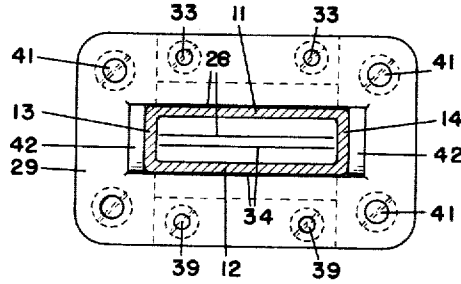


FIG. 5

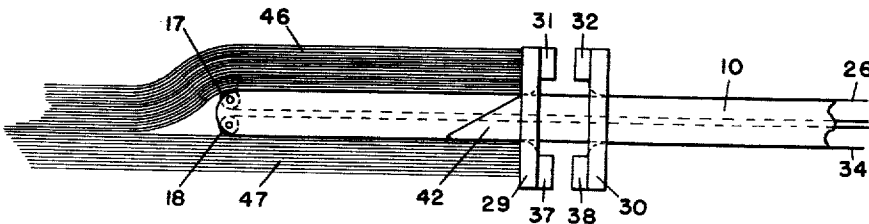
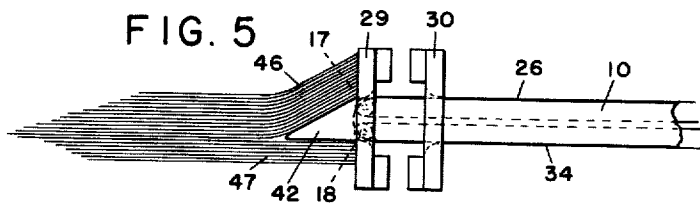


FIG. 6

INVENTOR.

WILLIAM H. SORENSON

BY

Byron Hume Green & Clement

ATTORNEYS

June 25, 1963

W. H. SORENSON
PILE SEPARATING DEVICE

3,095,193

Filed Oct. 9, 1961

3 Sheets-Sheet 2

FIG. 7

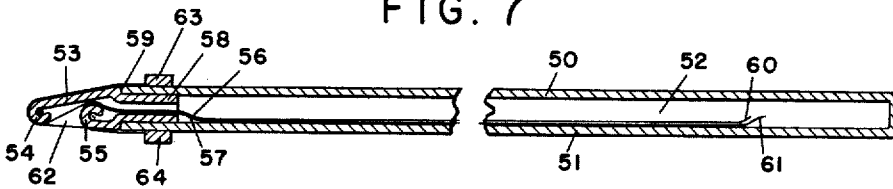


FIG. 13

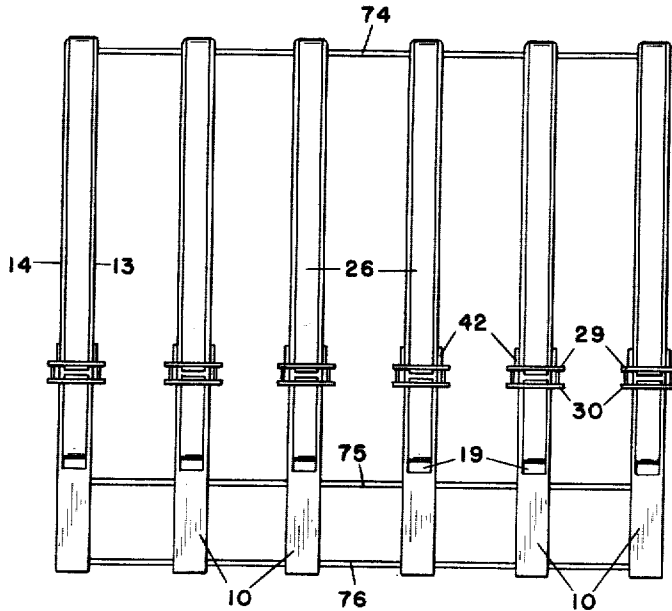
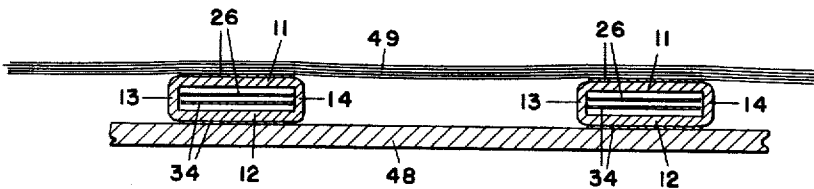


FIG. 8



INVENTOR.

WILLIAM H. SORENSON
BY

Byron Hume Groen & Clement
ATTORNEYS

June 25, 1963

W. H. SORENSON
PILE SEPARATING DEVICE

3,095,193

Filed Oct. 9, 1961

3 Sheets-Sheet 3

FIG. 10

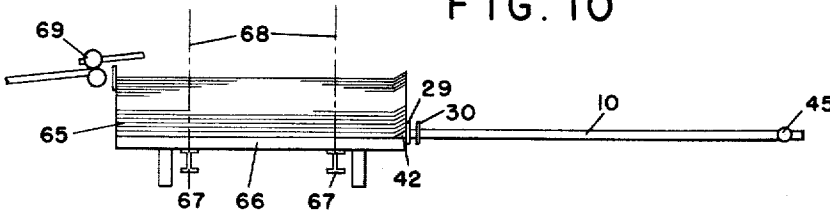


FIG. 11

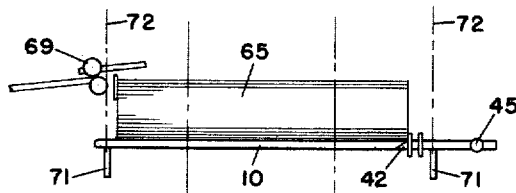


FIG. 12

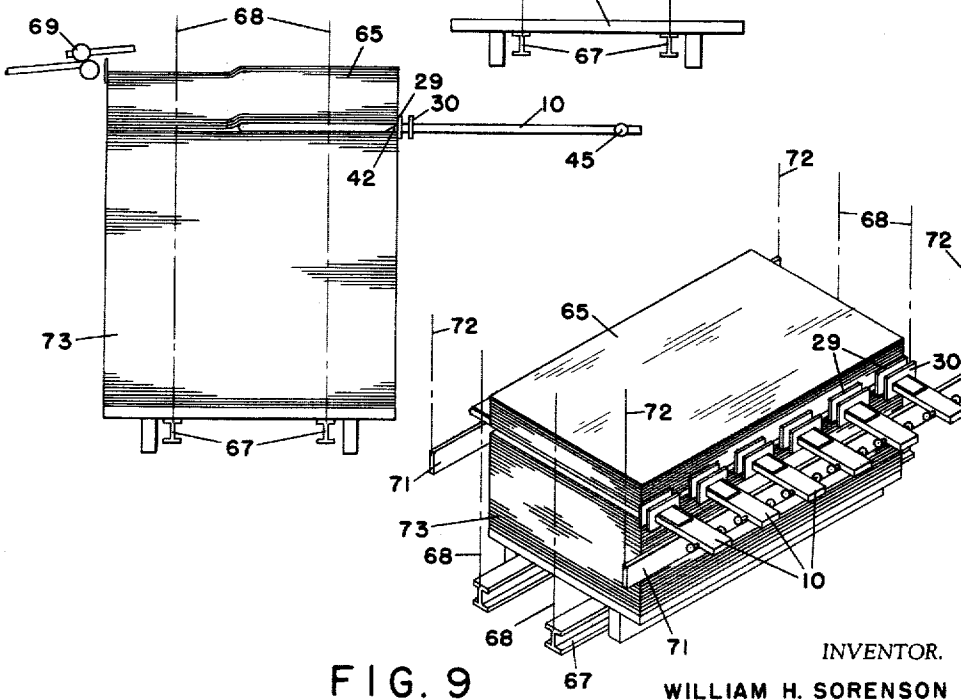


FIG. 9

INVENTOR.
WILLIAM H. SORENSON
BY

Byron Home Green & Clement
ATTORNEYS

1

3,095,193

PILE SEPARATING DEVICE

William H. Sorenson, Western Springs, Ill., assignor to Michle-Goss-Dexter, Incorporated, Chicago, Ill., a corporation of Delaware

Filed Oct. 9, 1961, Ser. No. 143,898

12 Claims. (Cl. 271-42)

In its broader aspects, this invention relates to an improved device for handling stacks of paper or the like sheet material. It is directed more specifically however, to an improved auxiliary pile separating and supporting means which is uniquely adapted for use in conjunction with apparatus for the continuous feeding of sheets to, or delivering sheets from a high speed printing press.

In order to obtain maximum production from any sheet processing machine and particularly a modern, high speed sheet fed printing press, it is obviously essential to maintain them in as nearly continuous operation as possible. Nevertheless, frequent shut-downs have been unavoidable in the past to permit the insertion of a fresh supply of sheets in the feeder each time the feed pile becomes exhausted or whenever the delivery pile becomes filled and must be removed and replaced by an empty pallet.

Such stops not only limit the overall production potential of the press, but they also contribute to the amount of waste sheets produced, particularly as regards lithographic offset presses, since such presses must be operated for a period of time after each shut-down before the proper ink-water balance on the plate is re-established. Thus the provision of means whereby truly continuous feeding and delivery of sheets can be attained constitutes an important and critical problem.

Various types of apparatus have been proposed in the past for the continuous feeding of sheets, none of which however has proved to be practical, particularly for handling large sheets. The known devices, in most instances, involve the use of an auxiliary pallet of one type or another for temporarily supporting an almost depleted stack of sheets while a fresh stack is placed in position whereupon the auxiliary pallet is withdrawn to deposit the remaining sheets in the depleted stack on top of the new pile.

The disadvantage of such systems resides in the fact that it is virtually impossible to insert or withdraw the auxiliary pallet when required without damaging the adjacent sheets or disturbing the remaining sheets in the pile. Consequently, it is almost always necessary to stop the press so that the damaged sheets can be removed and the remainder of the stack rearranged in proper alignment.

In an endeavor to overcome this problem it has been proposed to use special pile supporting pallets having a series of spaced, parallel grooves formed in the surface thereof to facilitate subsequent insertion and/or removal of an auxiliary pallet consisting of a series of similarly spaced tines or rods. These systems obviously facilitate manipulation of the auxiliary pallet, but they have the distinct disadvantage in that the entire stack of sheets must first be removed from the mill skid and repiled by hand in accurate alignment on the special pile board before the stack is placed in the feeder. Consequently, any advantage gained by virtue of the fact that such systems permit the continuous feeding of sheets to the press is substantially offset by the time and expense involved in repiling the sheets.

Still other systems have been proposed whereby air is injected between the surfaces of an auxiliary pile supporting member and the sheets of a stack when the supporting member is to be inserted or withdrawn. This

2

system also has been only partially successful because the compressed air is not completely effective to eliminate all contact between the auxiliary supporting member and the sheets and the resultant friction makes it difficult to insert and remove said member. Furthermore, the relative movement of the member tends to mark the adjacent sheets which must invariably be removed and discarded. Devices of this type also require additional auxiliary equipment in the form of air compressors, air hoses, etc., which is objectionable, not only because of the additional cost factor, but also because the presence of the air hoses in the vicinity of the feeder or delivery mechanism while the stacks are being changed constitute a hazard for the pressman who must work at a high speed in order to complete the job of inserting a fresh pile in the feeder before the sheets remaining in the remnant pile on the auxiliary support member are fed into the press.

It is an object of this invention, therefore, to provide an improved device for separating a pile of sheets from the remainder of a stack thereof or from a supporting surface and which device incorporates means to facilitate movement of said device relative to the pile of sheets while simultaneously preventing contact between any moving portion of said device and the adjacent sheets or surface.

Another object is to provide a pile separating and supporting device which eliminates the need for repiling a stack of sheets from the mill skid onto a special pallet.

Another object is to provide a pile separating device which can be inserted into and/or removed from a stack of sheets without adversely affecting the normal operation of associated sheet feeding elements of the feeder mechanism.

Other objects and advantages will become apparent from the following description and accompanying drawings which illustrate an embodiment of the invention and wherein:

FIGURE 1 is a plan view of a pile separating device incorporating the novel features of the invention;

FIGURE 2 is a sectional view taken substantially along the longitudinal center line of FIGURE 1;

FIGURE 3 is an end elevation taken from the left of FIGURE 2;

FIGURE 4 is a sectional view taken along line IV-IV of FIGURE 2;

FIGURES 5 and 6 are views, at a somewhat enlarged scale and illustrating the manner in which the device is used;

FIGURE 7 is a view illustrating a modification of the pile separating device;

FIGURE 8 is a sectional view illustrating how the flexible tapes support the sheets and prevent contact between said sheets and the body of the separating device;

FIGURE 9 is a fragmental perspective view of the pile separating device as used in combination with a conventional continuous feeder mechanism wherein the pallet or the individual pile separating members are supported on an auxiliary elevator and the main elevator is free to accept the subsequent pile of paper;

FIGURES 10, 11 and 12 are schematic side elevational views illustrating the manner in which the pile separating and supporting device is inserted into and removed from a pile of sheets; and

FIGURE 13 is a plan view of a pallet constructed in accordance with the invention and which consists of a plurality of the sheet separating devices that are joined together as an integral unit.

With reference to the drawings and particularly FIGURES 1 to 4 thereof the pile separating and supporting device is illustrated as comprising a base member 10 which may be fabricated from a suitable length of hollow metal tubing that is preferably rectangular in cross

3
section so as to provide a relatively broad top wall or load supporting surface 11, a corresponding bottom wall or supporting surface 12, and connecting side walls 13 and 14.

In the nose portion of the base member the side walls project slightly beyond the top and bottom walls and they provide support for the transverse shafts 15 and 16 on which are rotatably mounted the rollers 17 and 18, respectively. These rollers are spaced apart, vertically to provide clearance between their adjacent surfaces and the diameter of said rollers is such that their peripheries are substantially tangent to the planes of the top and bottom walls respectively whereas they project slightly in a forward direction beyond the curved projecting portions of the side walls as indicated in FIGURE 2.

Near the opposite or rear end of the base member, the top and bottom walls are slotted as at 19 and 20 to accommodate a corresponding pair of rollers 21 and 22 which are similarly mounted for rotation on the respective shafts 23 and 24, the ends of which are seated in the side walls. These latter rollers are also vertically aligned and located so their peripheries are substantially tangent to the planes of the top and bottom walls respectively.

Mounted about the rollers 17 and 21 is a flexible tape or band 26 which is inserted between the rollers 17 and 18 and through the slot 19 in a manner that its free ends 27 and 28 are exposed above the top wall. These ends in turn are clamped to the slide plates 29 and 30, respectively, which are mounted for relative sliding motion longitudinally on the base member 10 and which are provided with clamp bars 31 and 32. The ends 27 and 28 of the tape are inserted between the coating surfaces of the respective slide plates and the clamp bars which bars are then tightened into clamping relation with the slide plates by means such as the screws 33 to thereby hold the ends of the tape securely in position.

A similar flexible tape 34 is tracked about the bottom rollers 18 and 22 and in a manner that its free ends 35 and 36 are exposed below the bottom wall. The ends 35 and 36 of the tape 34 are also clamped to the slide plates 29 and 30 by means of the respective clamp bars 37 and 38 and the associated screws 39.

The two slide plates are connected together by four bolts 41, one of which is located in each corner thereof, and these bolts are adjustable whereby to draw the two slide plates together after the respective ends of the tape are securely clamped in position to thereby remove any slack in the tape and to apply a predetermined tension thereto.

The slide plate 29 is also provided with two forwardly projecting inclined nose portions 42, one adjacent each side wall of the base member which, as will become apparent from the following description, serve to facilitate the initial entry of the base member 10 between selected sheets of a stack of paper.

The rod 45 mounted transversely through the base member 10 at the rear end thereof constitutes a handle to facilitate manipulation of the device as will become evident from the ensuing description.

With the respective tapes 26 and 34 mounted in position, it will be evident that they constitute, in effect, endless belts which are adapted to have relative sliding movement longitudinally of the base member 10 when the latter is inserted into or withdrawn from a pile of sheets.

Although the preferred embodiment of the device illustrated herein contemplates the use of tapes of a predetermined length and having the ends thereof connected together by a clamping means, it is to be understood that endless belts or tapes can also be used for the purpose. In such case the clamping means could be eliminated and one of the side walls 13 or 14 would be removably secured to the base member to enable the endless belts to be mounted over the respective rollers.

The tapes are preferably of a width which is substan-

tially equal to the width of the top and bottom walls of the base member and they may be formed from any suitable thin, flexible metal, plastic, rubber or fabric material. The material selected should preferably be such as to have a minimum coefficient of friction relative to the coating surfaces of the base member, which surfaces are purposely ground and polished to a smooth finish to facilitate the sliding movement of the tapes under a stack of sheets. If excessive friction is encountered however, it can be substantially eliminated by coating the tapes or the surfaces of the base member or both, with a suitable dry lubricant such as, for example, polytetrafluoroethylene, which will permit the separator to be inserted under a relatively large stack of sheets with a minimum of effort.

The opposite surfaces of the tapes, namely, those which come in contact with the adjacent sheets of paper, preferably should have a relatively high coefficient of friction so as to minimize any tendency of the tape to slip relative to the paper as the base member 10 is being inserted into or withdrawn from a pile of sheets. Accordingly the exposed surfaces of the tapes may be coated with a suitable material such as rubber or the like to provide the necessary effect.

The manner in which the pile separating device functions can best be explained with reference to FIGURES 5 and 6. FIGURE 5 illustrates the initial position of the base member when it is to be inserted into a stack of sheets to thereby separate a lift of sheets 46 from the remainder of the stack 47 for example.

At this point the slide plate assembly 29-30 is positioned at the front end of the base member 10, in which position the slide plate 29 is substantially aligned with the rollers 17 and 18 and the wedge shaped nose portions 42 project forwardly beyond the end of the base member.

The nose portion is inserted between the selected sheets to preliminarily separate the leading edges thereof and in this position the leading edge of the bottom sheet of the lift 46 is located substantially in the plane of the top surface 11 and immediately adjacent the forward end of the tape 26. The edge of the top sheet of the stack 47 is also adjacent the forward end of the bottom tape 34. The operator now grasps the handle 45 and pushes the base member 10 between the sheets. As the base member is inserted, it will move relative to the slide plate assembly 29-30 which is restrained against movement by the edge of the stack and thus the tapes 26 and 34 will, in effect, unroll as the base member moves relative to the stack to thereby separate the adjacent sheets of the stack from the respective top and bottom surfaces of the base member.

As the base member advances between the sheets as indicated in FIGURE 6, it is important to note that the portion of the tapes 26-34 located within the base member will have longitudinal movement relative to the stack. However, as soon as any portion of the tapes advances to the exposed part of the rollers 17 and 18, it becomes stationary and fixed with respect to the adjacent sheets. Thus the base member in effect slides forward and back between the tapes relative to the stack and the tapes function as protective covers or endless tracks which prevent any part of the relatively moving base member from contacting and thereby disturbing or marring the adjacent sheets.

FIGURE 8 is a sectional view illustrating two of the pile separating devices in position between the top surface of a skid or the like support 48 and a stack of sheets 49 and it will be noted that the side walls 13 and 14 of the base member are curved abruptly away from the top and bottom walls 11 and 12 starting substantially at the edges of the tapes. Thus the thickness of the tapes is sufficient to prevent contact between the sheets and the base notwithstanding the fact that the sheets may have a tendency to sag slightly between adjacent separators in a manner as indicated.

5

This is a significant advantage of the invention which is of particular value when the separators are used to separate a lift of sheets from a stack of printed sheets for subsequent processing in a guillotine cutter, for example, or when printed sheets are to be fed into a printing press a second time to receive subsequent color impressions.

In such instances the ink impressions on the sheets may not be completely dry and any sliding contact between such printed sheet and a pallet or other device will smudge and mar the inked impressions on the adjacent sheets thereby rendering such sheets unacceptable.

With the present invention such conditions are eliminated because the tapes function as endless tracks which roll out to progressively engage the adjacent surfaces of the sheets without any relative motion therebetween and which prevent the said surfaces from coming in contact with the base member as the latter slides freely between the tapes.

Another important advantage of the present invention resides in the fact that the thickness or height of the separator devices is purposely maintained substantially less than the normal range of movement of the feeder separators. The separator devices can therefore be inserted into or withdrawn from a stack of sheets without interrupting the normal feeding function of the feeder separators, the normal range of movement of which will automatically compensate for any relative change in the height of the pile.

A modification of the invention is illustrated in FIGURE 7 wherein the device is adapted to utilize strips of tape material, the ends of which are not clamped together to form endless belts as in the previous arrangement. In this modification the top wall 50 and the bottom wall 51 of the base member 52 both present an uninterrupted continuous supporting surface and the nose section 53 is arranged to be removable so that the free ends of the tapes can be inserted within the hollow base member. The nose portion may be substantially the same as that illustrated in FIGURES 1 and 2, having rollers mounted therein for guiding the top and bottom tapes or it may be formed with curved portions 54 and 55 struck from the wall thereof to accommodate the tapes 56 and 57. The rear end 58 of the nose portion, however, is reduced in size so that it can be inserted into the open end of the base member to an extent as determined by the shoulders 59 formed thereon and which engage the adjacent ends of the top, bottom and side walls of the base member. Accordingly, when the device is to be used the nose section 53 is removed from the base member so that the free ends 60 and 61 of the tapes 56 and 57 can be threaded through the slot 62 of the nose section and which ends are then inserted into the open end of the base member before the nose section is replaced.

The opposite or exposed ends of the tapes are provided with tabs 63 and 64, respectively, which are positioned adjacent the front end of the base member as illustrated in FIGURE 7 when said member is to be inserted into a pile. It will thus be evident that as the base member 52 is pushed into the pile of sheets, the tabs 63-64 will engage the edge of the pile to prevent the tapes from moving with the base member and the loose ends of the tapes will thus be progressively withdrawn to thereby separate the adjacent sheets from the base member until the latter is fully inserted. Upon removal of the base member the tapes will remain in position between the adjacent sheets of the pile and will be removed by the operator when the stack of sheets supported thereon is virtually depleted.

The present invention, as indicated hereinabove, may be used in a variety of ways for handling stacks of paper or the like sheet material. However, it will now be described as it is used in conjunction with apparatus for the continuous feeding of sheets to a printing press for which purpose it is particularly valuable.

6

In apparatus of this type, FIGURES 9 to 12 inclusive, a skid load of sheets 65 on the skid 66 is supported in the press feeder on I beams 67 which are attached to the depending ends of chains 68 that are connected to the main pile raising mechanism, not shown, located at the top of the feeder assembly. In operation, the main pile raising mechanism functions in a known manner to raise the pile intermittently so that the top of the pile will remain at a substantially constant level as the sheets are separated therefrom by conventional feeder elements and fed into the press by means such as the feed rollers 69.

When the skid has been raised to a height at which only a small portion or remnant of the original pile remains on the skid, as illustrated in FIGURE 10, the separator devices are adapted to be inserted between the surface of the skid and the bottom sheet of the remnant pile to provide a temporary support for the remnant pile while the empty skid is removed and a fresh pile is placed in position.

The first step of the procedure is illustrated in FIGURE 10 wherein the operator has positioned the slide plates 29-30 of the separator device adjacent the front end of the base member 10 and has inserted the nose section 42 thereof between the skid and the edge of the bottom sheet of the stack. At this stage the leading edge of the bottom sheet will be supported in a position adjacent the top tape 26 and the bottom tape 34 will be in position to engage the top surface of the skid. The operator then grasps the handle 45 and pushes the separator beneath the stack. The slide plate 29, being in contact with the edges of the stack and the skid respectively, will prevent the tapes 26-34 from moving with the base member 10 and therefore, as the base member is pushed under the stack it will slide between the top and bottom tapes. These tapes in turn will roll out in the manner of endless tracks to progressively engage the respective surfaces of the skid and the bottom sheet of the stack and thus prevent contact between said surfaces and the relatively moving base member. The separator is inserted until the nose section thereof projects beyond the rear edge of the stack as indicated in FIGURE 11.

This operation is repeated until the required number of separators necessary to support the stack have been inserted at spaced intervals across the width thereof as illustrated in FIGURE 9.

With the separator devices in this position the auxiliary pile raising mechanism is actuated to support the remnant pile and such mechanism may comprise a pair of rails 71 which are attached to chains 72 connected to a conventional auxiliary pile raising mechanism mounted on the feeder frame. As indicated in FIGURE 11, the rails 71 are raised until they engage the separator devices whereby the weight of the remnant pile is transferred from the I beams 67 to the rails 71.

The auxiliary pile raising mechanism will be actuated in known manner to maintain the top of the remnant pile at a constant level so that feeding of the sheets continues while the main pile raising mechanism is reversed to lower the empty skid which is then removed and replaced by a full skid 73 as indicated in FIGURE 12. The new pile is then raised until it engages the bottom tapes of the separator devices whereupon the weight of the remnant pile is transferred back to the I beams 67.

The rails 71 are then lowered out of the way and the separator devices are withdrawn to deposit the sheets remaining in the remnant pile on top of the new pile. As the separators are withdrawn, the base member 10 slides between the top and bottom tapes 26-34 respectively, which latter are progressively withdrawn within the base member as they roll away from the surfaces of the adjacent sheets.

Since there is actually no physical contact between the moving base member and the sheets during insertion or removal of the separator devices, it will be seen that the sheets in the remnant pile will not be disturbed and will

7
be deposited in accurate alignment on the new pile so that feeding of the sheets can continue uninterruptedly.

While we have thus far described the separator devices as consisting of a plurality of separate units which are inserted into or withdrawn from a pile separately and independently, it is to be understood that a series of these devices may be connected together as a unit to form a pallet as illustrated, for example, in FIGURE 13. In such case the number of separator devices necessary to form a pallet of the required width are assembled in spaced relation on supporting shafts 74, 75 and 76. The rearmost shaft 76 in this instance would constitute a convenient handle whereby the pressman can manipulate the unit into and out of position and it will be appreciated that the shafts 74 and 75 would be located adjacent the tape rollers at each end of the separator devices so as not to interfere with the movement of the slide plates 29-30. It is to be understood that suitable mechanical means may be employed to position and actuate the full sized pallet if such should be desired.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. A device of the character described comprising a portable member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium for said sheets, a load supporting surface provided by said member, and means carried by said member for longitudinal movement relative to said surface, said means having operation to prevent contact between said surface and the bottom sheet of said stack during insertion or withdrawal of said member.

2. A device of the character described comprising an elongated, rigid member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium for said sheets, a load supporting surface provided by said member, and flexible means carried by said member for longitudinal movement relative to said surface, said flexible means being of a width substantially equal to the width of said surface and having operation to prevent contact between said surface and the bottom sheet of said stack during insertion or withdrawal of said member.

3. A device of the character described comprising an elongated relatively thin, rigid member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium for said sheets, a top surface on said member, a bottom surface on said member, and flexible tape means carried by said member for longitudinal movement relative to said top and bottom surfaces, respectively, said flexible tape means having operation to prevent contact between said top surface and the bottom sheet of said stack and between the said bottom surface and said supporting medium, respectively, during insertion or withdrawal of said member.

4. A device as set forth in claim 3 wherein the width of the flexible tape means is substantially equal to the width of said top and bottom surfaces.

5. A device of the character described comprising a relatively thin, hollow member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium therefor, a load supporting surface on said member, flexible tape means carried by said member for longitudinal movement relative to said surface, a portion of said tape means being located within said member and another portion of said tape means being exposed for engagement with the bottom sheet of said stacks, and means for moving said member relative to said tape means between said stack and said supporting medium.

6. A device of the character described comprising an elongated, relatively thin, hollow member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium therefor, a top surface on said member, a bottom surface on said member, a pair of flexible tapes carried by said member and in a manner that portions of both said tapes are enclosed within said member whereas the remaining portions of said tapes are exposed for coaction with said top and bottom surfaces, respectively, and which exposed portions of said tapes are interposed between the said top surface and the bottom sheet of said stack and between the said bottom surface and said supporting medium, and means for sliding said member between said tapes relative to said stack and said medium.

7. A device of the character described comprising an elongated, hollow member adapted to be inserted between and withdrawn from a stack of sheets and a supporting medium therefor, a top surface on said member, a bottom surface on said member, roller means mounted within said member, and a pair of flexible tapes mounted about said roller means in a manner that a portion of each tape is located externally of said member for longitudinal sliding movement relative to the said top and bottom surfaces, respectively, said tapes being adapted to have a stationary position with respect to the stack and the supporting medium, and means for sliding said member between said tapes relative to the stack and the supporting medium.

8. A device of the character described comprising a hollow member adapted to be inserted into or withdrawn from a position between a stack of sheets and a supporting medium therefor, a top surface on said member, a bottom surface on said member, roller means mounted transversely within said member, a pair of flexible tapes mounted about said roller means and in a manner that a portion of one tape is interposed between the said top surface of said member and the bottom of said stack and a portion of the other tape is interposed between the bottom surface of said member and the supporting medium, means for sliding said member between said tapes to and from said position, and means associated with said tapes and having coaction with the stack and said medium to prevent movement of said tapes during movement of said member to and from said position.

9. A device of the character described comprising a plurality of elongated, hollow members adapted to be inserted into or withdrawn from a position between a stack of sheets and a supporting medium therefor, each of said members having a top surface and a bottom surface, means connecting said members together in spaced parallel relation to form a pallet, flexible tape means mounted on each of said members for longitudinal movement relative to said top and bottom surfaces, and means for moving said pallet to and from said position, said flexible tape means being substantially as wide as said top and bottom surfaces and serving to prevent contact between the said top surfaces and the bottom of said stack and between the said bottom surfaces and said medium, respectively, during movement of the pallet to and from said position.

10. A device of the character described comprising an elongated, hollow member adapted to be inserted between or withdrawn from a stack of sheets and a supporting medium therefor, a top surface and a bottom surface on said member, roller means mounted within said member, a flexible tape mounted about said roller means for longitudinal movement relative to said top surface and in a manner that the free ends of said tape are exposed above said top surface, guide means movably mounted on said member, means for attaching the free ends of said flexible tape to said guide means, and means for adjusting said guide means to thereby apply tension on said flexible tape.

11. A device as set forth in claim 10 additionally in-

9

cluding wedge shaped nose means on said guide means to facilitate initial insertion of said member between the bottom of said stack and the supporting means.

12. A device of the character described comprising an elongated, hollow member adapted to be inserted into or withdrawn from a stack of sheets, a top surface and a bottom surface on said member, a first pair of rollers mounted within said member, one of said rollers being mounted adjacent each end thereof with the peripheries of said rollers tangent to the plane of said top surface, a first flexible tape mounted about said rollers with its free ends exposed above said top surface, a second pair of rollers mounted within said member, one of said second pair of rollers being mounted adjacent each end of

10

said member with the peripheries of said second pair of rollers tangent to the plane of said bottom surface, a second flexible tape mounted about said second pair of rollers with its free ends exposed below said bottom surface, a pair of slide plates movably mounted on said member, means for securing the free ends of said first and second tapes to said slide plates, and means for adjusting said slide plates whereby to tension said first and second tapes.

References Cited in the file of this patent

UNITED STATES PATENTS

1,464,513	Sutherland	-----	Aug. 14, 1923
1,801,822	Sutherland	-----	Apr. 21, 1931