Feb. 25, 1969 E. R. PETERSON 3,429,469

PAPER STACKING APPARATUS

Filed Oct. 5, 1966 Sheet 1 of 3

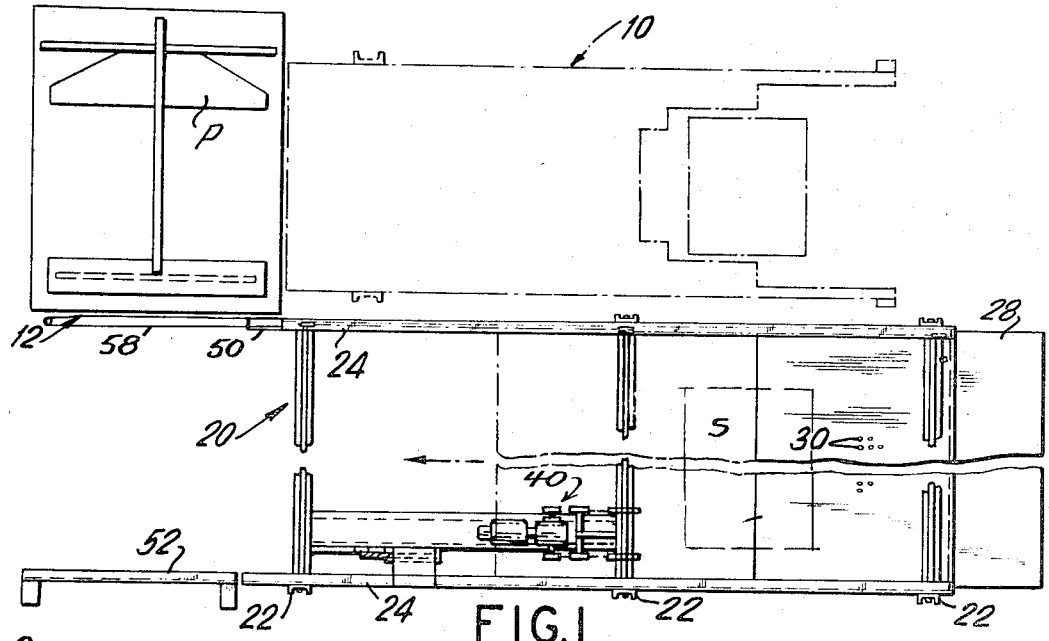


FIG. 1

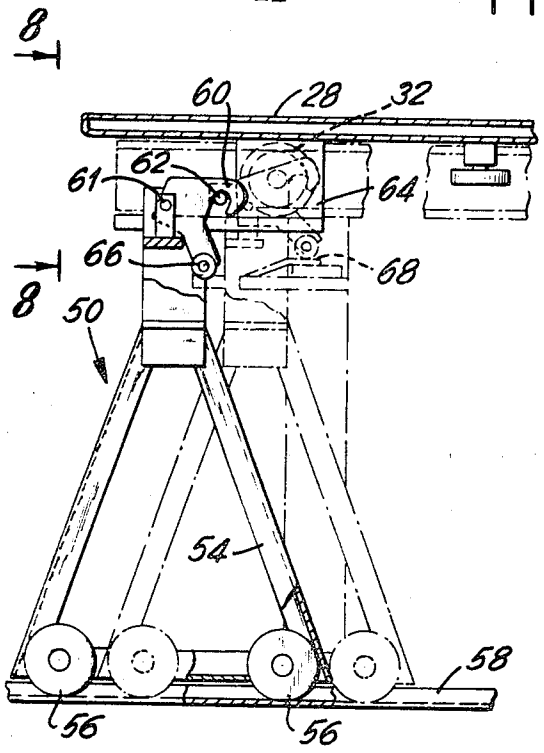


FIG. 7

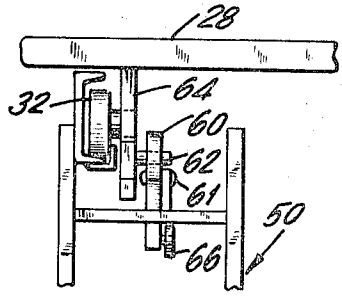


FIG. 8

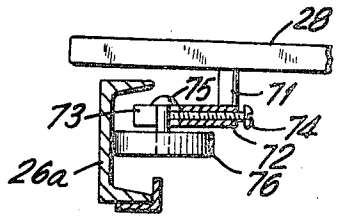


FIG. 9

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Feb. 25, 1969 E. R. PETERSON 3,429,469

PAPER STACKING APPARATUS

Filed Oct. 5, 1966 Sheet 2 of 3

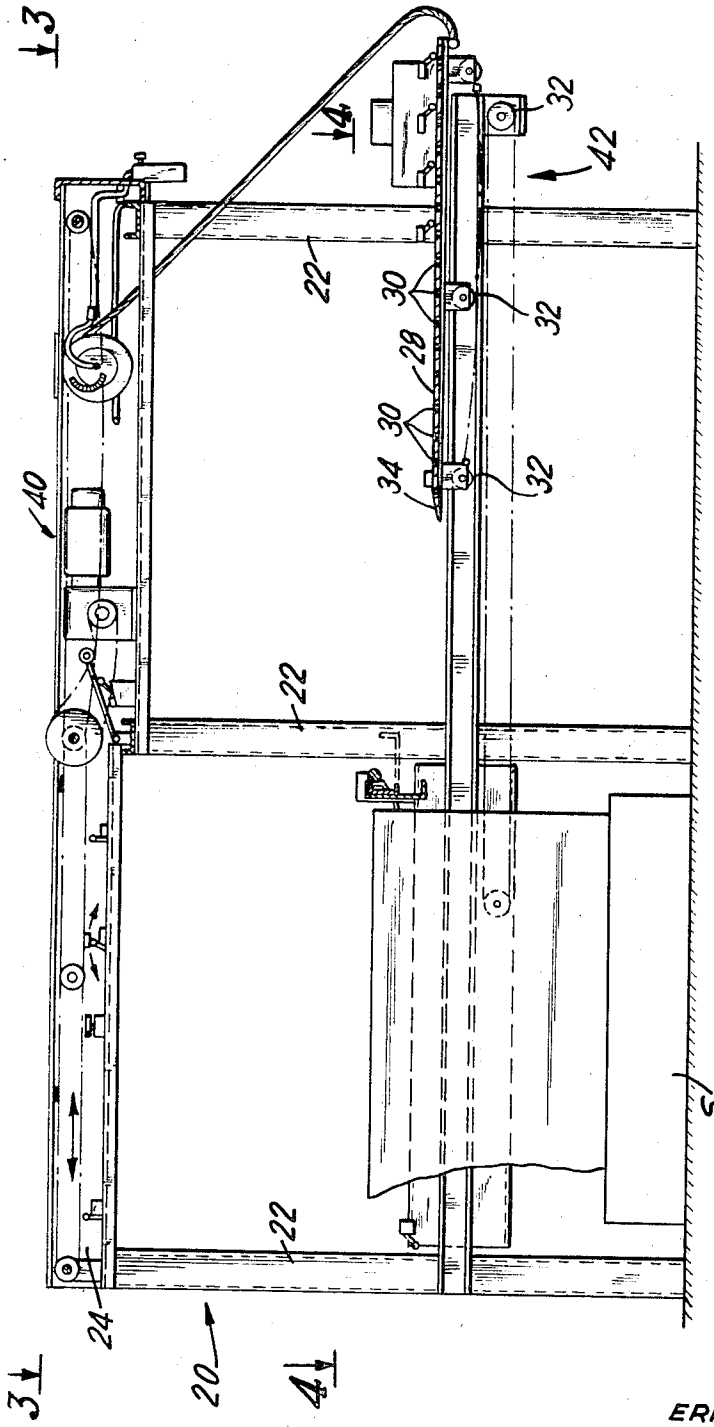


FIG. 2

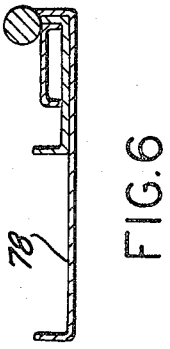


FIG. 6

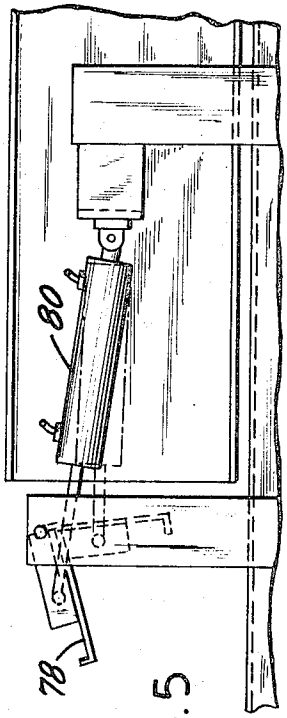


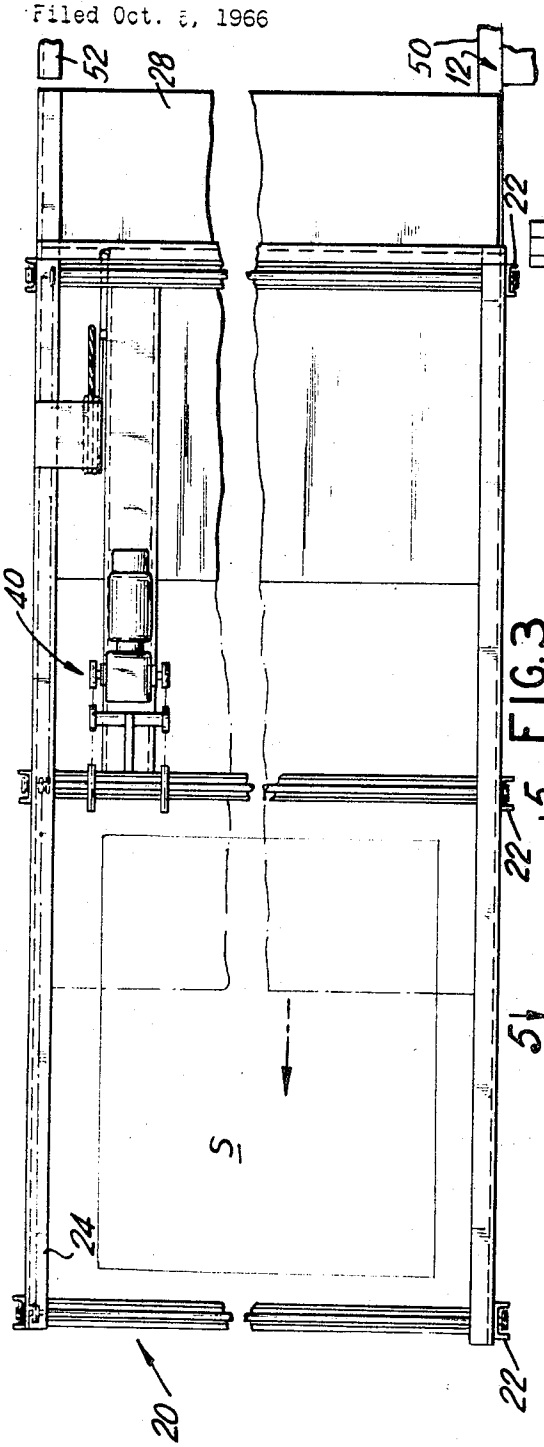
FIG. 5

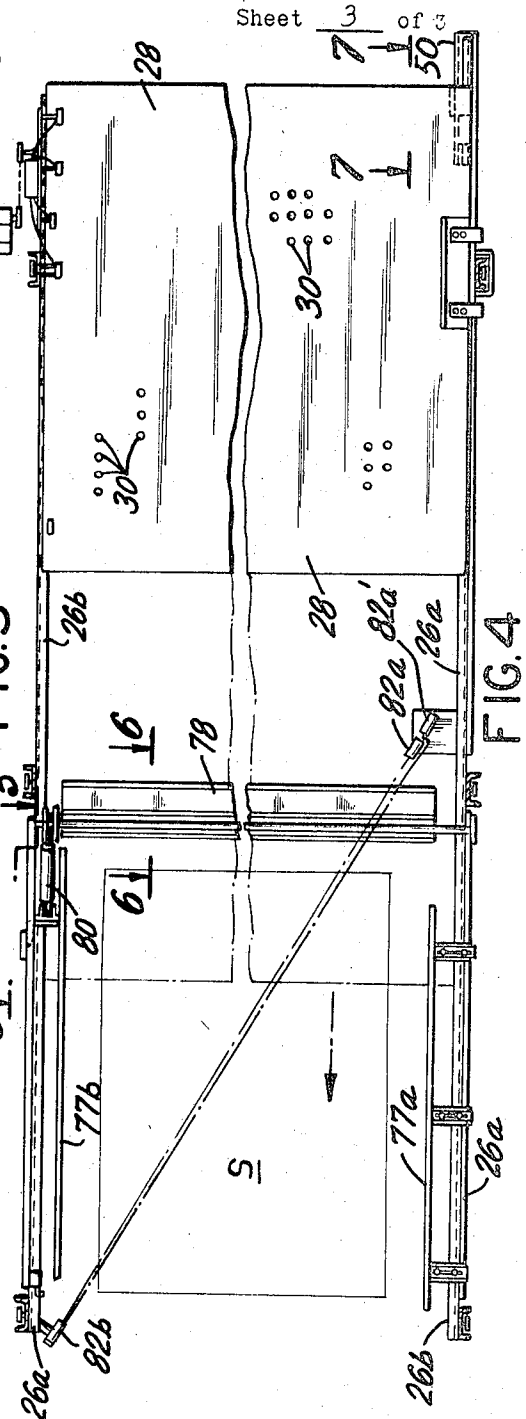
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3,429,469

PAPER STACKING APPARATUS

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Filed Oct. 5, 1966, Ser. No. 584,589
U.S. Cl. 214—730 3 Claims
Int. Cl. B65g 57/02, 61/00; B66f 9/14

ABSTRACT OF THE DISCLOSURE

An apparatus for delivering bundles of paper from a cutting machine to a receiving platform for stacking. A horizontally movable table is supported at the level of the bed of a cutting device for loading.

This invention relates to sheet handling devices and in particular to improved means for transferring a stack of paper sheets from cutting or trimming apparatus to a pallet.

The present invention is particularly directed to means for automatically and accurately handling heavy stacks of sheets as they are received from the cutting apparatus. Typically, a stack 6" x 53" x 78" weighs approximately 650 pounds before it is cut. Even when the original stack is cut in half, it will be appreciated that in order to handle bulk of these proportions without damaging the paper, the apparatus should function as automatically as possible. For the same reason, it is preferable that the operator be required to handle the stack as little as possible in order to reduce fatigue. In addition, the paper stack is usually smooth and has a slippery surface that makes it somewhat difficult to handle without damage.

At present, there are many devices available for removing and stacking reams of paper as they come from the cutting apparatus. The most popular form of machine utilizes an air table wherein the frictional forces are minimized between the top surface of the table and the bottom sheet resting thereon. This permits easy moving of the sheet even though the weight is excessive. The present invention utilizes an air table and also has certain other features and advantages that are not available in the prior art devices.

First, novel means are provided for moving the air table into juxtaposition with the output side of the cutting apparatus. Without resorting to tilting tables and the attendant mechanism, the present invention provides an auxiliary carriage that moves the table horizontally from its normal position in the area of the skid to a position wherein the air table is in opposition to the cutter bed. Second, pivotal gate means are provided above the air table so that as the table is retracted from its position above the skid, the ream of paper thereon will be blocked and held in place and be permitted to gently drop onto the waiting skid. Third, laterally adjustable roller means are provided for the air table in order to insure that the table does not inadvertently stray and cause the paper being transported to be upset.

The present invention is useful as auxiliary equipment for my "Multiple Sheet Handling Device" disclosed in U.S. Patent No. 3,206,042. In operation, the device of the aforementioned patent and the present invention are used side by side. The paper is delivered by my multiple sheet handling device to the cutting apparatus and from the cutting apparatus is replaced on a skid in cut form by the present invention.

Accordingly, it is an object of this invention to provide improved means for moving a pile of sheets from the cutting apparatus and placing the pile on a waiting skid.

Another object of this invention is to provide improved means to move a paper-carrying air table into juxtaposition with the output end of the cutting apparatus.

A further object is to provide improved paper stacking means requiring a minimum of manual operation.

A particular object is to provide a completely integrated system for loading, conveying, cutting and removing stacks of paper.

A further object is to provide adjustable guide means for accurately and smoothly moving the air table between the cutting apparatus and the skid or pallet on which the paper is to be stacked.

Yet another object is to provide improved paper stacking apparatus capable of installation without major constructional alterations in existing paper utilization plants.

Still another object is to provide improved blocking means that automatically aligns the paper stack above a waiting skid.

A particular feature of this invention is that the pile of trimmed paper sheets are stacked on the skid without disturbing the vertical alignment of the sheets.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawing which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

In the drawing:

FIG. 1 is a schematic plan view of a fully integrated paper handling system comprising paper unstacking means, cutting apparatus and the paper stacking means of this invention;

FIG. 2 is a side elevational view of the paper stacking apparatus comprising the present invention;

FIG. 3 is a plan view taken along line 3—3 of FIG. 2;

FIG. 4 is a sectional plan view taken along line 4—4 of FIG. 2;

FIG. 5 is a fragmentary, sectional, elevational view taken along line 5—5 of FIG. 4;

FIG. 6 is a transverse, sectional, elevational view taken along line 6—6 of FIG. 4;

FIG. 7 is a fragmentary sectional elevational view of the auxiliary carriage means taken along line 7—7 of FIG. 4;

FIG. 8 is a sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a fragmentary elevational view of adjustable guide roller means utilized with the air table.

The paper unstacking apparatus described in my issued U.S. Patent No. 3,206,042 is shown in phantom outline in FIG. 1. The output end of the unstacker **10** is adjacent one side of a conventional cutter or trimming apparatus **12** while the new stacking apparatus comprising the present invention is positioned in side-by-side relationship with the unstacking apparatus. As will be explained in detail hereinafter a portion of the instant invention is adapted to be moved into an extended position directly in front of the cutter apparatus output side. Thus the original stack of paper is delivered to the side of the cutter and is removed from an adjacent side.

The paper stacking apparatus generally denoted as **20** is shown in a side elevation in FIG. 2. It will be seen that the machine is comprised of a plurality of vertically disposed structural frame members **22**, horizontal beams **24** at the top of the machine and spaced, inwardly facing, horizontal, U-shaped channels **26***a* and **26***b* approximately at the vertical center. Beams **24**, which extend the length of the machine and are at both sides, carry much of the drive mechanism and switching members that are used to control and time the movement of the various components.

Horizontal channels **26***a* and **26***b* are also disposed on both longitudinal sides of the machine and are utilized as tracks for linearly displaceable air table **28**.

Drive means similar to those described in my issued patent are utilized for moving the air table in a vertical plane and in a horizontal plane. In addition, switches and other control means are included for the purpose of determining the direction and duration of table movement. These control members are an integral part of the apparatus and in fact include several safety features. However, for simplicity of description, emphasis will be placed on three features in particular, namely, the paper blocking gate operatively associated with the movement of the air table, an auxiliary carriage that moves the air table into juxtaposition with the output side of the paper cutting apparatus and adjustable roller means that accurately guide the table.

Apertures **30** are provided in the top surface of the air table which is hollow and which includes an interior chamber in communication with a suitable source of air (not shown). The same result may be achieved by a plurality of pipes in the hollow table. The pipes have a common source of compressed air and nozzles that direct streams of air upwardly from the top surface of the table. Each side of the table is also provided with a number of wheels **32** that are arranged to ride in the channels **26***a* and **26***b* (see FIGS. 2, 4, 7 and 8). As may best be seen in FIG. 2, the leading edge of the air table is downwardly sloped at **34** to define a knife edge.

Air table **28** is arranged to move within the confines of the machine frame in two opposite vertical directions and two opposite horizontal directions. To accomplish this, structural frame members **22** function as an elevator and serve to raise or lower channels **26***a* and **26***b* that carry the air table. Suitable drive means **40** are provided for this purpose (FIG. 2). By way of example, and without limiting the scope of this invention, an elevator system that is functionally comparable to the one disclosed in my issued patent may be employed.

The air table is also movable in a horizontal plane within the confines of the machine frame by schematically illustrated drive means **42** (FIG. 2). Again, without intending to be limiting, reference may be had to my issued patent wherein one form of horizontal drive means is fully disclosed. Regardless of the drive system used, it is essential that, within the boundaries of the machine frame, the elevator is arranged to move the air table vertically so that the air table may also move in a horizontal direction at the particular height required. It will also be brought out later that the air table is capable of additional horizontal movement past one end of the machine frame and at one particular height, namely, that of the cutter apparatus bed.

After the paper has been cut to the desired size, the cut stack is pushed onto table **28** by means of a pusher bar P (FIG. 1) that is a part of the trimming device **12**. In order to provide a smooth transition, the side of the air table must be brought into substantial abutment with the discharge side of he trimmer bed at precisely the same height thereof. To accomplish this, the air table is provided with a predetermined length of over-travel beyond the end of the machine frame.

In the illustrated embodiment of this invention an A-shaped carriage member **50** is utilized, in combination with a fixed height opposing channel member **52** (FIG. 1). As may best be seen in FIGS. 4, 7 and 8, the carriage is comprised of a frame **54** that is rollably supported on wheels **56**. The frame is guided by a track **58** that is positioned in front of the trimmer and parallel thereto. At the upper end of the carriage, a hook member **60** is pivotally mounted on a pin **61**. The hook may therefore engage an inwardly extending pin **62** on the flange **64** that supports the rearward wheel **32** on the cutter side of the air table.

The carriage member **50** is normally stationed at the end of the machine frame closest to the cutter. The hook is in a receiving position because a roller **66**, integral therewith, is on the high part of a cam surface **68** that is rigidly attached to one of the upright machine frame members. When the air table is driven by the horizontal drive system to the end of the machine frame, pin **62** engages the body of the hook. Continued motion of the air table causes roller **66** to travel downwardly along the downwardly sloping area of the cam surface. The hook pivots about pin **61** and drops onto pin **62**. Further movement of the air table in the same direction causes the carriage to move together with the air table. It will be obvious that movement of the air table in the opposite direction will cause roller **66** to ride up on cam surface **68** and thereby disengage both the hook and the carriage from the air table.

With the air table and carriage engaged, it will be seen that the side of the air table nearest to the cutter is supported. Accordingly, with at least one pair of opposed air table wheels **32** remaining in the channel **26***a* and **26***b*, the air table may be extended beyond the machine frame to a position directly in front of and at the same level as the cutter bed. In order to support the opposite side of the air table, a fixed channel **52** is provided that is contiguous with channel **26***b*. The fixed channel **52** is of course at the proper height to position the air table at the exact height of the cutter bed.

Auxiliary guide means to prevent lateral movement of the air table is shown in FIG. 9. At various places along both longitudinal edges of the air table a downwardly extending bar **71** is provided. Each bar includes a horizontal, outwardly extending arm **72** having a slot **73** in the free end thereof and a threaded member **74** extending into the slot. A stud **75** is supported in the slot and carries a roller **76** at its lower end. It is convenient to use a ball bearing assembly that has an inner race and an outer race as the roller. In order to remove any lateral play from the table threaded member **74** is brought to bear against stud **75**. The threaded member moves the stud laterally within the slot until the roller **76** rides along the inside, vertical surface of the horizontal channels. The tangential contact made between the rollers and the channel walls assures the elimination of lateral table movement and yet permits smooth longitudinal movement of the table.

The horizontal drive means is now used to move the air table from its position in front of the cutter to a second position over a waiting skid S. While the table is thus moving, the cut stack of paper is manually aligned along either guide means **77***a* or **77***b* that are secured to the frame members. At this time, blocking member **78** is in an upward position, as shown in FIG. 5, to permit the air table and its stack of cut paper to move thereunder. At an appropriate time, when the paper is in approximately the proper position, the gate is retracted or moved downwardly into a nearly vertical position by a suitably timed air cylinder **80**.

The table may now be retracted, that is, moved back towards the cutting apparatus. The gate, being in a nearly vertical position, will hold or block the paper and prevent its movement. The table therefore slides out from underneath the stack of paper so that the paper may be gently placed on the top of the waiting skid. The elevator means, in combination with suitable sensing apparatus in the form of a photoelectric system, shown schematically as **82***a*, **82***a'* and **82***b*, assures that the air table is at the proper height and clears the top of either the skid or the paper on the skid by a minimum amount. Thus, the paper that leaves the air table is required to be dropped a very small distance.

The apparatus described above may be used advantageously with ream unstacking devices such as disclosed in my Patent 3,206,042. Together, the two devices form a completely integrated and almost entirely automatic paper handling system by means of an auxiliary carriage.

A single air table may be used directly in front of the cutting apparatus and may be moved to a position directly above the skid on which the paper is to be deposited. The pivotal blocking gate provides effective means for impeding any movement of the paper while the air table is being moved rearwardly to a position in front of the cutting apparatus to receive the next load of paper.

There has been disclosed heretofore the best embodiment of the invention presently contemplated and it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In apparatus for transferring a stack of sheets from a cutting device to a receiving platform, the apparatus being of the type including a pair of spacedly opposed, horizontal channels arranged to be moved vertically and a table having laterally extending means integral with the first and second longitudinal sides thereof and adapted to engage the channels whereby the table may move horizontally within the confines of the apparatus, the improvement comprising:

(a) an elongated, horizontal guide member aligned with one of the horizontal channels and arranged to receive the laterally extending means on the first longitudinal side of the table;

(b) a carriage movable along a path contiguous with the second longitudinal side of the table;

(c) support means integral with said carriage and arranged to releasably engage the laterally extending means on the second longitudinal side of the table whereby the table is at the same height as the bed of the cutting device when the laterally extending means on the first longitudinal side of the table are engaged by said guide member; and

(d) drive mean adapted to move the table and support means when said carriage is in support thereof whereby the table is moved horizontally into and out of juxtaposition with the cutting device.

2. The apparatus in accordance with claim **1** wherein said guide member is rigidly positioned at a fixed height relative to the cutter bed and is spacedly opposed thereto by a dimension approximately the same as the width of the table.

3. The apparatus in accordance with claim **1** wherein said table includes a laterally extending pin and cam means and wherein said support means comprises a pivotal hook having a cam roller integral therewith, said roller being arranged to ride on and off of said cam means whereby said hook is disengaged and engaged from said pin.

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U.S. Cl. X.R.

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