Aug. 26, 1958 D. C. BEAULIEU 2,849,236

REVOLVING LAYBOY PILER

Filed Sept. 14, 1954 2 Sheets-Sheet 1

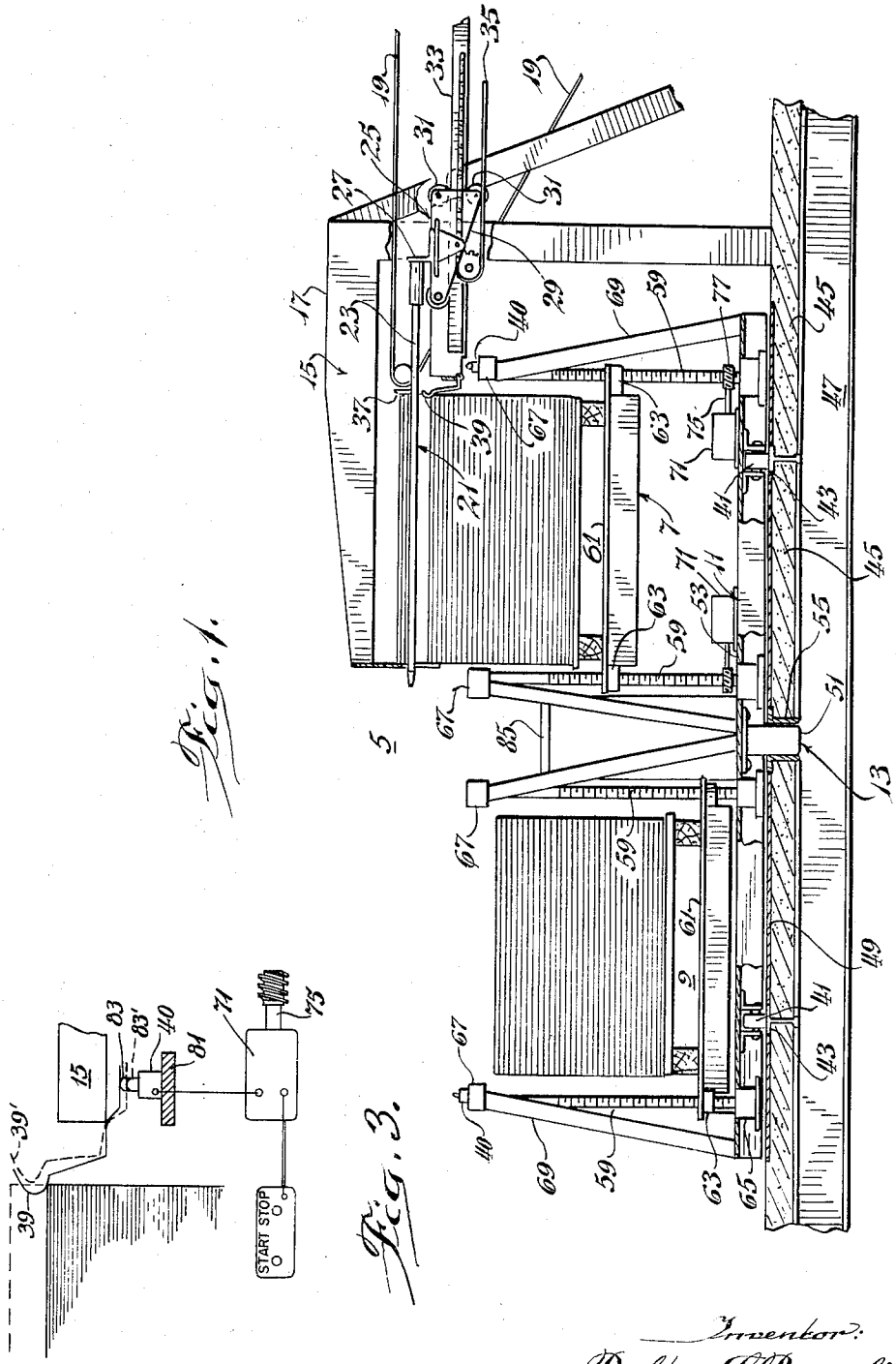

Fig. 1.

Fig. 3.

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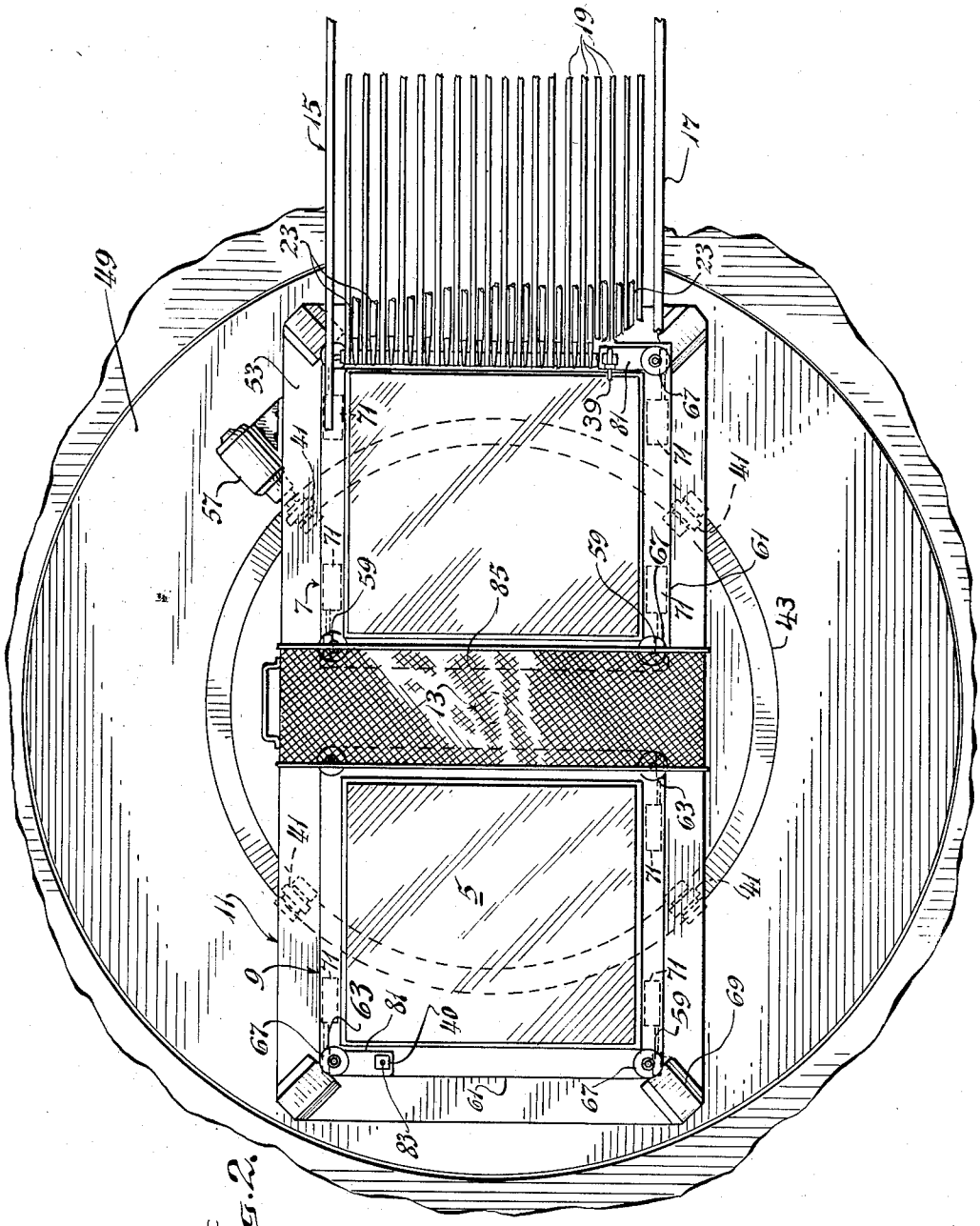

Fig. 2.

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REVOLVING LAYBOY PILER

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3 Claims. (Cl. 271—88)

The present invention relates generally to apparatus used in the handling of sheet material, and is more particularly directed to an improved form of sheet supporting means or piler for a layboy.

In the handling of sheet material, such as paper, paperboard and the like, it is the usual practice to provide a stacking apparatus, called a layboy, which functions in cooperation with a cutter mechanism to take the cut sheets from the cutter and arrange them on a skid or the like in a stack containing a predetermined quantity of sheets. The conventional type of layboy generally includes a series of joggers which constantly move back and forth against the edges of the sheets to achieve a vertical alignment of the sheets as they are being stacked, and a pile-height regulating mechanism which operates to lower the stack as it is being built up, to thereby maintain a constant level for the top of the stack in the layboy. As the predetermined number of sheets are accumulated in the layboy, the cutter is shut down and the stack lowered. The filled skid is then removed from the layboy and replaced by an empty skid. This shut down is for an appreciable length of time and occurs several times before the supply of paper in the backstand is normally exhausted. Obviously this repeated shut down seriously limits the capacity of the cutter-layboy machine.

In a so-called continuous type of layboy there is provided a temporary supporting means which, upon completion of the stack in the layboy, operates to receive the succeeding cut sheets and support them in position while the completed stack is being removed from the layboy table. Such a layboy is satisfactory insofar as it is capable of maintaining a speed of operation which conforms with the speed of the cutter. However, it is recognized that even in a continuous type of layboy, the pile must be lowered and removed and the layboy table returned to its sheet-receiving position in a period of time less than that required for the cutter to deliver another full stack to the layboy. Consequently, with a high-speed cutter the layboy is not able to handle all of the sheets coming from the cutter in the time that it takes to remove the completed stack from the layboy with known means. This means that, if the cutter is operated at its intended speed, it must be periodically shut down to compensate for the inadequacy of the temporary supporting means in the layboy. Obviously, the intermittent operation of the cutter makes the entire sheet handling operation less efficient and less productive.

The principal object of the present invention is to provide a new and improved sheet stacking arrangement for a layboy, which overcomes the above deficiencies and is adaptable for use with either the conventional or continuous type of layboy. Another object of the invention is to provide a dual-stack receiving arrangement for a layboy, which is movable relative to the sheet-feeding mechanism on the cutter to present either of two stack receivers in operative relation to the layboy to receive

sheets from the sheet-feeding mechanism. Other objects and advantages will become apparent as the disclosure progresses with respect to the accompanying drawings, wherein:

Figure 1 is an elevational view of a structure embodying the principles of the present invention, with parts broken away to more clearly illustrate portions of the structure.

Figure 2 is a plan view of the structure in Figure 1, with parts broken away and certain of the elements moved to another position.

Figure 3 is an enlarged, schematic view of a portion of the apparatus in Figures 1 and 2.

The present invention, as seen in the illustrated machine, is concerned with an improved form of apparatus for handling sheets of material, such as paper, so as to arrange the sheets in a stack as they are delivered from a cutter mechanism. Generally, the stacking of the sheets and the removal of the piled sheets is expedited by means of a revolving layboy piler **5** comprising a pair of vertically movable skid bases **7** and **9** mounted on a platform **11** which is rotatable about a pivot **13**. In this manner, one of the skid bases can be arranged in position for receiving sheets from the cutter, while the other skid base is free for removal of the stack of sheets which has previously been deposited thereon.

The illustrated embodiment shows the revolving piler **5** in connection with a continuous layboy **15**, although it will be apparent from the following description that the piler may also be advantageously employed in other types of layboys. The layboy **15** includes a frame structure **17** which also provides support for the terminal end of a series of conveyor belts **19** which carry the sheets from a cutter (not shown) to the layboy **15**. In order to handle the continuously fed sheets during the unloading of the completed stack in the layboy, a temporary support **21** is provided for receiving the sheets from the conveyor **19**. This temporary support comprises a plurality of rods **23** mounted at one end on a movable carriage **25**. The carriage **25** includes a transverse supporting member **27** which is fixed at its opposite ends to a pair of triangular plate structures **29** each including wheels **31** disposed for rolling movement relative to a track **33** on the cutter-layboy frame. The carriage **25** is connected to a power-driven endless chain **35**, so that movement of the chain in one direction effects an extension of the rods **23** to a position overlying the stack in the layboy (Fig. 1), and movement of the chain in the opposite direction retracts the rods to a position clear of the layboy stack, as seen in Fig. 2.

Also mounted on the layboy frame **17** are the usual joggers **37**, which oscillate continuously to help align the sheets as they are deposited in the layboy, and a pile level detector **39**, which is operatively connected with a pile-lowering mechanism to maintain the top of the stack of sheets in the layboy at a substantially constant level. Generally, the upper end of the detector **39** is provided with a portion curved in the direction of the pile, and as this upper portion engages the edge of the pile and is held away from the pile it operates a limit switch **40** to effect a lowering movement of the pile. As the pile lowers in the layboy it permits the detector **39** to move to a position overlying the pile (Figure 1) and thereby releases the limit switch **40** to halt the operation of the pile-lowering mechanism.

The revolving piler **5** comprises the generally rectangular platform **11** upon which is mounted the vertically movable skid bases **7** and **9**. The platform **11** is a plate structure which is supported on four circumferentially arranged wheels **41** disposed for movement over a circular track **43** embedded in the floor **45** which supports the

piler. As illustrated, the floor **45** is of concrete and is supported on steel girders **47**. A circular plate **49** is mounted in generally flush relation to the floor surface. The center pivot **13**, comprising a cylindrical member **51** secured to the center of an upper plate **53** of the platform, is disposed within a bearing **55** embedded in the floor to guide the platform in its rotation.

Th platform **11** is preferably power driven by a motor **57** (Figure 2) which is supported on the plate **53** and drivingly connected with one of the wheels **41** supporting the platform. The skid bases **7** and **9** are supported on the platform in diametrically opposed positions, with each skid base comprising a rectangular table member **61** supported at its four corners by screw posts **59**. The screw posts **59** are each reecived by an internally threaded corner portion **63** of the table **61**, so that axial rotation of the screw posts will afford a raising and lowering of the table.

The screw posts **59** are rotatably mounted at their lower ends in cylindrical bearing supports **65** which are suitably fixed to the plate **53** in depending relation thereto, as by welding. Of course, sufficient clearance is provided between the lower ends of these bearing supports and the circular floor plate **49** to permit free rotation of the piler. The upper ends of the screw posts **59** are rotatably mounted in a journal member **67**, which is carried at the upper end of an inclined brace member **69** disposed at each of the four corners of the skid bases **7** and **9**.

In order to provide for rotation of the screw posts **59**, there is provided a suitable drive means in the form of a motor **71** (Fig. 1). This motor is suitably drivingly connected with the lower end of the screw posts **59** to thereby effect an elevation of the skid bases **7** and **9**. More particularly, in the illustrated machine, the motor drive shaft includes a worm section **75** which is engageable with a gear **77** carried at the lower end of the screw post **59**. Preferably, each of the screw posts for the skid bases **7** and **9** are equipped with a similar drive means, and the motors **71** for each skid base are synchronized for simultaneous operation at selected uniform speeds.

Suitable control means, including the limit switch **40**, is provided for selectively connecting the pile level detector **39** with the motors **71** of the skid base in the layboy. More particularly, each of the skid bases **7** and **9** include a limit switch **40** which is supported on a horizontal member **81** fixed to the upper end of one of the corner posts for the skid base. Each limit switch includes an operating button **83** which is disposed in underlying relation to the pile detector **39** when the associated skid base is in its sheet-receiving position in the layboy.

As seen particularly in Figure 3, the pile detector **39** comprises a generally L-shaped member which is pivotally mounted on a forward portion of the layboy **15** so that the upwardly extending portion of the detector engages the pile of sheets carried by the skid base **61**. The latter engagement may be maintained by gravity or by a suitable biasing means, such as a spring. The upper end of the detector **39** includes a curved portion, or other suitable device, adapted to be initially disposed in overlying relation to the adjacent upper edge of the sheet pile. As the height of the pile increases, the upper, curved end of the detector **39** is moved to a position along the side of the pile of sheets, as indicated by broken lines, thereby moving the opposite end portion of the detector against the limit switch button **83** to depress the latter to the position indicated at **83'**. This operation of the limit switch **40** effects a starting of the motor or motors **71** associated with the skid base **61** to lower the latter. As the pile is lowered to a position affording re-entry of the upper, curved portion of the detector **39** to the position shown in full in Figure 3, the button **83** is released and the motors stopped. This action is repeated until the desired height of the pile is achieved. Once the pile is completed, the base **61** can be lowered sufficiently to clear the layboy through operation of the manual control associated with each skid base, which affords stopping, starting and reversing of the motors **71** independently of the operation of the detector **39**. The piler **5** can be rapidly rotated through 180 degrees by operation of the motor **57** to place the reserve skid base in the layboy where it is operable in a similar manner. The position of the piler is preferably suitably indexed with respect to the layboy, so that the rotation of the piler is readily halted with a skid base in a sheet-receiving position and the associated limit switch **40** in position for actuation by the pile level detector **39**.

Intermediate the two skid bases **7** and **9** there is provided a platform **85** affording sufficient room for an operator to stand so as to witness the operation of the layboy **15** and control the motor **57** for rotating the piler and the motors **71** which operate the skid bases **7** and **9**. Preferably, the operator's station is elevated with respect to the bottom plate **53** of the piler, in order to present a better vantage point for watching the operation of the various mechanisms.

It is seen from the foregoing, therefore, that there is presented herein a novel means for expediting the handling of sheets in the formation of piles thereof, whereby the shut down period for the cutter is eliminated or substantially decreased. By presenting a pair of vertically movable platforms or skid bases on a rotatable structure, with each of the skid bases being controllable by pile lowering mechanism on the layboy, there is eliminated much of the loss of time normally encountered in disposing of the completed pile of sheets. As the sheet-filled skid base is moved out of the layboy **15**, by rotation of the platform **11**, the other skid base is rapidly moved into the layboy in position to receive the sheets from the cutter (not shown). Moreover, the pile lowering motors **71** for each of the skid bases are automatically connected with the pile level detector **39** through one of the limit switches **40**, when each of the skid bases are in the layboy, to effect a gradual lowering of the skid base **61** as the pile of sheets accumulates in the layboy.

Apparatus constructed in accordance with this invention not only saves valuable time in affording a rapid exchange of skid bases in the layboy, but also save space in the sheet handling line. The rotatable piler economizes on space transversely of the path of the sheets from the cutter and requires little more than the usual layboy width for its rotation. Then too, it offers the advantage of always unloading from the same position, which is in a straight line with respect to the path of the sheets into the layboy. However, it will be readily apparent that, if desired, more than two skid bases can be used on the piler, if additional unloading time is required and the position of unloading is not important.

It will also be apparent that the revolving piler **5** may be advantageously employed in connection with a layboy which does not provide a temporary support, such as the extensible fingers **23**. In such instance, the cutter will have to be shut down temporarily once a skid base has been filled. However, the time for removal of the completed pile from the layboy and presentation of an empty skid base in position to receive sheets from the cutter will be considerably shortened with the use of the revolving piler.

Although shown and described with respect to particular apparatus, it will be apparent that certain principles of the present invention may be readily employed in connection with other apparatus.

I claim:

1. The combination comprising a layboy adapted to receive sheet material being successively fed thereto and to arrange said sheet material in a vertical stack, a piler associated with said layboy for receiving sheets therefrom in a vertical stack, said piler comprising a platform mounted for rotation about a vertical axis, a pair of vertically movable tables carried by said platform on opposite sides of said vertical axis, means for rotating said

platform to thereby selectively position one of said tables to receive sheets being fed to the layboy, means for independently raising and lowering each of said tables, and a control element on said layboy which is responsive to the increase in the height of the pile of sheet material being formed to operate the raising and lowering means associated with the selected one of said tables as the latter is positioned to receive sheets from the layboy, so as to gradually lower said table as the height of the pile of sheet material thereon increases.

2. In combination, a layboy adapted to receive sheet material being successively fed thereto and to arrange said sheet material in a vertical stack, a piler disposed with respect to said layboy in position for receiving sheets therefrom in a vertical stack, said piler comprising a platform mounted for rotation about a vertical axis, a plurality of spaced-apart, sheet-receiving tables mounted on said platform for rotation therewith so that a selected one of said tables may be positioned to support the sheets being stacked by said layboy, power means associated with each of said tables for raising and lowering same, control mechanism for each of said power means comprising a control element carried by said piler which is operable to effect a lowering movement of the associated table, and an additional element mounted on said layboy in position for engagement with the stack of sheets being delivered to said selected table and for engagement with the control element on said selected one of said tables, said additional element being movable in response to an increase in the height of the pile of sheet material on said selected table to move said control element and thereby operate said power means to lower said table.

3. In combination, a layboy adapted to receive sheet material being successively fed thereto and to arrange said sheet material in a vertical stack, a piler disposed with respect to said layboy in position for receiving sheets therefrom in a vertical stack, said piler comprising a platform mounted for rotation about a vertical axis, a plurality of spaced-apart, sheet-receiving tables mounted on said platform for rotation therewith so that a selected one of said tables may be positioned to support the sheets being stacked by said layboy, power means associated with each of said tables for raising and lowering same, control mechanism for said power means comprising a plurality of control elements carried by said piler, each of said control elements being operable to effect a lowering movement of one of the associated tables, additional manual control means for operating each of said power means, and an element pivotally mounted on said layboy in position for engagement with the stack of sheets being delivered to said selected one of said tables and for engagement with the control element on said selected one of said tables, said pivotally mounted element being movable in response to an increase in the height of the pile of sheet material on said selected table to move the associated one of said control elements and thereby operate said power means to lower said table.

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