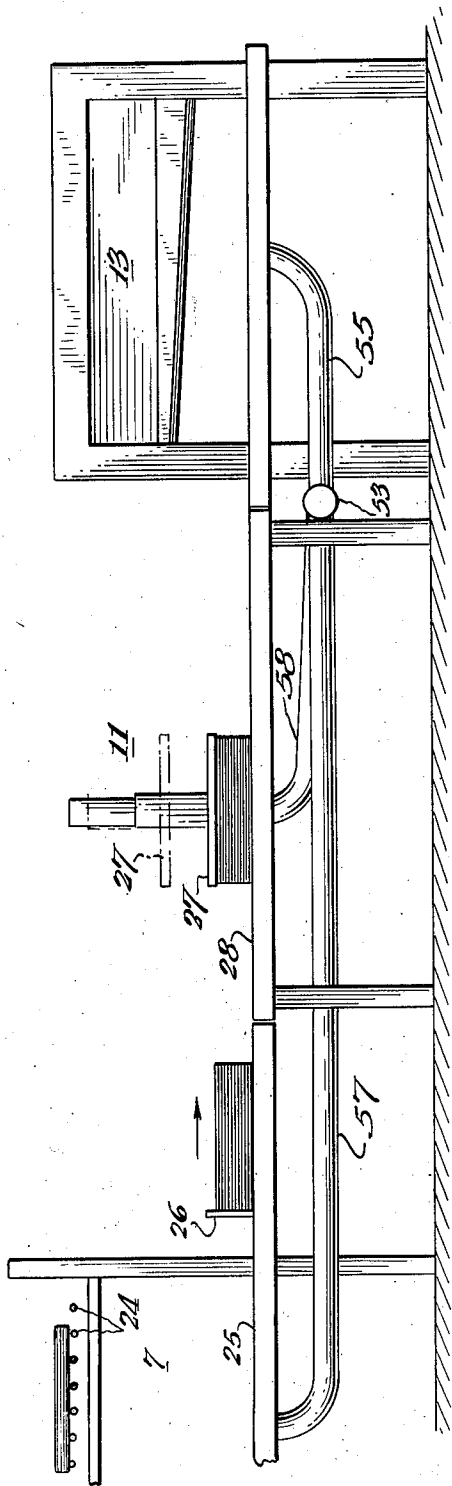


June 11, 1957

D. C. BEAULIEU
METHOD FOR HANDLING SHEETS IN THE FORMATION
OF A STACK OF UNIFORM SIZE SHEETS
Filed Dec. 29, 1953

2,795,274



Inventor
Delton C. Beaulieu
By Soans, Whister & Anderson
Attorneys

1

2,795,274

METHOD FOR HANDLING SHEETS IN THE FORMATION OF A STACK OF UNIFORM SIZE SHEETS

Delton C. Beaulieu, Neenah, Wis., assignor, by mesne assignments, to Kimberly-Clark Corporation, a corporation of Delaware

Application December 29, 1953, Serial No. 400,991

3 Claims. (Cl. 164—17)

The present invention relates generally to the manufacture of paper, and is particularly directed to an improved method for converting a roll of paper into a stack of sheets of a selected size and quantity.

In the manufacture of paper which is to be used in sheet form, there is considerable handling of the paper during the course of the necessary operations for transforming a roll of paper into stacks of sheets which are suitable for shipment to the consumer. In the usual method for completing the production of such paper, the rolled paper is run through a cutting machine, where it is cut into sheets of selected length, and then the sheets are assembled in a stack. The stacked sheets are usually inspected for defects, and then the stack is stored for a period of time prior to trimming the stack to the required size.

The storage of the stacked sheets prior to trimming has heretofore been found necessary in order to achieve an exact and uniform size for the sheets. The rapid action of the cutter, as well as the action of the delivery and stacking machines which are used to assemble the cut sheets, causes an appreciable amount of air to be trapped between the sheets of paper. With the air trapped in the stack, the latter tends to slide when moved and, furthermore, the center bulge created by the trapped air makes it impossible to trim a stack of sheets to a uniform size throughout the stack. Consequently, the storage period has been utilized to permit the sheets to settle and thus expel the air from the stack, before the stacks are handled much and before they are trimmed to the specified size.

Handling paper sheets in the above manner requires a large storage area, as well as requiring considerable manual labor in loading the stack onto skids or the like for inspection and storage, and then unloading the stack for trimming. In addition, a single stack for shipment may be several times greater than the effective capacity of the trimming machine and considerably in excess of the weight that can be manually lifted and, therefore, must be trimmed a portion at a time. Both of these factors add to the amount of labor involved as well as increasing the waste of sheet material through numerous handlings of the sheets.

Furthermore, the described manner of handling paper sheets involves a delay in the production of the finished sheets due to the storage period requirement. Consequently, it is apparent that the time and labor involved in the production of paper sheets are very appreciable factors in the cost of such paper.

The principal object of the present invention is to provide an improved method for handling sheet material, in a manner affording continuous and speedy handling of the paper in a minimum amount of space and with a minimum amount of manual movement of the paper, to form a stack of uniform size sheets. Other objects and advantages of the invention will become apparent as the disclosure progresses, with reference to the accompanying drawings, wherein the drawing is an elevational

2

schematic view of apparatus embodying the present invention.

According to the invention, which is particularly adapted to the handling of lightweight, quality grade paper (for example, book paper having a basis weight below 120 lbs. for 500 sheets, 25 x 38 inches), since such paper is most likely to trap air between the sheets and is made to the most exact specifications, a roll of paper is cut into selected size sheets and assembled into a pile of a predetermined quantity of the sheets. The pile of sheets is then exposed to pressure across the entire upper area thereof, in order to expel the air which has been accumulated in the pile by virtue of the sheet movement involved in assembling the pile. The compressed pile may then be moved about without spilling and may be readily trimmed to a predetermined uniform size without difficulty.

For inspection purposes an additional step may be provided immediately after the pile of cut sheets is formed. The sheets may be inspected in any desired manner, such as moving the sheets one by one through a path for the sorting of defective sheets and then re-assembling the sheets into a pile of accepted sheets which is compressed to facilitate handling and trimming as above.

Referring to the drawing, there is illustrated one embodiment of the invention, wherein the apparatus is indicated diagrammatically, involving the conversion of rolled paper into a vertically aligned pile of uniform-size sheets. The apparatus used in the formation of the sheet finishing line chosen to illustrate the invention includes a cutter-layboy 7, a press 11, and a trimmer 13, all arranged in a compact, continuous line to provide for rapid handling of the paper.

The cutter-layboy 7 is preferably of the type which is adapted to continuously receive sheets of paper and arrange them in a pile containing a predetermined quantity. In one layboy of this type, there is provided a temporary support for holding the oncoming sheets during the time that the completed pile is being carried away from the layboy. As shown in the drawing, this temporary support is in the form of a movable table comprising a series of retractable rods 24.

The completed pile of sheets is lowered by the layboy and removed therefrom in any suitable manner. As illustrated, the sheets are lowered by the layboy 7 onto an air-table 25, where a relatively movable pusher element 26 engages the pile and moves it from the layboy on to an adjoining air-table 28. These air-tables are a hollow structure having communication with a source of air and including a number of very small openings in the upper surface, through which air is blown to provide a buoyant effect on the sheet pile to make the pile more easily movable along the table. The path of the pile through the sheet finishing line is then determined largely by previous inspections. If no defects, such as coating spots, wrinkles, calender marks etc., have been detected in the paper, the pile will be moved to the press 11, where the stack is compressed as by moving a pressure plate 27 downwardly into engagement with the pile to force the air out from between the sheets. Suitable means (not shown) might be used to effect the vertical movement of the plate 27 between the broken line position in the drawing to the pile engaging position shown in full lines. To most effectively accomplish the removal of air from between the sheets the plate 27 should extend beyond the edges of the pile and cover the entire area of the pile.

The compressed stack is then moved along the air table 28 to the trimmer 13 where the edges of the pile are trimmed to produce sheets of the exact desired size. The trimmed pile is then ready to be packaged for shipment.

3

In the event that a particular pile of sheets assembled at the layboy 7 contains defective sheets the sheets are inspected either by manual or suitable mechanical sorting means (not shown), prior to placing the pile in the press 11.

The piles of sheets which have thus been inspected are moved into the press 11 for expulsion of the air from each pile, and then the piles are handled in the manner previously described for trimming the sheets.

As indicated above, movement of the piled sheets along the finishing line is facilitated by the use of air tables. The means for supplying air to the hollow tables comprises a blower fan (not shown) having communication through a number of ducts with the various air tables. A large air duct 53 leads from the blower toward the trimmer 13 and includes branch sections 55 to the trimmer table, a duct 57 to the cutter-layboy air table 25, and a duct 58 to the air-table 28 for the press 11.

It is understood, of course, that all of the mentioned air-tables include a large number of small openings through their upper surfaces to permit the escape of air and thereby provide a buoyant effect on a pile of sheets being moved across these small openings.

It is seen, therefore, that there is provided a novel method for handling the finishing of paper into sheets of uniform size, which affords a substantially continuous movement of the paper through the various stages of its final preparation for shipment. Further, the apparatus described for carrying out the various steps of the disclosed method may be compactly arranged to save space and, also, to minimize the distance that the paper is required to be moved.

The disclosed method eliminates the need for any sheet storage between the various operations and, in general, facilitates and expedites the production of the finished sheets. Of considerable importance is the reduction in the amount of handling of the sheet piles which was previously necessary. This factor not only improves the operating efficiency of the personnel involved, because they are less likely to become tired, but the reduction in handling also reduces the waste. Each time that a pile of sheets must be manually moved or lifted the upper and lower sheets of the pile are almost invariably damaged to an extent which makes them unacceptable for use. Furthermore, each movement of the pile tends to shift the pile out of alignment, thereby making it more difficult to handle and to achieve a neatly aligned pile for shipment.

While the disclosed method is particularly advantageous in the handling of lightweight, quality grade paper sheets as they leave the cutter, it is not intended to thereby

4

limit the invention, since certain of the principles thereof are readily adaptable to the handling of other types of sheet material which may include air between the sheets resulting from other means of handling the sheets and, therefore, these principles are not necessarily dependent upon association with a cutter for their merit.

I claim:

1. A method for handling flexible sheets in the formation of a stack of uniform size sheets, comprising the formation of a stack of the sheets, compressing the stack across the entire area thereof to expel the air from between the sheets, and then promptly, while the air is expelled from the stack, successively trimming a plurality of the edges of the stack to achieve a predetermined size for the sheets.

2. A method affording continuous handling of flexible sheets in the formation of a stack of uniform size sheets, comprising the formation of a stack of the sheets in a manner which results in the entrapment of air between the sheets, compressing the stack across the entire area thereof to expel the air from between the sheets, and then shortly thereafter, while the stack is in an air-free condition, successively trimming each of the edges of the stack to achieve a predetermined, uniform size for the sheets.

3. A method for continuously handling light-weight sheets in the formation of a stack of uniform size sheets, comprising the steps of receiving and assembling a predetermined quantity of the sheets in a manner resulting in the entrapment of air between the sheets, compressing the stack across the entire area thereof so as to expel substantially all of the air from between the sheets, releasing the pressure exerted on the stack, and then shortly thereafter, while the stack is free of air between the sheets, successively trimming a plurality of the edges of the stack to thereby produce a stack of uniform-size sheets.

References Cited in the file of this patent

UNITED STATES PATENTS

204,741	Jones	June 11, 1878
490,877	Lovell et al.	Jan. 31, 1893
594,490	Seybold	Nov. 30, 1897
823,751	Adshead	June 19, 1906
1,035,200	Klugel	Aug. 13, 1912
2,373,539	Carver	Apr. 10, 1945
2,417,643	Gneuchs	Mar. 18, 1947
2,608,254	McLaughlin	Aug. 26, 1952

FOREIGN PATENTS

486,169	Canada	Sept. 2, 1952
---------	--------	---------------