Feb. 24, 1970

R. L. DOERFLER ET AL 3,496,816

TWO-ON SIAMESE TWIN BOOKS SEPARATOR, TRIMMER, AND RESEQUENCING PROCESS AND APPARATUS

Filed Jan. 8, 1968

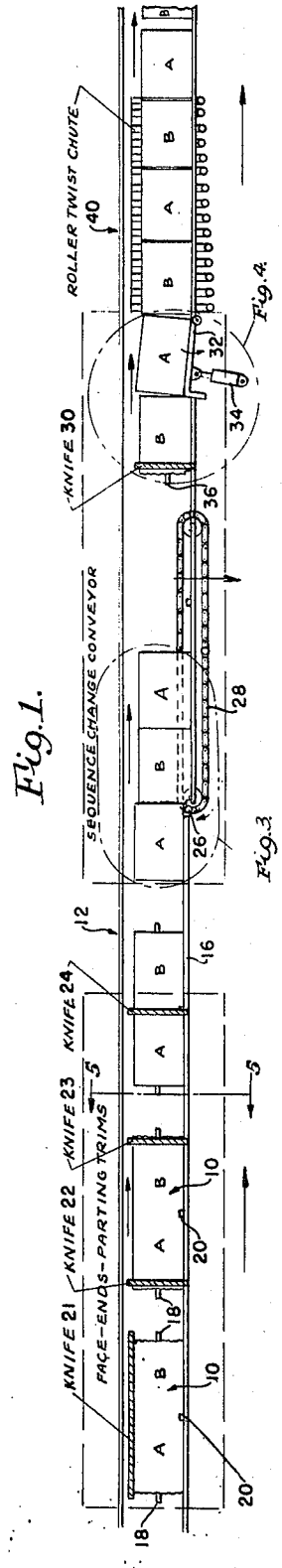


Fig. 1.

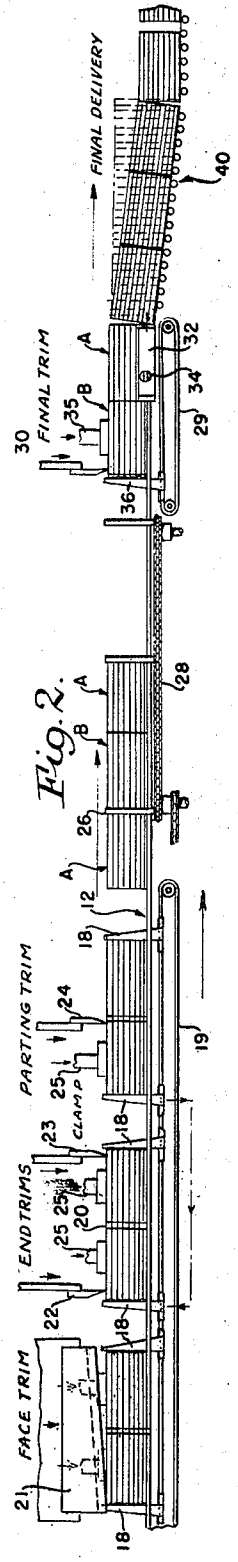


Fig. 2.

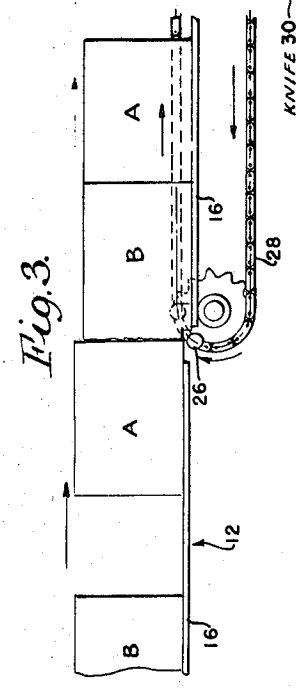


Fig. 3.

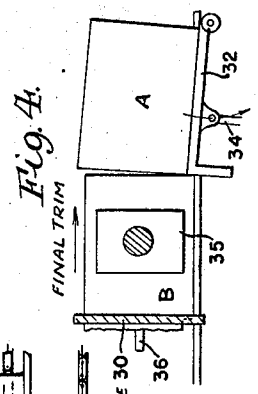


Fig. 4.

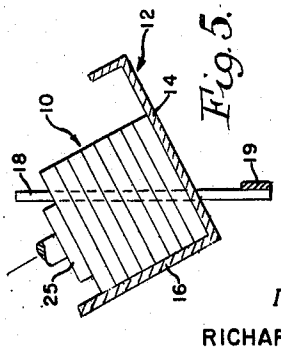


Fig. 5.

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3,496,816

Patented Feb. 24, 1970

3,496,816

TWO-ON SIAMESE TWIN BOOKS SEPARATOR, TRIMMER, AND RESEQUENCING PROCESS AND APPARATUS

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Filed Jan. 8, 1968, Ser. No. 696,241
Int. Cl. B26d 3/00
U.S. Cl. 83—39 6 Claims

ABSTRACT OF THE DISCLOSURE

A method and machine for receiving from a continuous conveyor an in-line supply of spaced apart, like-sequenced, two-on or "twin" books requiring separation and edge trimming; featuring a mechanically simple straight-line pass-through system. This involves operations performing consecutively on each twin unit the face trims and the two remote end trims, and then the unit parting cut performing concomitantly therewith the lead end trim on the tail end book of each unit. The severed unit then passes through a resequencing conveyor apparatus which shifts the trailing book of each unit into the lead position of the next succeeding book unit; following which the trailing end of the resequenced book unit is given its end trim; thus completing all of the requisite trimming operations while conveying the work through the machine without interruption and by simple straight-line conveyor means.

BACKGROUND OF THE INVENTION

Whereas it is common practice to print and assemble signatures and to cover them into the so-called two-on Siamese twin book form and to stack such twin-books into "lifts" prior to trimming their face and end portions; the operation of subsequently "splitting" or parting the books inevitably produces a rough end on one of the books of each "twin," because of the nature of the parting knife blade. In consequence, it has heretofore been the practice to eject from the conveyor line every other one of the separated books (the ones requiring no further "final" end trimming) and to temporarily bypass them by means of a supplemental circuit conveyor system from the main line conveyor system while the remaining books are finally end-trimmed. The previously side-tracked books are then recombined by alternate insertion in properly coordinated sequence relation with the books still travelling on the main conveyor line, so as to deliver "lifts" of books which have been properly parted and trimmed, and in proper sequence.

Obviously, the mechanisms required for such bypassing and recombining of the books as explained hereinabove, especially when involved in a modern high speed book processing operation, are necessarily complicated both in respect to mechanical structure and in respect to the requisite electrical operation monitoring and control systems. Hence, the capital investment and mechanical complications and maintenance costs of such equipment are very substantial, and an additional production interruption and "maintenance trouble" potential is imposed on the overall operation.

It is the object of the present invention to provide an improved method for resequencing the passage of books on a straight-line conveyor system after being parted from twin-book form, for final end trimming operations thereon; thereby avoiding need of any bypass and subsequent recombine apparatus as discussed hereinabove. By way of example, the method and one form of apparatus

embodying the present invention is illustrated by the accompanying drawing, wherein:

FIG. 1 is a semi-schematic top plan view of an apparatus embodying the present invention;

FIG. 2 is a side elevational view thereof;

FIG. 3 is an enlarged scale fragmentary view taken as suggested at "FIG 3" on FIG. 1;

FIG. 4 is a similar view taken as suggested at "FIG. 4" on FIG. 1; and

FIG. 5 is a fragmentary enlarged scale section taken on line 5—5 of FIG. 1.

As shown in the drawing herewith at FIGS. 1, 2, there is provided essentially a single straight-line conveyor for receiving at its intake end a train of stacked twin-books in slightly spaced apart relation, such as are designated generally at **10**. The conveyor may be of any preferred form, but as shown herein comprises a horizontally extending, vertically canted, trough designated generally at **12** which includes a bottom floor portion **14** and a retaining wall portion **16**. Book pusher and positioning lugs as indicated at **18** extend upwardly through a slotted portion of the floor plate **14** and are carried at their lower ends by any suitable form of transport conveyor chain or the like as indicated at **19**. Thus, it will be understood that stacks of "twin" books such as indicated at **10** may be fed to the intake (far left) end of the conveyor to be picked up by the lugs **18** for transport through the system as illustrated schematically by the drawing.

The "twin" books **10** are shown herein to each compise a book A and a book B (FIG. 1) before delivery to the machine of the present invention. The conveyor **19** is operated such as through an intermittent cam system or the like so as to stop each stack of "twins" in register with (1) a face edge trimmer knife as designated in the drawing at **21**; (2) a pair of end trim knives **22–23**; and then (3) a parting knife **24**. Suitable knife mechanisms of the type referred to are well known in the art, such as are disclosed for example in U.S. Patents 3,329,053 and 3,340,758. Pressure pads as indicated at **25** are employed to hold the "lifts" of books firmly during the knife trimming operations.

The cutting edges of such knives are necessarily bevelled (at one side) and therefore the knives **21, 22, 23** provide good clean cuts or trims at the face and ends of each twin book stack. However, knife **24** provides a clean cut only along its straight side; and thus as shown in FIG. 2 when it parts the two books of each "twin" it leaves only the leading edge portions of the A books with satisfactory end trims. The tail ends of the books B of each stack therefore require to be subsequently trimmed, which presents the problem to which the present invention relates.

In accordance with the present invention, after the twin has been parted by knife **24** the unit is shoved by the conveyor **19** along the trough **12** to a sequence change station at which point the retaining wall **16** of the trough system is offset outwardly and downwardly so as to allow the successively arriving stacks of books to slide further downwardly on the bottom plate **14** and into a slightly laterally offset line of travel, so as to permit a pusher dog **26** (which is carried by an endless drive chain or belt **28**) to move around and in behind each stack of B books as they come from the parting knife (FIG. 3). Thus, each lift of B books is now picked up by the pusher **26** which is carried by the conveyor **28**, and is thereby shoved along the trough **12** towards the right; in each case being thereby pushed against the lift of A books of the previously preceding unit of A and B books. In this manner the A and B books of the feed supply units are resequenced; in each case a lift of A books now being disposed to lead a lift of B books.

A third conveyor as indicated at **29** now operates to move the resequenced units into the final trim station; the trailing end portion of the lift of B books being thereby disposed in register with the final trim knife **30**. At this same time a hinged portion **32** of the trough retaining wall is projected inwardly (as by means of a piston-cylinder unit **34**) so as to temporarily block passage of the lift of B books, to stop them in the exact position of register with the knife. A pressure pad **35** (FIG. 2) also comes into action to positionally lock the lift of B books (in cooperation with the conveyor pusher **36** and the hinged block **32**) during the final trim action; the blade of the knife **30** being disposed as shown in FIG. 2 so as to provide a smooth and accurate trim on the trailing end portions of the lift of B books. Following this final trim, the conveyor **29** operates to forward the resequenced unit of severed and trimmed A and B books to a take-away conveyor such as for example a roller-gravity conveyor as indicated at **40** (FIGS. 1, 2). It will of course be understood that the conveyor devices **19**, **28**, **29** and the trimmers **21**, **22**, **23**, **24**, **30** may be of any preferred forms, and that they will be power-driven and automatically controlled to synchronize their functions so as to provide a smooth and rapid overall operation.

Thus, it will be appreciated that by means of the method and apparatus of the present invention the lifts of two-on "twin-books" coming successively into the system are conveyed through a single straight-line passageway wherein they are initially partially trimmed and severed, and then resequenced and then final-trimmed; without requiring any intermediate directional diversions and recombining of the parts thereof; and that although only one form of apparatus operable in accord with the invention has been illustrated and described by way of example hereinabove, various changes may be made therein without departing from the spirit of the invention.

What we claim as our invention is:

1. A method for producing trimmed books from a supply train of spaced-apart, like-sequenced, two-on "twin" book units while advancing the work continuously in single file manner, said method comprising:

first performing on each twin-book unit the face trim;

next performing thereon the two remote end trims;

then parting the unit while performing concomitantly therewith the final end trim on one book of the unit;

then relatively shifting the books of the parted unit in the direction of book travel into resequenced relation with books parted from the next-ahead and next-behind book units, respectively, so that the lead book of each supply twin book unit now becomes the trailing book of a resequenced unit;

and then trimming the previously untrimmed end of the newly resequenced book unit;

all of said trimming and parting operations being performed while advancing the train of books in a single file continuous travel path.

2. A method as set forth in claim **1** wherein the twin book parting operation concomitantly end-trims the leading end of the trailing book portion of each twin unit, and wherein the resequencing operation is performed by advancing the leading book of each unit as it is parted therefrom forwardly to assume the trailing position at the rear end of the next ahead book, thereby providing a resequenced book unit; the final trimming operation being performed upon the trailing end portion of said advanced book.

3. A method as set forth in claim **1** wherein the book trim and parting operations are performed by knife blades having in each case the cutting edge thereof bounded by one surface which is coplanar with the direction of the knife blade motion, and another surface bevelled thereto, so as to deflect the trimmings away from the trimmed book parts.

4. A machine for processing a supply train of spaced-apart, like-sequenced, two-on "twin" book units requiring separation and edge trimming; said machine essentially comprising:

conveyor means for carrying said supply book units in single file relation through a succession of operative stations;

means for performing at a first one of said stations the face trims on said "twin" units as they pass therethrough;

means for performing at a second one of said stations the two remote end trims thereon;

means for performing at a third one of said stations a unit parting cut, said means performing concomitantly therewith the end trim on one book of each unit;

a resequencing device which thereupon shifts the lead book of each unit to assume the tail end position in the next-ahead unit while the trailing book of each parted unit assumes the lead position of the next-behind book unit;

and means for performing at a fourth one of said stations a final end trim operation on the previously untrimmed book end portion.

5. A machine as set forth in claim **4** wherein said conveyor means operates intermittently to step-advance the book units into successive positions at said operative stations.

6. A machine as set forth in claim **4** wherein said means for operating and trimming the books are of the bevelled edge knife blade type.

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U.S. Cl. X.R.

83—102, 255, 276, 404