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Miaskoff et al.

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[54] **APPARATUS FOR MAKING BOOKS**

[75] Inventors: **Leonard Miaskoff; David A. Reed,** both of Easton, Pa.

[73] Assignee: **Harris Corporation,** Cleveland, Ohio

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Related U.S. Patent Documents

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Filed: **May 7, 1973**

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[51] **Int. Cl.²** **B42C 11/00**

[58] **Field of Search** 270/56, 58; 198/79, 198/80; 271/9, 57, 58; 118/1; 156/362–364

[56] **References Cited**

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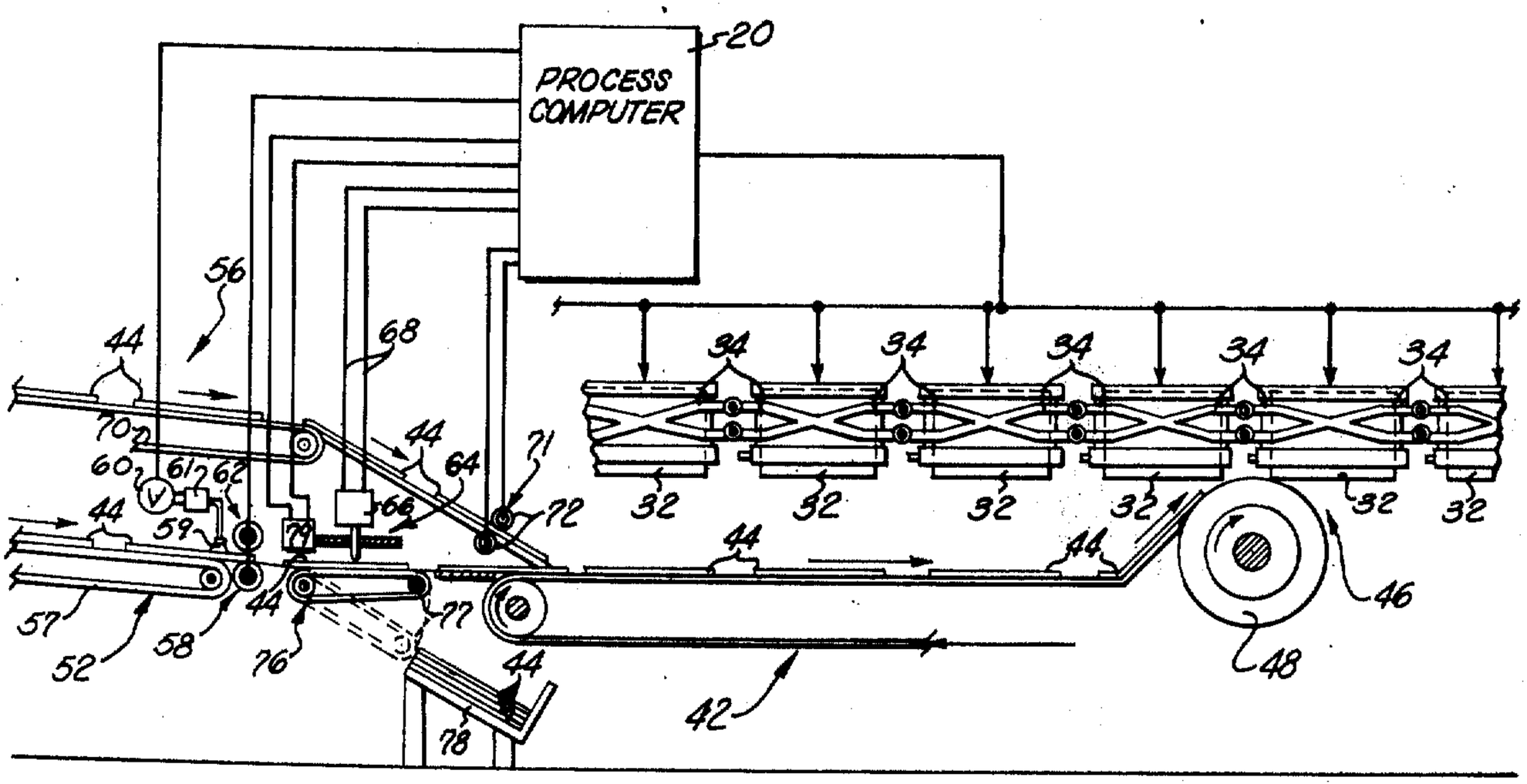
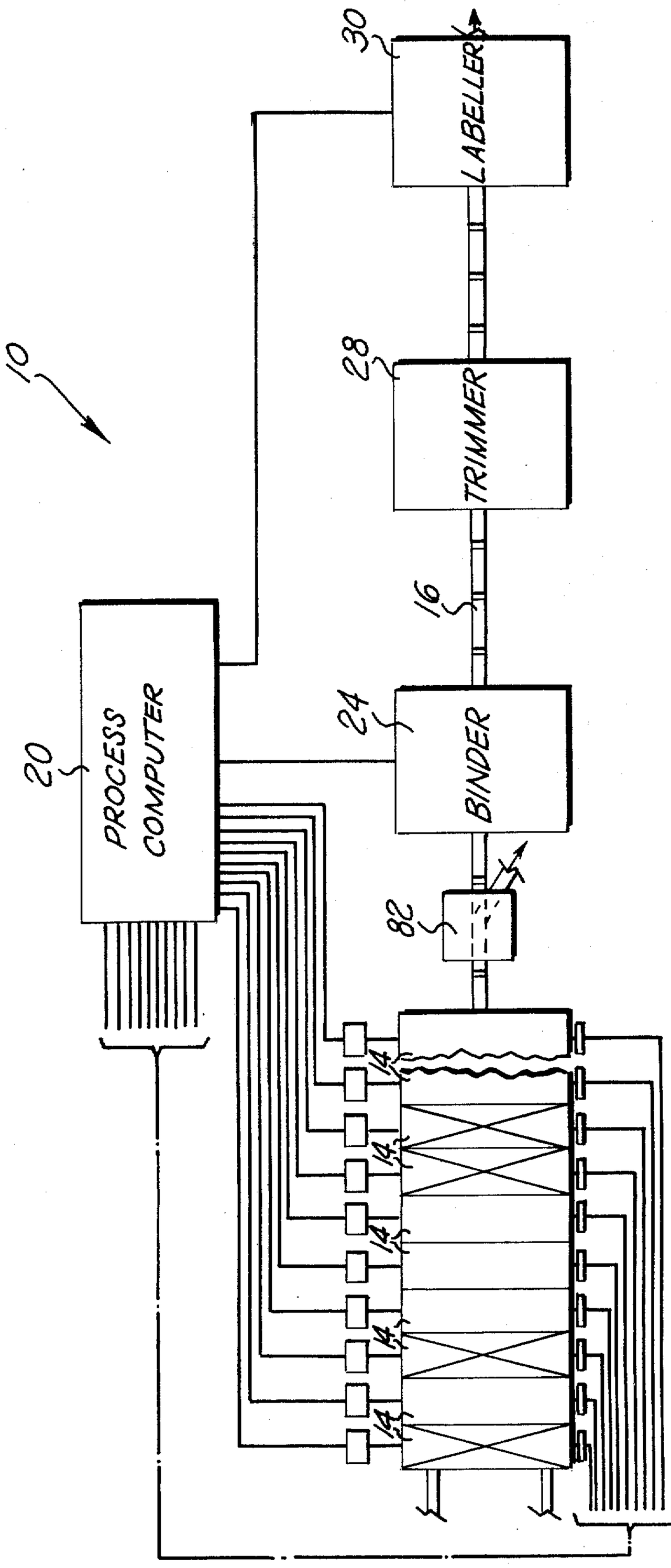
Primary Examiner—Lawrence Charles

[57] **ABSTRACT**

An improved apparatus for making books and other sheet material articles includes a main conveyor for transporting groups of signatures to a covering station. A cover conveyor transports covers to the covering station where they are sequentially applied to the groups of signatures in a known manner. A first cover feed assembly sequentially feeds covers to the cover conveyor. In the event of a malfunctioning of a first cover feed assembly, a second cover feed assembly is activated to feed a cover to the cover conveyor. A detector for detecting a malfunctioning of the first cover feed assembly is capable of detecting either a failure to feed a cover or the feeding of double covers. In the event that double covers are fed, the double covers are rejected and the second cover feed assembly is activated.

8 Claims, 4 Drawing Figures

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LABELLER
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TRIMMER
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24
BINDER
20
PROCESS
COMPUTER
82
14
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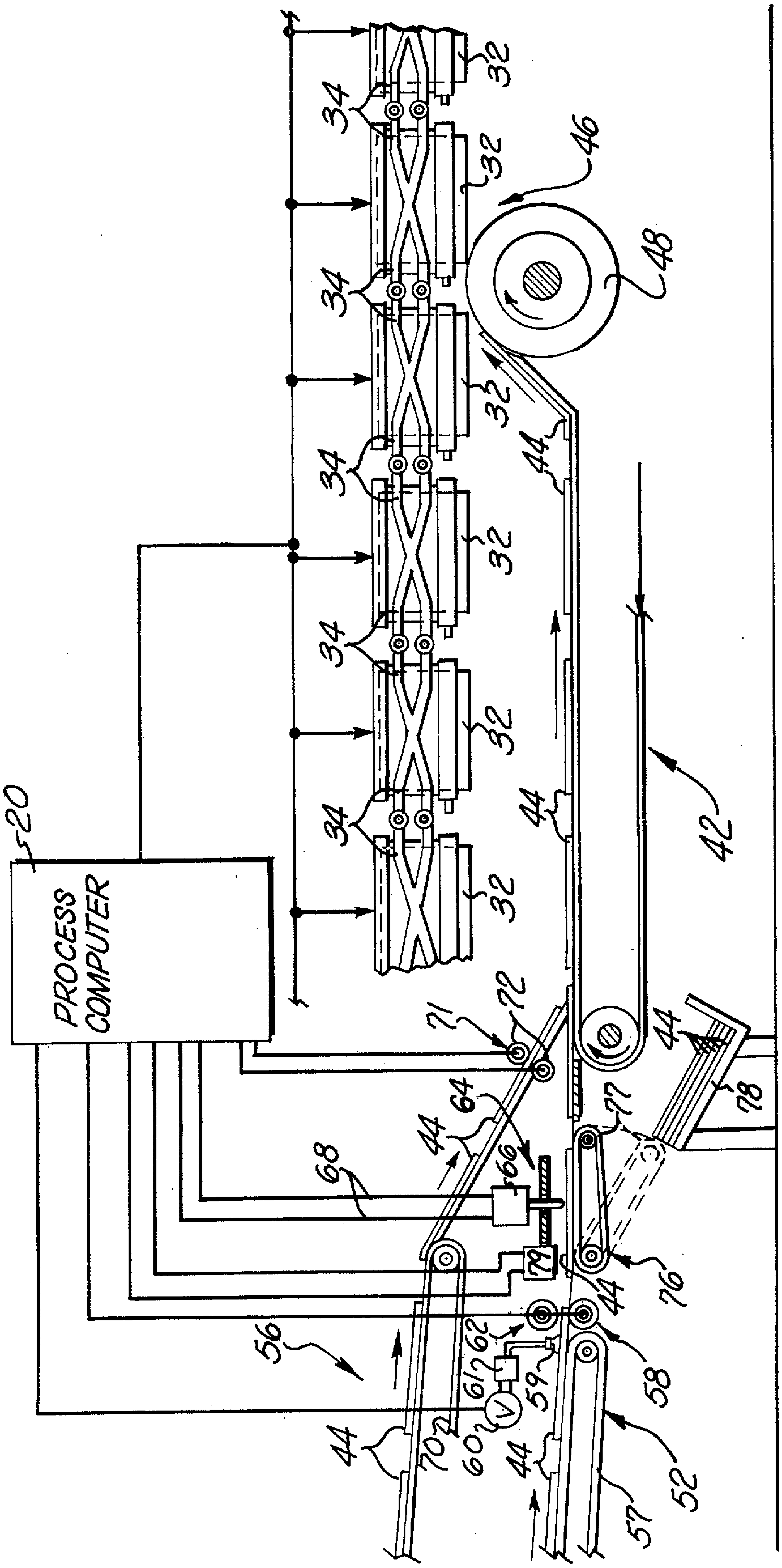
14
14
12

FIG. 1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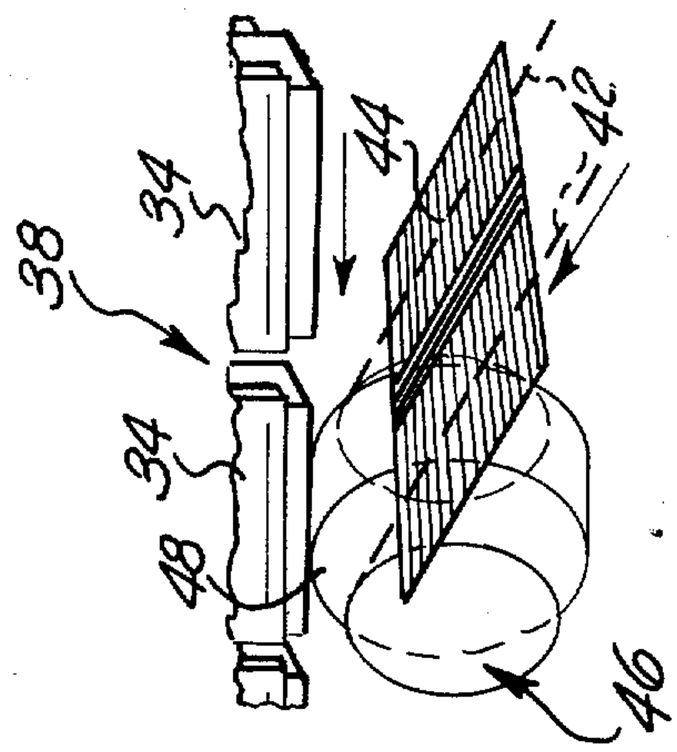
58
57
52

FIG. 2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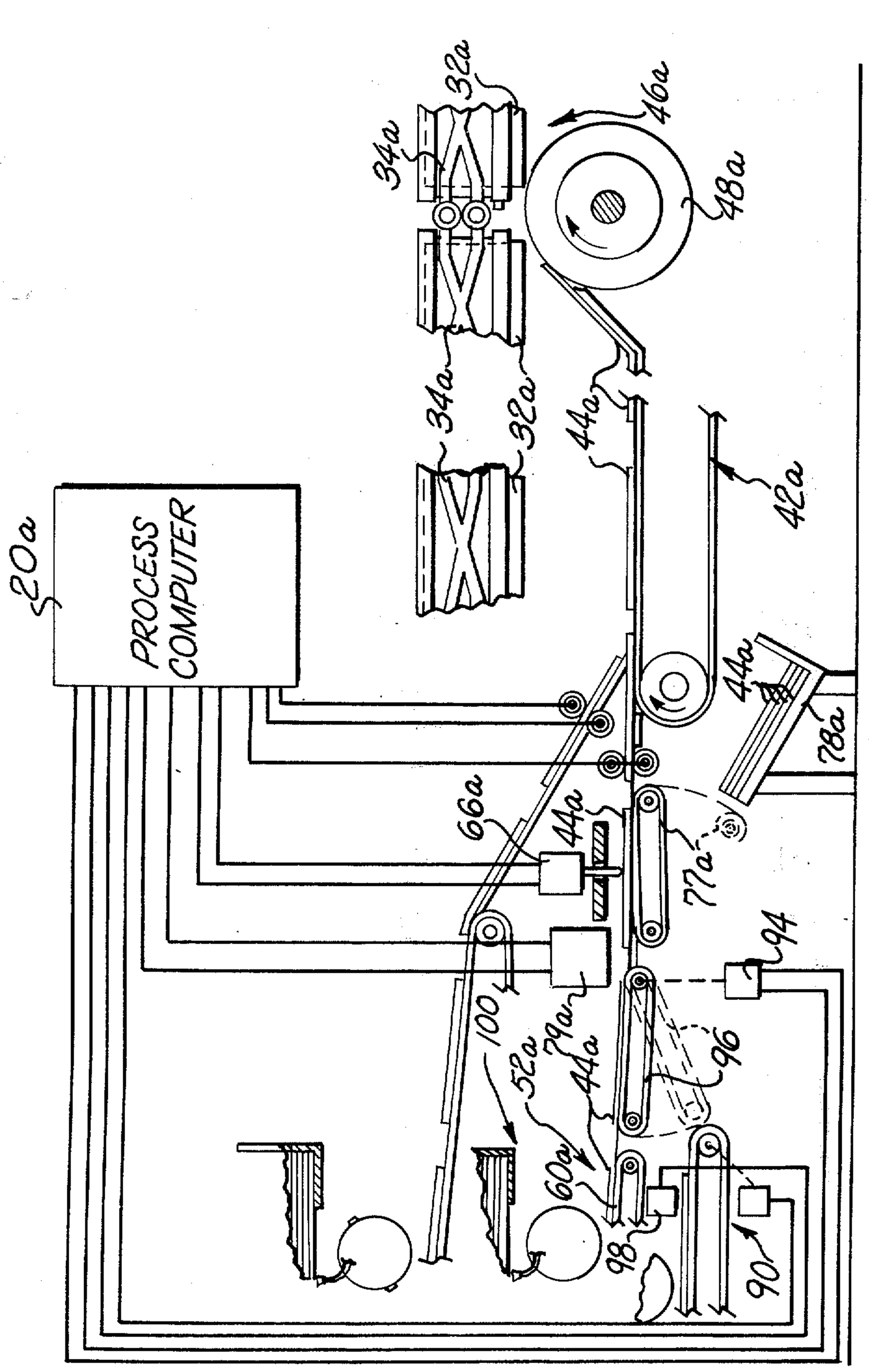
42
46

FIG. 3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PROCESS COMPUTER
34a
32a
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32a
46a
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44a
42a
66a
44a
77a
44a
78a
94
100
52a
79a
44a
96
60a
98
90

FIG. 4

APPARATUS FOR MAKING BOOKS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

A known bookbinding system includes a signature conveyor assembly having a plurality of clamps which grip groups of signatures. The clamps carry the groups of signatures to a first station where a rotary knife cuts off the folds at the backs of the signatures. The books are then sequentially conveyed to a second station where the backs of the books are roughened. At one or more gluing stations, glue is applied to the roughened backs of the books. A cover feeder is effective to sequentially feed open covers to a covering station in a registered relationship with the books. After the covers have been applied to the books, the covers are formed by a cover breaker. The books are then delivered to trimmers for suitable trimming operations.

If the cover feeder in a known bindery fails to feed a cover to a covering station, the bindery is stopped and the malfunction of the cover feeding apparatus is corrected. If double covers are fed to the covering station, a jam-up or other malfunction of the covering apparatus may occur. Whether the covering apparatus fails to feed a cover or feeds double covers, it is necessary to stop the bindery and interrupt production in order to correct the fault.

SUMMARY OF THE PRESENT INVENTION

The present invention provides an apparatus for use in covering books, magazines, catalogs, or similar items. This apparatus includes a cover conveyor which sequentially transports covers to a covering station where they are applied to a book. A first cover feeder assembly is provided to feed covers to the cover conveyor. In the event of a malfunctioning of the first cover feed assembly, a second cover feed assembly is activated to feed covers to the cover conveyor. A detector for detecting a malfunctioning of the first cover feed assembly is capable of detecting either a failure to feed a cover or a feeding of double covers. In either case, the second cover feed assembly is activated to feed a cover without interrupting operation of the bindery.

Accordingly, it is an object of the invention to provide a new and improved apparatus for covering books or similar articles and which includes a cover conveyor for transporting covers to a covering station, a first cover feed assembly for feeding covers to the cover conveyor, and a second cover feed assembly which is effective to feed covers to the cover conveyor in the event of a malfunctioning of the first cover feed assembly.

Another object of this invention is to provide a new and improved apparatus as set forth in the next preceding object and wherein a detector assembly is provided to detect either a failure to feed a cover or the feeding of double covers by the first cover feed assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and features of the present invention will become more apparent upon a consideration of the following description taken in connection with the accompanying drawings wherein:

FIG. **1** is a schematic illustration of an apparatus for making books;

FIG. **2** is a schematic illustration of a cover feed arrangement utilized in a bindery of the book-making apparatus of FIG. **1**;

FIG. **3** is a schematic illustration of a covering station where covers are applied to books; and

FIG. **4** is a schematic illustration of a second embodiment of invention.

DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

A system **10** for making books is illustrated in FIG. **1**. This system includes a gatherer **12** having a plurality of feed mechanisms **14** for feeding signatures from supply hoppers or pockets onto a main conveyor assembly **16**. During a cycle of operation of the gatherer **12**, the feed mechanisms **14** are activated by process computer **20** to feed the signatures in such a manner as to form different books or magazines for different subscribers in accordance with predetermined criteria from known subscriber information, such as age, occupation, geographic location, etc. Thus, if the signatures are being grouped in accordance with geographic location, some of the feed mechanisms **14** would be operated to feed signatures while others would be ineffective to thereby provide a combination of signatures directed to a subscriber in a certain area, such as the North. If the subscriber lived in a southern area, the feed mechanisms **14** would be effective to form a different combination of signatures.

The signatures are transported by the conveyor **16** to a binder **24** then the signatures are bound into a book. The main conveyor **16** then transports the bound book to a trimmer **28** where the book is trimmed to a desired size in a known manner. Finally the conveyor **16** transports the bound and trimmed book to a labeler to be addressed to the subscriber who is to receive the particular combination of signatures contained in the book. The process computer **20** is utilized to control the operation of the binder **24**, the trimmer **28** and labeler **30** in the manner disclosed in U.S. application Ser. No. 141,331 filed May 7, 1971, by Donald C. Harder and Victoriano F. Rana and entitled Method and Apparatus for Producing Magazines or the Like.

When groups **32** of signatures enter the binder **24**, they are held in an on edge orientation with their folded backs down by a clamp assemblies **34** (FIG. **2**) of the type illustrated in U.S. Pat. No. 3,132,360. The interconnected clamps **34** form a book conveyor **38** (FIG. **3**) which is a part of the main conveyor assembly **16** and is utilized to transport the books through the binder **24** with the books in an upright orientation. As the books move through the binder **24**, a rotary knife (not shown) cuts off the signature folds and the backs are then roughened. Adhesive is then applied to the backs of the books in a known manner.

After adhesive is then applied to the back of a book, a cover conveyor **42** (FIG. **2**) transports a cover **44** to a covering station **46** (FIG. **3**) where the cover is applied to the back of the book by suitable applicator **48**. Since the bindery operations for preparing signatures

and binding a cover onto a book are well-known, they will not be further described herein to avoid prolixity of description. However, it should be noted that the known bindery operations can be utilized to apply covers to magazines, booklets, or pamphlets.

A main feed mechanism **52** (FIG. **2**) is provided in the binder **24** to feed covers **44** to the cover conveyor **42.** In accordance with the present invention, a secondary cover feed mechanism **56** is provided to feed covers to the cover conveyor **42** in the event of a malfunction of the main cover feed mechanism **52.** Therefore, if the main cover feed mechanism **52** should fail to feed a cover to the cover conveyor **42,** the secondary cover feed mechanism **56** will supply the conveyor **42** with a cover so that an uninterrupted stream of covers is conducted to the covering station **46** by the cover conveyor **42** even if the main cover feed mechanism malfunctions.

The main cover feed mechanism **52** includes a conveyor **57** which transports a stream of flat or open covers **44** to a feed station **58.** A sucker **59** at the feed station is connected with a source of low pressure through a solenoid operated valve **60.** When a cover is to be fed, the valve **60** is opened under the control of the computer **20** and a drive mechanism **61** moves the sucker **59** through a feed stroke to feed an open cover into the nip of a pair of feed rollers **62.**

After passing through the nip of the feed rollers **62,** the cover moves to an inspection station **64.** At the inspection station **64** a detector **66** detects that a cover is being fed from the main feed mechanism **52** to the cover conveyor **42.**

In the event of a failure of the main feed mechanism **52** to feed a cover to the inspection station **64,** a signal is transmitted from the detector **66** to the process computer **20** over leads **68.** In response ot this signal, the process computer **20** activates the secondary feed mechanism **56** to feed a cover **44** to the cover conveyor **24** in the place which would normally have been occupied by the cover which was not fed by the main feed mechanism **52.** Thus, even though the main feed mechanism **52** should skip or fail to feed a cover, the secondary feed mechanism **56** feeds a cover so that the cover conveyor **42** is effective to conduct a continuous stream of covers **44** to the covering station **46.**

The secondary feed mechanism **56** includes a conveyor **70** which transports the covers to a feed station **71.** When the process computer **20** activates the secondary feed mechanism **56,** feed rollers **72** at the feed station **71** feed one cover **44** into the vacant position on the cover conveyor **42** resulting from a malfunction of the main feed mechanism **52.** As this one cover is fed, the feeder and conveyor **70** are operated for a short period of time to move a next succeeding cover to the feed station **71.**

It is contemplated that under certain circumstances the main feed mechanism **52** may feed two covers rather than one. The detector assembly **66** is of the caliper type and is effective to detect the feeding of more than one cover. Upon the detecting of the feeding of more than one cover, a signal is transmitted over the leads **68** to the process computer **20.** Whereupon the process computer **20** activates a reject mechanism **76** to reject the double covers. In addition the process computer **20** will activate the secondary feed mechanism **56** to feed a cover **44** to the cover conveyor **42** in place of the rejected double covers.

The reject mechanism **76** includes a divert gate **77** which is pivoted downwardly, to the position shown in dashed lines in FIG. **2,** to direct the double [cover-sinto] covers into reject or double cover receiving bin **78.** The divert gate **77** is constructed in a manner similar to that illustrated in U.S. Pat. application Ser. No. 176,851 filed Sept. 1, 1971, by Frederick T. Anderson and David A. Reed and entitled "Method and Apparatus for Producing Magazines or the Like." Of course, other known divert or reject mechanisms, such as the one disclosed in U.S. Pat. No. 2,991,603, could be used if desired.

The reject mechanism **76** includes a known drive mechanism, illustrated schematically at **79** in FIG. **2,** which is activated by the computer **20** in response to detection of double covers **44** by the detector assembly **66.** Activation of the reversible drive mechanism **79** moves the gate **77** between the feed position shown in solid lines in FIG. **2** and the divert position shown in dashed lines in FIG. **2.**

If the gatherer **12** malfunctions, a reject mechanism **82** (FIG. **1**) is activated to reject the defective book which results from the malfunction. The clamp assembly **34** associated with the rejected book will be empty when it arrives at the covering station **46.** Of course, a cover **44** should not be supplied for the empty clamp assembly.

When a book is rejected, the computer **20** renders the main and secondary feed mechanisms **52** and **56** ineffective to feed a cover for the empty clamp assembly **34.** This results in an opening in the stream of covers transported by the cover conveyor **42** to the covering station **46.** Due to the coordination provided by the computer **20,** the opening in the stream of covers arrives at the covering station **46** simultaneously with the empty clamp assembly **34.**

When a book is rejected by reject mechanism **82,** the resulting discontinuity in the flow of books to the binder **24** is noted by the computer **20.** When the sucker **59** is to feed a cover to be associated with the rejected book, the computer **20** effects operation of the valve **60** to the closed condition. Therefore, the main feed mechanism **52** does not feed a cover to the cover conveyor **42** for association with the empty clamp assembly **34.**

The detector **66** will detect the failure of the main feed mechanism **52** to feed a cover for association with the empty clamp assembly **34.** A disabling circuit in the computer **20** will then prevent activation of the feed rollers **72.** Therefore the secondary feed mechanism **56** is ineffective to feed a cover. This results in an opening in the series of covers conducted to the covering station **46** by the cover conveyor **42.**

In the embodiment of the invention illustrated in FIG. **2** the feed mechanisms **52** and **56** are effective to feed similar covers to the cover conveyor **42.** However, it is contemplated that different covers may be used with different books. Thus, if the gatherer **12** assembles a book for one geographic area, such as a northern area, and a book for another geographic area, such as a southern area, the book intended for the northern subscriber has one cover while the book intended for the southern subscriber may have another cover.

Accordingly, in the embodiment of the invention illustrated in FIG. **4,** three feed mechanisms are utilized to feed covers to the cover conveyor. One of these feed mechanisms feeds covers intended for one category of subscribers, such as subscribers in a northern area. The

second feed conveyor feeds covers for books intended for subscribers who live in another area, such as a southern area. Finally, a third feed mechanism is provided to feed covers which are suitable for either of the two categories of subscribers. The third feed mechanism is activated in the event of a malfunctioning of one of the other two feed mechanisms. Since the embodiment of the invention illustrated in FIG. **4** is generally similar to the embodiment illustrated in FIGS. **1** through **3**, similar numerals will be utilized to designate similar components, the suffix letter "a" being associated with the numerals of FIG. **4** to avoid confusion.

A first feed mechanism **52a** is effective to feed covers **44a** to a cover conveyor assembly **42a.** The first feed mechanism **52a** includes a hopper type feeder **100** for depositing covers onto a conveyor **60a.** A second cover feed mechanism **90** is also effective to feed covers to the cover conveyor **42a.** For example, the feed mechanism **52a** feeds covers intended for northern subscribers while the feed mechanism **90** feeds covers intended for southern subscribers. Of course, the differences between the covers could be based upon subscriber age, income, occupation, etc., as well as geographic location of the subscriber.

The process computer **20a** effects operation of the gatherer **12** to form combinations of signatures which are in accordance with known subscriber criteria in the manner disclosed in the aforementioned Harder and Rana application Ser. No. 141,331. The process computer **20a** includes suitable registers for keeping track of the different combinations of signatures. In addition the computer includes controls for activating a drive mechanism **94** to move a divert gate **96** between a position (shown in solid lines in FIG. **4**) in which it is effective to direct covers from the feed mechanism **52a** to the cover conveyor **42a** and a position (shown in dashed lines in FIG. **4**) in which the gate **96** is effective to direct covers from the feed mechanism **90** to the conveyor **42a.**

When the divert gate **96** is in the raised position shown in solid lines in FIG. **4,** a drive mechanism **98** is activated by the computer **20a** to feed a first type of cover. When the divert gate **96** is in the lowered position shown in dashed lines in FIG. **4,** a drive mechanism **100** is activated by the computer to feed a second type of cover. By controlling the operation of the feed mechanisms **52a** and **90** and the position of the gate **96,** the computer **20a** is effective to have different covers, associated with different subscribers, transported to the covering station **46a** in timed relationship with different combinations of signatures.

A detector **66a** is associated with feed mechanisms **52a** and **90** to detect misfeeding or a double feed of covers by the feed mechanisms. If the detector **66a** detects a failure of one of the feed mechanisms **62a** or **90** to feed a cover or the feeding of double covers, the process computer **20** activates a third feed mechanism **106** to feed a standard cover which is suitable for any of the subscribers. In the event of a double feeding of covers by one of the cover feed mechanisms **52a** or **90,** a reject gate **77a** is actuated by a drive mechanism **79a** to reject the covers.

The computer **20** is effective to detect a malfunctioning of the gatherer **12** in forming a book for association with a cover fed by either the first cover feed mechanism **52a** or the second cover feed mechanism **90.** The reject mechanism is activated by the computer **20** to reject the defective book. In addition, the computer **20** renders the cover feed mechanism **52a** or **90** ineffective to feed a cover for association with the rejected book. Of course, the computer **20** also renders the third feed mechanism **106** ineffective to feed a standard cover for association with the rejected book.

In view of the foregoing description, it can be seen that the system **10** includes a conveyor **42** which sequentially transports covers to a covering station **46.** In the FIG. **2** embodiment, a first cover feed mechanism **52** is provided to feed covers to the cover conveyor **42.** In the event of a malfunctioning of the cover feed mechanism **52,** a second cover feed mechanism **56** is activated to feed a cover to the conveyor **42** so that a continuous stream of covers is conducted to the covering station **46.** In the FIG. **4** embodiment cover feed mechanisms **52a** or **90** are utilized to feed covers to the cover conveyor **42a.** This enables books entitled for different subscribers to have different covers. In the event of a malfunctioning in one of the cover feed mechanisms **52a** or **90,** a third cover feed mechanism **106** is activated to feed a cover to the cover conveyor **42a.** Although the binder **24** has been described herein in connection with soft cover books, it is contemplated that it could be utilized for hard cover books.

Having described specific preferred embodiments of the invention, the following is claimed:

1. An apparatus for use in covering books, said apparatus comprising book conveyor means for sequentially conveying a stream of books to a covering station, cover conveyor means for sequentially transporting a stream of covers to the covering station, first cover feed means for sequentially feeding covers to said cover conveyor means, detector means for detecting a malfunction of said first cover feed means and resulting opening in the stream of covers, second cover feed means for feeding a cover to said cover conveyor means at the opening resulting from the malfunctioning of said first cover feed means, and control means for activating said second cover feed means to feed a cover to said cover conveyor means in response to detection of a malfunction of said first cover feed means by said detector means.

2. An apparatus as set forth in claim **1** wherein said detector means includes means for detecting the feeding of double covers by said first cover feed means and wherein said apparatus further includes reject means for rejecting double covers fed by said first cover feed means.

3. An apparatus as set forth in claim **1** wherein said detector means includes means for detecting a failure of said first cover means to feed a cover to said cover conveyor means.

4. An apparatus as set forth in claim **1** further including gatherer means for forming signatures into groups to make books, and reject means for rejecting a defective book, said control means including means for rendering said first and second feed means ineffective to feed a cover for association with the rejected book.

5. An apparatus for producing different books of different predetermined combinations of signatures for different subscribers in accordance with predetermined criteria from known subscriber information, said apparatus comprising gatherer means for forming a combination of signatures in accordance with known subscriber criteria, said gatherer means including means for defining a plurality of feed stations, main conveyor means for transporting groups of signatures, feed means at each of said feed stations for feeding signa-

tures to said conveyor means, control means for effecting operation of said feed means to form different combinations of signatures for different subscribers, cover applicator means disposed at a covering station for applying a cover to each of the different combinations of signatures, said main conveyor means being effective to sequentially transport the different combinations of signatures to the covering station, cover conveyor means for sequentially transporting covers to the covering station, first cover feed means for sequentially feeding covers to said cover conveyor means, detector means for detecting a malfunction of said first cover feed means, and second cover feed means for feeding covers to said cover conveyor means, said control means including means for activating said second cover feed means to feed a cover to said cover conveyor means in response to detection of a malfunction of said first cover feed means.

6. An apparatus as set forth in claim **[4]** *5* further including third cover feed means for feeding covers which are different than the covers fed by said first and second cover feed means, said control means including means for effecting operation of said first cover feed

means to feed covers to combinations of signatures for one group of subscribers and for effecting operation of said third cover feed means to feed covers to combinations of signatures for another group of subscribers.

7. An apparatus as set forth in claim **[4]** *5* further including reject means for rejecting defective books formed as a result of a malfunctioning of said gatherer means, said control means including means for rendering said first and second cover feed means ineffective to feed a cover for association with the rejected book.

8. A collating apparatus for collating first and second sheet material articles comprising conveyor means for sequentially conveying the collated article, first feed means for sequentially feeding one of said sheet material articles individually to said conveyor means, detector means for detecting a malfunction of said first feed means, second feed means adjacent said first feed means for feeding individual sheet material articles to said conveyor means as a substitute for the articles fed from said first feed means, and control means for activating said second feed means to feed a substitute article in response to detection of a malfunction of said first feed means by said detector means.

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