United States Patent [19]

Santaella

[11] **3,819,172**

[45] **June 25, 1974**

[54] **METHOD AND APPARATUS FOR FORMING A PLURALITY OF BOOKLETS**

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[73] Assignee: **Goodway, Inc.,** Philadelphia, Pa.

[22] Filed: **Aug. 20, 1971**

[21] Appl. No.: **173,594**

[52] **U.S. Cl.** **270/41**

[51] **Int. Cl.** **B411 43/04**

[58] **Field of Search** 270/94, 86, 93, 41, 5–11, 270/42–44

[56] **References Cited**

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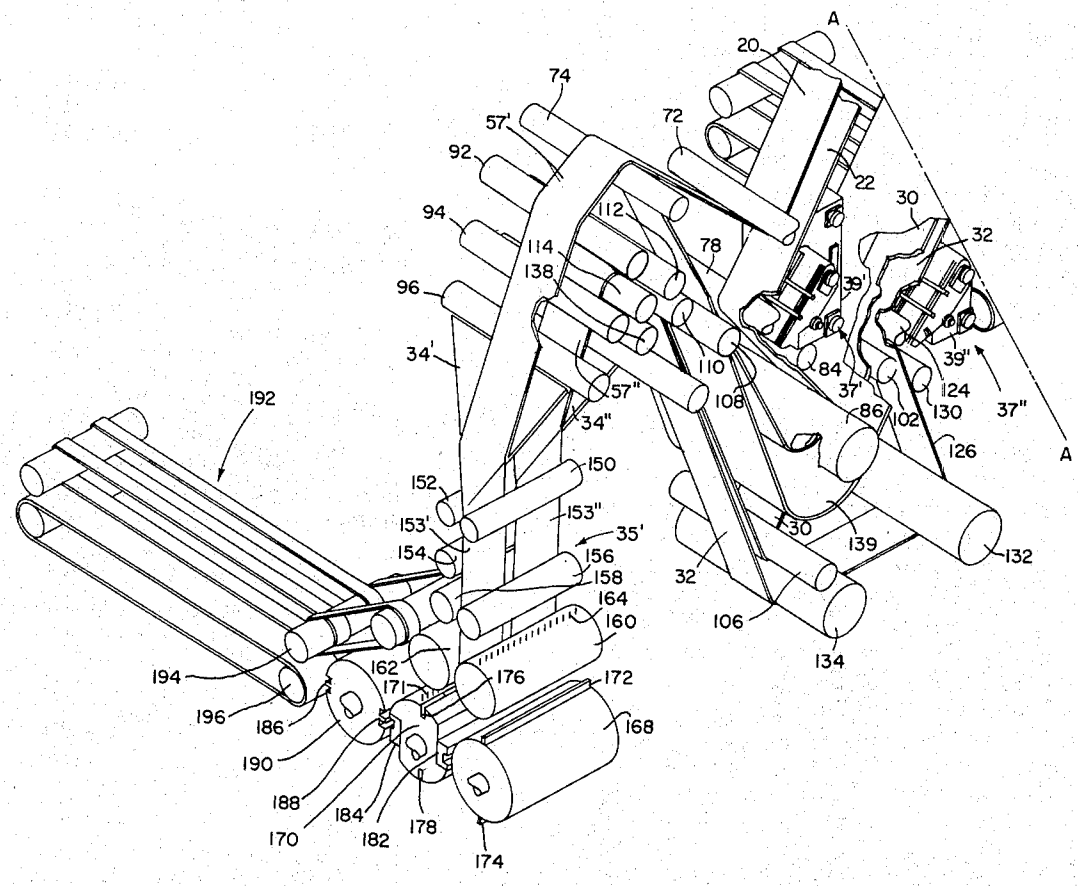
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Attorney, Agent, or Firm—Karl L. Spivak, Esq.

[57] **ABSTRACT**

A method of forming a plurality of individual booklets, or the like, having removable insert members affixed thereto. The method includes severing at least one continuous web of printed paper along transversely spaced, elongate lines to form continuous ribbons; affixing a plurality of insert members to one surface of at least one of the continuous ribbons at spaced, longitudinal intervals; longitudinally folding a ribbon having insert members affixed thereto to form continuous multi-leaf booklets and transversely severing each continuous multi-leaf booklets to form a plurality of individual booklets, each containing at least one insert member. The method also includes severing more than one continuous web of printed paper into ribbons, and securing predetermined ribbons to each other to form sets of ribbon prior to the longitudinal folding and transverse severing operations. The apparatus for forming a plurality of booklets also forms a part of this invention.

4 Claims, 18 Drawing Figures



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SHEET 1 OF 8

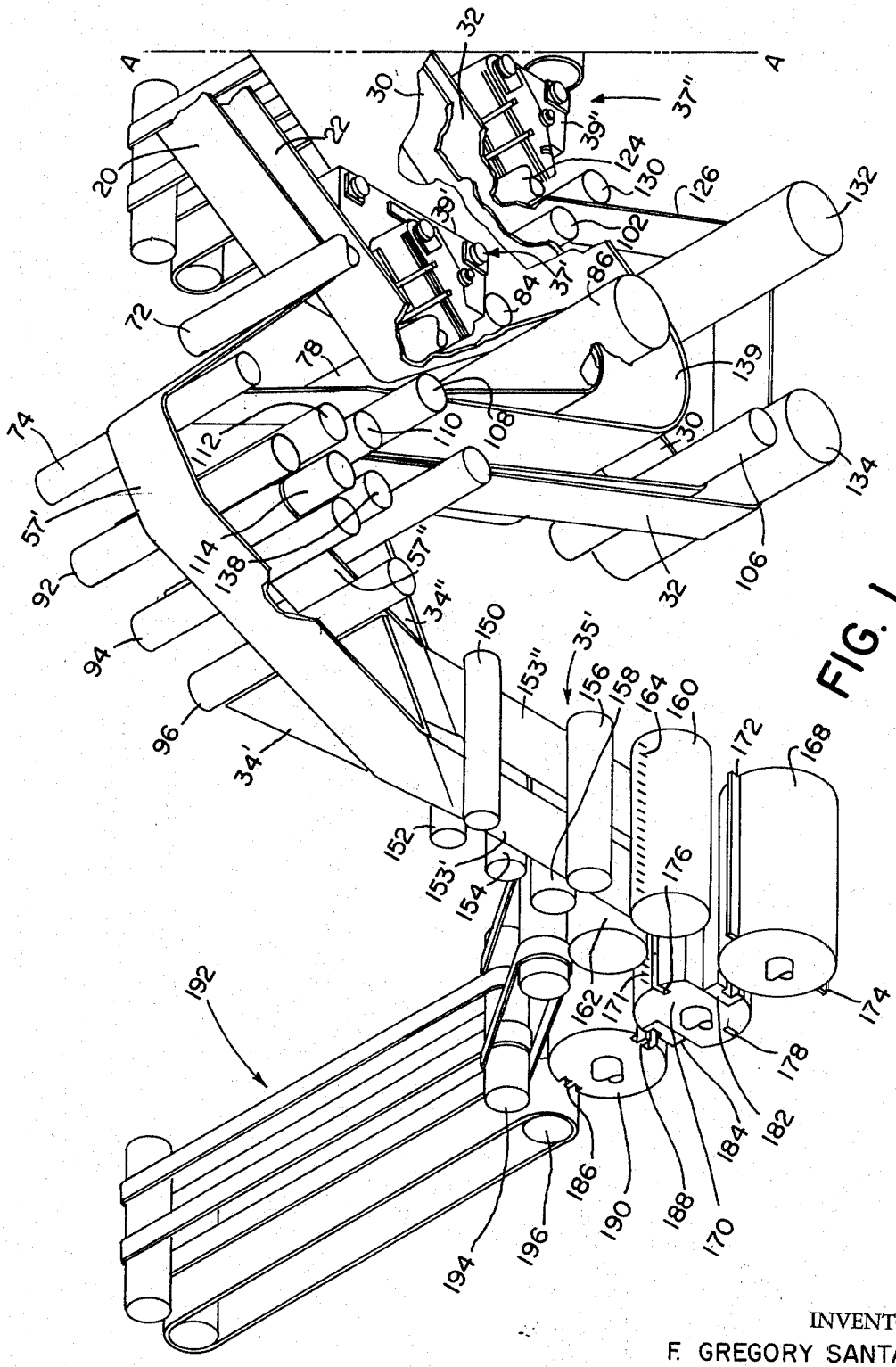


FIG. 1

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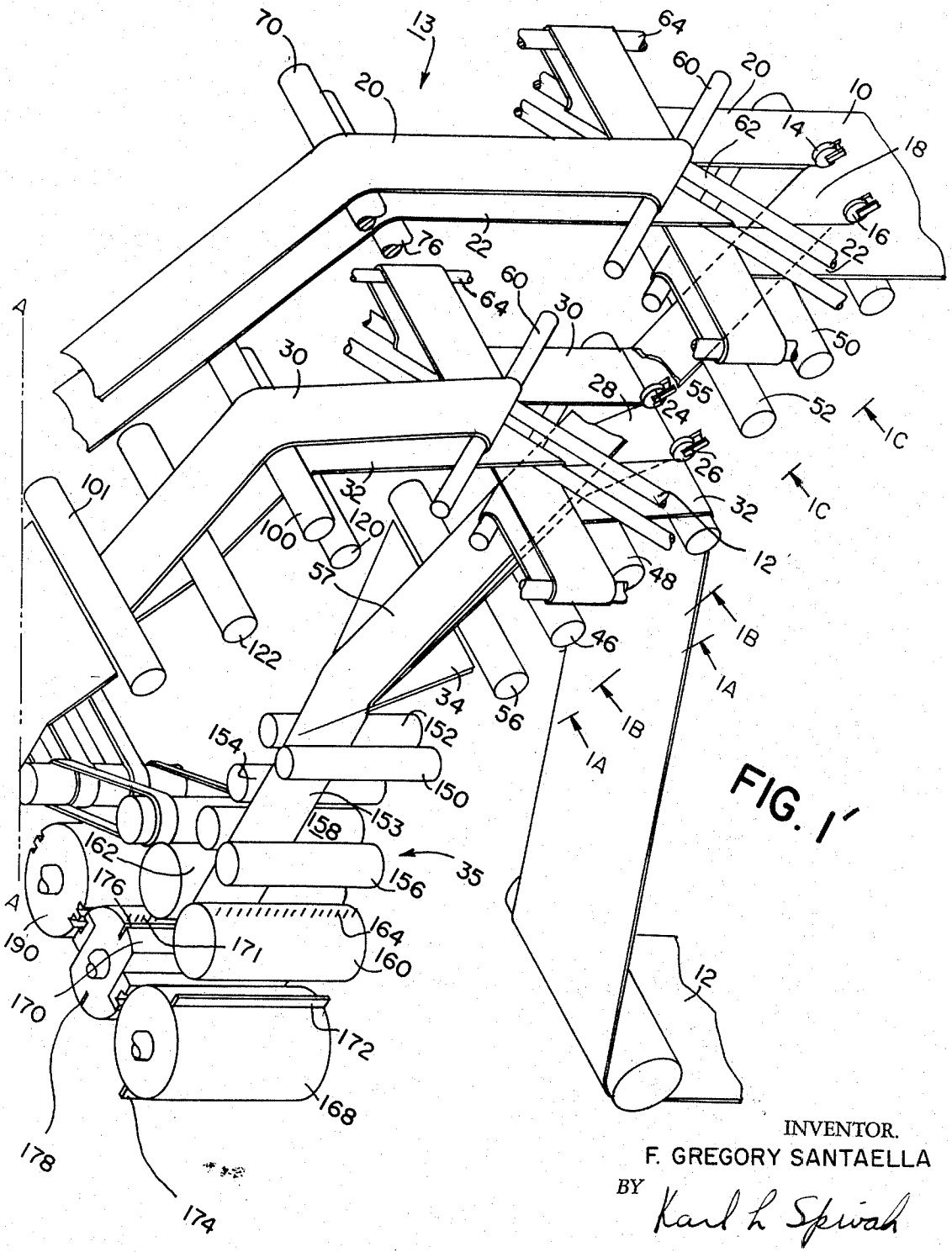


FIG. 1'

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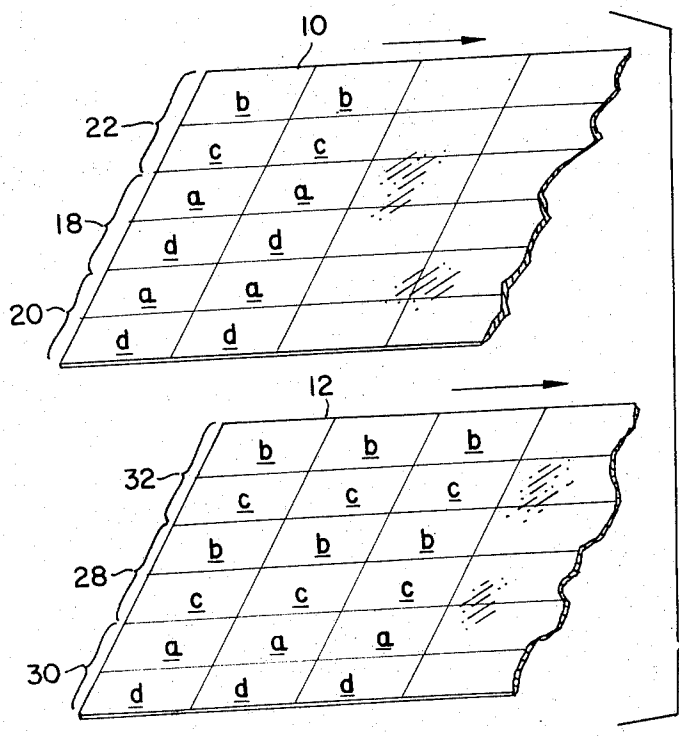


FIG. 3

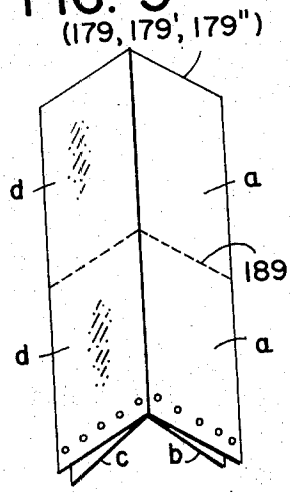


FIG. 5

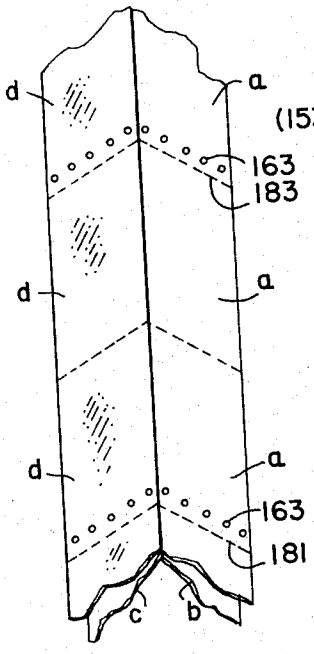


FIG. 4

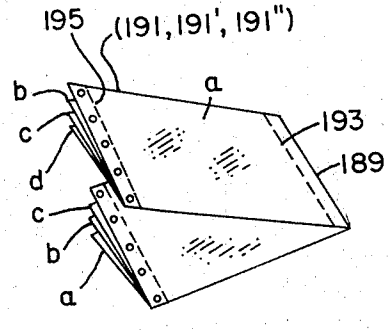


FIG. 6

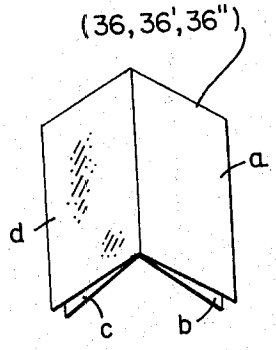


FIG. 7

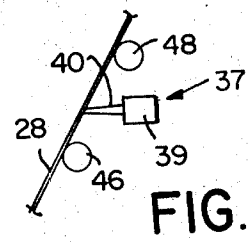


FIG. 1A

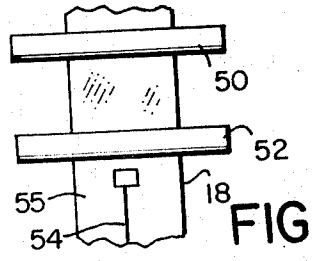


FIG. 1C

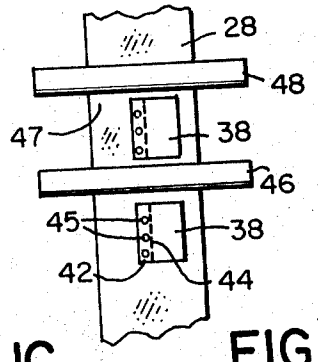


FIG. 1B

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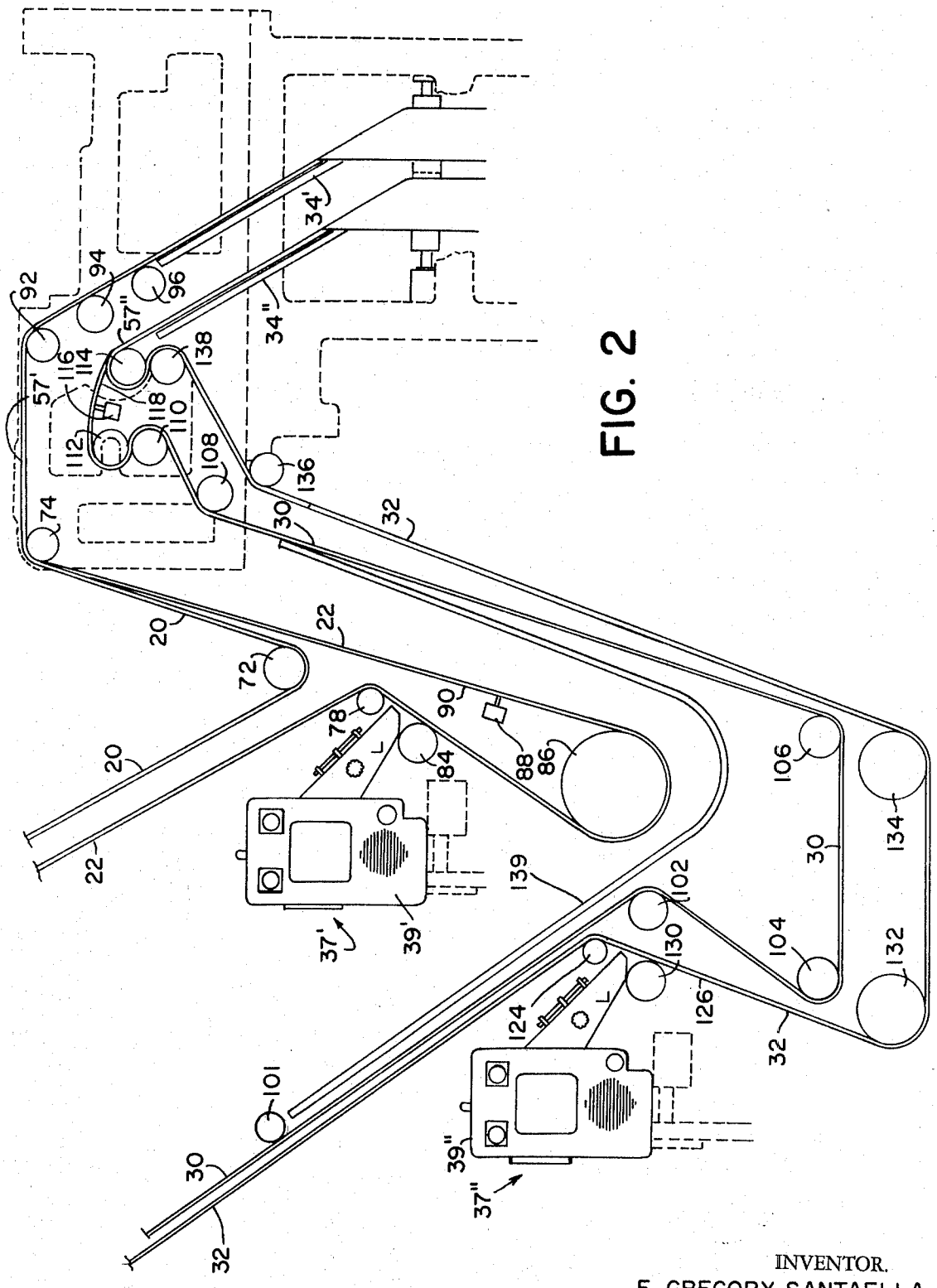


FIG. 2

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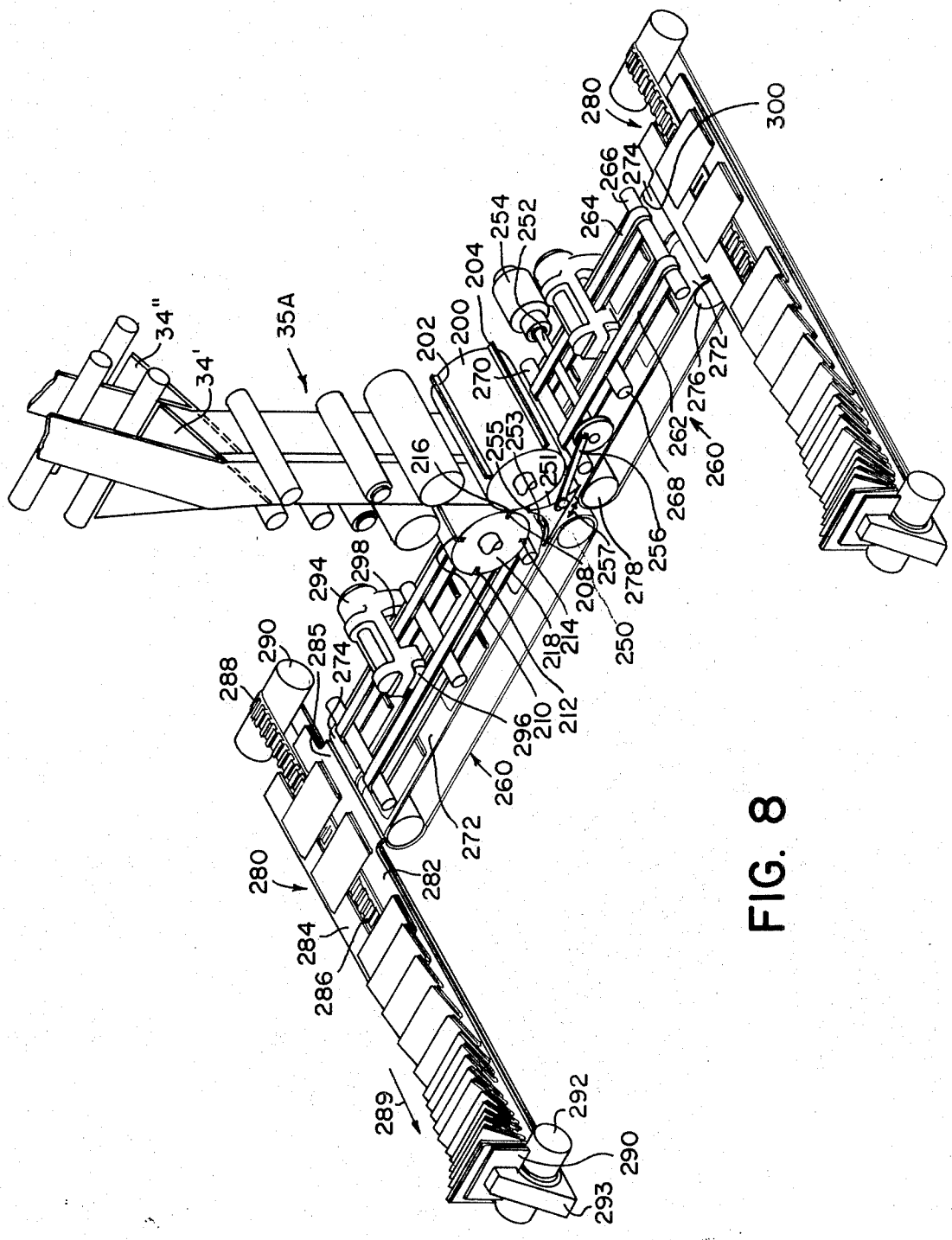


FIG. 8

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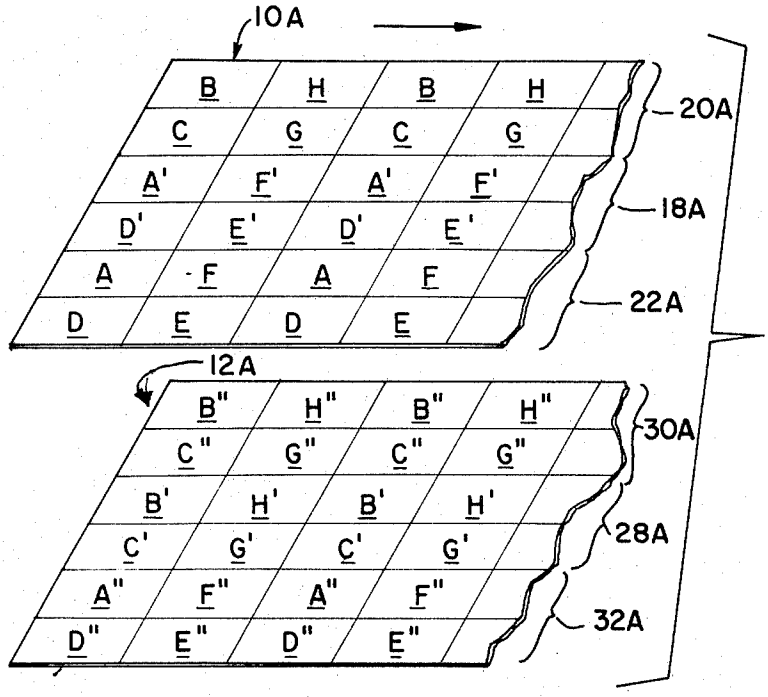


FIG. 9

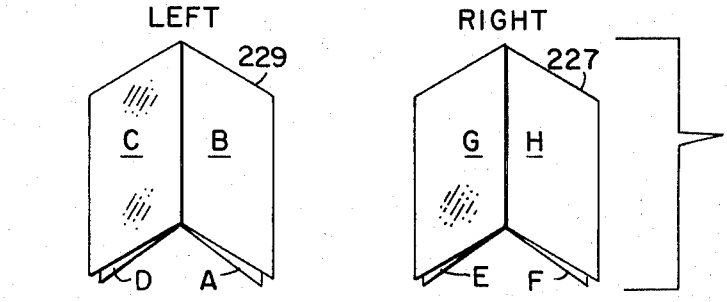


FIG. 11

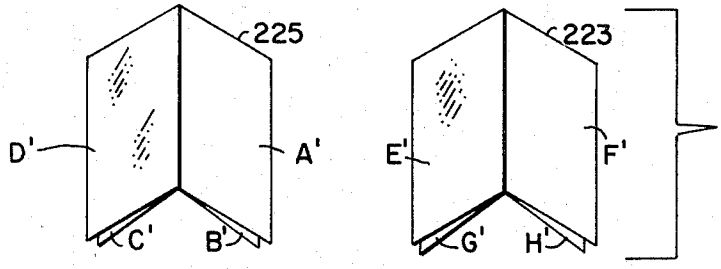


FIG. 10

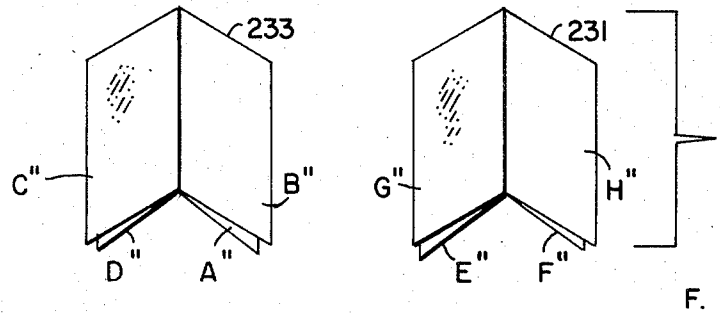
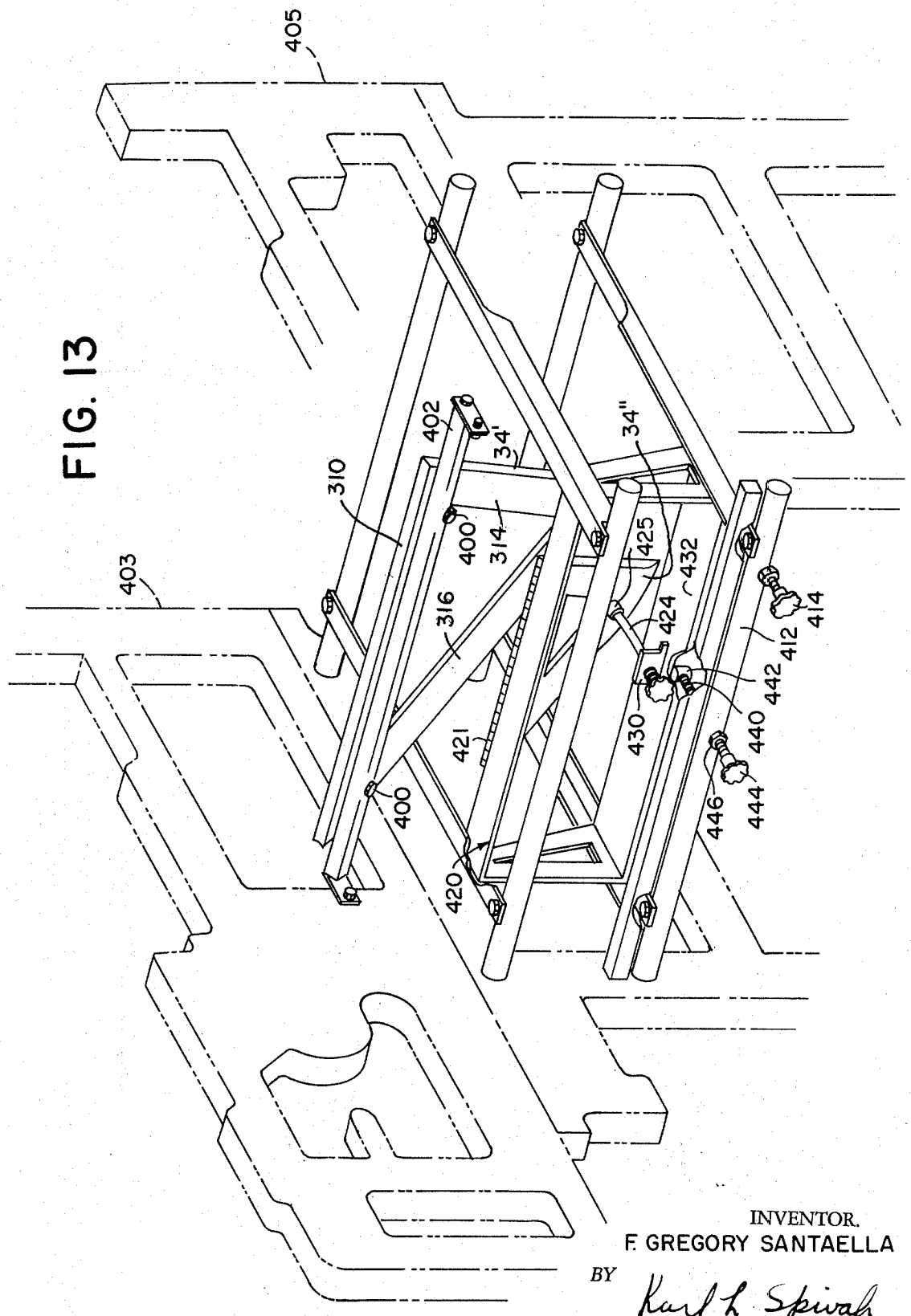


FIG. 12

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FIG. 13



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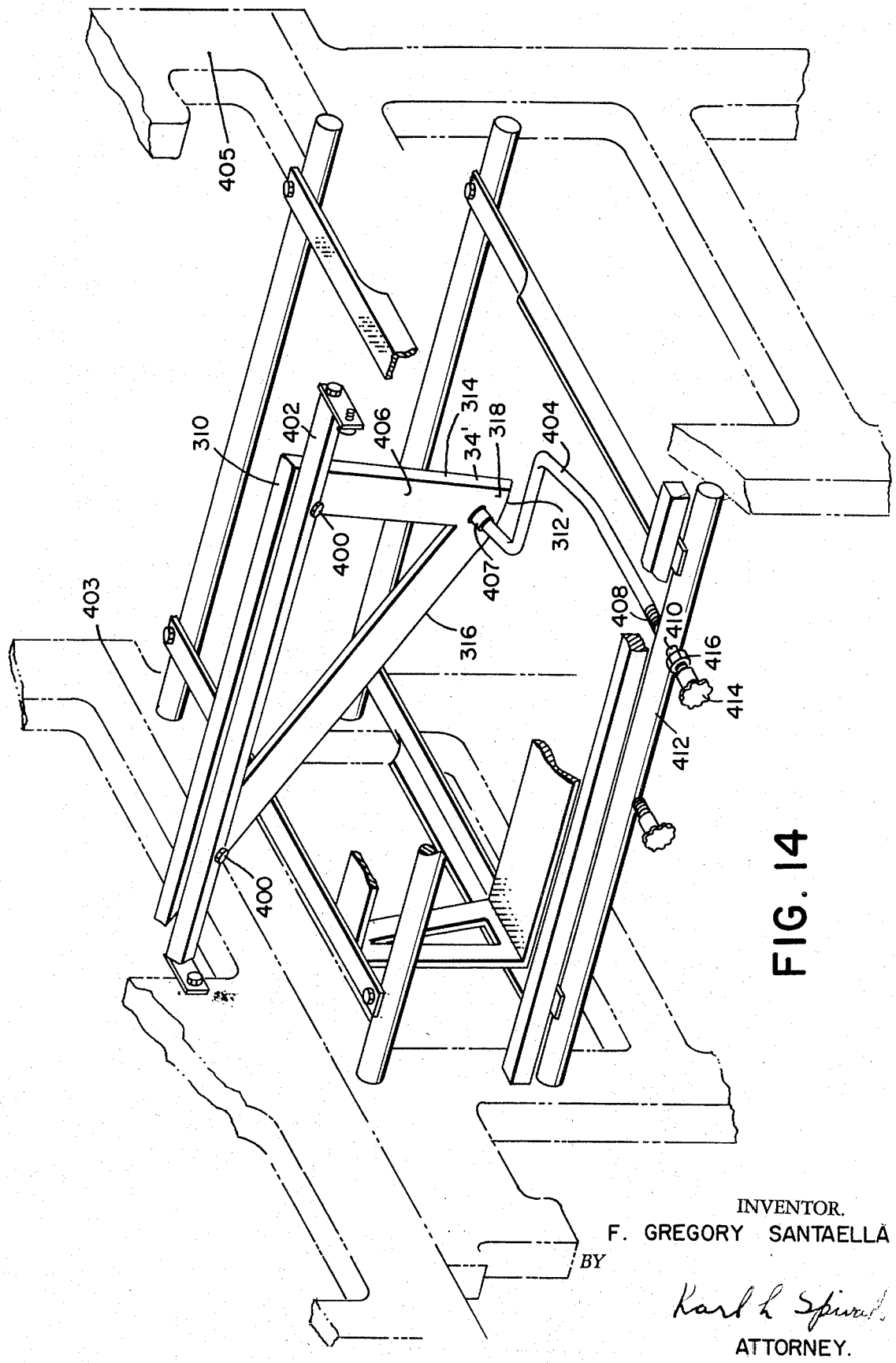


FIG. 14

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METHOD AND APPARATUS FOR FORMING A PLURALITY OF BOOKLETS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method and apparatus for manufacturing booklets, or the like; and more particularly to a continuous, high-speed, mass production method for manufacturing a plurality of individual, multi-page booklets having an insert member affixed thereto, and to the apparatus for making such booklets.

2. Description of the Prior Art

In a patent application entitled Method of Printing and Folding a Mailing Piece, Ser. No. 813,892, filed Apr. 7, 1969, and assigned to the assignee of this application, now Pat. No. 3,579,947, a method and apparatus is disclosed for continuously manufacturing individual multi-page booklets having return envelopes removably affixed thereto. The multi-page booklets are made from a single, unsevered, continuous web of previously printed paper. The printed material contained in each mailing piece is printed across the entire transverse extent of the continuous web. To manufacture an eight-page mailing piece having an elongate dimension x by the method disclosed in Ser. No. 813,892, twice that amount, $2x$, of continuous, previously printed web material must be fed through the forming section of the apparatus.

SUMMARY OF THE INVENTION

This invention relates to a mass production method and apparatus for manufacturing individual multi-page booklets each having a removable insert member, such as a return envelope, affixed thereto. This invention is an improvement over the method and apparatus disclosed in Ser. No. 813,892.

The word "booklet" as employed in this specification includes a plurality of bound or unbound sheets of printed matter either with or without a cover. In the method and apparatus of this invention, at least one continuous web of previously printed paper (e.g. printed by a rotary press) is severed into continuous ribbons. Each ribbon has printed material across the width thereof which constitutes approximately four pages, or two leaves, of the multi-page booklets. Additionally, an unfolded ribbon of two pages could be employed. A plurality of removable insert members, such as return envelopes, are affixed to some of the continuous ribbons at pre-selected longitudinal intervals such that each individual booklet will have at least one insert member affixed thereto. The continuous ribbons are folded to form continuous booklets, and then severed at spaced intervals to form the individual booklets. Alternatively, predetermined ribbons are secured to each other along their respective longitudinal axes to form sets of ribbons prior to the folding and severing operations. The number of ribbons within each set will be determined by the number of pages required in the individual booklets, e.g. a set consisting of two ribbons is formed into individual, eight-page (four leaves) booklets.

In one form of the invention the individual multi-page booklets are formed by transversely severing the continuous booklets (containing one or more continuous ribbons) at longitudinally spaced intervals equal to twice the height of each individual booklet, whereby individual groups of two booklets are formed. Each group of two booklets is then folded along a transverse medial line which separates the individual booklets and is then sevred closely adjacent the fold line to form two separate individual booklets.

In a second form of the invention the individual multi-page booklets are formed by transversely severing the continuous booklets (containing one or more continuous ribbons) at longitudinal intervals equal to the height of each individual booklet, whereby individual booklets are severed in one step from the continuous booklets. Individual booklets containing identical subject matter are fed to the same collection area. If two different booklets are formed at a particular forming section, they are fed to separate collection areas.

The apparatus of this invention has two former members aligned with a common forming section. A continuous ribbon, or set of ribbons, is fed over each former member where it is folded along its longitudinal axis to form continuous multi-page booklets. One of the former members is disposed behind the other and is mounted for linear movement to permit both forward and backward adjustment to regulate the spacing between the continuous booklets in the forming section. The output is doubled by utilizing two former members, instead of one, in conjunction with a single forming section.

In accordance with this invention, an eight-page booklet having an elongate dimension x is formed by feeding x amount of web material (a set consisting of two ribbons secured together) through the forming section. Therefore, for a given web speed, twice as many eight-page booklets can be manufactured from a continuous run of printed web passing through the forming section of this invention, as compared to the forming section disclosed in Ser. No. 813,892. If desired, a four page booklet could be produced by this apparatus by feeding a single ribbon through the forming section.

Further in accordance with this invention, the printed material contained in each booklet is printed along the entire transverse extent of each ribbon. Therefore, the printed material along the entire transverse extend of each continuous web (containing several ribbons) is for more than a single booklet. By severing the continuous web into ribbons, the output according to the method of this invention is greater than the output according to the method disclosed in Ser. No. 813,892. The exact increase in output is determined by the number of continuous webs utilized in the process of this invention, the number of ribbons severed from each continuous web and the number of pages included in each booklet.

It is therefore an object of this invention to provide an improved method and apparatus for forming a plurality of booklets with return inserts of the type set forth.

It is another object of this invention to provide a novel method and apparatus for forming a plurality of booklets that is reliable in operation, rapid in production and rugged in construction.

Other objects and a fuller understanding of the invention will be had by referring to the following description and claims of a preferred embodiment thereof, taken in conjunction with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 1' comprise an isometric view of the apparatus of this invention.

FIG. 1A is a view along Line 1A—1A of FIG. 1, looking in the direction of the arrows.

FIG. 1B is a view along Line 1B—1B of FIG. 1 withh the envelope feeding apparatus removed, looking in the direction of the arrows.

FIG. 1C is a view along Line 1C—1C of FIG. 1, looking in the direction of the arrows.

FIG. 2 is a side elevational view of a portion of the apparatus shown in FIG. 1.

FIGS. 3 – 7 are views showing various states of product formation according to the method of this invention.

FIG. 8 is a second embodiment of a forming section which can be utilized in the apparatus shown in FIG. 1.

FIG. 9 indicates one arrangement of printed matter on two continuous webs.

FIGS. 10 – 12 show the finished multi-page booklets formed from the continuous webs shown in FIG. 9.

FIG. 13 is a rear isometric view showing the mounting arrangement for two of the former members utilized in the apparatus of this invention.

FIG. 14 is an enlarged, rear isometric view showing the mounting arrangement for the two former members shown in FIG. 13, with one former member and portions of its supporting structure removed and broken away to show details of construction of the other of said former members.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTON

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure of my invention selected for illustration in the drawings, and are not intended to define or limit the scope of the invention.

Referring to FIG. 1, an upper and lower continuous web of previously printed paper **10, 12,** respectively, are fed through the apparatus **13** of this invention. The upper continuous web **10** is fed past spaced rotary slitter rolls **14, 16** and is slit into a center ribbon **18** and two outer ribbons **20, 22.** The lower continuous web **12** is fed past spaced, rotary slitter rolls **24, 26,** and is slit into a center ribbon **28** and two outer ribbons **30, 32.**

Referring now to FIG. 3, the upper and lower continuous webs **10, 12,** respectively, are printed in a specific arrangement as indicated at *a, b, c* and *d.* The regions designated by *a* have the same subject matter therein, and this same condition holds true for the regions designated by *b, c* and *d,* respectively.

The two center ribbons **18, 28** are superimposed over each other, secured to each other along their longitudinal axes and feed over a first former member **34** and through a first forming section **35** to form a plurality of multi-page booklets **36** (FIG. 7). The center ribbon **28** of the lower continuous web **12** is fed past an insert applying station **37** prior to being secured to the center ribbon **18,** and prior to being fed over the first former member **34** (FIG. 1A). Individual inserts, which may be envelopes **38** are secured at spaced, longitudinal intervals along the longitudinal axis of a web section, for example web section **28** (FIG. 1B). These inserts are fed at spaced intervals from a conventional insert feeding apparatus **39** sold under the trademark Ad-A-Card. See FIG. 1A. This insert feeding apparatus **39** is described in FIG. 1 of co-pending application Ser. No. 813,892 filed Apr. 7, 1969, and assigned to the assignee of this application. The Ad-A-Card insert feeding apparatus **39** separates individual envelopes **38** from a continuous roll of envelopes. Each envelope is separated from its adjacent envelope in the roll by a transverse line of perforations.

The removable envelopes **38** are attached to a feeding strip **42** by a line of perforations **44** (FIG. 1B). The feeding strip has a plurality of openings **45** therein for receiving pins of a feeding roller (not shown) contained in the Ad-A-Card feeding apparatus. A the feeding strip (and the envelopes secured thereto) is fed over the pinned feeding roller the individual envelopes **38** are separated from the continuous roll along the transverse lines of perforations. Adhesive is applied to the feeding strip prior to the separation of individual envelopes **38** from the continuous roll of envelopes. The individual envelopes **38** are then fed in spaced relationship along a chute **40** (FIG. 1A) to a ribbon, for example the lower center ribbon **28.** Each envelope **38** is secured by its attached feed strip **42** to surface **47** of the center ribbon **28.** The securing operation is accomplished by pressing the feed strip against the surface **45** with a press roller **46.** The lower center ribbon **28** is propelled over a guide and tensioning roller **48** prior to being fed past the envelope applying station **37** (FIGS. **1, 1A** and **1B**).

Referring now to FIGS. **1** and **1C**, the upper center ribbon **18** passes over guide rollers **50, 52.** A stripe or spot of the glue **54** is applied to the surface **55** of the center ribbon **18** as it passes over the guide roller **52** (FIG. 1C). If desired, the glue **54** can be eliminated and the pages could simply be folded together. The upper and lower center ribbons **18, 29** are fed over a marrying roller **56** where they are secured to each other by the longitudinal stripe of glue **54** to form a first set of secured continuous ribbons **57** (FIG. **1**).

The two outer ribbons **20, 22** of web **10** and the two outer ribbons **30, 32** of web **12** are respectively superimposed in spaced vertical alignment, i.e. their longitudinal axes are all aligned in the same vertical plane. The superimposing of outer ribbons is affected by feeding the outer web sections **20, 22, 30, 32** over turning assemblies. Each turning assembly is comprised of mutually perpendicular first and second turning bars **60, 62,** respectively, and a third turning bar **64.** The turning bars **60, 62** are disposed at a 45° angle to the longitudinal axis of its respective outer ribbon; and the third turning bar **64** is substantially parallel to the axis of its respective outer ribbon (FIG. **1**). The outer ribbons **20, 22** are secured to each other along their longitudinal axes, and are fed to a second former member **34'** and through a second forming section **35'** to form a plurality of multi-page booklets **36'** (FIG. 7). The outer ribbons **30, 32** are secured to each other along their longitudinal axes and fed over a third former member **34''** and through the second forming section **35'** to form a plurality of multi-page booklets **36''** (FIG. 7).

Referring to FIGS. **1** and **2,** the method and apparatus for forming booklets from the continuous outer ribbons **20, 22** will now be described in detail. The outer ribbon **20** is passed over the guide roller **70,** under the

guide roller **72** and is married to the outer ribbon **22** at a marriage roller **72.** The outer ribbon **22** is fed over the guide rollers **76, 78,** and past the insert applying station **37'** prior to being fed to the marriage roller **74.** The insert applying station **37'** is comprised of an Ad-A-Card unit **39'** which is the same as the one described supra.

Individual inserts such as return envelopes are secured at spaced, longitudinal intervals to any ribbon, for example ribbon **22,** along the longitudinal axis or any other part thereof by a presser roll **83** in the same manner as the individual inserts **38** are attached to center ribbon **28.** The oute ribbon **22,** with the individual inserts spaced along the surface, preferable at the longitudinal axis thereof, is passed over a turning roller **87** and past a glue applying station **88** at which a stripe of glue is applied along the longitudinal axis of the surface **90** (FIG. **2**). If desired in the final product, the glue could be applied in spots or even, could be entirely eliminated. The outer ribbon **22** is then married to the outer rinbon **20** at the marriage roller **74** to form a second set of secured continuous ribbons **57'** is then fed over a series of guide rollers **92, 94** and **96**; over the second former member **34'** and through the second forming section **35'** to form a plurality of individual multi-page booklets having at least one insert removably secured therein. The second forming section **35'** is identical to the first forming section **35** and will be described later.

Referring to FIGS. **1** and **2,** the method and apparatus for forming a plurality of individual multi-page booklets with inserts removably secured therein from the outer ribbons **30, 32** will now be described in detail. As the outer ribbon **30** comes off turning bar **60,** it is fed over guide rollers **100, 101, 102, 104, 106** and **108** (FIGS. **1** and **2**). The ribbon **30** is then fed between the nip defined by guide rollers **110, 112** and is married to the outer continuous ribbon **32** at the marriage roller **114.** The outer ribbon **30** is fed past a glue applying station **116** prior to being fed to the marriage roller **114,** and a stripe of glue or spots are applied along the surface **118** of said outer ribbon **30** preferably at the longitudinal axis thereof. (FIG. **2**). If the pages need not be secured in the final product, the gluing operation can be omitted. Prior to marrying the outer ribbons **30, 32,** the outer ribbon **32** is fed over the guide rollers **120, 122** and **124.** As the outer ribbon **32** passes the guide roller **124** (FIG. **2**), individual inserts are applied to the surface **126** at spaced, longitudinal intervals at an insert applying station **37''** in the same manner as the individual inserts **38** are attached to center ribbon **28.** These inserts are fed from an Ad-A-Card unit **39''** which is identical to the one described previously. The individual inserts are secured to the surface **126** (FIG. **1** and **2**) of the outer ribbon **32** by a press roller **130** and preferably overlie the longitudinal axis of the ribbon. After the outer ribbon **32** passes the press roller **130** it is fed over guide rollers **132, 134, 136** and into the nip defined between guide roller **138** and marriage roller **114.** The married outer ribbons **30, 32** are secured to each other by the stripes of glue applied to surface **118** of outer section **30** to form a third set of continuous ribbons **57''**. The third set of ribbons **57''** is fed over the third former member **34''** and through the same second forming section **35'** as the second set of ribbons **57'**.

Referring to FIG. **1,** the details of construction of the first forming section **35** and the second forming section **35'** will now be described, it being understood that both forming sections are not identical but are similar in operation. The three sets of ribbons **57, 57'** and **57''** are fed over their respective former members **34, 34'** and **34''** into the elongate nip defined by driven former rollers **150, 152.** As the three sets of ribbons are fed over their respective former members and between the driven former rollers **150, 152,** they are longitudinally folded along their longitudinal axes to define three identical continuous runs of eight-page (four leaves) booklets **153, 153'** and **153''** (FIGS. **1** and **4**). Each continuous run of booklets is directed over a tension roller **154** by power driven feed rollers **156, 158.** Each continuous run of booklets is then fed through the nip of driven perforating rollers **160, 162,** to form longitudinally spaced, transverse lines of perforations **163.** (FIG. **4**). The transverse lines of perforations **163** are formed by perforating pins **164** which are secured within the perforating roller **160.** These perforating pins mate with aligned openings (not shown) formed in the opposed perforating roller **162.** Each continuous run of booklets **153, 153', 153''** is then passed between a knife cylinder **168** and a pin and tucker cylinder **170.** A row of pins **171** on the pin and tucker cylinder **170** engage within the openings of a transverse line of perforations **163** (FIG. **4**) to pull each continuous run of booklets about its respective pin and tucker cylinder **170.** Diametrically opposed knives **172, 174,** which are fixed within the knife cylinder **168,** cooperate with recesses **176, 178,** respectively, in the pin and tucker cylinder **170** to transversely cut each continuous run of booklets **153, 153'** and **153''** along lines **181, 183** (FIG. **4**) to form groups of two, eight-page booklets **179, 179', 179''** (FIG. **5**). The pin and tucker cylinder **170** of each forming section rotates the groups of two booklets to the jaw and tucker cylinder **190.** Jaws **182, 184** of the pin and tucker cylinder cooperate with diametrically opposed tuckers **186, 188** on the jaw and tucker cylinder **190** to fold each group of two booklets **179, 179', 179''** along a transverse medial line **189** to form folded groups of booklets **191, 191', 191''** (FIG. **6**). The jaw and tucker cylinder **190** feeds the folded groups of booklets to a delivery conveyor **192** which is driven by power rollers **194, 196** in a usual manner. The delivery conveyor **192** delivers the folded groups of booklets **191, 191', 191''** to a further finishing station wherein end portions of each group of folded booklets are severed along transverse lines indicated at **193, 195** (FIG. **6**). This severing operation forms two individual eight-page booklets (one being shown in FIG. **7**) with a removable return insert affixed therein from each of said groups of booklets (**191, 191', 191''**). The finishing station (not shown) may be similar to the finishing chopper station shown in FIG. **1** of application Ser. No. 813,892.

Referring to FIG. **8,** a second embodiment of a forming section **35A** will be described. The forming section **35A** can be substituted for either one or both of the forming sections **35, 35'** shown in the apparatus **13** of FIG. **1.** The specific forming sections which are utilized will depend upon the particular production requirements. The forming section **35A** is shown in FIG. **8** as being aligned with the second former member **34'** and the third former member **34''**. This forming section **35A** is provided with a knife cylinder **200** having four knives **202, 204, 206** and **108** disposed along the periphery thereof at ninety degree intervals. The knives

are adapted to cooperate with opposed slits **210, 212, 214** and **216** in a knife-cooperating cylinder **218,** to sever each continuous run of booklets into individual multi-page booklets, each one having at least one return insert affixed therein. In this embodiment the continuous runs of booklets are cut in longitudinal intervals equal to the height of a single booklet, and the transverse folding of groups of two booklets is eliminated. The forming section **35A** does not form transverse lines of perforations in the continuous runs of booklets. Therefore a pin and tucker cylinder and the jaw and tucker cylinder are not required.

A mechanically activated guide **250** has concave guide surfaces **251, 253** which terminate in an upper elongate edge **255.** The guide **250** is disposed with its elongate edge **255** adjacent the nip defined between the knife cylinder **200** and knife-cooperating cylinder **218.** The guide is mounted for transverse reciprocating movement in the direction indicated by arrow **257** by any conventional mounting means (not shown). A drive shaft **252** of motor **254** is connected to the guide **250** through an arm **256** which is eccentrically mounted to the drive shaft. The rotation of drive shaft **252** is translated into reciprocating, transverse movement of the guide **250** in the direction indicated by arrow **257.** The motor is synchronized in conventional manner with the various elements of the forming section **35A** to guide adjacent individual booklets in opposite directions from the forming section **35A.** As each booklet exits from the nip defined between the knife cylinder **200** and its cooperating cylinder **218,** it is engaged by the right and left take off conveyor units **260** which direct the finished booklets away from the forming section **35A.** The guide **250** serves to direct successive booklets in opposite direction along the right and left conveyor units **260** to thus facilitate continuous operation without slow-down by providing sufficient space in the system to compensate for the slight hesitation inherent in any web cutting operation.

Each conveyor unit **260** is provided with upper spaced belts **262, 264** which are trained about rollers **266, 268** and **270,** at least one of which is driven. In addition, each conveyor unit **260** is provided with a pair of lower spaced belts **272, 274** which are trained about spaced power-driven rollers **276, 278.** Each conveyor unit **260** feeds the indivdual booklets to an assembling conveyor unit **280.**

Each of the assembling conveyor units **280** is comprised of spaced upper plate members **282, 284** between which an upper run **286** of a conveyor belt **288** is directed. The conveyor belt **288** is mounted for movement about a pair of power driven rollers **290, 292.** The upper plate member **282** has a lip **285** which is disposed close to the lower spaced belts **272, 274** for assuring a positive and reliable transfer of the individual booklets onto the assembling conveyor unit **280.** The upper run **286** of the conveyor belt **288** is driven in the direction indicated by the arrow **289** to feed the finished booklets into a horizontally stacked relationship against a stop plate **290** which is attached to a rigid support member **293.**

A cutter unit **294** is disposed adjacent each of the conveyor units **260.** Each cutter unit **294** has a pair of rotating spaced cutting wheels **296, 298.** The cutting wheels **296, 298** trim the longitudinal free edges of the finished booklets as they are fed past the cutter unit. The rotating cutting wheel **296** of each cutter unit **294** is aligned with the space defined between the upper belts **262, 264** and the space defined between lower belts **272, 274.** The cutting wheel **298** is disposed closely adjacent, but beyond the outer edge **300** of the lower conveyor belt **274.**

The arrangement of printed subject matter on a continuous upper web **10A** and a continuous lower web **12A** is shown in FIG. **9.** Six different eight-page booklets **223, 225, 227, 229, 231** and **233** are formed from the upper and lower continuous webs **10A, 12A** (FIGS. **10, 11** and **12**). The regions designated with the same letter (e.g.A) in FIG. **9** contain the same printed subject matter.

FIG. **10** shows two different finished booklets **223, 225** which are formed from the set of center ribbons **18A, 28A** (FIG. **9**) at the first forming section. Adjacent individual booklets **223, 225** are fed in opposite directions by conveyor units **260.**

FIG. **11** shows two different booklets **227, 229** which are formed from the set of secured outer ribbons **20A, 22A** (FIG. **9**) at the second forming section. Adjacent finished booklets **227, 229** are fed in opposite directions from the second forming section by conveyor unit **260.**

FIG. **12** shows two different booklets **231, 233** which are formed from the third set of secured outer ribbons **30A, 32A** (FIG. **9**) at the same second forming section at which booklets **227, 229** are formed. Adjacent booklets **231, 233** are fed in opposite directions by conveyor units **260.**

Six different eight-page booklets can be formed utilizing the forming section **35A** shown in FIG. **8** in place of forming sections **35** and **35'** shown in FIG. **1.** Any other combination of like booklets can be formed. The exact type of booklets formed will depend upon the specific arrangement of printed material on the continuous webs **10A, 12A** (FIG. **9**).

When forming four different booklets over the second and third former members and through the second forming section shown in FIG. **8,** the assembling conveyor unit **280** is modified to provide two separate continuous runs feeding laterally in opposite directions from the conveyor unit **260.** This arrangement of an assembling conveyor **280** separates the four different booklets which are formed.

The apparatus of this invention can be used to manufacture multipage booklets from only a single continuous web of printed paper or from multiple webs of printed paper. Individual ribbons formed by severing either a single web or multiple webs of printed paper can be fed individually to separate forming sections. Alternatively, pre-selected ribbons can be secured to each other to form sets of ribbons which are fed to forming sections. The precise number of ribbons in each set will be determined by the number of pages which are required in the finishing booklets.

Referring now to FIGS. **13** and **14,** the specific mounting arrangement for the former member **34, 34', 34''**, and the structure of the former members will be described. Each of the former members are identical. Referring to FIG. **14,** these former members have an upstream end **310,** a downstream end **312,** and side margins **314, 316** which converge in a downstream direction to form nose section **318.** The nose section of each former member is aligned with the elongate nip defined between driven former rollers **150, 152** (FIG. **1**).

FIGS. 13 and 14 show the mounting arrangement for the second former member 34' and the third former member 34''. The first former member 34 can be mounted in a manner similar to the second or third former member 34'. The second former member 34' and the third former member 34'' are aligned with the second forming section 35'. The second former member 34' is mounted by bolts 400 to a bar 402 which is rotatably mounted to supporting end members 403, 405 of the apparatus 13. The second former member 34' can be rotatably adjusted through the interconnection of a rod 404 with the back wall 406 of the second former member. The forward end of the rod 404 is disposed within a hollow ferrule 407 in the preferred embodiment of the invention. It is understood that any suitable connection means can be utilized to interconnect the rod 404 with the second former member 34'. The rear end of rod 404 is provided with external threads 408 which engage with internal threads of opening 410 extending through a mounting rod 412. The mounting rod 412 is fixedly secured to the supporting end members 403, 405.

The rear end of the rod 404 is provided with a handle 414 which can be turned in opposite directions to provide rotatable adjustment of the second former member 34' to properly align the second former member 34' for receiving continuous ribbons. A locknut 416 is rotated until it firmly engages the mounting rod 412 after the second former member has been properly adjusted. This arrangement assures that undesired movement of the rod 404 and therefore undesired movement of the second former member, does not occur.

The third former member 34'' is mounted through a hinged connection 421 to a laterally movable carriage 420 (FIG. 13). The third former member is rotatably mounted through the hinged connection, and the rotatable position can be set through an adjusting rod 424. The rod 424 has its forward end inserted into a hollow ferrule 425 and its rearward end provided with external threads for cooperating with internal threads of an upright member 430. The upright member 430 is secured to the lower wall 432 of the laterally movable carriage 420.

A carriage adjusting screw 440 is mounted through a threaded opening in the mounting rod 412, and is secured at a forward end to a lower mount 442. The lower mount 442 is secured to the underside of the lower wall 432 of the carriage 420. The rearward end of the carriage adjusting screw is provided with a handle 444 and a locknut 446 for permitting lateral adjustment of the carriage 420, and therefore the third former member 34''.

By mounting the third former member 34'' for backward and forward adjustment, the distance between the two continuous runs of booklets passing through the second forming section can be adjusted (FIG. 8). This type of adjustment is important when forming multipage booklets from different width ribbons. To further explain, when the width of the continuous ribbons passing over the second former member 34' is different from the width of the continuous ribbons passing over the third former member 34'' it may be necessary to adjust the relative position of the two former members to prevent interference of the runs of continuous booklets as they pass through the second forming section 35'. Also, the backward and forward adjustability of the third former member 34'' permits proper alignment of the free longitudinal edge of the booklets (the edge opposite from the longitudinal fold) formed from the continuous ribbon, or ribbons, passing over said third former member 34'' with the cutting wheels 298 of the cutter 294 to sever a predetermined portion of the booklets to reduce their width. The ability to provide a reduced width booklet or like article cannot be accomplished with the prior art, stationary former members.

I claim:

1. In an apparatus for forming a plurality of booklets or the like, from two continuous webs containing printed matter, the combination of

A. slitter rolls dividing each web into a center ribbon and right and left outer ribbons;

B. means to arrange the various ribbons into first, second and third superimposed pairs of continuous ribbons;

C. a first former member having a first nose section,

1. said first former member including first guide means to guide the first pair of continuous ribbons over the first nose section to form a first longitudinal fold;

D. a first forming section receiving the first pair of folded continuous ribbons from the first former member,

1. said first forming section including a pair of cooperating driven former rollers which define a first nip therebetween,

2. said first nose section being aligned with the said first nip to direct the first pair of folded continuous ribbons thereto;

E. second and third former members, each former member having an upstream end, a downstream end and side margins, the side margins of each of said second and third former members converging in a downstream direction to form respectively a second nose section and a third nose section at said downstream end;

F. guide means disposed upstream of each second and third former member for guiding one of said second or third pairs of continuous ribbons to each second or third former member to form second and third longitudinal folds;

G. a second forming section receiving the second and third pairs of continuous ribbons from the second and third former members,

1. said second forming section including a pair of cooperating driven former rollers which define a second nip therebetween,

2. said second nose section and third nose section each being aligned with the said second nip to direct the second and third pairs of folded, continuous ribbons thereto;

H. mounting means for mounting said second and third former members with their respective nose sections aligned with the elongate second nip of said driven former rollers of the second forming section,

1. said mounting means including means for permitting at least one of said second or third former members to be pivotally adjusted,

2. said mounting means including a carriage, securing means for attaching at least one of said second or third former members to said carriage and

track means to linearly move the carriage relative to the driven former rollers;

I. adjustment means for permitting linear movement of one of said second or third former members relative to the driven former rollers for permitting adjustment of said second or third former members relative to each other;

J. severing means for severing the runs of first, second and third pairs of folded continuous booklets to form a plurality of individual booklets, said booklets having longitudinal edges,

1. said securing means comprising hinge means for permitting pivotal adjustment of said at least one said second or third member relative to said carriage; and

K. cutting means disposed downstream from said severing means for trimming the longitudinal free edges of the booklets which are formed by severing at least one of the runs of continuous booklets,

1. at least one of the runs of continuous booklets being formed over the nose section of the second or third former member which is mounted for linear movement to thereby permit adjustment relative to said cutting means of the longitudinal free edges of the booklets which are formed by severing said at least one of the runs of continuous booklets.

2. In an apparatus for forming a plurality of booklets, or the like, from two continuous webs containing printed matter, the combination of

A. slitter rolls dividing each web into a center ribbon and right and left outer ribbons;

B. means to arrange the various ribbons into first, second and third superimposed pairs of continuous ribbons;

C. a first former member having a first nose section,

1. said first former member including first guide means to guide the first pair of continuous ribbons over the first nose section to form a first longitudinal fold;

D. a first forming section receiving the first pair of folded continuous ribbons from the first former member,

1. said forming section including a pair of cooperating driven former rollers which define a first nip therebetween,

2. said first nose section being aligned with the said first nip to direct the first pair of folded continuous ribbons thereto;

E. second and third former members, each former member having an upstream end, a downstream end and side margins, the side margins of each of said second and third former members converging in a downstream direction to form a second nose section and a third nose section at the said downstream end;

F. guide means disposed upstream of each second and third former member for guiding one of said second or third pairs of continuous ribbons to each second or third former member to form second and third longitudinal folds;

G. feed means disposed downstream of said second and third former members for feeding said second and third pairs of continuous ribbons in a downstream direction over the nose sections of said second and third former members to fold said pairs of continuous ribbons longitudinally to form runs of continuous booklets, said feed means comprising aligned, elongate feed rollers defining an elongate second nip therebetween;

H. mounting means for mounting said second and third former members with their respective nose sections aligned with the elongate second nip of said feed rollers,

1. said mounting means including means for permitting at least one of said second or third former members to be pivotally adjusted,

2. said mounting means including a carriage, securing means for attaching at least one of said second or third former members to said carriage and track means to permit linear movement of the carriage relative to the feed rollers,

a. said securing means comprising hinge means to permit pivotal adjustment of at least one said second or third former member relative to the carriage;

I. adjustment means for permitting linear movement of at least one of said second or third former members relative to the feed rollers for permitting adjustment of said former members relative to each other,

1. one of the runs of continuous booklets being formed over the nose section of the second or third former member which is provided with the said adjustment means to permit adjustment relative to the cutting means;

J. severing means for severing the runs of continuous booklets to form a plurality of individual booklets, the said booklets having longitudinal edges; and

K. cutting means for trimming the longitudinal free edges of the booklets,

1. said cutting means being disposed downstream from the severing means.

3. The invention of claim **2** wherein the first superimposed pair of ribbons comprises the center ribbon of the two webs.

4. The invention of claim **3** wherein the second superimposed pair of continuous ribbons comprises the right outer ribbon of each said web and the third superimposed pair of continuous ribbons comprises the left outer ribbon of each web.

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