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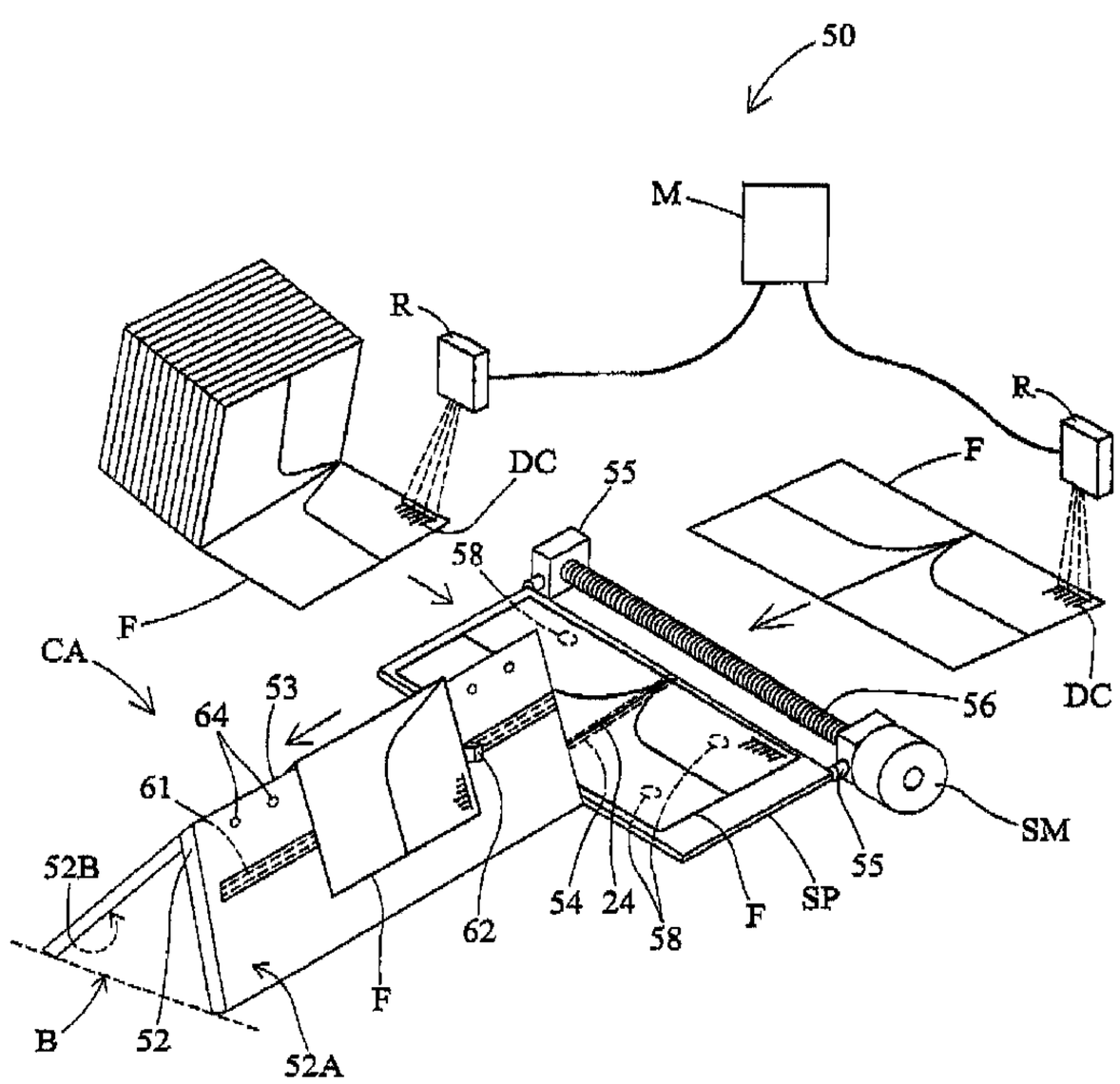


(57) Abrégé/Abstract:
A novel apparatus and method of automatically stuffing folder pockets includes providing a folder with one or more pockets; providing one or more inserts which can be of differing sizes; the accumulation of the one or more inserts in a stack for insertion into the one or more pockets of the folder; opening the one or more pockets of the folder; and the insertion of the accumulated stack of the one or more inserts into the one or more folder pockets. Predetermined inserts can be selectively processed and stuffed into selected folder pockets. An embodiment also can fold the folder, producing a final product of a stuffed folder ready for distribution.

Abstract of the Disclosure

A novel apparatus and method of automatically stuffing folder pockets includes providing a folder with one or more pockets; providing one or more inserts which can be of differing sizes; the accumulation of the one or more inserts in a stack for insertion into the one or more pockets of the folder; opening the one or more pockets of the folder; and the insertion of the accumulated stack of the one or more inserts into the one or more folder pockets. Predetermined inserts can be selectively processed and stuffed into selected folder pockets. An embodiment also can fold the folder, producing a final product of a stuffed folder ready for distribution.

Description

APPARATUS AND METHOD FOR STUFFING A FOLDER

Technical Field

The present invention relates generally to stuffing folders. More particularly, the present invention relates to an apparatus and method for automatically stuffing folder pockets.

Background Art

A variety of machines and methods exist for the stuffing of envelopes or other closed-end products. U.S. Patent No. 4,055,932 to Wanner discloses an envelope stuffing machine adapted to insert sheets of paper or the like between the sides of a cover which can be drawn apart by suction to accommodate the sheets. The device further comprises a pair of opposite perforated surfaces connected to a suction chamber and between which the envelope is introduced so as to draw the opposite sides of the envelope apart to receive the sheets to be inserted.

Additionally, U.S. Patent No. 3,999,701 to Ward; U.S. Patent No. 5,107,656 to Katz et al.; and U.S. Patent No. 5,475,968 to Linder all discuss devices for the insertion of sheets into an envelope-type packet. Ward discusses a currency-holding packet and a method of forming the packet and inserting bills of currency into the packet using prior art envelope stuffers. Katz et al. discloses a system for producing a mass distributable packet wherein a web of paper is provided and cut to form sheets. The sheets are then accumulated and stacked in a hopper and the bottom sets are successively removed and packaged in a standard envelope inserter. Linder describes a device to insert printed products into an envelope using a rotating conveying member that is equipped with receiving pockets that are distributed over its circumference and can be closed and opened.

Finally, U.S. Patent No. 4,295,643 to de la Vega; U.S. Patent No. 5,823,320 to Seidel et al.; and U.S. Patent No. 6,311,968 to Linder et al. all disclose devices for the transporting and inserting of flat products. Each of the references is directed to devices which may be used for the transportation of

newspaper jackets and insertion of various supplemental materials therein.

As shown in the prior art, the use of machines for the stuffing of envelopes or other closed-end products is well known in the industry. However, these particular designs have not addressed the insertion of sheet articles into one or more folder pockets. Stuffing of folder pockets in the past has involved manually registering accumulated inserts, placing them in folder pockets, and folding the folder manually to produce the final product of a stuffed folder. The stuffed folder is then typically placed onto either a stack or conveyor where it is often re-checked for quality control purposes. Because this is a manual procedure, it is time consuming and subject to integrity errors, such as missing an insert or mixing the order. In addition, because of the number of repetitive motions involved, hand-stuffing folders can cause health problems.

In light of the above, there exists a need therefore for an automated folder stuffing apparatus and method that overcomes the above described shortcomings.

Disclosure of the Invention

An automated folder stuffing apparatus and method is provided for stuffing a folder of the type that is foldable along a fold line and includes an inside surface and at least one pocket formed on the inside surface. The folder stuffing apparatus includes a conveyor for advancing a folder along a conveying surface of the conveyor, an opener for at least partially opening a pocket of the folder, and an inserter for inserting insert material into the folder pocket while the pocket is open. The conveyor surface can further include a plurality of vacuum ports and the conveyor can further include a rotatable endless member and a pusher element for engaging and advancing the folder along the conveyor surface. The inserter can further include an insert carriage member slidable along an insert track for releasably engaging the insert material and directing the insert material into the opened pocket. Readers can be included and utilized at various positions for reading data code, which can be on the insert material and even the folders, and the data read can be used to process items in a predetermined manner.

A method for stuffing insert material into a pocket of a folder includes advancing a folder along a conveyor surface while an outside surface of the folder slidably contacts the conveyor surface and a pocket of the folder faces outwardly in relation to the conveyor surface. The method further includes at least partially opening the folder pocket with an opener when the folder has reached an insertion site of the conveyor surface and inserting insert material into the folder pocket while the folder is at the insertion point. The insert material and even the folders can include data codes thereon which can be used for controlling various steps of processing as desired to ensure the integrity of assembled stuffed folders.

It is therefore an object to provide a novel automated folder stuffing apparatus and method for stuffing a folder having at least one pocket.

An object having been stated hereinabove, and which is achieved in whole or in part by the folder stuffing apparatus and method described herein, other objects will become evident as the description proceeds when taken in connection with the accompanying drawings as best described hereinbelow.

Brief Description of the Drawings

Exemplary embodiments of the invention will now be explained with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a folder with two pockets stuffed with insert material;

Figure 2 is a flow diagram illustrating an embodiment of the folder stuffing method;

Figure 3 is a partial isometric view of a feeding and conveying system for feeding insert material into the folder stuffing apparatus;

Figures 4A and 4B are isolated schematic isometric views of a folder feeding section of the folder stuffing apparatus;

Figure 5 is a partial schematic view of an embodiment of the folder stuffing apparatus;

Figure 6 is a partial isometric view of a folder stuffing stage;

Figure 7 is a front-end view of an embodiment of the folder stuffing apparatus;

Figure 8 is a side view of a clamping unit that can be used with the folder stuffing apparatus; and

Figure 9A – 9C are isolated schematic isometric views illustrating use of a folder folding section of the folder stuffing apparatus.

Detailed Description of the Invention

Referring now to FIG. 1, a sample folder **F** that can be stuffed by the apparatus and method described herein is shown. Folder **F** includes an outside surface generally designated **20**, an inside surface generally designated **22**, and a fold line **24** that runs down the middle of folder **F**, preferably separating both sides equally. The left side of folder **F** has a left inside panel **26** and a left flap **28**, wherein the void defined between left inside panel **26** and left flap **28** is the left pocket generally designated **LP**. Similarly, the right side of folder **F** has a right inside panel **26'** and a right flap **28'**, wherein the void defined between right inside panel **26'** and right flap **28'** is the right pocket, generally designated **RP**. Collated insert material, such as, for example, left pocket insert material generally designated **LM**, and right pocket insert material generally designated **RM**, can be inserted into the appropriate pockets **LP**, **RP** of folder **F** as described further below. Folder **F** can be considered to be in a folded state when an angle **A** between left and right inside panels **26**, **26'** is less than 180 degrees, and can be considered to be in an open state when angle **A** is greater than 180 degrees.

Referring now to FIG. 2, an overview of a preferred embodiment of the automated folder stuffing method is illustrated. A folder, such as folder **F**, of any suitable type with one or more pockets **LP**, **RP** can be automatically stuffed with accumulated pocket insert materials **LM**, **RM**, folded, and conveyed to a final destination for distribution. Stuffing can occur downstream of a device that is capable of transporting pre-collated material, typically collated by other mechanical means, such as by using push pins located along a transport surface. Primary product material, such as sheets, pamphlets, booklets, etc., can be received generally along a material feed or flow direction from an upstream location into the folder stuffing apparatus. In a preferred

embodiment, primary product material can be collated into left pocket insert material **LM** and right pocket insert material **RM**. Left pocket insert material **LM** and right pocket insert material **RM** can each constitute a different predetermined combination of primary product material (e.g., one or more individual sheets, a stapled set of sheets, cards, booklets, etc.) as desired by the user for stuffing left folder pocket **LP** or right folder pocket **RP**. Left pocket insert material **LM** and right pocket insert material **RM** can be conveyed in a manner in which they will alternate along the transport surface when moving towards the folder stuffing apparatus, such that left pocket insert material **LM** to be stuffed in left folder pocket **LP** will be followed by right pocket insert material **RM** to be stuffed in right folder pocket **RP**, and this series can repeat for sets 3 and 4, 5 and 6, etc. It is also envisioned that if a user desires to stuff only one pocket of folder **F**, such as, for example, right folder pocket **RP**, only right pocket insert material **RM** will be produced in a series for stuffing the right folder pocket **RP**.

Folder **F** to be stuffed can enter the folder stuffing apparatus by way of a separate conveyor that advances folder **F** along a conveying surface wherein folder **F** is in an open state. While running in parallel to the folder conveying system, left pocket insert material **LM** can enter a Stage 1 position where it can be mechanically stuffed into left folder pocket **LP** by a process to be described in more detail below. Right pocket insert material **RM** can pass through the Stage 1 position and enter a Stage 2 position where can be mechanically stuffed in a similar manner into right folder pocket **RP**. After folder pockets **LP**, **RP** are automatically stuffed with pocket insert materials **LM**, **RM**, respectively, and folder **F** is folded, the final product, a stuffed folder, can then be transferred to a downstream location generally along an exit or output direction.

Referring to FIG. 3 where the detailed illustration of stuffing folders begins, production of a stuffed folder begins with the delivery of assembled insert material, such as from a stack or an advanced stream, from any conventional device for assembling or processing such documents. Non-limiting examples of such devices include devices or systems including feeders,

cutters, readers, folders, stagers, and/or turnover devices. As illustrated in FIG. 3 in an exemplary embodiment, primary product material **PM** can comprise any documents suitable for assembly into a set of insert material and for stuffing into a folder as described above. As illustrated for exemplary purposes, primary product material PM comprises individual stacks of insert materials which can be fed from the side (preferably bound edge first and printed side face up for booklets, stapled sets of sheets, etc.) onto insert transport surface **42** to form assembled sets of materials, which can be left pocket insert material **LM** and right pocket insert material **RM**.

As can be appreciated by those of skill in the art, one or more pieces of primary product material **PM** can include data code **DC** thereon, shown in FIG. 3 as bar codes. Data code **DC** can be positioned in any suitable location on primary product material **PM** and can include any suitable readable data for feeding or processing instructions or for matching with one or more folder **F**. Readers **R** can be used to read data code **DC** from primary product material **PM** at any point during processing, such as prior to advancement onto insert transport surface **42**, while being advanced onto insert transport surface **42**, or at any desirable stage of processing after advancement onto insert transport surface **42**. For exemplary purposes only, reading is illustrated in FIG. 3 as occurring as primary product material **PM** is being advanced onto insert transport surface **42**. Readers **R** communicate with a central or local microprocessor **M** for processing of read data code **DC** and for controlling the processing of primary product material **PM**. The read data from data code **DC** can be used for selectively feeding certain primary product material **PM** in a predetermined manner and facilitating accurate matching and stuffing of primary product material **PM** with folders such as folder **F** and for verifying the integrity of stuffed folders, as further described hereinbelow.

In a preferred embodiment of stuffing a two pocket folder **F** with a left folder pocket **LP** and a right folder pocket **RP**, left pocket insert material **LM** and right pocket insert material **RM** can be assembled in a staggered, alternating order one behind the other. The controlled in-feed of primary

product material **PM** to form pocket insert materials **LM**, **RM** can be implemented by providing means for feeding primary product material **PM** in accordance with a repeatable (i.e., cyclical) profile. It is envisioned that this profile can be programmed to enable primary product material **PM** to be fed in a manner creating left pocket insert material **LM** and right pocket insert material **RM** or can be programmed to only enable primary product material **PM** to be fed in a manner creating one set of either left pocket insert material **LM** or right pocket insert material **RM** (such as, for example, if only the right pocket **RP** of folder **F** is to be stuffed). This profile can be suitably adjusted according to user specifications. Left pocket insert material **LM** and right pocket insert material **RM** can be accumulated and formed in alternate sets along insert transport surface **42** as they are directed toward the folder stuffing module.

It is preferable that all product material **PM**, whether individual sheets or multiple-sheet items such as stapled sheet sets or booklets, be fed onto insert transport surface **42** face up and in a left-to-right orientation. In the case of bound insert materials such as booklets and pamphlets, the left-to-right orientation means that product material **PM** is fed with its bound edge first, which is the orientation with which conventional inserter machines feed insert materials. As a result, the insert materials constituting each left pocket insert material **LM** and each right pocket insert material **RM** are all oriented in the same manner. As described hereinbelow, each left pocket insert material **LM** can be inserted into left folder pocket **LP** of folder **F** such that the bound edge enters left folder pocket **LP** first and the non-bound edge last. By contrast, each right pocket insert material **RM** can be inserted into right folder pocket **RP** of folder **F** such that the non-bound edge enters right folder pocket **RP** first and the bound edge last. As a result, both left pocket insert material **LM** and right pocket insert material **RM** are presented in folder **F** in the left-to-right orientation, thereby rendering left and right pocket insert materials **LM** and **RM** immediately and easily readable upon opening the stuffed folder **F**.

Assembled pocket insert materials **LM**, **RM** can be pushed along insert transport surface **42** by push pins **44** or any other suitable form of conveying

system known to those skilled in the art. Insert transport surface **42** can be further indexed with the use of registration straps **46** to ensure rear registration against push pins **44** as primary product material **PM** is fed and formed into pocket insert materials **LM**, **RM**. Registration straps **46** can be constructed of metal, cloth, plastic or any other suitable material known to those skilled in the art. After all requisite primary product material **PM** has been fed and pocket insert materials **LM**, **RM** have been completely formed, pocket insert materials **LM**, **RM** can be pushed downstream for further processing.

Referring now to FIGS. 4A and 4B, seriatim preparation of folders **F** is illustrated. Initially, folders **F** can be fed into a folder entry area generally designated **50** in an open position from any suitable direction. As illustrated for exemplary purposes, folders **F** can be provided from a direction that can be perpendicular or parallel to insert transport surface **42** (shown in Fig. 5) in order to ultimately be positioned on a folder conveyor assembly generally designated **CA**. As described above with reference to primary product material **PM**, folders **F** can include data code **DC** thereon, illustrated as bar code, which can include any suitable data for feeding or processing instructions or for matching folders **F** with certain, predetermined primary product material **PM**, such as for example assembled left pocket insert material **LM** and right pocket insert material **RM**. One or more readers **R** can be used to read data code **DC** from folders **F** at folder entry area **50**. Readers **R** can communicate with a central or local microprocessor **M** for processing of read data code **DC** and for controlling the processing of folders **F**. The data from each data code **DC** can be utilized in any suitable manner to identify and recognize folders **F** and to process them in a predetermined and controlled fashion. Desired folders **F** can be matched up with desired primary product material **PM**, such as left pocket insert material **LM** and/or right pocket insert material **RM**. Accurate stuffing and verification of the integrity of folders **F** can thus be accomplished. The processing of read data code from both folders **F** and primary product material **PM** enables automated stuffing of folders **F** wherein selected, predetermined folders **F** can be stuffed on demand and in a personalized manner with only selected,

predetermined primary product material **PM**. Data code **DC** on primary pocket material **PM** and folders **F** can further be processed and used to determine what to do to certain folders **F**. For example, instructions can be provided to selectively print or paint certain items on selected folders **F**, or instructions can be provided as to whether or not to stuff certain folders **F** at all as advanced pocket insert material and/or folders **F** can be selectively advanced without being stuffed as described further below with reference to FIG. 5.

In a preferred embodiment, folder conveyor assembly **CA** is configured as an A-frame structure **52** having a first conveyor surface generally designated **52A** and a second conveyor surface generally designated **52B** wherein first and second conveyor surfaces **52A**, **52B** are joined at a common edge **53** and extend outwardly at an angle from common edge **53** relative to a base plane generally designated **B**. Conveyor assembly **CA** further comprises a conveyor consisting of, for example, an endless member **61** such as a chain or belt with pusher elements **62** such as grips or fingers, or any other conveying mechanism known to those skilled in the art.

In a preferred embodiment, folder **F** can enter folder entry area **50** and come to rest in a substantially flat position on a swivel plate **SP**, as shown in FIGS. 4A and 4B. Swivel plate **SP** is an invertible section comprising a central hinge **54** that allows swivel plate **SP** to pivot upwardly in the center. Swivel plate **SP** is further attached by appropriate linkages **55** to a rod-type linear actuator **56**, such as a ball screw that provides linear motion via a motor **SM**. Swivel plate **SP** can also comprise one or more vacuum ports **58** through which a vacuum can be applied as can be appreciated by those of skill in the art to suitably hold folder **F** to swivel plate **SP** during the upward motion of swivel plate **SP**.

Once folder **F** has entered folder entry area **50** and has come to rest on swivel plate **SP**, a vacuum is applied through vacuum ports **58** to secure folder **F**. Motor **SM** is then activated, thus turning linear actuator **56** drawing linkages **55** on both ends of swivel plate **SP** towards one another, thus urging swivel plate **SP** upwardly at central hinge **54**, as shown in FIG. 4B. Folder **F**,

maintained in position on swivel plate **SP**, will also be drawn upwardly at folder fold line **24** thus drawing folder **F** from a substantially flat position to an inverted position with folder inside surface **22** facing outwardly and left and right folder inside panels **26**, **26'** substantially coplanar with first and second conveyor surfaces **52A**, **52B**.

Once opened and suitably partially inverted, folder **F** can be conveyed onto A-frame **52** and moved downstream towards a Stage 1 position **70** (shown in FIG. 5) via endless member **61** and pusher elements **62**. Folder **F** can be advanced along A-frame **52** for further processing while folder **F** maintains an inverted state wherein folder inside surface **22** and folder left and right pockets **LP**, **RP** face outwardly in relation to first and second conveyor surfaces **52A**, **52B**.

Referring now to FIGS. 5 – 7, folder stuffing stages of a preferred embodiment of folder stuffing apparatus **10** are described. Two folder stuffing stages include a Stage 1 position **70**, where left folder pocket **LP** can be stuffed and a Stage 2 position **70'**, where right folder pocket **RP** can be stuffed. As shown in FIG. 5, left pocket insert material **LM** and right pocket insert material **RM** that are to be stuffed into left folder pocket **LP** and right folder pocket **RP**, respectively, can be located above folder **F** that is carried along A-frame **52**.

Insert material for entering folder stuffing stages **70**, **70'** can be read or otherwise recognized as consisting of left pocket insert material **LM** or right pocket insert material **RM**. If the insert material is left pocket insert material **LM**, it will be processed in Stage 1 position area **70** for stuffing into left folder pocket **LP**; similarly, if the insert material is right pocket insert material **RM**, it will pass through Stage 1 position **70** and move further downstream to be processed in Stage 2 position area **70'** for stuffing into right folder pocket **RP**. As discussed earlier, if a user desires that only one pocket of a two pocket folder **F** be filled (or if the user is stuffing a one pocket folder **F**), the stage position that is not being used to fill a folder pocket can be intentionally by-passed. For example, if a user desires to fill only right folder pocket **RP** of a two pocket folder **F**, Stage 1 position **70** that normally stuffs left folder pocket

LP can be by-passed such that Stage 2 position **70'** to fill right folder pocket **RP** will only be activated and vice-versa. Each of the two folder stuffing stages **70**, **70'** described above can operate in a similar manner as will now be described in further detail below.

When the particular pocket insert materials **LM**, **RM** enter the appropriate folder stuffing stage (i.e., Stage 1 position **70** for left pocket insert material **LM** and Stage 2 position **70'** for right pocket insert material **RM**), side transporters generally designated **ST**, **ST'** can be activated. In a preferred embodiment, side transporters **ST**, **ST'**, respectively, comprise endless belt systems **72**, **72'** with push pins **78**, **78'** or any other suitable conveying system as known to those skilled in the art and can be oriented transversely to insert transport surface **42**. Side transporters **ST**, **ST'** can activate to transfer applicable pocket insert materials **LM**, **RM** from insert transport surface **42** to insert carriage members generally designated **80**, **80'**.

Insert carriage members **80**, **80'** can be slidably attached to insert track or guide rails **76**, **76'** such that insert carriage members **80**, **80'** and all associated mechanisms can move up and down guide rails **76**, **76'** as necessary, driven by motors **M**, **M'** (see FIG. 6). As shown in FIGS. 6 and 7, in a preferred embodiment, guide rails **76**, **76'** are configured so that insert carriage members **80**, **80'** are slidable along guide rails **76**, **76'** through an insert path that is substantially coplanar with first and second conveyor surfaces **52A**, **52B**, respectively.

Insert carriage member **80**, used in Stage 1 position **70**, is shown in FIGS. 7 and 8, with an isolated view illustrated in FIG. 8. Insert carriage member **80'** (shown in FIGS. 6 and 7) used in Stage 2 position **70'** can be similarly configured. Insert carriage members **80**, **80'** can comprise clamp plates **82**, **82'** that are attached to registration platters **74**, **74'** by clamp plate solenoids **84**, **84'**. Clamp plate solenoids **84**, **84'** allow clamp plates **82**, **82'** to be raised and lowered onto pocket insert materials **LM**, **RM**, thus catching pocket insert materials **LM**, **RM** in a secured manner between clamp plates **82**, **82'** and registration platters **74**, **74'**, respectively. Registration platters **74**, **74'**,

clamp plates **82**, **82'**, and clamp plate solenoids **84**, **84'**, respectively, together form the insert carriage members **80**, **80'** which hold pocket insert materials **LM**, **RM**, respectively, and subsequently place pocket insert materials **LM**, **RM** into the applicable folder pockets **LP**, **RP**, respectively. It thus can be seen that insert carriage members **80**, **80'** can operate as staging devices to hold pocket insert materials **LM**, **RM** as necessary for a predetermined or programmed period of time. The ability to stage pocket insert materials **LM**, **RM** in this manner facilitates the synchronization of the operation of insert carriage members **80**, **80'** with other operative components of folder stuffing apparatus **10**, such as pocket opening vacuum solenoids **86, 86'** described hereinbelow.

As shown in FIG. 7, push pins **78**, **78'** that are attached to the drive belts of endless belt systems **72**, **72'** can contact the applicable pocket insert materials **LM**, **RM** and transfer them in a transverse direction off of insert transport surface **42** and onto registration platters **74**, **74'** of insert carriage members **80**, **80'**. Push pins **78**, **78'** will push pocket insert materials **LM**, **RM** to a predetermined position on registration platters **74**, **74'** and will then stop movement, thus holding pocket insert materials **LM**, **RM** in position. Push pins **78**, **78'** can produce a jogging movement to register pocket insert materials **LM**, **RM** such that their contents are rear end and edge registered for placement into the applicable pockets **LP**, **RP** of folder **F**.

Referring back to FIGS. 5-7, once push pins **78**, **78'** have moved pocket insert material **LM**, **RM** into position and have edge registered the inserts by jogging, clamp plates **82**, **82'** can be lowered on pocket insert material **LM**, **RM**, thus securing pocket insert material **LM**, **RM** between clamp plates **82**, **82'** and registration platters **74**, **74'** of insert carriage members **80**, **80'** for subsequent placement into applicable folder pockets **LP**, **RP**, respectively, guided by insert carriage members **80**, **80'**, respectively.

With pocket insert materials **LM**, **RM** secured to insert carriage members **80**, **80'**, respectively, and waiting or staged for insertion by insert carriage members **80**, **80'**, respectively, folder **F** is pushed along A-frame **52** into position for stuffing, with gripper finger pushers **62** pushing folder **F** from the

rear or by another suitable conveying system. Additional holding support on first and second conveyor surfaces **52A**, **52B** for folder **F** can be provided by suitable vacuum through vacuum ports **64** or similar mechanisms embedded in A-frame **52** that subjects outside surface **20** of folder **F** to a vacuum, thus securing folder **F** to A-frame **52**.

Once folder **F** is in position between guide rails **76**, **76'**, pocket openers such as pocket opening vacuum solenoids **86**, **86'** as illustrated in FIG. 6, or other suitable opening mechanisms, can be used to open left folder pocket **LP** or right folder pocket **RP**, as applicable (FIG. 6 illustrates the process in Stage 2 position **70'** of stuffing right folder pocket **RP**). Pocket opening vacuum solenoids **86**, **86'** can be rigidly attached to anchor plates **88**, **88'** that are rigidly attached to the apparatus frame (not shown). As shown in FIG. 7, pocket opening vacuum solenoids **86**, **86'** are lowered onto and engage folder flaps **28**, **28'**, respectively. With A-frame vacuum ports **64** providing suction on folder outside surface **20** (shown in FIG. 1), pocket opening vacuum solenoids **86**, **86'** are raised back towards their initial positions, thus raising folder flaps **28**, **28'** and opening folder pockets **LP**, **RP**.

With folder pockets **LP**, **RP** in an open position, pocket insert materials **LM**, **RM** (as applicable) secured by insert carriage members **80**, **80'** (including registration platters **74**, **74'**, clamp plates **82**, **82'**, and clamp plate solenoids **84**, **84'**) can then move downwardly on guide rails **76**, **76'** by motors **M**, **M'** to move pocket insert materials **LM**, **RM** into folder pockets **LP**, **RP**, all respectively. The leading edges of pocket insert materials **LM**, **RM** are protected on top by clamp plates **82**, **82'** and on the bottom by registration platters **74**, **74'** so that pocket insert materials **LM**, **RM** will not catch on any seams on flaps **28**, **28'** or inside panels **26**, **26'** on the inside of folder pockets **LP**, **RP**. Leading edges **90**, **90'** of registration platters **74**, **74'** and leading edges **92**, **92'** of clamp plates **82**, **82'** are beveled or otherwise machined (see FIG. 7) so as to not catch on any seams on the inside of folder pockets **LP**, **RP**, all respectively.

Referring to FIGS. 6 and 7, once insert carriage members **80**, **80'** with pocket insert materials **LM**, **RM** have come to a position fully inside folder

pockets **LP**, **RP**, insert hold-down devices, such as insert hold-down solenoids **94**, **94'** with corresponding reciprocable retainer rods **95**, **95'** can be activated. Insert hold-down solenoids **94**, **94'** can be rigidly attached to anchor plates **88**, **88'** and when activated, insert hold-down solenoids **94**, **94'** actuate retainer rods **95**, **95'** to move downwardly to apply pressure to pocket insert materials **LM**, **RM** through clamp plate slots **96**, **96'** formed in clamp plates **82**, **82'** and registration platter slots **98**, **98'** formed in registration platters **74**, **74'**, all respectively. Insert hold-down solenoids **94**, **94'** can be located such that retainer rods **95**, **95'** will not contact folder pockets **LP**, **RP** but will only contact pocket insert materials **LM**, **RM** once the insert material is placed into applicable folder pockets **LP** or **RP**. Insert hold-down solenoids **94**, **94'** through retainer rods **95**, **95'** will hold pocket insert materials **LM**, **RM** against inside folder panels **26**, **26'** as they pass through clamp plate slots **96**, **96'** and registration platter slots **98**, **98'**, all respectively.

With insert hold-down solenoid retainer rods **95**, **95'** applying pressure to pocket insert materials **LM**, **RM**, clamp plate solenoids **84**, **84'** will raise clamp plates **82**, **82'**, thus retracting clamp plates **82**, **82'** off of pocket insert materials **LM**, **RM**, respectively, and back to their initial positions. Insert carriage members **80**, **80'** will then retract upwardly along guide rails **76**, **76'** through motors **M**, **M'**, respectively. Insert hold-down solenoid retainer rods **95**, **95'** and pocket opening solenoids **86**, **86'**, respectively, will then retract to their initial positions, and the folder stuffing cycle is complete.

As can be appreciated, if the folder stuffing cycle described above occurred in Stage 1 position **70** (stuffing of left folder pocket **LP**), folder **F** can then be advanced to Stage 2 position **70'** along A-frame **52** if right folder pocket **RP** is to be stuffed. Right pocket insert material **RM** for right pocket **RP** will be advanced to Stage 2 position **70'** and the above process can be repeated for stuffing right pocket **RP**. Concurrently, Stage 1 position **70** can then be filled with the next left pocket insert material **LM** and the next folder **F** follows just behind the one having its right pocket **RP** stuffed.

Referring again to FIG. 5, insert transport surface **42** can communicate with or be extended to a downstream path represented by arrow **DP** directed to any structure, module, or equipment situated downstream from the folder stuffing components described herein. The realization of downstream path **DP** in connection with the use of one or more readers **R** as described previously enables any pocket insert material **LM** or **RM** to be selectively rejected for stuffing into a folder pocket so that it is advanced in the direction of arrow **DP** for diverting out of the system entirely of for further processing as desired. For example, if any pocket insert material **LM** or **RM** was not compiled correctly or otherwise fails a verification or integrity test, it can be rejected for stuffing and the rejected material can be transported over insert transport surface **42** and through downstream path **DP** for diversion of further processing. Such further processing can even include recovering and rerouting the rejected insert material back to the collating area for again processing it through the folder stuffing components.

Referring now to FIGS. 9A – 9C, in a preferred embodiment, once folder **F** is stuffed with applicable pocket insert materials **LM**, **RM**, the completed stuffed folder **SF** can be advanced into a folder folding section generally designated **130** and onto an exit swivel plate **SP'** (shown in an up position in FIG. 9A). Exit swivel plate **SP'** comprises a central hinge **132** that allows swivel plate **SP'** to pivot downwardly in the center. Exit swivel plate **SP'** further comprises a central slot or opening **134** that allows stuffed folder **SF** to pass downwardly through the center. Central hinge **132** will be placed on either side of central slot **134**. Swivel plate **SP'** can be attached by appropriate linkage **138** to a rod-type linear actuator **136**, such as a ball screw that provides linear motion via a motor **SM'**.

Referring to FIG. 9A, once stuffed folder **SF** is advanced onto swivel plate **SP'**, a folding member or knife bar **142** of any suitable type can move downwardly into the center of stuffed folder **SF**, which helps keep pocket insert materials **LM**, **RM** from getting caught in fold line **24** (see FIG. 1). Once knife bar **142** comes into contact with stuffed folder **SF**, motor **SM'** is activated and

linear actuator **136** turns, drawing swivel plate **SP'** downwardly at central hinge **132** to a flat position as shown in FIG. 9B. As illustrated in FIG. 9C, knife bar **142** "breaks" fold line **24** in stuffed folder **SF** downward through central slot **134** until stuffed folder **SF** is closed and exits through swivel plate **SP'**.

Once stuffed folder **SF** exits the system, belt transports **144** or similar mechanism can deliver stuffed folder **SF** to any form of downstream processing device. Non-limiting examples of downstream processing devices include conveyor, reading station, box, modular stuffer, poly wrapper, or any other form of processing unit.

It will be understood that various details of the invention may be changed without departing from the scope of the invention. Furthermore, the foregoing description is for the purpose of illustration only, and not for the purpose of limitation—the invention being defined by the claims.

CLAIMS

What is claimed is:

1. An automated folder stuffing apparatus for stuffing a folder foldable along a fold line and including an inside surface and at least one pocket formed on the inside surface, the folding stuffer apparatus comprising:
   (a) a conveyor for advancing a folder along a conveyor surface;
   (b) an opener for at least partially opening a pocket of the folder; and
   (c) an inserter for inserting insert material into the folder pocket while the pocket is open.

2. The folder stuffing apparatus according to claim 1 wherein the at least one pocket comprises a flap and wherein the opener further opens the flap.

3. The folder stuffing apparatus according to claim 1 wherein the conveyor surface comprises a plurality of vacuum ports for subjecting an outside surface of the folder to a vacuum.

4. The folder stuffing apparatus according to claim 1 wherein the conveyor comprises a rotatable endless member and a pusher element connected to the endless member and movable therewith for engaging and advancing the folder along the conveyor surface.

5. The folder stuffing apparatus according to claim 1 wherein the opener comprises a vacuum cup mounted above the conveyor surface and actuatable into contact with the pocket.

6. The folder stuffing apparatus according to claim 1 wherein the inserter comprises an insert carriage member slidable along an insert track for releasably engaging the insert material and directing the insert material into the opened pocket.

7. The folder stuffing apparatus according to claim 6 further comprising an insert hold-down device actuatable into engagement with the insert material while the insert material is in the pocket for retaining the insert material while the insert carriage member releases the insert material.

8. The folder stuffing apparatus according to claim 6 further comprising an insert transport surface disposed above the conveyor surface for

transporting the insert material to the insert carriage member.

9. The folder stuffing apparatus according to claim 8 further comprising a side transporter for transferring the insert material from the insert transport surface to the insert carriage member.

10. An automated folder stuffing apparatus for stuffing a folder of a type comprising an outside surface, first and second inside panels joined at a fold line and foldable toward each other at the fold line, and a pocket formed on one of the inside panels, the apparatus comprising:

(a) a conveyor surface comprising first and second conveyor surface portions joined at a common edge and extending outwardly at an angle from the common edge;

(b) a conveyor movable in relation to the conveyor surface for advancing the folder along the conveyor surface and maintaining the folder in an open state wherein the outside surface slidably contacts the first and second conveyor surface portions and the pocket faces outwardly in relation to at least one of the first and second conveyor surface portions;

(c) an opener for at least partially opening the pocket while the folder is on the conveyor surface; and

(d) an inserter for inserting insert material into the pocket while the pocket is open.

11. The folder stuffing apparatus according to claim 10 wherein the first and second conveyor surface portions comprise a plurality of vacuum ports for subjecting the outside surface of the folder to a vacuum.

12. The folder stuffing apparatus according to claim 10 wherein the conveyor comprises a rotatable endless member and a pusher element connected to the endless member and movable therewith for engaging and advancing the folder along the conveyor surface.

13. The folder stuffing apparatus according to claim 10 wherein the opener comprises a vacuum cup mounted above the conveyor surface and actuatable into contact with the pocket.

14. The folder stuffing apparatus according to claim 10 wherein the inserter

comprises an insert carriage member slidable along an insert track for releasably engaging the insert material and directing the insert material into the opened pocket.

15. The folder stuffing apparatus according to claim 14 wherein each of the first and second conveyor surface portions is oriented at an angle relative to a base plane and wherein the insert carriage member is slidable along the insert track through an insert path coplanar with one of the conveyor surface portions.

16. The folder stuffing apparatus according to claim 14 comprising an insert hold-down device actuatable into engagement with the insert material while the insert material is in the pocket for retaining the insert material while the insert carriage member releases the insert material.

17. The folder stuffing apparatus according to claim 14 comprising an insert transport surface disposed above the conveyor surface for transporting the insert material to the insert carriage member.

18. The folder stuffing apparatus according to claim 17 comprising a side transporter for transferring the insert material from the insert transport surface to the insert carriage member.

19. An automated folder stuffing apparatus for stuffing a folder of a type comprising first and second inside panels foldable toward each other along a fold line, and first and second inside pockets respectively formed on the first and second inside panels, the folder stuffing apparatus comprising:

(a) a conveyor assembly comprising a conveyor surface disposed along a central longitudinal axis and a conveyor for advancing the folder along the conveyor surface while maintaining the folder in an open state at which the first and second pockets face outwardly in relation to the conveyor surface, the first pocket being disposed on a first side of the longitudinal axis, and the second pocket being disposed on a second side of the longitudinal axis;

(b) first and second openers mounted above the conveyor surface

for respectively opening the first and second pockets;

(c) a first inserter for inserting a first insert material into the first pocket and comprising a first insertion track and a first carriage member slidable along the first insertion track from the second side of the longitudinal axis to the first side of the longitudinal axis; and

(d) a second inserter for inserting a second insert material into the second pocket and comprising a second insertion track and a second carriage member slidable along the second insertion track from the first side of the longitudinal axis to the second side of the longitudinal axis.

20. The folder stuffing apparatus according to claim 19 comprising an insert transport surface disposed above the conveyor surface and a side transporter for transferring the first and second insert materials from the insert transport surface to the first and second insertion devices, respectively.

21. A method for stuffing insert material into a pocket of a folder, the method comprising the steps of:

(a) advancing a folder along a conveyor surface while an outside surface of the folder slidably contacts the conveyor surface and a pocket of the folder faces outwardly in relation to the conveyor surface;

(b) at least partially opening the folder pocket when the folder has reached an insertion site of the conveyor surface; and

(c) inserting insert material into the folder pocket while the folder is at the insertion site.

22. The method according to claim 21 further comprising the step of collating a set of insert elements to form the insert material to be inserted into the pocket.

23. The method according to claim 21 further comprising the steps of advancing the insert material along an insert transport surface disposed above the conveyor surface, and transporting the insert material off the

insert transport surface to an insert carriage member, wherein the step of inserting the insert material comprises conveying the insert material from the insert carriage member to the opened pocket below the insert transport surface.

24. The method according to claim 23 wherein the folder includes first and second inside panels foldable toward each other along a fold line and the pocket is formed on one of the first or second inside panels, wherein an angled portion of the conveyor surface is disposed at an acute angle in relation to a base plane, the inside panel on which the pocket is formed is at least substantially coplanar with the angled portion, and the insert material is conveyed by the insert carriage member along an insert path generally coplanar with the angled portion and the inside panel on which the pocket is formed.

25. The method according to claim 23 comprising the step of staging the insert material within the insert carriage member after transporting the insert material off the insert transport surface, wherein the staging transpires for a period of time prior to inserting the insert material into the opened pocket.

26. The method according to claim 25 wherein the insert material is staged at an elevation greater than an elevation of the insert transport surface.

27. The method according to claim 23 comprising releasing the insert material after conveying the insert material to the opened pocket.

28. The method according to claim 21 wherein the folder includes first and second inside panels foldable toward each other along a fold line and the pocket is formed on one of the first or second inside panels.

29. The method according to claim 28 wherein an angle between the first and second inside panels is approximately 180 degrees or greater while the folder is advancing along the conveyor surface.

30. The method according to claim 28 wherein the conveyor surface comprises an inverted section extending upwardly at an acute angle in relation to a base plane, and, while the folder is being advanced, the inside panel on which the pocket is formed is coplanar with the inverted

section.

31. The method according to claim 30 wherein the conveyor surface comprises an invertible section situated adjacent to and upstream from the inverted section, and the step of advancing the folder comprises:

(a) providing the folder on the invertible section of the conveyor surface while the folder is in a flat state at which an angle between the first and second inside panels is approximately 180 degrees;

(b) pivoting the invertible section to the acute angle to align the inside panel on which the pocket is formed in coplanar relation to the inverted section; and

(c) advancing the folder from the pivoted invertible section to the inverted section.

32. The method according to claim 28 further comprising the steps of advancing the folder stuffed with the insert material to a folding site situated downstream from the insertion site and, at the folding site, folding the folder such that an angle between the first and second inside panels is less than 180 degrees.

33. The method according to claim 32 wherein the folding step comprises forcibly contacting the folder at its fold line to move the folder through an opening of a surface of the folding site.

34. The method according to claim 21 comprising the step of determining whether the insert material is to be rejected and, if the insert material is to be rejected, refraining from performing the folder pocket opening and insert material inserting steps and diverting the insert material to a downstream path situated downstream from the insertion site.

35. A folding apparatus for producing a folder, the folding apparatus comprising:

(a) a frame for supporting an open folder thereon, the frame defining a slot therethrough;

(b) a folding member for extending at least partially through the slot;

(c) whereby the folding member is operable to contact an open

folder supported on the frame and extend at least partially through the slot to push the open folder along a fold line such that the folder passes through the slot in a closed position.

36. The folding apparatus of claim 35 wherein the frame comprises two sides interconnected by a hinge.

37. The folder stuffing apparatus of claim 1 further comprising one or more readers for reading data code.

38. The method according to claim 21 further comprising reading data code from the insert material and inserting the insert material into the folder pocket based upon the data code.

39. The method according to claim 38 further comprising reading folder data code from the folder and processing the folder based upon the folder data code.

40. The method according to claim 21 wherein the insert material, prior to being inserted into the folder pocket, is advanced along an insert transport surface wherein the insert material is oriented in a uniform manner.

41. A method for stuffing insert material into a pocket of a folder, the method comprising the steps of:

(a) providing a folder;

(b) providing insert material having data code thereon, the data code comprising readable instructions for processing of the insert material;

(c) reading the data code from the insert material;

(d) at least partially opening the folder pocket; and

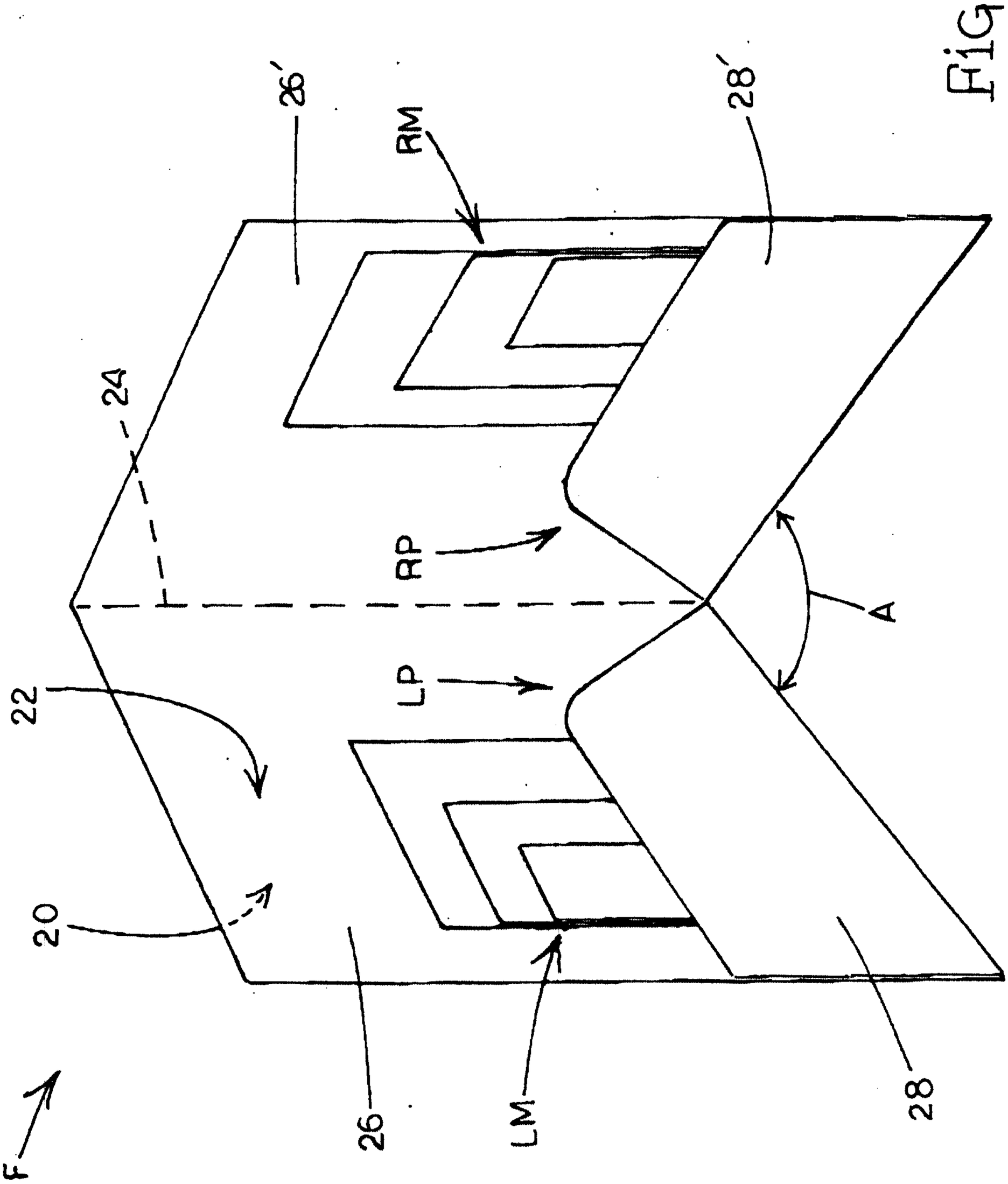
(e) stuffing the insert material into the folder pocket based upon a determination to do so by the data code read from the insert material.

42. The method according to claim 41 wherein the folder has folder data code thereon, the folder data code comprising readable instructions for processing of the folder, and further comprising the steps of:

(a) reading the folder data code from the folder; and

(b) processing the folder based upon the folder data code.

FIG. 1



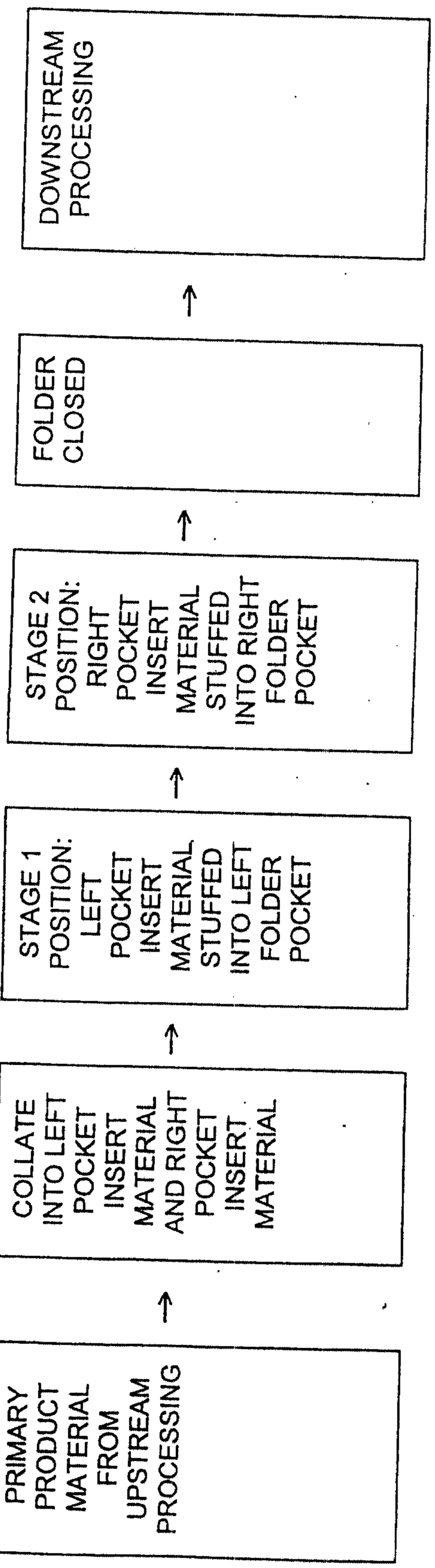

PRIMARY PRODUCT MATERIAL FROM UPSTREAM PROCESSING
COLLATE INTO LEFT POCKET INSERT MATERIAL AND RIGHT POCKET INSERT MATERIAL
STAGE 1 POSITION: LEFT POCKET INSERT MATERIAL STUFFED INTO LEFT FOLDER POCKET
STAGE 2 POSITION: RIGHT POCKET INSERT MATERIAL STUFFED INTO RIGHT FOLDER POCKET
FOLDER CLOSED
DOWNSTREAM PROCESSING

FIG. 2

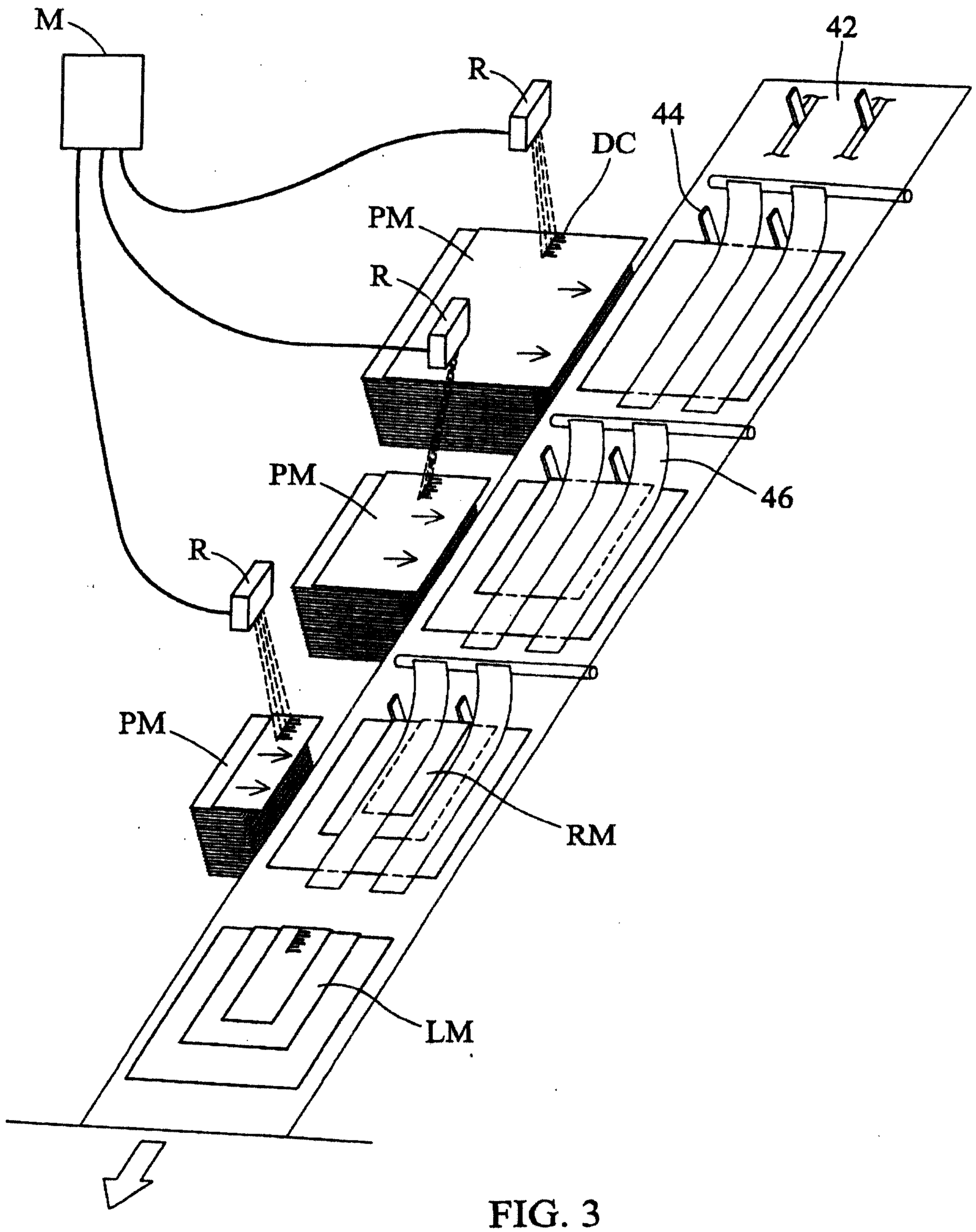


FIG. 3

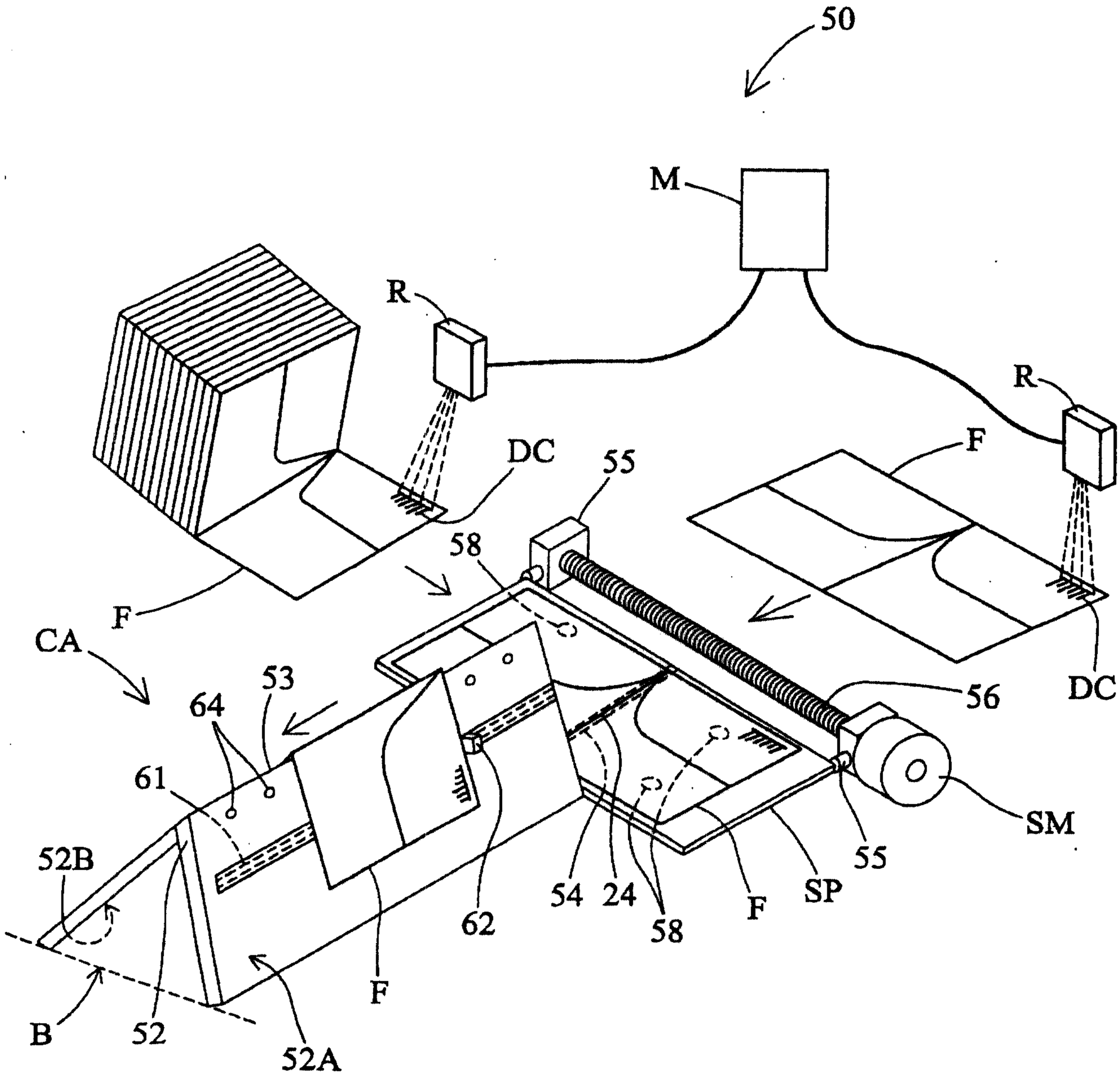


FIG. 4A

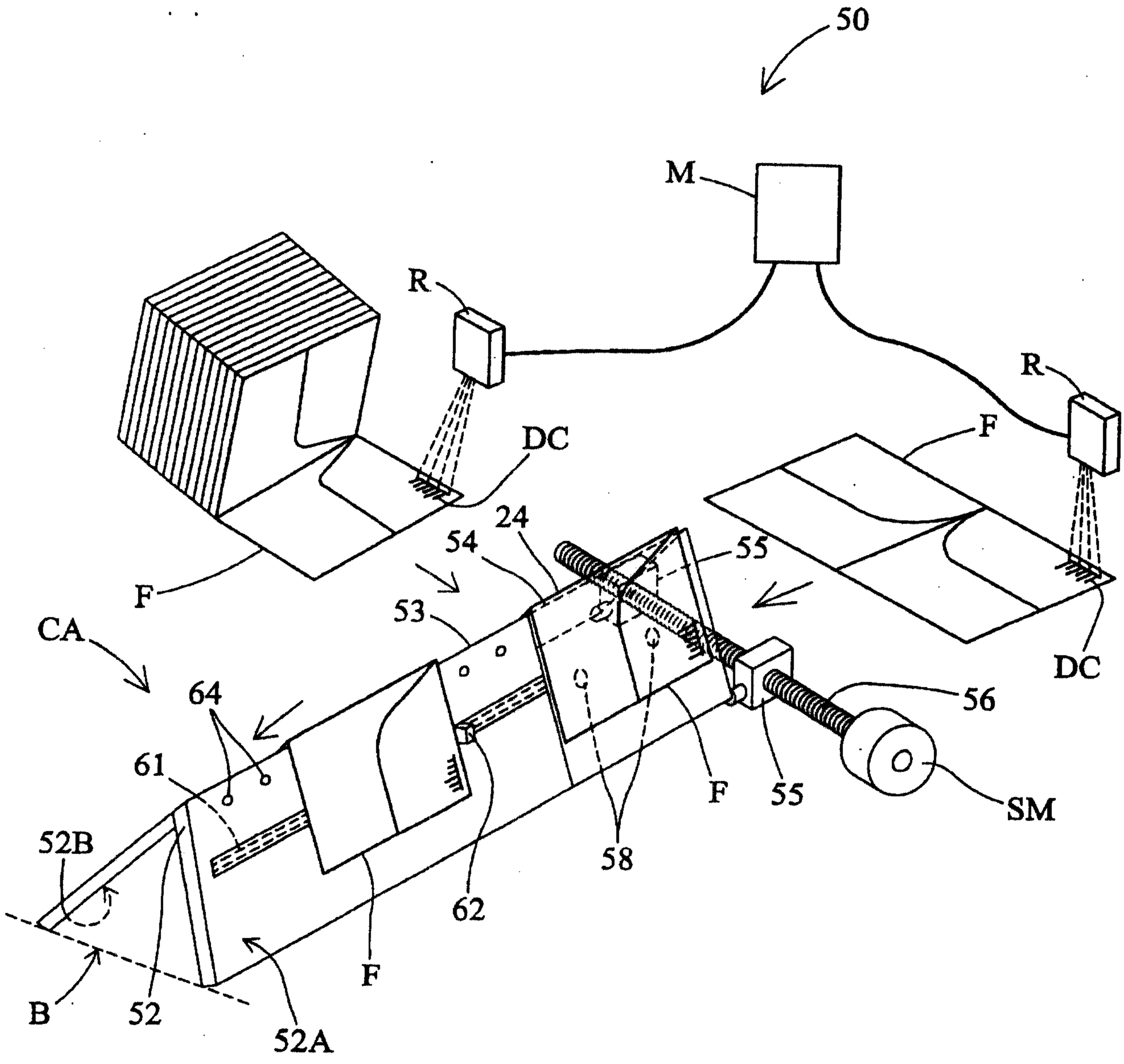


FIG. 4B

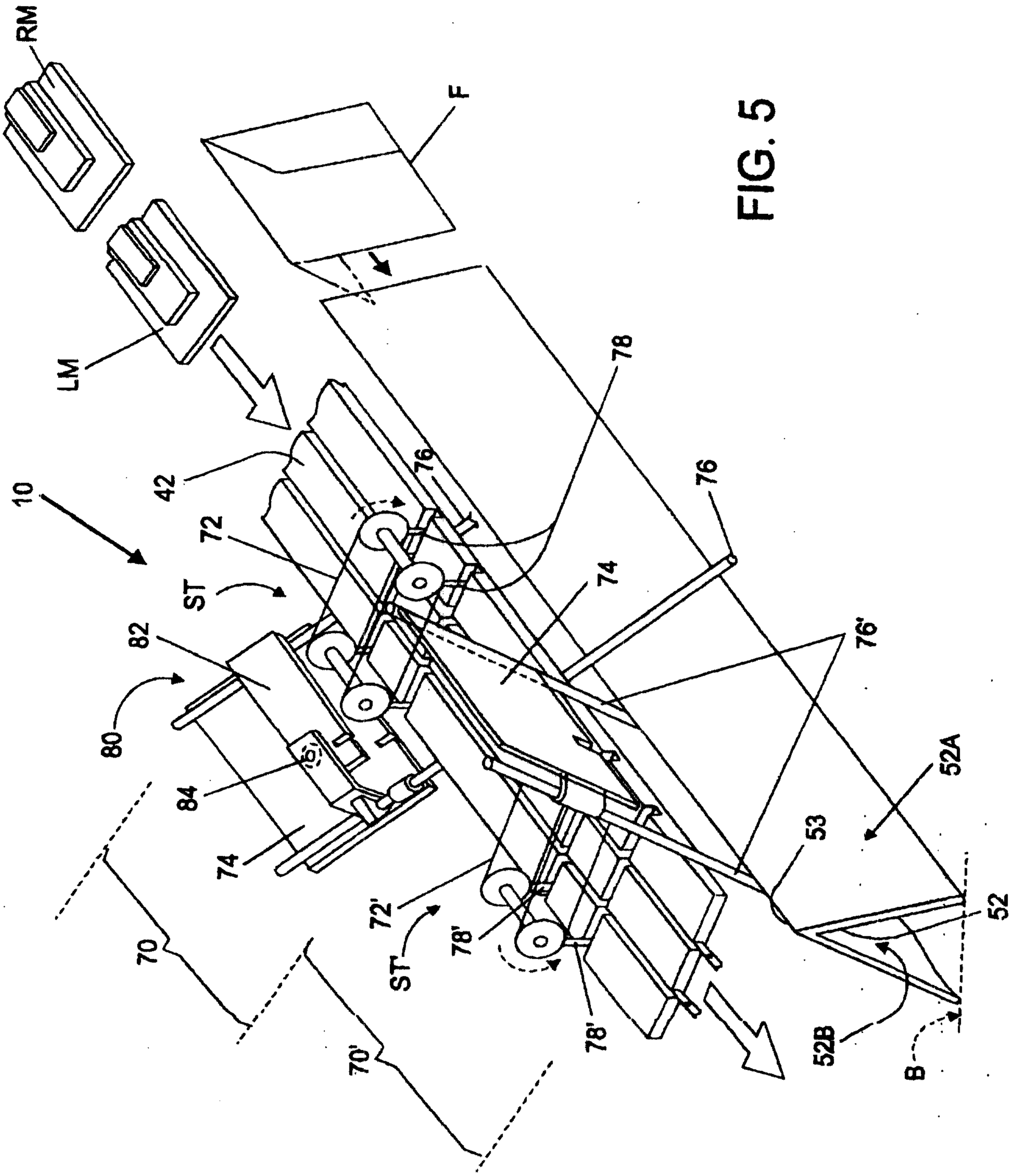

RM
F
LM
78
42
76
10
72
76
ST
74
82
76'
80
52A
84
53
74
72'
52
ST'
78'
70
78'
52B
70'
B

FIG. 5

FIG. 6

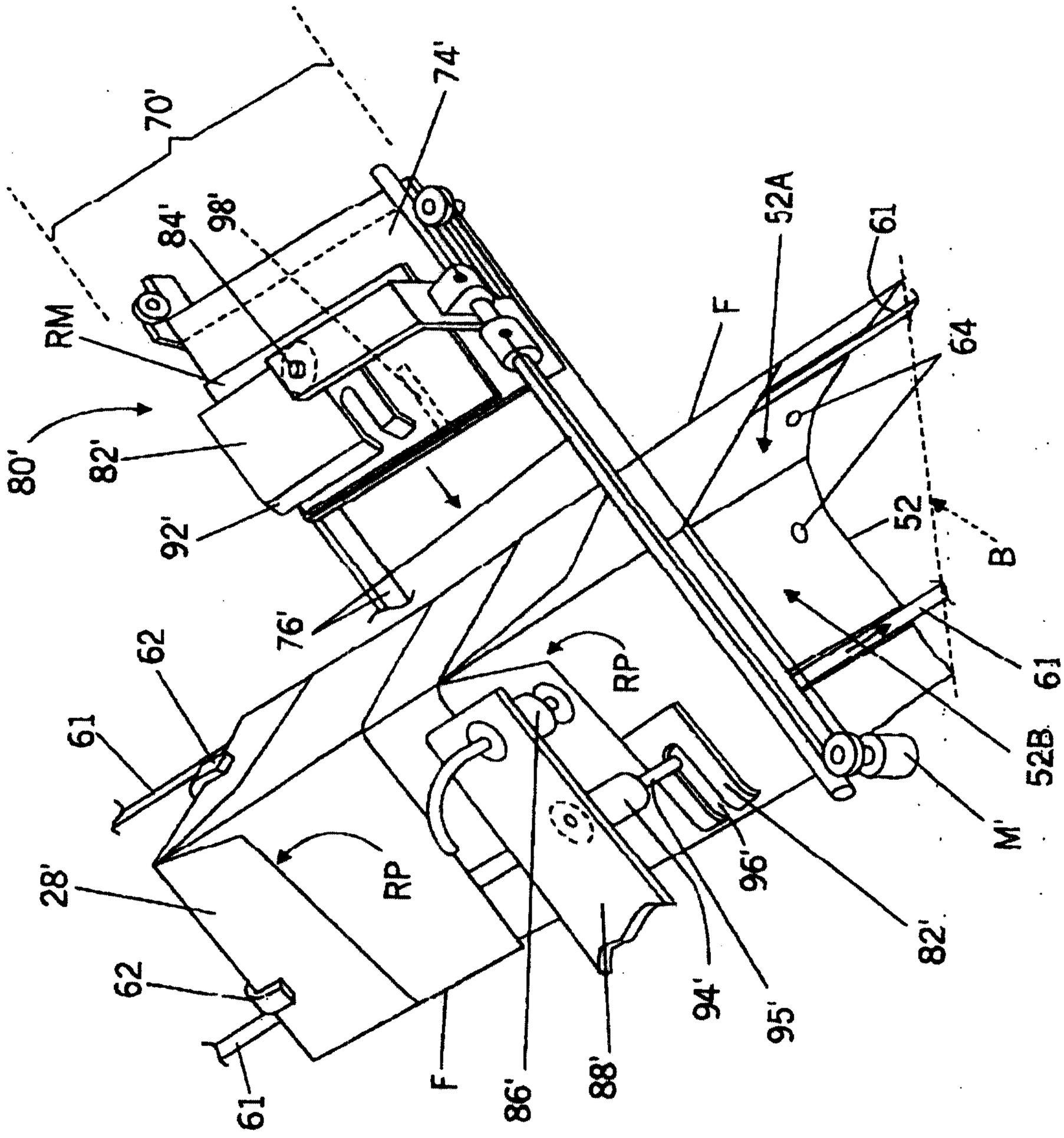
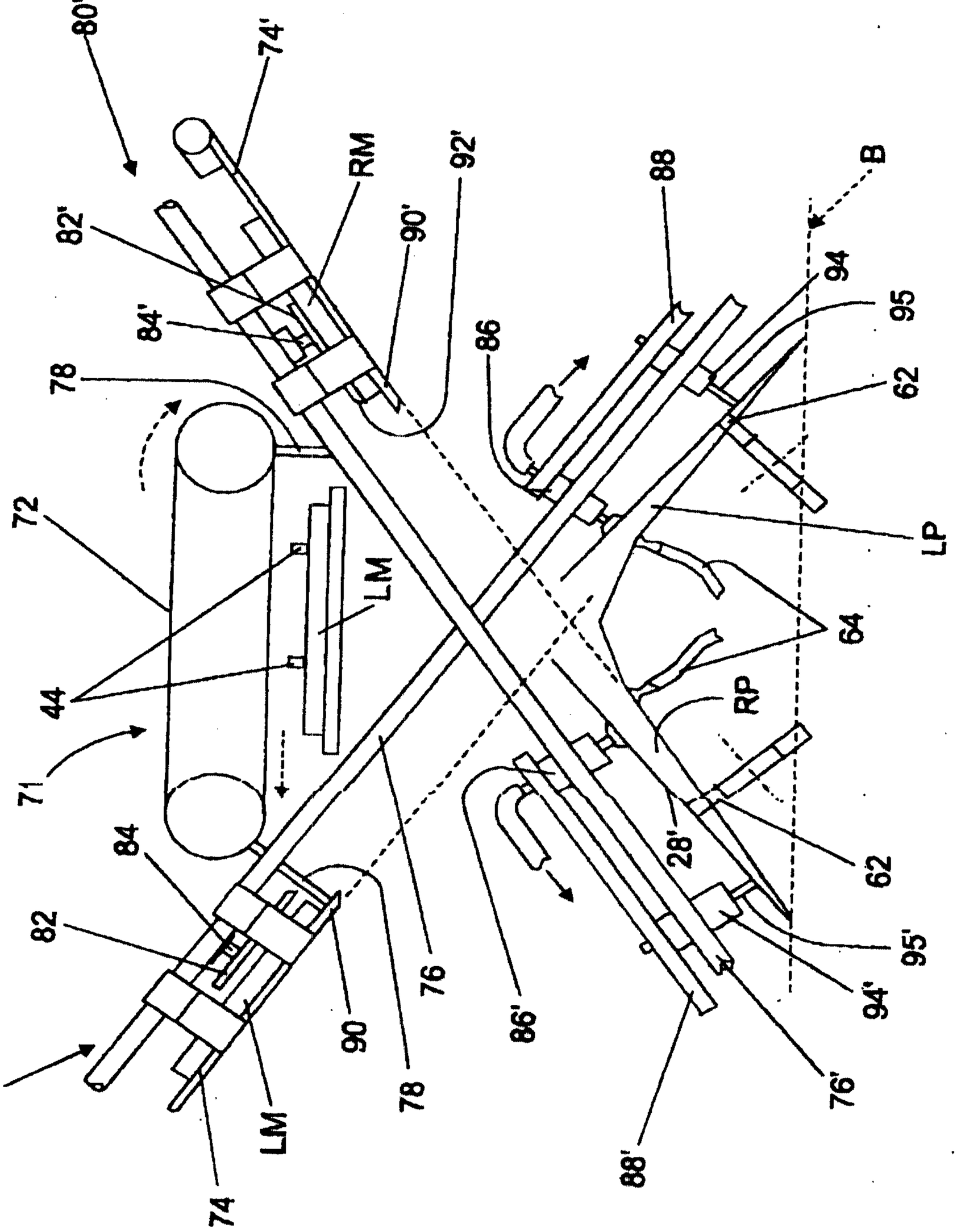

70'
74'
84'
98'
RM
80'
82'
92'
76'
62
61
28'
RP
62
61
F
52A
61
64
52
B'
61
52B
M'
96'
82'
94'
95'
88'
86'
F

FIG. 7


80
74'
82'
84'
78
72
44
71
74
80
82
84
90
78
LM
LM
RM
90'
92'
86
88
B
94
95
62
LP
64
RP
28'
62
95'
94'
76'
88'
86'
76

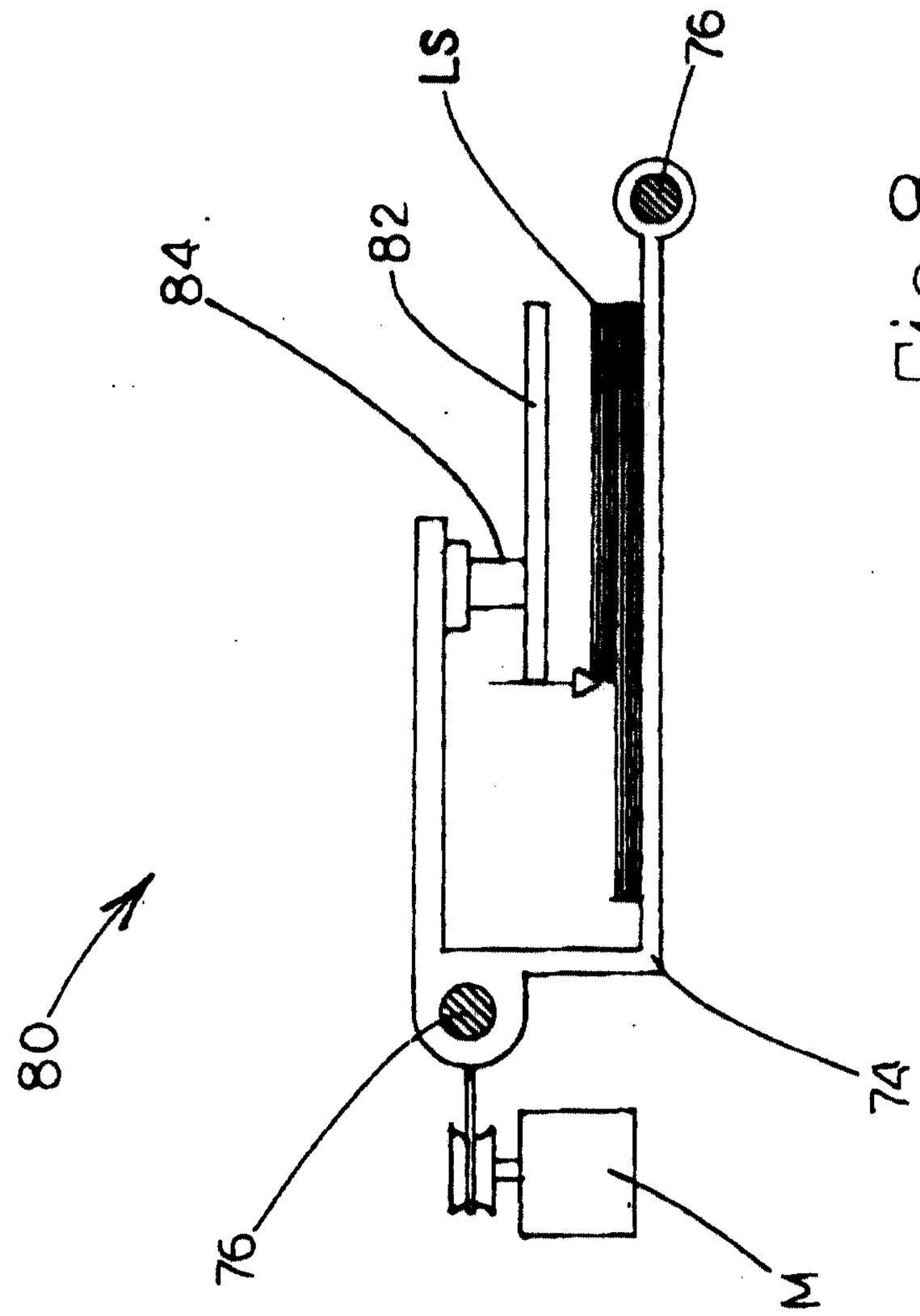


FIG.8

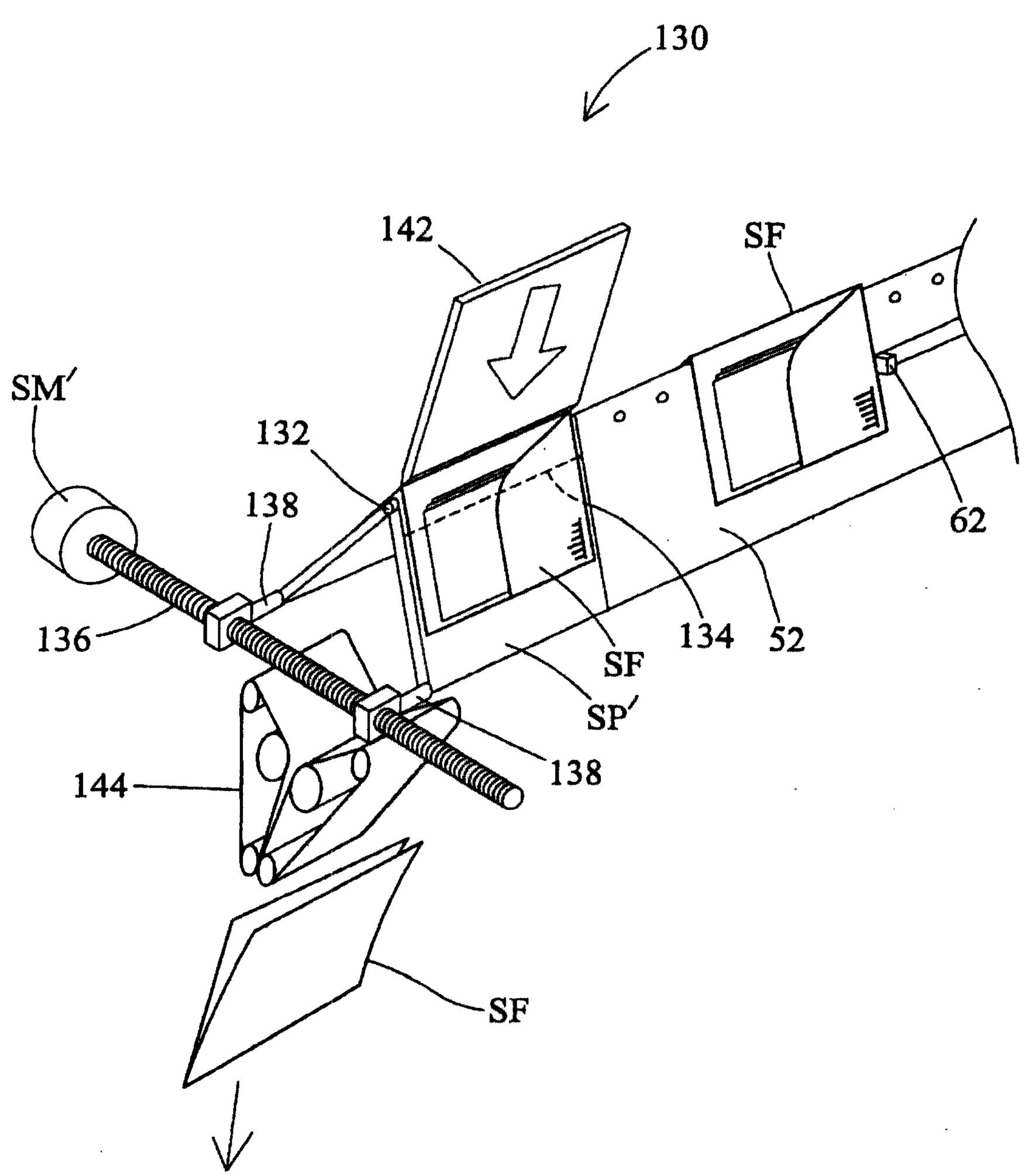


FIG. 9A

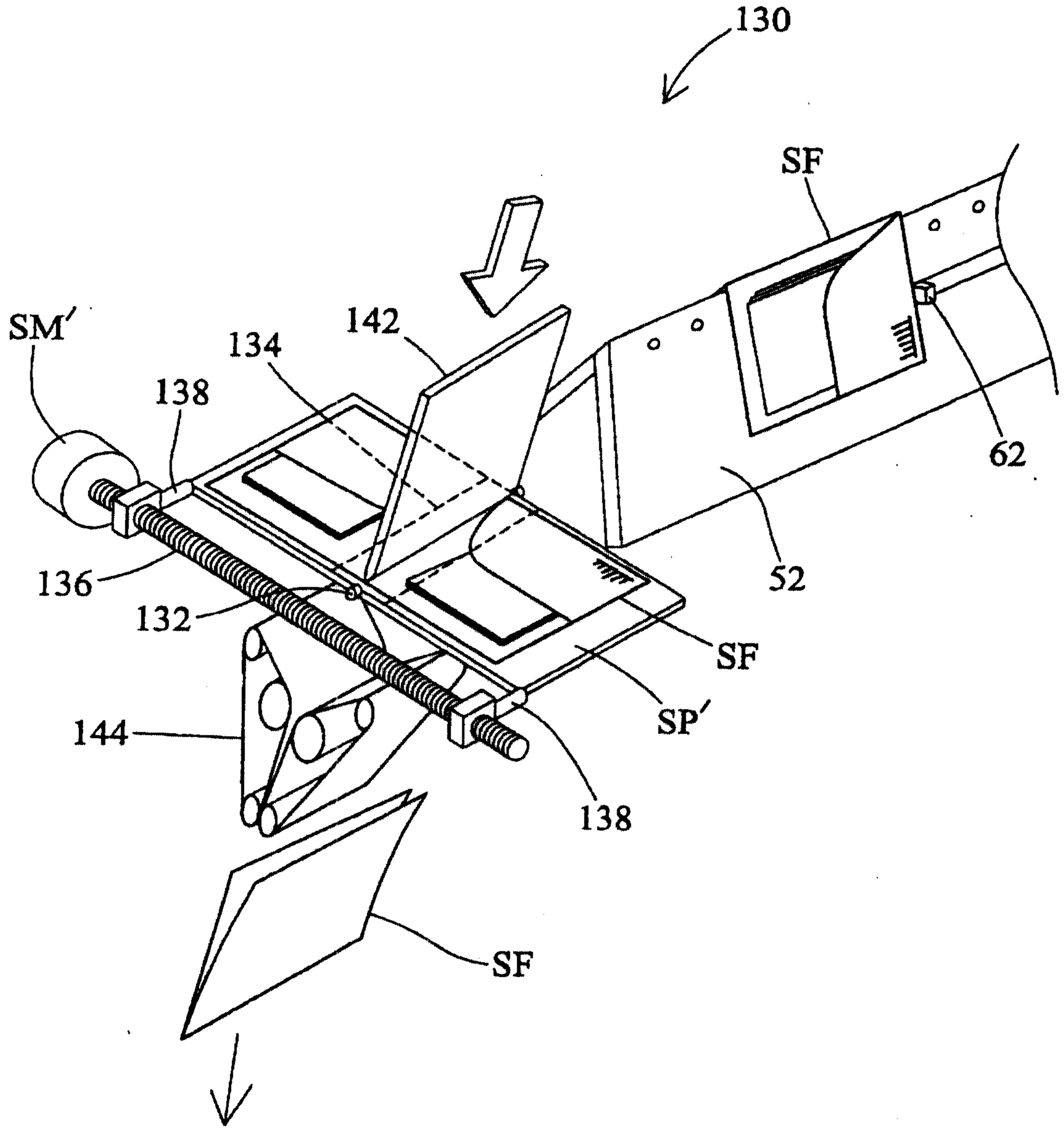


FIG. 9B

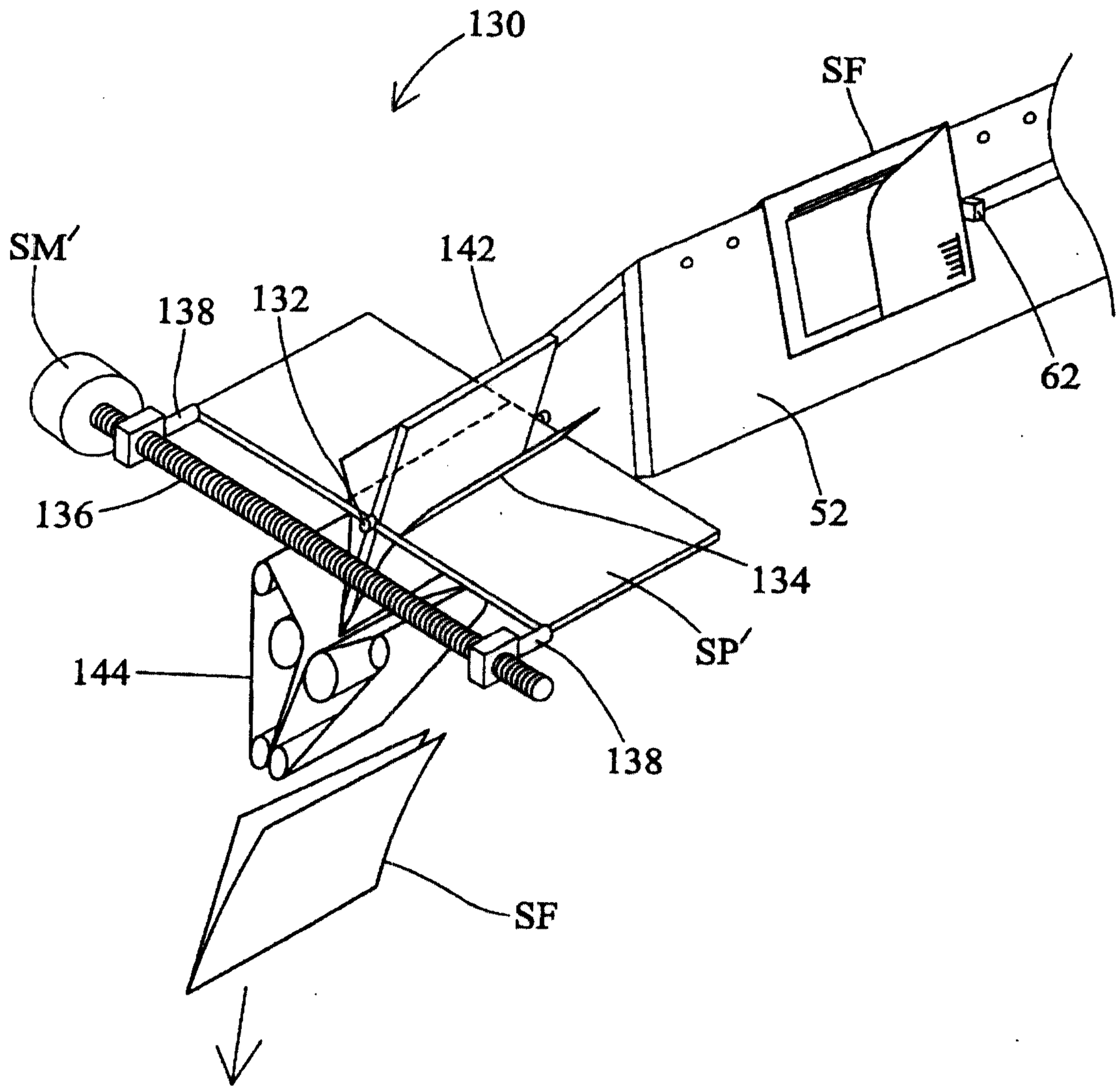
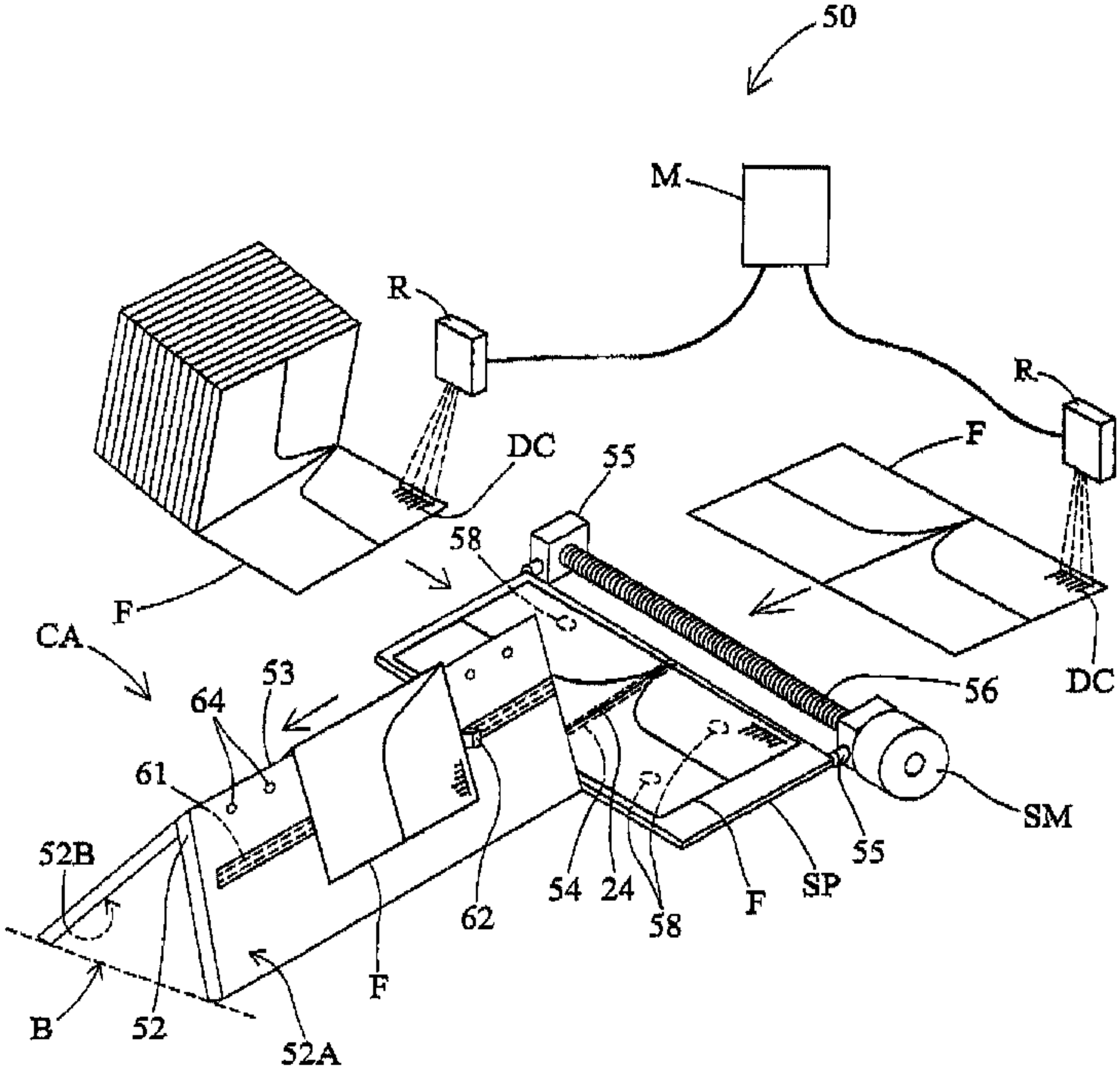


FIG. 9C


50
M
R
R
DC
55
58
F
F
CA
53
64
61
52B
B
52
52A
F
62
54
24
58
F
SP
55
SM
56
DC