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(54) Title: A FEED ASSIST APPARATUS FOR A FLEXIBLE SHEET MATERIAL SPREADER

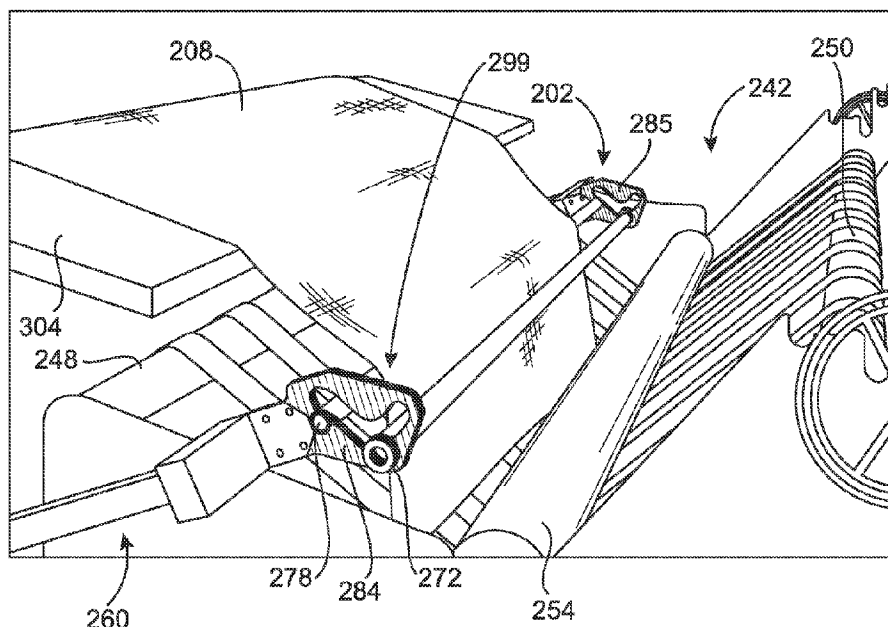


FIG. 4

(57) **Abrégé/Abstract:**

A feed assist apparatus for a flexible sheet material spreader, comprising a first arm attached at a first end to one side of the material spreader, a second arm attached at a first end to another side of the material spreader, and a material retainer attached at a second end of each of the first and second arms, the material retainer having a first configuration for feeding flexible sheet material there-through and a second configuration for retaining flexible sheet material. The first arm and the second arm are moveable together from a first position adjacent a flexible material supply and a second position adjacent entry to the material spreader, and the material retainer is in the second configuration when the moveable arms are in the first position, and the material retainer is in the first configuration when the moveable arms are in the second position.

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D06F 67/04 (2006.01) *B65H 23/022* (2006.01)*B65H 20/02* (2006.01)(72) Inventor: **PAN, Hong**; c/o GERBER TECHNOLOGY

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(54) Title: A FEED ASSIST APPARATUS FOR A FLEXIBLE SHEET MATERIAL SPREADER

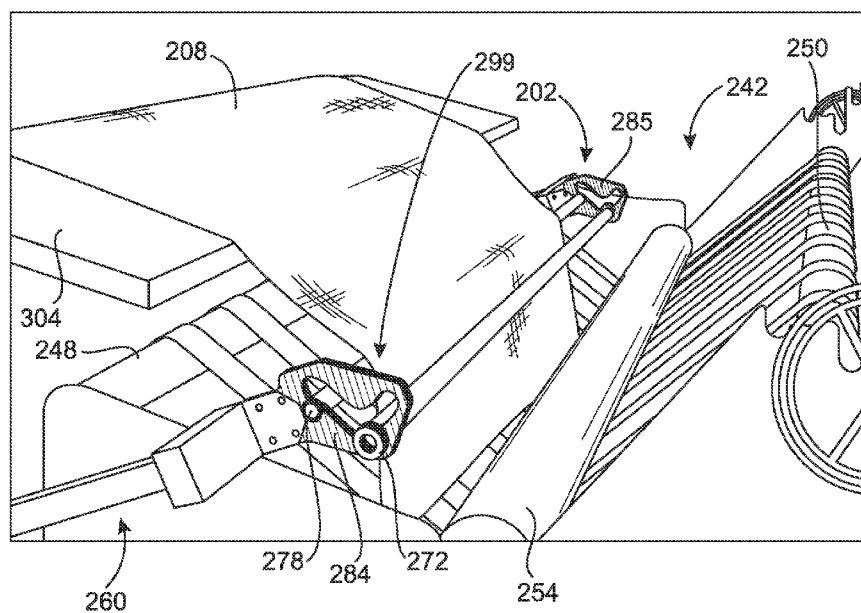


FIG. 4

(57) **Abstract:** A feed assist apparatus for a flexible sheet material spreader, comprising a first arm attached at a first end to one side of the material spreader, a second arm attached at a first end to another side of the material spreader, and a material retainer attached at a second end of each of the first and second arms, the material retainer having a first configuration for feeding flexible sheet material there-through and a second configuration for retaining flexible sheet material. The first arm and the second arm are moveable together from a first position adjacent a flexible material supply and a second position adjacent entry to the material spreader, and the material retainer is in the second configuration when the moveable arms are in the first position, and the material retainer is in the first configuration when the moveable arms are in the second position.

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A FEED ASSIST APPARATUS FOR A FLEXIBLE SHEET MATERIAL SPREADER

BACKGROUND OF THE INVENTION

1. Related Applications

[0000] This application claims priority to U.S. Provisional Application No. 62/855,516, filed May 31, 2019, the disclosure and teachings of which are incorporated herein by reference for any purpose whatsoever.

2. Field of the Invention

[0001] The invention disclosed herein relates to a single operator spreading and material feeding apparatus, and in particular to an apparatus for dispensing fabric that is unrolled one ply at a time.

3. Description of the Related Art

[0002] Sheet material, such as cloth, laminates, and the like, is used in a variety of products. Included are garments, upholstery, and many other products. High production volume necessitates efficient work practices with sophisticated equipment. Examples of equipment useful for preparing sheet material in the manufacturing process include cutting tables and fabric spreaders. Generally, a fabric spreader will spread the sheet material for subsequent cutting with the cutting table. The exceedingly competitive nature of such enterprises requires manufacturers to work quickly and make as much use as possible of the sheet material consumed.

[0003] Fabric spreaders are generally part of a system, in which the fabric spreader is disposed over a table. The fabric spreader contains an operator panel, throttle, and controller, whereby the operator panel and throttle communicate with the controller to control various sub-components of the fabric spreader.

[0004] Fabric spreaders utilize a cradle to support the roll of material that is rolled one ply at a time as the fabric spreader advances over a table. The cradle has a fabric supply for loading a roll of material and using it for spreading. The cradle may be bounded by a series of belts, which are driven by a driven roller. The belts are driven by a motor that is remote from the cradle. As the driven roller spins, it causes the belts to move about idler rollers. When the roll of material is placed within the cradle, action of the belts causes the roll of material to spin as well. The spinning of the roll of material provides for dispensing of the fabric to the fabric spreader.

[0005] Depicted in FIG. 1 is a conventional fabric spreader. The fabric spreader can have a V-shaped cradle, including a first arm and a second arm, and have a length at least equal to that of the material. Generally, between the first arm and the second arm of the V-shaped cradle is a material fabric supply (not pictured), wherein a roll of material or a bundle of material can be positioned for spreading. More information regarding conventional fabric spreaders can be found in co-pending U.S. Patent Application 16/204,127.

[0006] Both flattening and coning of the roll of material are conditions that cause inconsistent dispensing of fabric from the roll of material. Aside from the dispensing of fabric from the roll of material under a consistent, constant tension, it is advantageous to dispense the fabric in a constant orientation. Accordingly, adjustment of the positioning of the roll of material during production to accommodate such goals provides for improved fabrication processes.

[0007] Typically, to ensure proper spreading of the material, two operators tug laterally on the material to provide uniform distribution and remove wrinkles in the material. Performing this process with one operator is challenging, generally two operators work simultaneously to smooth and position the fabric.

[0008] Thus, what are needed are methods and system to provide improved dispensing of sheet of material from a spreading machine using only one operator, thereby increasing efficiency, reducing setup time, and improving safety. Preferably, the system may be supplied as part of a new spreading machine or as a retrofit to an existing spreading machine.

SUMMARY OF THE INVENTION

[0009] Disclosed herein is a feed assist apparatus for a flexible sheet material spreader, more particularly for feeding fabric. The feed assist apparatus for a flexible sheet material spreader includes a material retainer and swing arm, the pinch roller is preferably self-releasing. The feed assist apparatus for a flexible sheet material spreader of the present disclosure is configured to evenly spread material on a material assembly for later cutting. Preferably, by incorporating the use of a swing arm and the material retainer into the feed assist apparatus for a flexible sheet material spreader, the feed assist apparatus for a flexible sheet material spreader can feed fan folded material, or a roll of material, evenly onto a table using solely one operator.

[0010] The feed assist apparatus for a flexible sheet material spreader includes a swing arm, having a material retainer, preferably comprised of a pinch roller, stationary roller, and guide plates. The pinch roller can be moved between a released position and a load position, preferably by an operator. In a release configuration, the pinch roller is positioned at a second end of a guide plate, preferably distal to the stationary roller, located at a first end of a guide plate, at a pre-determined distance. The release position thereby allows the insertion or release of fabric between the stationary roller and pinch roller. Alternatively, the pinch roller can be moved to a load position wherein the pinch roller is positioned adjacent to the stationary roller, such that a piece of material is secured between the pinch roller and the stationary roller.

[0011] The swing arm can be moved using a set of arms attached from the guide plates to a pivot point of a fabric spreader. The spreading panel can include a hollow curve attached to a flat table-like structure, assisting in maintaining tension within the fabric for even spreading.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The features and advantages of the invention are apparent from the following description taken in conjunction with the accompanying drawings in which:

[0013] FIG. 1 is an illustration of a conventional fabric spreader.

[0014] FIG. 2 is a view of the feed assist apparatus for a flexible sheet material spreader wherein the material retainer is in the pre-load position.

[0015] FIG. 3 is a second view of the feed assist apparatus for a flexible sheet material spreader wherein the material retainer is in a load position.

[0016] FIG. 4 is a view of the reconfiguration of the material retainer after the light shock load, wherein the material retainer is in the release position, as well as the feeding of the material into the V-shaped cradle.

[0017] FIG. 5 is an illustration of the material retainer and swing arm, spreading the material over the spreading panel.

[0018] FIG. 6A is a simplified view of the material retainer in the pre-load position.

[0019] FIG. 6B is a simplified view of the material retainer in the load position.

[0020] FIG. 6C is a simplified view of the material retainer in the release position after the light shock load has been administered.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Disclosed herein is an apparatus for dispensing sheet material in a material spreading machine while only using one operator. Advantageously, application of the methods and system results in a substantially uniform dispensing of the sheet material for fabrication processes using only one operator.

[0022] Generally, a material spreading machine, or “fabric spreader” is a machine useful for spreading sheet material for one or more fabric layers. Specifically, in a production environment for spreading one or more fabric layers on a cutting table. The sheet material may be spread to provide for subsequent cutting of the material to a desired size. In embodiments disclosed herein, the material spreading machine is used for production of consumer goods such as garments, upholstery for residential, commercial and/or automotive furnishings and for other similar products.

[0023] The term “material” is used herein related to material that is supplied in a fanfold or roll form for use with the workstation described herein. Any other forms of material as deemed suitable may be used with the teachings herein. The term “fabric” may be used interchangeably with the term “material.” No limitations are to be construed by the terminology used.

[0024] Disclosed herein is a preferred embodiment of the invention. The present invention comprises a feed assist apparatus for a flexible sheet material spreader including flexible material **208**, preferably fabric, and a swing arm **260**. In the embodiment depicted in FIGS. 2 and 3, a fabric supply, which in this embodiment is a folded bundle **206** of material **208**, having a leading raw edge **210**, is positioned on the top surface **214** of a table **212**. It may be appreciated that a second embodiment of the system can exist wherein the folded bundle of material is a roll of material.

[0025] Positioned at a pre-determined distance above the table **212** is a guide rod **226**. The left **228** and right (not pictured) sides of the guide rod **226** are attached to a set of arms **236**, and the guide rod **226** has a length at least equal to that of the material **208**. It may be appreciated that a single operator (not pictured) can pull the leading edge **210** of the material **208** over the top

surface **232** of the guide rod **226**, to guide the material **208** to the pinch roller **272** and stationary roller **278**.

[0026] Each arm within the set of arms **236** has a first end **238** and a second end **240**. The first ends **238** of the arms **236** can be attached to a pivot point **280** located on the material spreader, as illustrated in FIGS. 2 and 5. The second ends **240** of the arms **236** may extend to first **284** and second **285** guide plates. Once an operator pulls the leading edge **210** of the material **208** over the top surface **232** of the guide rod **226**, the operator may further pull the leading edge **210** over the top surface **266** of a pinch roller **272**.

[0027] The pinch roller **272** is positioned between the first and second guide plates **284**, **285**, such that each end of the pinch roller **272** is secured within the elongated slots **294** of each guide plate **284**, **285**. The pinch roller **272** may be comprised of, but is not limited to, a metal tube coated with uniform elastomer along its axial direction. It may be appreciated that the width, diameter, and durometer of the elastomer coating may vary depending on the properties of materials the pinch roller **272** will transport. As seen in FIG. 3, positioned above and adjacent to the pinch roller **272** is a stationary roller **278**. Similarly, the stationary roller **278** is positioned within the elongated slots **294** of each guide plate **284**, **285**.

[0028] The guide plates **284**, **285** assist in guiding the material **208** over the top surface **266** of the pinch roller **272**. As seen in FIG. 2, the guide plates **284**, **285** have first **286** and second **288** ends, the first ends **286** are adjacent to the pinch roller **272**, and the second ends **288** are adjacent to the second ends **240** of the arms **236**. Each guide plate **284**, **285** may have elongated slots **294**. Preferably, as seen in the example in FIG. 3, the elongated slots **294** have a long end **216** and a short end **218**.

[0029] As seen in the examples in FIGS. 2 and 6A the pinch roller **272** can be in a first configuration for feeding flexible sheet material, more particularly, as seen in FIG. 6A, a pre-load position **296**. The pinch roller **272** can also be in a second configuration for retaining flexible sheet material, more particularly, as seen in FIGS. 3 and 6B, a load position **298**. In the pre-load position **296**, the pinch roller **272** is positioned at the first end **286** of the guide plates **284**, **285** within the long end **216** of the elongated slots **294**. It can be appreciated that the pinch roller **272** may be slid and rotated from a pre-load position **296** to a load position **298** through the

use of force by an operator. To enter the load position **298**, as depicted in FIGS. 3 and 6B, the operator may push the pinch roller **272**, causing it to slide through the elongated slots **294** from the first ends **286** of the guide plates **284** to the second ends **288**, such that the pinch roller **272** sits adjacent to the stationary roller **278**. As illustrated in FIG. 3, the pinch roller **272**, stationary roller **278**, and guide plates **284** work together to form a material retainer **202**.

[0030] In FIG. 6A, the material retainer **202** is in the pre-load position **296**, thereby providing a space **300**, of a pre-determined length, from the pinch roller **272** to the stationary roller **278**. This space **300** allows for the material **208** to glide under the stationary roller **278**, and over the top surface **266** of the pinch roller **272**. Once an operator has situated the material **208** onto the top surface **266** of the pinch roller **272**, the operator can push the pinch roller **272** into the load position **298**, as seen in FIGS. 3 and 6B. In the example in FIG. 3, this change in configuration presses and secures the material **208** between the pinch roller **272** and the stationary roller **278**, thereby creating tension in the fabric for easy spreading. It may be appreciated that the material retainer **202** eliminates the need of assistance from a second operator to ensure the material is evenly spread.

[0031] Once the material **208** is securely positioned between the top surface **266** of the pinch roller **272** and the bottom surface (not pictured) of the stationary roller **278**, a single operator can swing the swing arm **260** above and over a spreading panel **302**. As seen in FIG. 5, the spreading panel **302** comprises a flat table-like structure **304**, having a rectangular shape. Attached perpendicularly to the underside of the table-like structure **304** of the spreading panel **302** is a pivot point **280**, and attached to the front end **308** of the table-like structure **304** of the spreading panel **302** is a hollow curve.

[0032] The swinging of the material **208** and swing arm **260** over the spreading panel **302**, coupled with the tension in the material **208**, produced by the load position **298** of the material retainer **202**, spreads the fabric tightly over the hollow curve of the flat table-like structure **304** of the spreading panel **302**. Once the swing arm **260** swings into a predetermined angle over the spreading panel **302**, a hard stop occurs, sending a light shock load to the guide plates **284**, **285**. As seen in FIGS. 4 and 6C, the swinging of the swing arm **260** causes the guide plates **284**, **285** to flip into a third configuration. The light shock load causes the pinch roller **272** to disengage

from the material **208** and stationary roller **278** and move into a release position **299**. In the example embodiment depicted in FIGS. 4 and 6C, the pinch roller **272** retreats into the release position **299** and the pinch roller moves to the short end **218** of the guide plates **284**, **285**. This mechanism releases the material **208** into the bottom of the V-shaped cradle **242**. As seen in FIG. 4, the V-shaped cradle **242** includes a first roller **248** and a second roller **250**, and has a length at least equal to that of the material **208**. Between the first roller **248** and the second roller **250** of the V-shaped cradle **242** is a drive roller **254**.

[0033] When the material **208** is released from the swing arm **260**, by the material retainer **202**, the material **208** is laid over the first arm **248** of the V-shaped cradle **242** and fed into the tension roller **254**. Through the use of a controller **320** and a throttle **322**, the drive roller **254** spins, thereby winding the material **208** around itself. The material **208** may then be released over the second arm **250** of the V-shaped cradle **242** in a conventional manner.

[0034] The present invention is not to be limited in scope by the specific embodiments described herein. Indeed, various modifications of the present invention, in addition to those described herein, will be apparent to those of ordinary skill in the art from the foregoing description and accompanying drawings. Thus, such modifications are intended to fall within the scope of the invention. Further, although aspects of the present invention have been described herein in the context of a particular implementation in a particular environment for a particular purpose, those of ordinary skill in the art will recognize that its usefulness is not limited thereto and that the present invention can be beneficially implemented in any number of environments for any number of purposes.

What is claimed is:

1. A feed assist apparatus for a flexible sheet material spreader, comprising:
a first arm attached at a first end to one side of the material spreader;
a second arm attached at a first end to another side of the material spreader; and
a material retainer attached at a second end of each of the first and second arms, the material retainer having a first configuration for feeding flexible sheet material there-through and a second configuration for retaining flexible sheet material;
wherein the first arm and the second arm are moveable together from a first position adjacent a flexible material supply and a second position adjacent entry to the material spreader;
and
wherein the material retainer is in the second configuration when the moveable arms are in the first position, and the material retainer is in the first configuration when the moveable arms are in the second position.
2. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the flexible material is fabric.
3. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the material supply is a folded bundle of material.
4. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the material supply is a roll of material.
5. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the material retainer has elongated slots.
6. The feed assist apparatus for a flexible sheet material spreader according to Claim 5, wherein the elongated slots has a long end and a short end.

7. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein a moveable roller and a non-movable roller are positioned between the elongated slots of the material retainers.
8. The feed assist apparatus for a flexible sheet material spreader according to Claim 1 wherein the moveable roller is moved about the elongated slots through gravity.
9. The feed assist apparatus for a flexible sheet material spreader according to Claim 1 wherein the moveable roller is moved about the elongated slots through a spring mechanism.
10. The feed assist apparatus for a flexible sheet material spreader according to Claim 1 wherein the moveable roller is moved about the elongated slots through physical force.
11. The feed assist apparatus for a flexible sheet material spreader according to Claim 1 wherein the moveable roller is moved about the elongated slots through gravity.
12. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the moveable roller is in the first configuration and the flexible material is draped over the moveable roller.
13. The feed assist apparatus for a flexible sheet material spreader according to Claim 9, wherein the moveable roller is a metal tube.
14. The feed assist apparatus for a flexible sheet material spreader according to Claim 9, wherein the moveable roller is coated with a uniform elastomer coating along its axial direction, and the width, diameter, and durometer of the elastomer coating may vary depending on the properties of flexible material.
15. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the moveable roller is in the second configuration and the flexible material is secured between the moveable roller and the non-movable roller.

16. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the flexible material is spread over a spreading panel.
17. The feed assist apparatus for a flexible sheet material spreader according to Claim 1, wherein the flexible material is pulled over a spreading panel.
18. The feed assist apparatus for a flexible sheet material spreader according to Claim 16, wherein the spreading panel comprises a flat table-like structure.
19. The feed assist apparatus for a flexible sheet material spreader according to Claim 16, wherein the spreading panel comprises a hollow curve attached to a flat table-like structure.
20. A feed assist apparatus for a flexible sheet material spreader, comprising:
a first arm attached at a first end to one side of the material spreader;
a second arm attached at a first end to another side of the material spreader; and
a material retainer having a means of retaining flexible material, attached at a second end of each of the first and second arms, the material retainer having a pre-load position for feeding flexible sheet material there-through and a load position for retaining flexible sheet material;
wherein the first arm and the second arm have a means for moving together from a first position adjacent a flexible material supply and a second position adjacent entry to the material spreader; and
wherein the material retainer is in the load position when the moveable arms are in the first position, and the material retainer is in the pre-load position when the moveable arms are in the second position.
21. A feed assist apparatus for a flexible sheet material spreader, comprising:
a first arm attached at a first end to a first side of a pivot point of the material spreader;
a second arm attached at a first end to a second side of the material spreader; and
a material retainer attached at a second end of each of the first and second arms, the material retainer comprising guide plates, a pinch roller, and a stationary roller; and

the guide plates having elongated slots with long and short ends;

wherein the material retainers have a first configuration for feeding flexible sheet material there-through and a second configuration for retaining flexible sheet material;

wherein the first arm and the second arm are moveable together from a first position adjacent a flexible material supply and a second position adjacent entry to the material spreader;

wherein the material retainers are in the second configuration when the moveable arms are in the first position, and the guide plates are in the first configuration when the moveable arms are in the second position.

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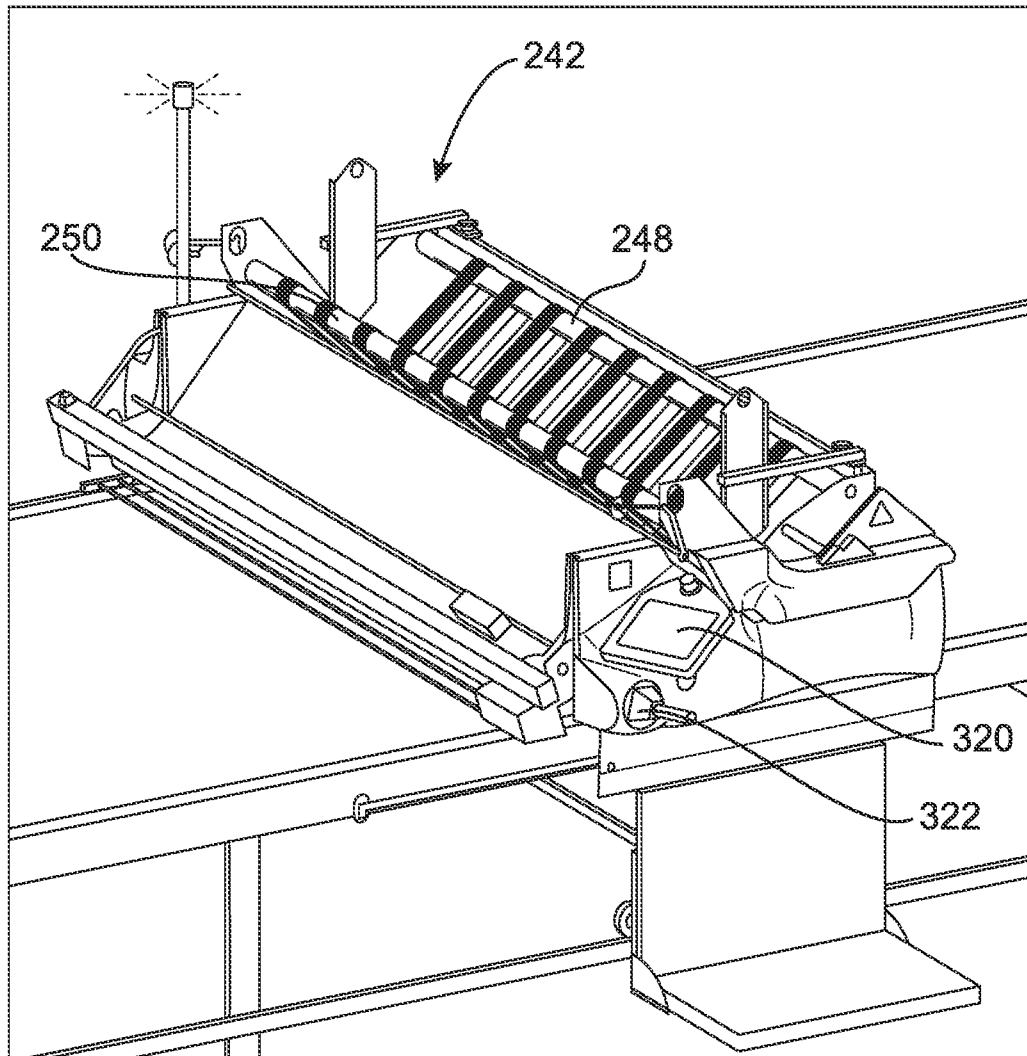


FIG. 1
(PRIOR ART)

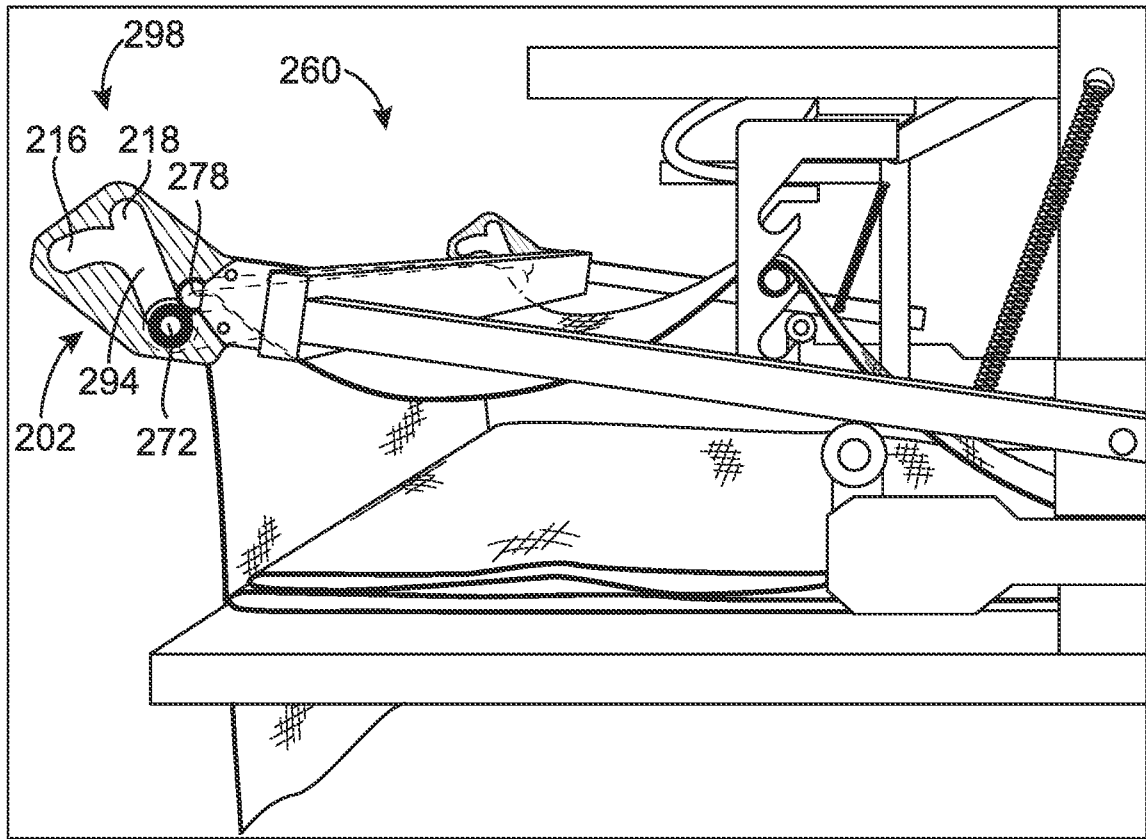


FIG. 3

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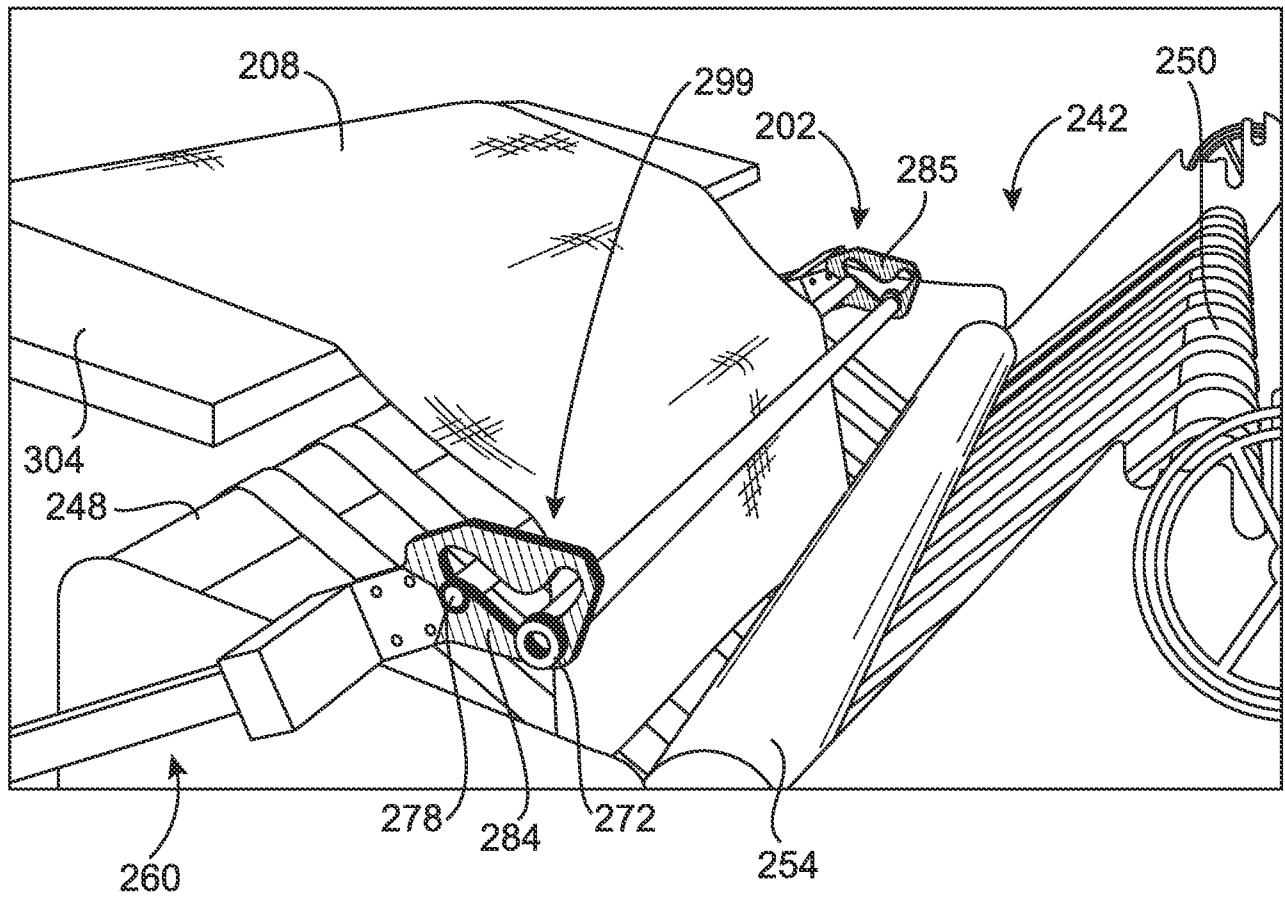
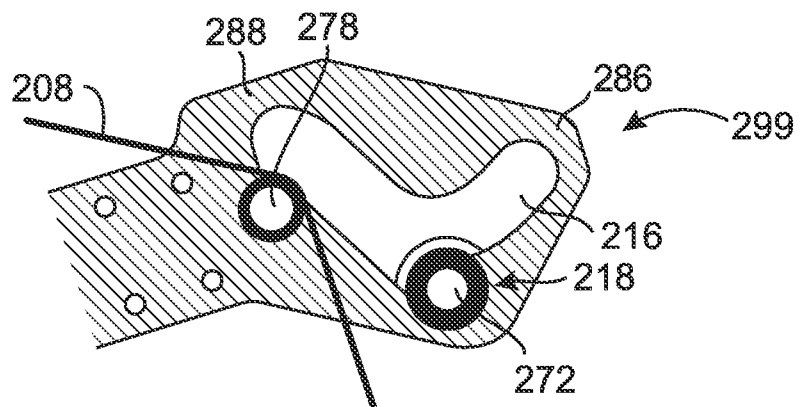
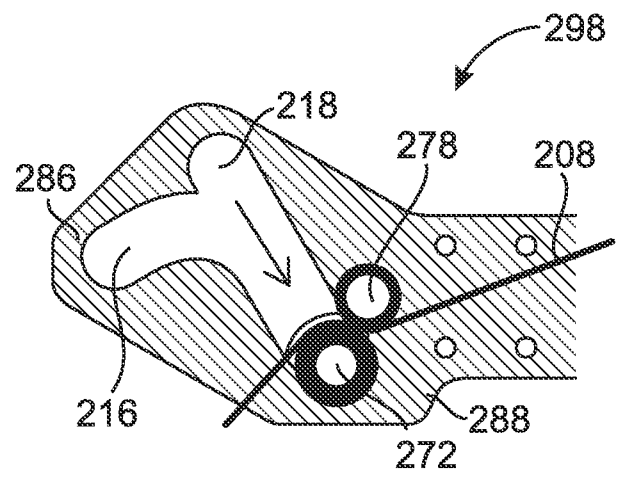
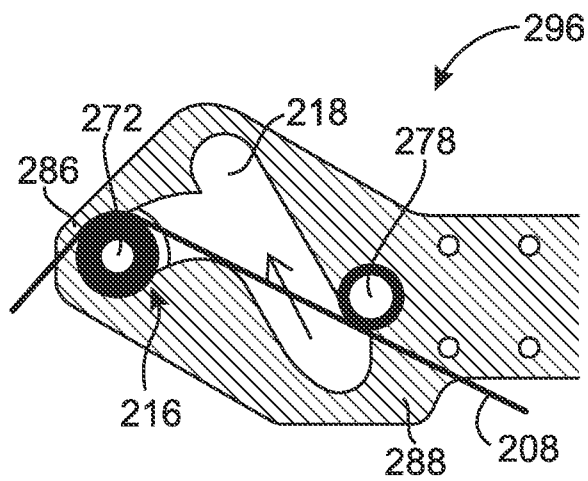
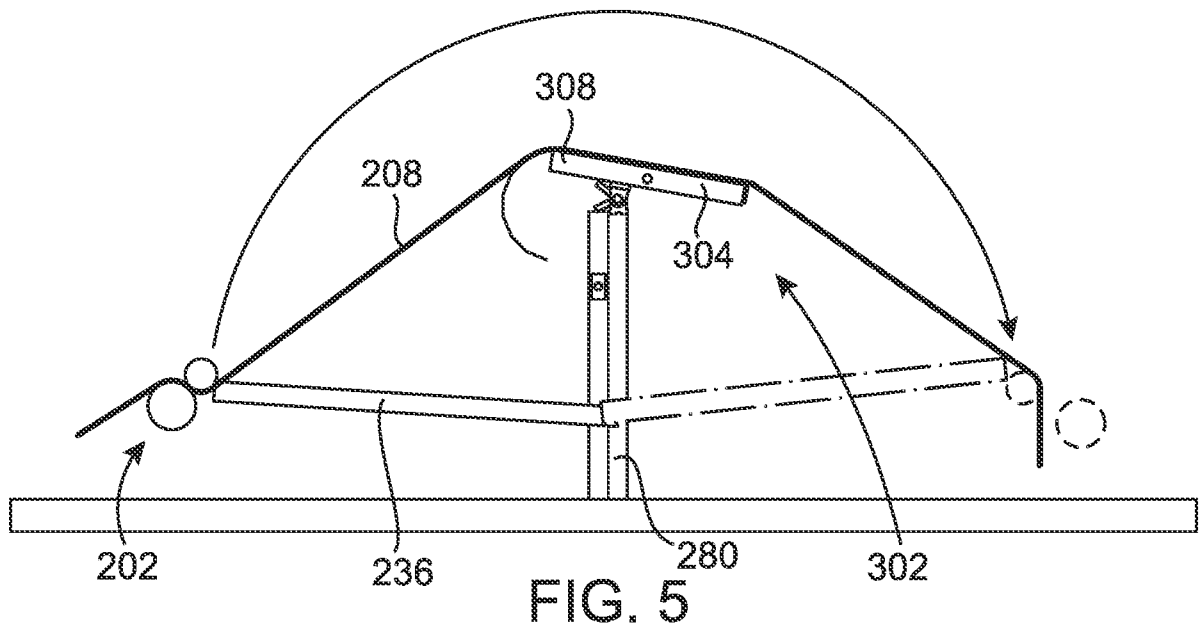


FIG. 4

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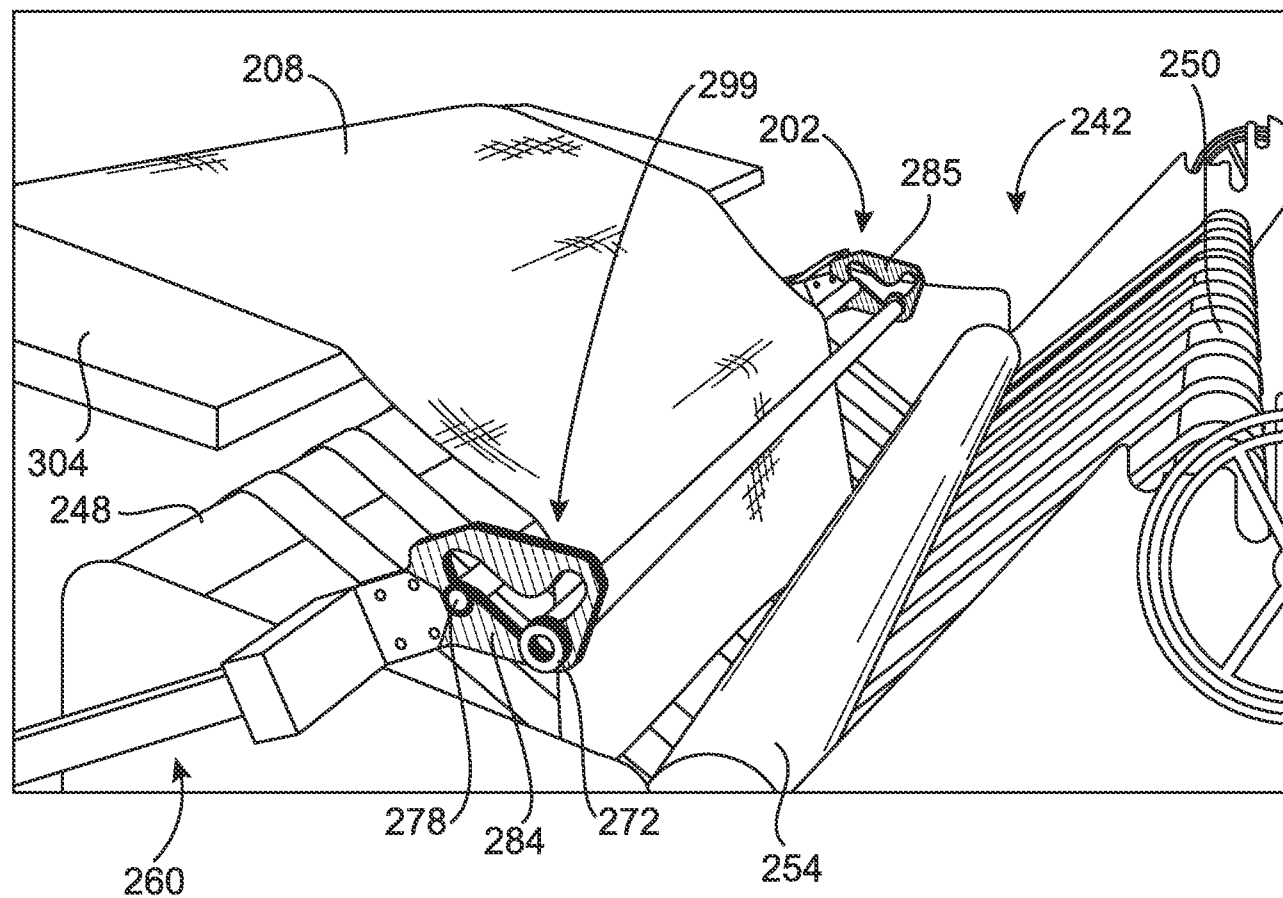


FIG. 4