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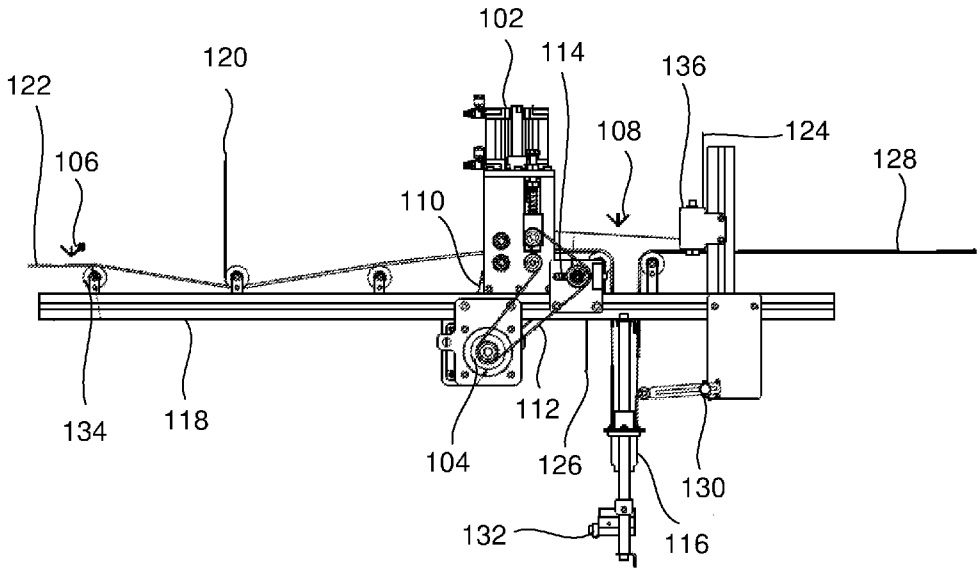

FIG. 1

(57) Abstract: A device for sandwiching operation of different layers is described here. The sandwiching device (100) includes a sandwiching module (102), one or more motors (104), a first adhesive applicator (106), a second adhesive applicator (108), a core roller drive belt (110), a sandwich roller drive belt (112), a belt tension adjuster (114), a loop adjuster mechanism (116), a frame (118), a pneumatic cylinder (506), a cutting die (504) and an adjustable roller (136). The sandwiching module (102) includes one or more core rollers (602) and one or more sandwich rollers (502) that are adapted to insert core layers between a bottom sheet and a top sheet of a sanitary napkin automatically. The one or more core rollers (602) are adapted to pull the core layers from a storage area. The one or more sandwich rollers (502) are adapted to pull a plastic film from the sandwiching module (102).

WO 2019/016829 A1

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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A DEVICE FOR SANDWICHING OPERATION OF DIFFERENT LAYERS

BACKGROUND

Technical Field

[0001] The embodiments herein generally relate to performing sandwiching operation on sanitary napkins, and more particularly, a device and method for performing sandwiching operation of different layers used to manufacture sanitary napkins and similar hygiene products.

Description of the Related Art

[0002] Sanitary napkins are media for absorbing a large amount of body fluid. Typical manufacturing device used for sandwiching operation of the sanitary napkins runs at very high speed using high level automation. Due to the nature of the raw materials involved it is tricky to handle and maintain them within tolerances. There are four raw materials which are sandwiched in a set pattern. The lengths of two smaller raw materials are lesser by a fixed amount compared to the length of other two materials. The high-level automation includes the use of components like vacuum conveyors, rollers, rotary blades and other automation equipment's to make the manufacturing process more sophisticated which in turn requires high amount of energy and further requires more space for the installation of the components. The requirement of more space makes the device very bulky which in turn makes complexity for the designers to design a cost effective and compact device. Further the high cost of the components like the rotary blades in the typical manufacturing device increases the cost of the sanitary napkins.

[0003] Accordingly, there remains a need for a device that is compact and cost-effective to perform the sandwiching operation of different layers to manufacture sanitary napkins and similar hygiene products.

SUMMARY

[0004] In view of the foregoing, a sandwiching device (100) for performing a sandwiching operation of different layers to manufacture a sanitary napkin is provided. The sandwiching device includes a first adhesive applicator, a second adhesive applicator and a plurality of sandwich rollers. The first adhesive applicator applies an adhesive between core layers to combine said core layers before entering into one or more core rollers. In one embodiment, said one or more core rollers pulls the core layers, wherein said core layers

comprises an air laid layer and a sap layer. The second adhesive applicator applies said adhesive on back side of a PE sheet to attach said core layers on said back side of said PE sheet. The plurality of sandwich rollers pulls a plastic film from a storage area, wherein said plastic film comprises said PE sheet and a perforated core. In one embodiment, the one or more core rollers and the one or more sandwich rollers are operated using one or more motors to pull the core layers and the plastic film to form a composite layer. In one embodiment, the plurality of sandwich rollers inserts the core layers between a top sheet and a bottom sheet of the sanitary napkin, wherein the composite layer is pulled using the one or more sandwich rollers to a first predetermined length. In another embodiment, when said composite layer is passed through a loop adjuster mechanism that triggers a second limit switch which (i) enables the one or more core rollers and the one or more sandwich rollers to stop or actuate a cutting die 504 to cut the core layers, (ii) obtains a linear actuation of a second predetermined length and pulls the composite layer to the second predetermined length by moving the second idler roller upwards when the second limit switch is triggered.

[0005] In another embodiment, the loop adjuster mechanism comprises a second idler roller, wherein a weight of the second idler roller creates tension in the composite layer and ensures the length of the one or more core layers is maintained as per requirement. The sandwich device includes a pneumatic cylinder. The pneumatic cylinder includes a cutting die, wherein the cutting die is adapted to cut the one or more core layers into a predetermined length. The loop adjuster mechanism includes a first limit switch. In one embodiment, upward movement of the second idler roller operates the one or more sandwich rollers and stops the one or more core rollers at the end of the linear actuation which pulls the plastic film to a third predetermined length and actuates the first limit switch, wherein said third predetermined length is difference between the second predetermined length and the first predetermined length.

[0006] In another aspect, a method for performing a sandwiching operation of different layers to manufacture a sanitary napkin is provided. The method includes the steps of: (i) applying, using a first adhesive applicator, an adhesive between core layers to combine the core layers before entering into one or more core rollers; (ii) pulling, using said one or more core rollers, the core layers, wherein said core layers comprises an air laid layer and a sap layer; (iii) applying, using a second adhesive applicator, the adhesive on back side of a PE

sheet to attach the core layers on the back side of the PE sheet; (iv) pulling, using one or more sandwich rollers, a plastic film, wherein said plastic film comprises the PE sheet and a perforated core; (v) operating, using one or more motors , the one or more core rollers and the one or more sandwich rollers to pull the core layers and the plastic film to form a composite layer; (vi) inserting, using one or more sandwich rollers, the core layers between a top sheet and a bottom sheet of the sanitary napkin, wherein the composite layer is pulled using the one or more sandwich rollers to a first predetermined length; (vii) passing said composite layer through a loop adjuster mechanism that triggers a second limit switch which (i) enables the one or more core rollers and the one or more sandwich rollers to stop or actuate a cutting die to cut the core layers; and (viii) obtaining a linear actuation of a second predetermined length and pulls the composite layer to the second predetermined length by moving a second idler roller upwards when the second limit switch is triggered.

[0007] The method further includes the steps of: (ix) operating the one or more sandwich rollers are operated when the one or more core rollers are stopped at the end of the linear actuation which further pulls the plastic film to a third predetermined length by actuating a first limit switch; (x) performing a sandwiching operation of the sandwiching device that operates for a predetermined time and stops when the linear actuation is actuated.

[0008] In one embodiment, the one or more sandwich rollers are operated when the one or more core rollers are stopped at the end of the linear actuation which further pulls the plastic film to a third predetermined length by actuating a first limit switch.

[0009] In another embodiment, a weight of the second idler roller creates tension in the composite layer and ensures the length of the one or more core layers is maintained as per requirement. In yet another embodiment, upward movement of the second idler roller operates the one or more sandwich rollers and stops the one or more core rollers at the end of the linear actuation which pulls the plastic film to a third predetermined length and actuates the first limit switch, wherein said third predetermined length is difference between the second predetermined length and the first predetermined length.

[0010] These and other aspects of the embodiments herein will be better appreciated and understood when considered in conjunction with the following description and the accompanying drawings. It should be understood, however, that the following descriptions, while indicating preferred embodiments and numerous specific details thereof, are given by

way of illustration and not of limitation. Many changes and modifications may be made within the scope of the embodiments herein without departing from the spirit thereof, and the embodiments herein include all such modifications

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The embodiments herein will be better understood from the following detailed description with reference to the drawings, in which:

[0012] FIG.1 illustrates a left side view of a sandwiching device for performing sandwiching operation of different layers that are used to manufacture sanitary napkin according to an embodiment herein;

[0013] FIG. 2 illustrates a front view of the sandwiching device for performing the sandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein;

[0014] FIG. 3 illustrates a top view of the sandwiching device for performing the sandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein;

[0015] FIG. 4 illustrates a perspective view of the sandwiching device for performing the sandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein;

[0016] FIG. 5 illustrates a front view of a sandwiching module in the sandwiching device according to an embodiment herein;

[0017] FIG. 6 illustrates a perspective view of the sandwiching module in the sandwiching device according to an embodiment herein;

[0018] FIG. 7 illustrates an exploded view of a loop adjuster mechanism of the sandwiching device of FIG. 1 according to an embodiment herein; and

[0019] FIGS. 8A-8B is a flow diagram illustrating a method for performing the sandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein.

DETAILED DESCRIPTION OF THE DRAWINGS

[0020] The embodiments herein and the various features and advantageous details

thereof are explained more fully with reference to the non-limiting embodiments that are illustrated in the accompanying drawings and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0021] There is a need for cost-effective and compact device for sandwiching operation of different layers to manufacture sanitary napkins effectively. The embodiments herein achieve this by providing a sandwiching device that inserts core layers between a top sheet and a bottom sheet of a sanitary napkin. Referring now to the drawings, and more particularly to FIGS. 1 through 8B where similar reference characters denote corresponding features consistently throughout the figures, there are shown preferred embodiments.

[0022] FIG. 1 illustrates a left side view of a sandwiching device 100 that performs sandwiching operation of different layers that are used to manufacture sanitary napkinaccording to an embodiment herein. The sandwiching device 100 includes a sandwiching module 102, one or more motors 104, a first adhesive applicator 106, a second adhesive applicator 108, a core roller drive belt 110, a sandwich roller drive belt 112, a belt tension adjuster 114, a loop adjuster mechanism 116, a frame118, a first idler roller 134, a pneumatic cylinder, a cutting die and an adjustable roller 136. The sandwiching module 102 is adapted to insert core layers between a bottom sheet and a top sheet of a sanitary napkin automatically.

[0023] The sandwiching module 102 includes one or more core rollers and one or more sandwich rollers. The one or more core rollers and the one or more sandwich rollers are operated individually by the one or more motors 104 using the core roller drive belt 110 and the sandwich roller drive belt 112 respectively. The belt tension adjuster 114 is adapted to adjust the tension of the core roller drive belt 110 and the sandwich roller drive belt 112. The one or more core rollers may pull the core layers from a storage area. The core layers may be stored in the storage area. The core layers include a sap layer 120 and an air laid layer 122. The first adhesive applicator 106 applies an adhesive between the sap layer 120 and the air laid

layer 122 before entering the one or more core rollers. The one or more sandwich rollers are adapted to pull a plastic film from the sandwiching module 102.

[0024] The plastic film includes a polyethylene (PE) sheet 124 and a perforated core 126.The second adhesive applicator 108 applies the adhesive on back side of the PE sheet 124 that is adapted to attach the core layers on the back side of the PE sheet 124. The one or more motors 104 operate the one or more core rollers and the one or more sandwich rollers to pull the core layers and the plastic film to form a composite layer 128 of a first predetermined length. The one or more sandwich rollers are adapted to insert the core layers between the top sheet and the bottom sheet of the sanitary napkin and pull the composite layer 128 to the first predetermined length. The sandwiching device 100 allows the composite layer 128 to pass through the loop adjuster mechanism 116. The loop adjuster mechanism 116 allows transition from rotary motion of the sandwiching module 102 into a linear start and stop motion. The loop adjuster mechanism 116 is further adapted to synchronize the composite layer 128 that comes out from the sandwiching module 102 and a pulling mechanism. The pulling mechanism pulls the composite layer 128 and has start and stop process. The pulling mechanism includes a gripper that pulls the composite layer 128 when the pulling mechanism is actuated. The composite layer 128 does not move and the gripper is released while returning back to original position. The adjustable roller 136 adjusts the alignment of the PE sheet124 in machine cross direction.

[0025] The loop adjuster mechanism 116 includes a first limit switch 130, a second limit switch 132, a linear bearing, a linear guider and a second idler roller 702. The weight of the second idler roller 702 creates tension in the composite layer 128 and ensures the length of the one or more core layers is maintained as per requirement. The second idler roller 702 is connected to the linear bearing which provides a linear motion vertically. The pneumatic cylinder includes a cutting die that is adapted to cut the one or more core layers into a required length. The linear bearing and the linear guider allow the second idler roller to have a vertical motion and maintain the tension required in the one or more core layers. The first limit switch 130 and the second limit switch 132 operated as indicators to control the length of the one or more core layers.

[0026] The position of the first limit switch 130 and the second limit switch 132 may be adjusted to vary the length of the one or more core layers as per the requirement. The

passage of the composite layer 128 through the loop adjuster mechanism 116 triggers the second limit switch 132 that (i) causes the one or more core rollers and the one or more sandwich rollers to stop and actuates the cutting die to cut the one or more core layers, (ii) obtains a linear actuation of a second predetermined length and pulls the composite layer 128 to the second predetermined length and (iii) moves the second idler roller upwards when the second limit switch 132 is triggered.

[0027] The upward movement of the second idler roller operates the one or more sandwich rollers and stops the one or more core rollers at the end of the linear actuation which pulls the plastic film to a third predetermined length (i.e. difference between the second predetermined length and the first predetermined length) and actuates the first limit switch 130. In one embodiment, the second predetermined length is greater than the first predetermined length. The third predetermined length may be adjusted by changing a position of the first limit switch 130. The length of the core layers and the plastic film may be adjusted by changing a position of the second limit switch 132.

[0028] FIG. 2 illustrates a front view of the sandwiching device 100 for performing the sandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein. The sandwiching device 100 includes the sandwiching module 102, the one or more motors 104, the first adhesive applicator 106, the second adhesive applicator 108, the core roller drive belt 110, the sandwich roller drive belt112, the belt tension adjuster 114, the frame 118, the pneumatic cylinder, the cutting die and the loop adjuster mechanism 116. The function of these components as has been described above.

[0029] FIG. 3 illustrates a top view of the sandwiching device 100 for performing thesandwiching operation of the different layers that are used to manufacture the sanitary napkin according to an embodiment herein. The sandwiching device 100 includes the sandwiching module 102, the one or more motors 104, the first adhesive applicator 106, the second adhesive applicator 108, the core roller drive belt 110, the sandwich roller drive belt 112, the belt tension adjuster 114, the loop adjuster mechanism 116, the frame 118, the first idler roller 134, the adjustable roller 136, the pneumatic cylinder and the cutting die. The function of these components as has been described above.

[0030] FIG. 4 illustrates a perspective view of the sandwiching device 100 for performing the sandwiching operation of the different layers that are used to manufacture the

sanitary napkin according to an embodiment herein. The sandwiching device 100 includes the sandwiching module 102, the one or more motors 104, the first adhesive applicator 106, the second adhesive applicator 108, the core roller drive belt 110, the sandwich roller drive belt 112, the belt tension adjuster 114, the loop adjuster mechanism 116, the frame 118, the first idler roller 134, the adjustable roller 136, the pneumatic cylinder and the cutting die. The function of these components as has been described above.

[0031] FIG. 5 illustrates a front view of the sandwiching module 102 of the sandwiching device 100 of FIG. 1 according to an embodiment herein. The sandwiching module 102 includes the one or more core rollers 602 and the one or more sandwich rollers 502. The one or more core rollers 602 and the one or more sandwich rollers 502 are operated individually by the one or more motors 104. The sandwiching module 102 further includes the cutting die 504, the pneumatic cylinder 506, the linear guider508, an adjustable bolt 510, an anvil 512, an anvil adjuster 514, a pulley 516, the linear bearing 518 and an adjustable bearing block 520. The cutting die 504 is adapted to cut the one or more layers when the composite layer 128 is passed through the sandwiching module 102. The pneumatic cylinder 506 is adapted to actuate the cutting die 504. The adjustable bolt 510 is adapted to adjust required pressure on the one or more sandwich rollers 502 for the sandwiching operation. The anvil 512 is adapted to support the cutting die 504 for cutting the one or more core layers. The linear bearing 518 and the linear guider 508 constrains the motion of the pneumatic cylinder 506 to one degree of freedom (DOF) and provide rigidity to the cutting die 504. The anvil adjuster 514 is adapted to adjust a level of the anvil 512 for cutting the one or more core layers when the cutting is not proper in one side. The pulley 516 is adapted to drive the one or more core rollers and the one or more sandwich rollers 502. The adjustable bearing block 520 adjusts a pressure of the one or more sandwich rollers 502 corresponding to the required pressure for the sandwiching operation. The adjustable bearing block 520 includes a self align ball bearing that aligns automatically to provide smooth operation even if shaft has misalignment.

[0032] FIG. 6 illustrates a perspective view of the sandwiching module 102 in the sandwiching device 100 of FIG. 1 according to an embodiment herein. The sandwiching module includes the one or more core rollers 602, the self align ball bearing 604, a deep groove ball bearing 606, the one or more sandwich rollers 502, the cutting die 504, the pneumatic cylinder 506, the linear guider 508, the adjustable bolt 510, the anvil 512, the anvil adjuster

514, the pulley 516 and the linear bearing 518. The self align ball bearing 604 adjusts according to static and dynamic misalignments while performing the sandwiching operation. The deep groove ball bearing 606 is used to withstand from high speed or radial loads or high pressures that are applied to the one or more core rollers 602 and the one or more sandwich rollers 502. The adjustable bolt 510 is adapted to adjust the adjustable bearing block 520. The function of the other components as has been described above.

[0033] FIG. 7 illustrates an exploded view of the loop adjuster mechanism 116 of the sandwiching device 100 of FIG. 1 according to an embodiment herein. The loop adjuster mechanism 116 includes the second idler roller 702, the second limit switch 132, the linear bearing 518 and the linear guider 508. The function of these components as has been described above.

[0034] FIGS. 8A-8B is a flow diagram illustrating a method for performing the sandwiching operation of the different layers to manufacture the sanitary napkin according to an embodiment herein. At step 802, a first adhesive applicator 106 applies an adhesive between core layers to combine the core layers before entering one or more core rollers 602. At step 804, the one or more core rollers 602 pull the core layers (i.e. an air laid layer 122 and a sap layer 120). At step 806, a second adhesive applicator 108 applies the adhesive on back of a PE sheet 124 to attach the core layers on the back of the PE sheet 124. At step 808, one or more sandwich rollers 502 pull a plastic film (i.e. the PE sheet 124 and a perforated core 126). At step 810, one or more motors 104 operate the one or more core rollers 602 and the one or more sandwich rollers 502 to pull the core layers and the plastic film to form a composite layer 128. At step 812, the core layers are inserted between a top sheet and a bottom sheet and the composite layer 128 is pulled to a first predetermined length using the one or more sandwich rollers 502.

[0035] At step 814, the composite layer 128 is passed through a loop adjuster mechanism 116 that triggers a second limit switch 132 which further causes the one or more core rollers 602 and the one or more sandwich rollers 502 to stop or actuate a cutting die 504 to cut the core layers. At step 816, a linear actuation of a second predetermined length is obtained when the second limit switch 132 is triggered which further pulls the composite layer 128 to the second predetermined length by moving a second idler roller 702 in upward direction. At step 818, the one or more sandwich rollers 502 are operated when the one or

more core rollers 602 are stopped at the end of the linear actuation which further pulls the plastic film to a third predetermined length by actuating a first limit switch 130. The third predetermined length may be varied by changing position of the first limit switch 130. The length of the core layers and the plastic film maybe varied by changing position of the second limit switch 132. At step 820, a sandwiching operation of the sandwiching device 100 operates for a predetermined time and stops when the linear actuation is actuated.

[0036] The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the appended claims.

CLAIMS

I/We Claim:

1. A sandwiching device (100) for performing a sandwiching operation of different layers to manufacture a sanitary napkin, wherein said sandwiching device (100) comprises

a first adhesive applicator (106) that applies an adhesive between core layers to combine said core layers before entering into one or more core rollers (602), wherein said one or more core rollers (602) pulls the core layers, wherein said core layers comprises an air laid layer (122) and a sap layer (120);

a second adhesive applicator (108) that applies said adhesive on back side of a PE sheet (124) to attach said core layers on said back side of said PE sheet (124); and

a plurality of sandwich rollers (502) that pulls a plastic film from a storage area, wherein said plastic film comprises said PE sheet (124) and a perforated core (126), wherein the one or more core rollers (602) and the one or more sandwich rollers (502) are operated using one or more motors (104) to pull the core layers and the plastic film to form a composite layer (128),

wherein said plurality of sandwich rollers (502) inserts the core layers between a top sheet and a bottom sheet of the sanitary napkin, wherein the composite layer (128) is pulled using the one or more sandwich rollers (502) to a first predetermined length,

wherein when said composite layer (128) is passed through a loop adjuster mechanism (116) that triggers a second limit switch (132) which (i) enables the one or more core rollers (602) and the one or more sandwich rollers (502) to stop or actuate a cutting die 504 to cut the

core layers, (ii) obtains a linear actuation of a second predetermined length and pulls the composite layer (128) to the second predetermined length by moving the second idler roller upwards when the second limit switch (132) is triggered.

2. The sandwich device (100) as claimed in claim 1, wherein the loop adjuster mechanism 116 comprises a second idler roller (702), wherein a weight of the second idler roller (702) creates tension in the composite layer (128) and ensures the length of the one or more core layers is maintained as per requirement.

3. The sandwich device (100) as claimed in claim 1, comprises

a pneumatic cylinder that comprises a cutting die (504), wherein said cutting die (504) is adapted to cut the one or more core layers into a predetermined length.

4. The sandwich device (100) as claimed in claim 1, wherein said loop adjuster mechanism (116) comprises a first limit switch (130), wherein upward movement of the second idler roller (702) operates the one or more sandwich rollers (502) and stops the one or more core rollers at the end of the linear actuation which pulls the plastic film to a third predetermined length and actuates the first limit switch (130), wherein said third predetermined length is difference between the second predetermined length and the first predetermined length.

5. A method for performing a sandwiching operation of different layers to manufacture a sanitary napkin, said method comprising:

applying, using a first adhesive applicator (106), an adhesive between core layers to combine the core layers before entering into one or more core rollers (602);

pulling, using said one or more core rollers (602), the core layers, wherein said core layers comprises an air laid layer (122) and a sap layer (120);

applying, using a second adhesive applicator (108), the adhesive on back side of a PE sheet (124) to attach the core layers on the back side of the PE sheet (124);

pulling, using one or more sandwich rollers (502), a plastic film, wherein said plastic film comprises the PE sheet (124) and a perforated core (126);

operating, using one or more motors (104), the one or more core rollers (602) and the one or more sandwich rollers (502) to pull the core layers and the plastic film to form a composite layer (128);

inserting, using one or more sandwich rollers (502), the core layers between a top sheet and a bottom sheet of the sanitary napkin, wherein the composite layer (128) is pulled using the one or more sandwich rollers (502) to a first predetermined length;

passing said composite layer (128) through a loop adjuster mechanism (116) that triggers a second limit switch (132) which (i) enables the one or more core rollers (602) and the one or more sandwich rollers (502) to stop or actuate a cutting die (504) to cut the core layers; and

obtaining a linear actuation of a second predetermined length and pulls the composite layer (128) to the second predetermined length by moving a second idler roller (702) upwards when the second limit switch (132) is triggered.

6. The method as claimed in claim 5, comprises

operating the one or more sandwich rollers (502) are operated when the one or more core rollers (602) are stopped at the end of the linear actuation which further pulls the plastic film to a third predetermined length by actuating a first limit switch (130); and

performing a sandwiching operation of the sandwiching device (100) that operates for a predetermined time and stops when the linear actuation is actuated.

7. The method as claimed in claim 5, wherein the one or more sandwich rollers (502) are operated when the one or more core rollers (602) are stopped at the end of the linear actuation which further pulls the plastic film to a third predetermined length by actuating a first limit switch (130).

8. The method as claimed in claim 7, wherein a weight of the second idler roller (702) creates tension in the composite layer (128) and ensures the length of the one or more core layers is maintained as per requirement.

9. The method as claimed in claim 8, wherein upward movement of the second idler roller (702) operates the one or more sandwich rollers (502) and stops the one or more core rollers (602) at the end of the linear actuation which pulls the plastic film to a third predetermined length and actuates the first limit switch (130), wherein said third predetermined length is difference between the second predetermined length and the first predetermined length.

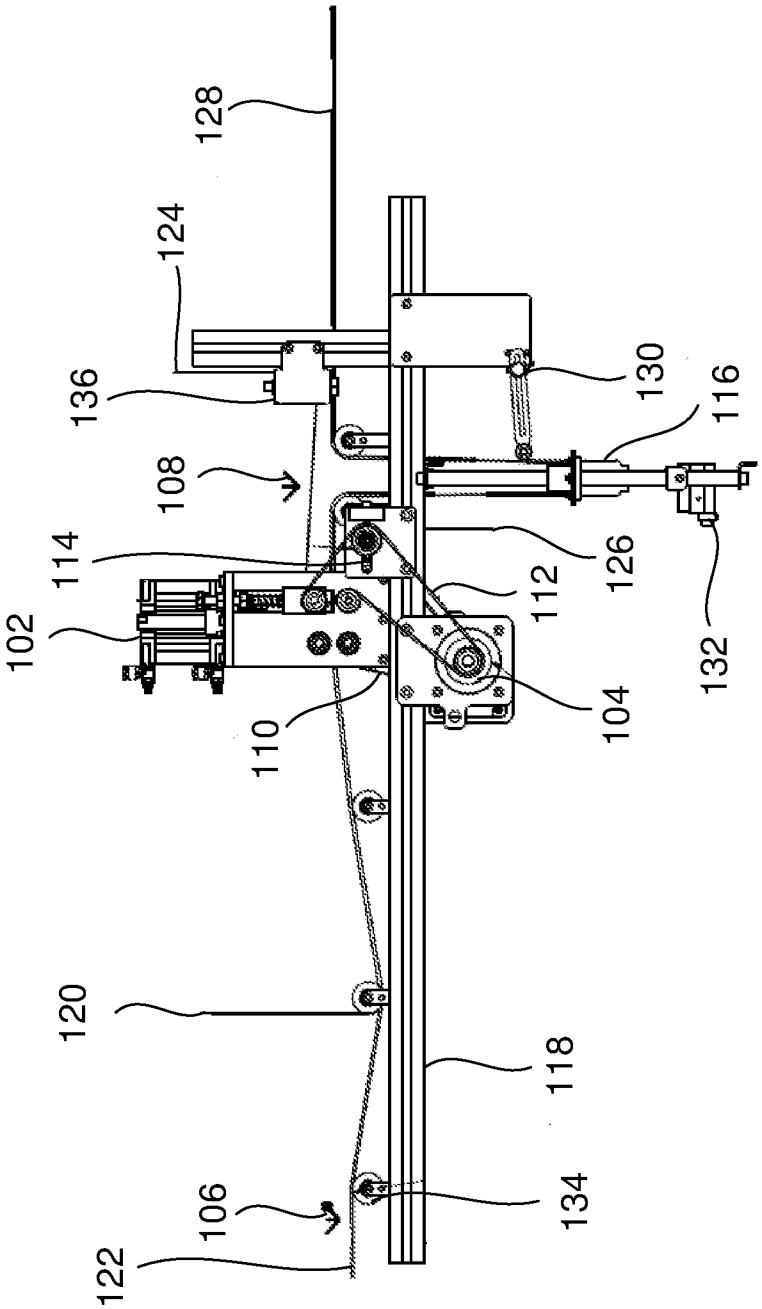
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FIG. 1

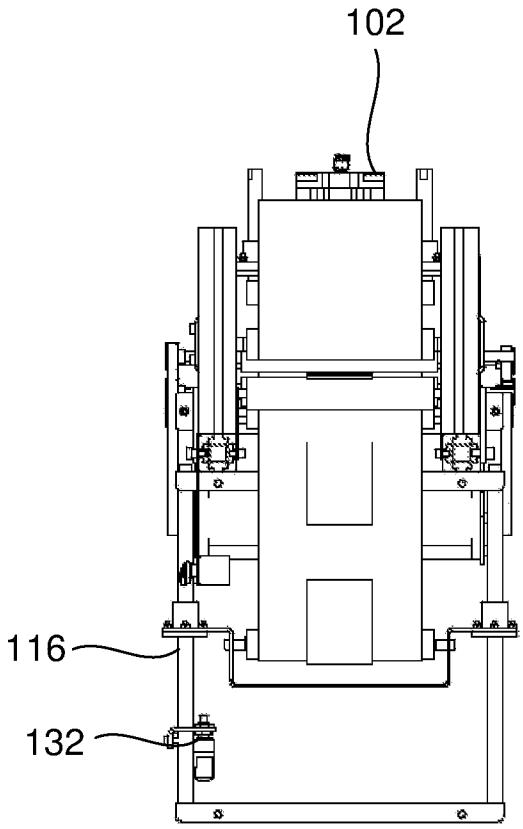

FIG. 2

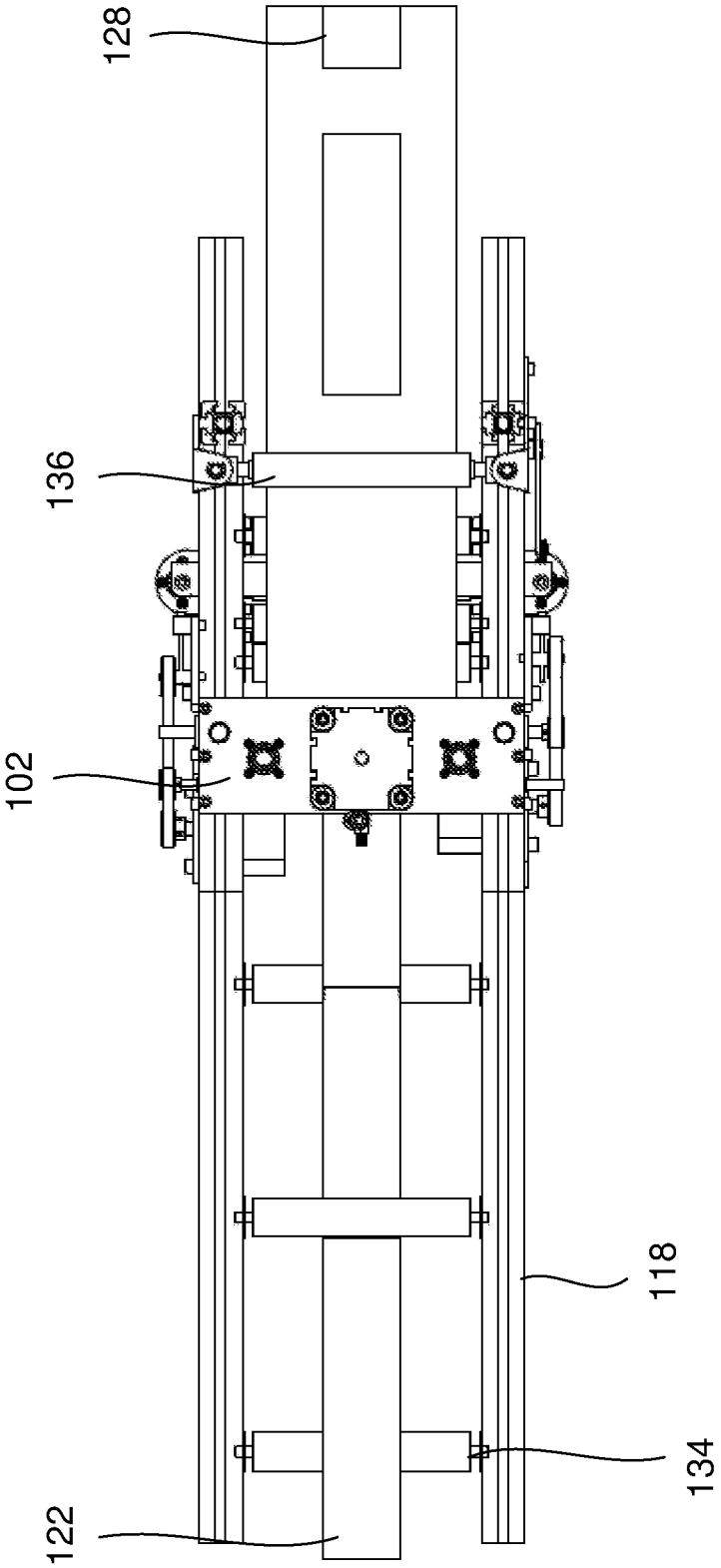

FIG. 3

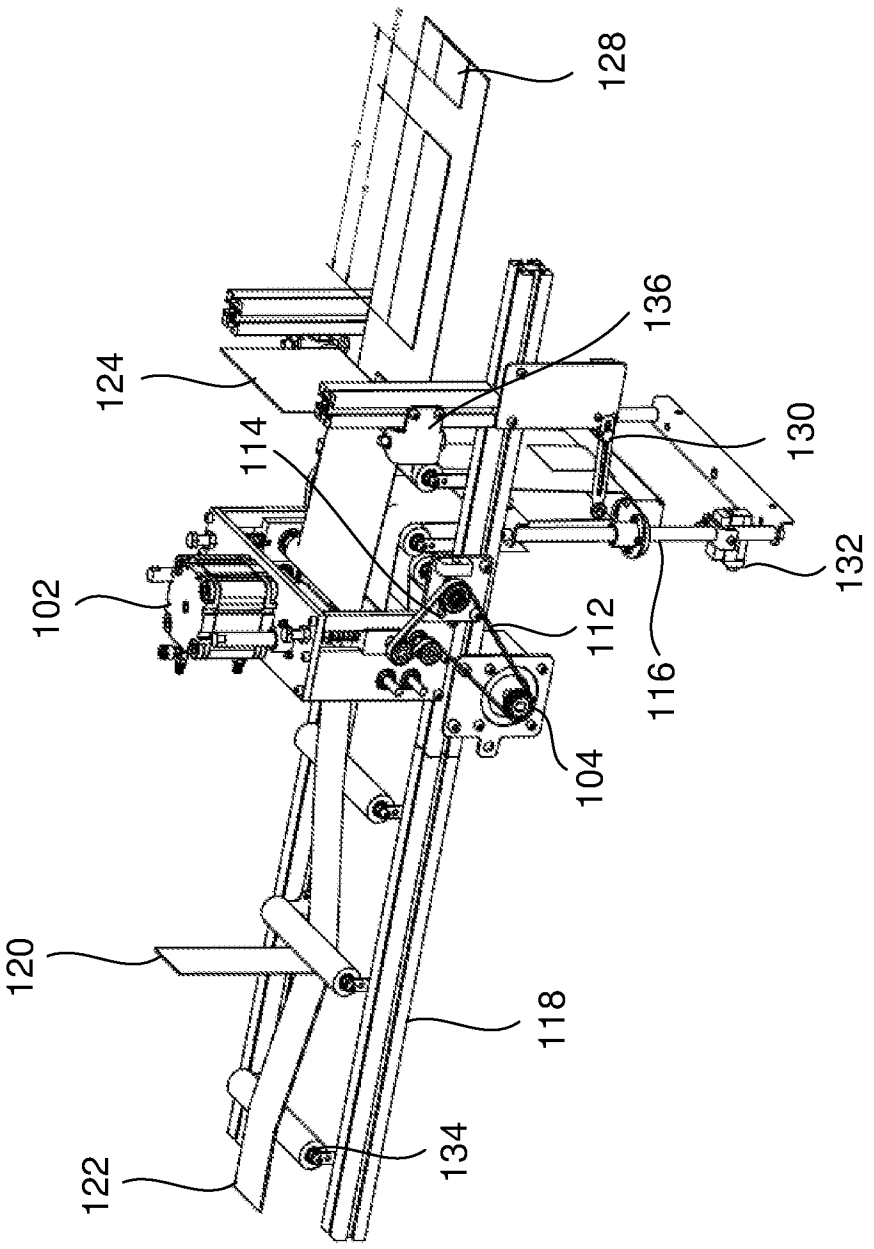

FIG. 4

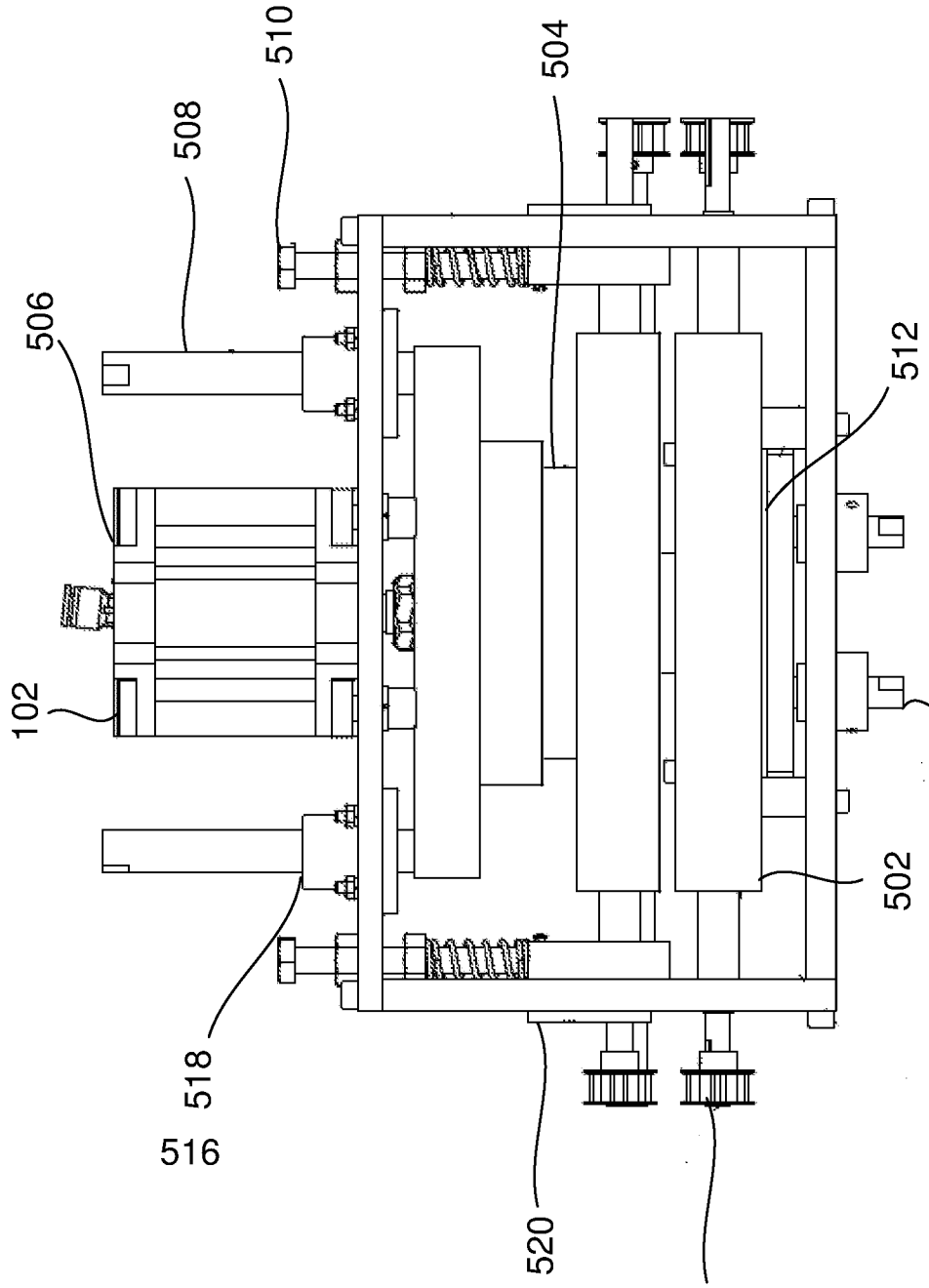

FIG. 5

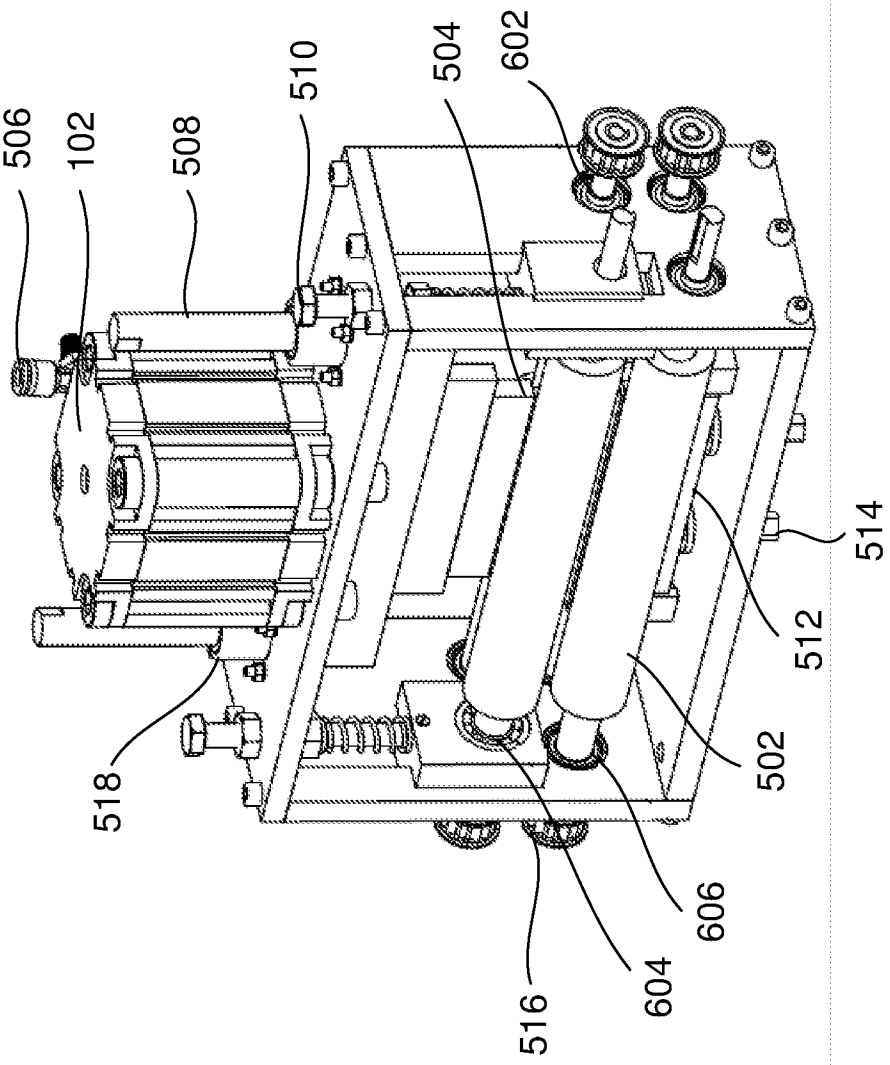

FIG. 6

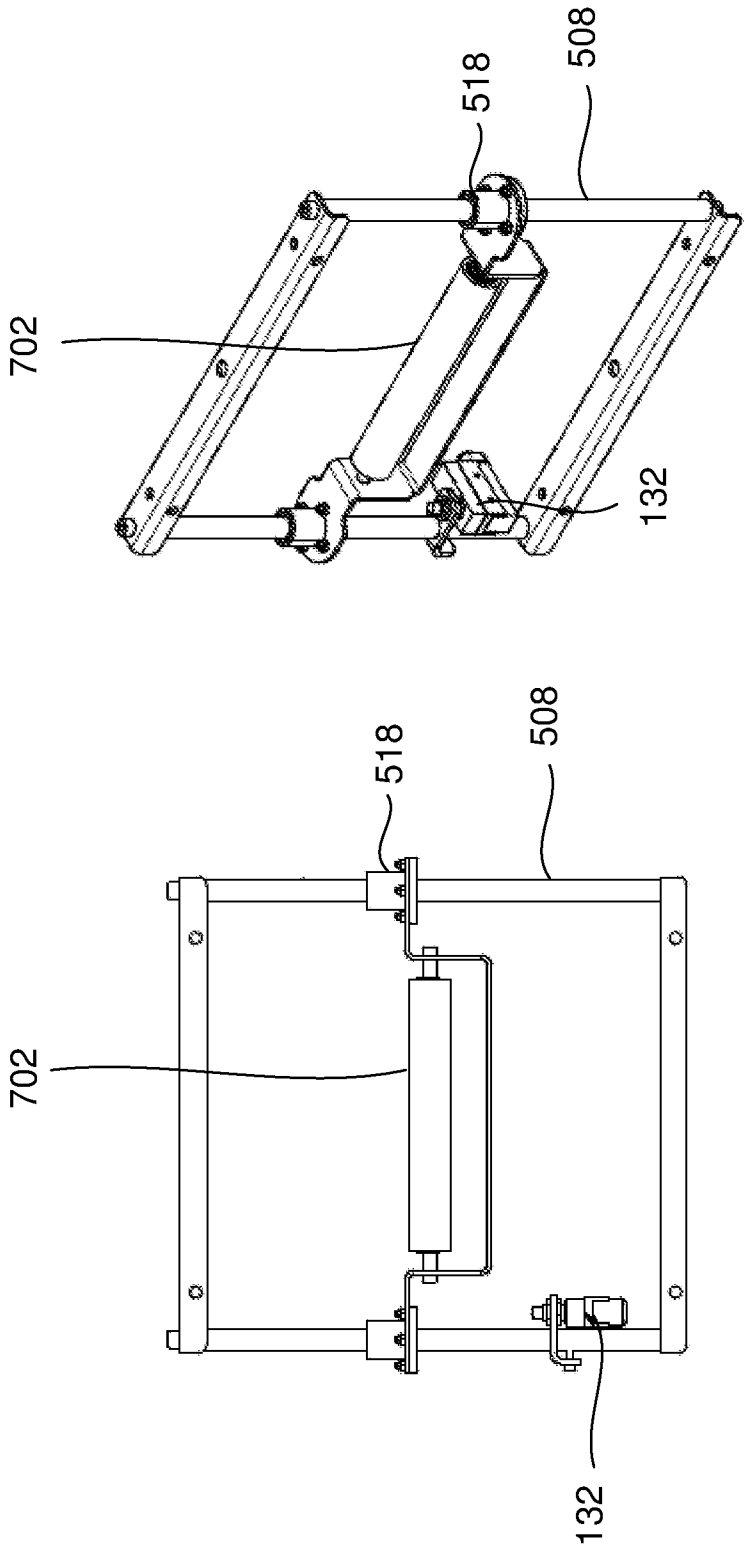

FIG. 7

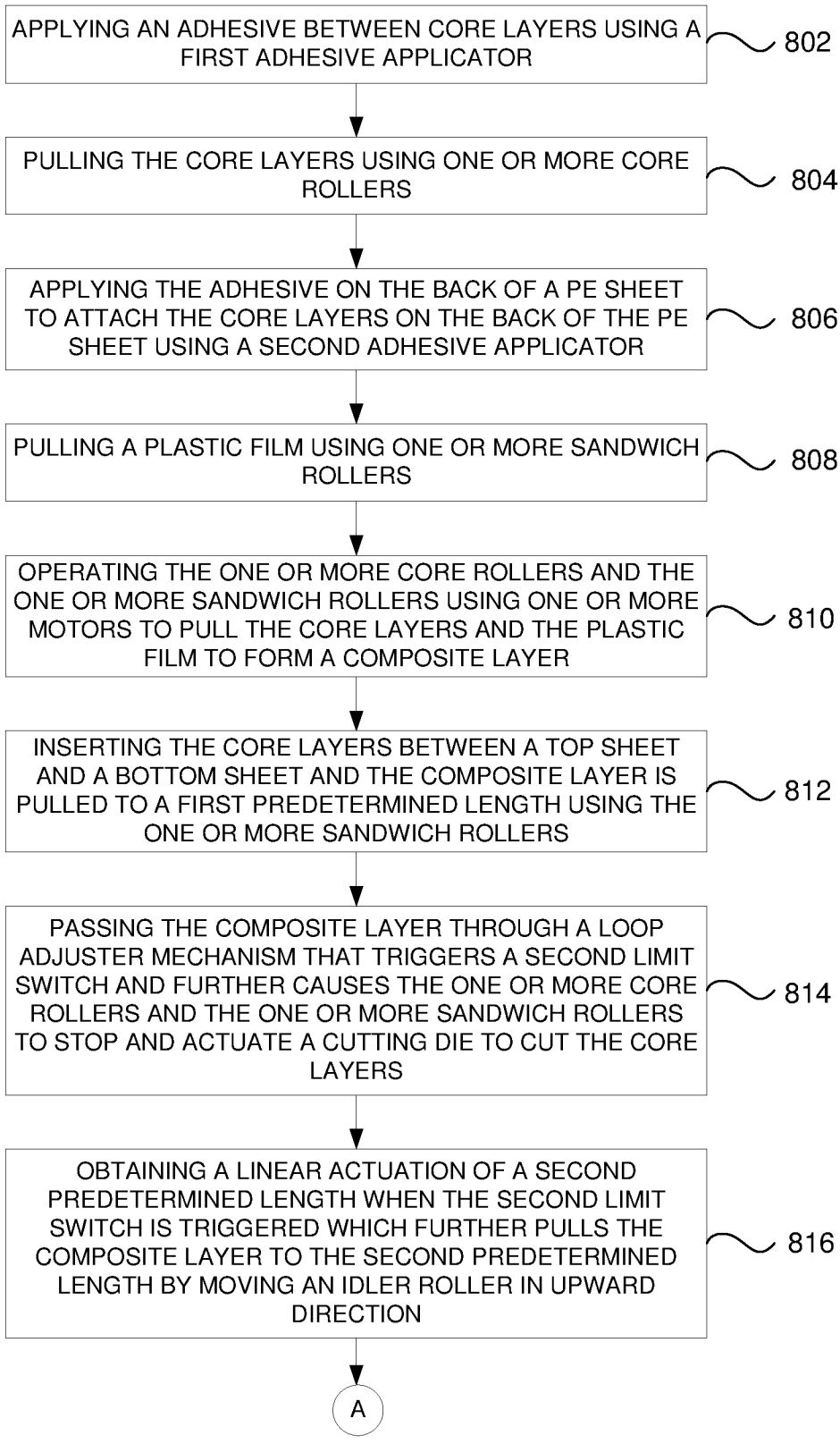
APPLYING AN ADHESIVE BETWEEN CORE LAYERS USING A FIRST ADHESIVE APPLICATOR
802
PULLING THE CORE LAYERS USING ONE OR MORE CORE ROLLERS
804
APPLYING THE ADHESIVE ON THE BACK OF A PE SHEET TO ATTACH THE CORE LAYERS ON THE BACK OF THE PE SHEET USING A SECOND ADHESIVE APPLICATOR
806
PULLING A PLASTIC FILM USING ONE OR MORE SANDWICH ROLLERS
808
OPERATING THE ONE OR MORE CORE ROLLERS AND THE ONE OR MORE SANDWICH ROLLERS USING ONE OR MORE MOTORS TO PULL THE CORE LAYERS AND THE PLASTIC FILM TO FORM A COMPOSITE LAYER
810
INSERTING THE CORE LAYERS BETWEEN A TOP SHEET AND A BOTTOM SHEET AND THE COMPOSITE LAYER IS PULLED TO A FIRST PREDETERMINED LENGTH USING THE ONE OR MORE SANDWICH ROLLERS
812
PASSING THE COMPOSITE LAYER THROUGH A LOOP ADJUSTER MECHANISM THAT TRIGGERS A SECOND LIMIT SWITCH AND FURTHER CAUSES THE ONE OR MORE CORE ROLLERS AND THE ONE OR MORE SANDWICH ROLLERS TO STOP AND ACTUATE A CUTTING DIE TO CUT THE CORE LAYERS
814
OBTAINING A LINEAR ACTUATION OF A SECOND PREDETERMINED LENGTH WHEN THE SECOND LIMIT SWITCH IS TRIGGERED WHICH FURTHER PULLS THE COMPOSITE LAYER TO THE SECOND PREDETERMINED LENGTH BY MOVING AN IDLER ROLLER IN UPWARD DIRECTION
816
A

FIG. 8A

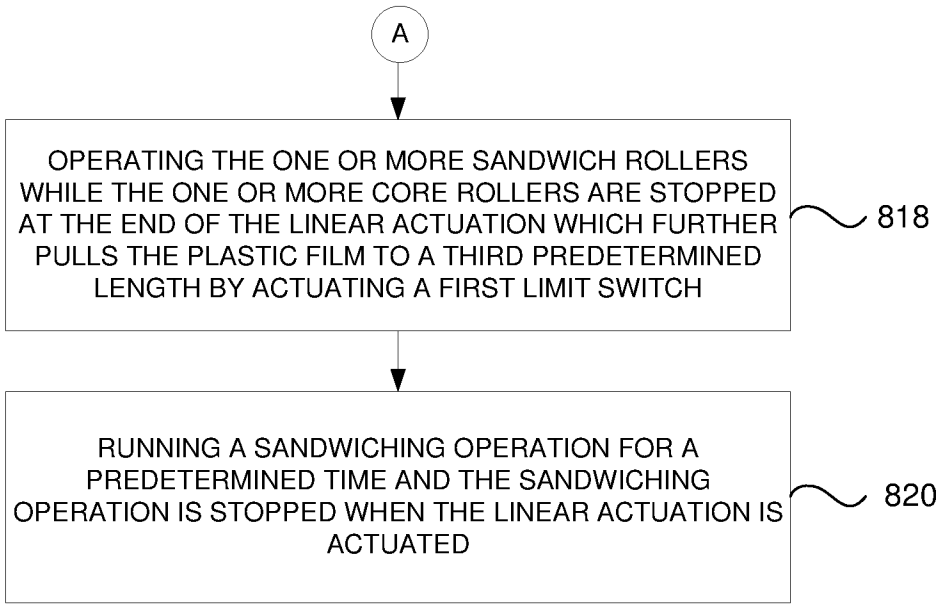
A
OPERATING THE ONE OR MORE SANDWICH ROLLERS WHILE THE ONE OR MORE CORE ROLLERS ARE STOPPED AT THE END OF THE LINEAR ACTUATION WHICH FURTHER PULLS THE PLASTIC FILM TO A THIRD PREDETERMINED LENGTH BY ACTUATING A FIRST LIMIT SWITCH
818
RUNNING A SANDWICHING OPERATION FOR A PREDETERMINED TIME AND THE SANDWICHING OPERATION IS STOPPED WHEN THE LINEAR ACTUATION IS ACTUATED
820

FIG. 8B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2018/050462

A. CLASSIFICATION OF SUBJECT MATTER
A61F13/15 Version=2018.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

TotalPatent One, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US6234229B1 (TAO MACHINE INDUSTRY INC.) May 22, 2001. Abstract; Figures 1-12; Column 7, Line 12-Line 18; Column 8, Line 21-Line 44; Column 10, Line 50-Line 67; Column 11, Line 1-Line 16; Column 12, Line 44-Line 64;	1-9
Y	US20170172810A1 (DRYLOCK TECHNOLOGIES NV.) June 22, 2017. Abstract; Figures 6, 13, 21-22; Para [0016] - Para [0033];	1-9
Y	US5286543A (KIMBERLY-CLARK CORPORATION) February 15, 1994. Abstract; Figures 1-15; Column 5, Line 56-Line 68; Column 6; Column 11; Column 12, Line 38-Line 60;	1-9
Y	US5147487A (UNI-CHARM CORPORATION) September 15, 1992. Abstract; Figures 1-8; Column 4; Column 5, Line 01-Line 45;	2, 4-9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31-10-2018	31-10-2018

Name and mailing address of the ISA/	Authorized officer
Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Aniruddh Garg Telephone No. +91-1125300200

International application No.
PCT/IN2018/050462

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