(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 417 558 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
**21.08.2024 Bulletin 2024/34**

(21) Application number: **23217744.4**

(22) Date of filing: **18.12.2023**

(51) International Patent Classification (IPC):
***B65H 19/22*** *(2006.01)* ***B65H 19/28*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
**B65H 19/2284; B65H 19/2276; B65H 19/28;**
B65H 2301/41429; B65H 2301/414325;
B65H 2301/41486; B65H 2402/31; B65H 2408/231;
B65H 2701/377; B65H 2701/5112

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **27.12.2022 IT 202200026895**

(71) Applicants:
- **Calderara, Ivo**
  **21010 Castelveccana (VA) (IT)**
- **Stocchetti, Giovanni**
  **21027 Ispra (VA) (IT)**

(72) Inventors:
- **Calderara, Ivo**
  **21010 Castelveccana (VA) (IT)**
- **Stocchetti, Giovanni**
  **21027 Ispra (VA) (IT)**

(74) Representative: **Cosenza, Simona et al**
**Barzanò & Zanardo Milano S.p.A.**
**Via Borgonuovo, 10**
**20121 Milano (IT)**

# (54) ROLL OF ADHESIVE TAPE, PROCESS AND MACHINE TO MAKE SUCH A ROLL OF ADHESIVE TAPE

(57) A roll (1) of adhesive tape is described as comprising: a film (2) having a first surface (21) covered with adhesive material and a second surface (22) opposite to the first surface (21), said film (2) being wound in coils (20) with the second surface (22) facing outwards and the first surface (21) facing inwards of the roll (1) so that the first surface (21) of a coil (20) is in contact with the second surface (22) of the adjacent internal coil (20); the film (2) has an external end (23) which is at least partly free and an internal end at the first winding coil (201) of said film (2); a core (3) on which the film (2) is wound, the core (3) is placed at the internal end and in contact with the first surface (21) of the first winding coil (201); the core (3) is made by winding a strip (30) obtained from a sheet (5) in at least one winding coil.

A process and a machine (100) for making such a roll (1) of adhesive tape are also described.

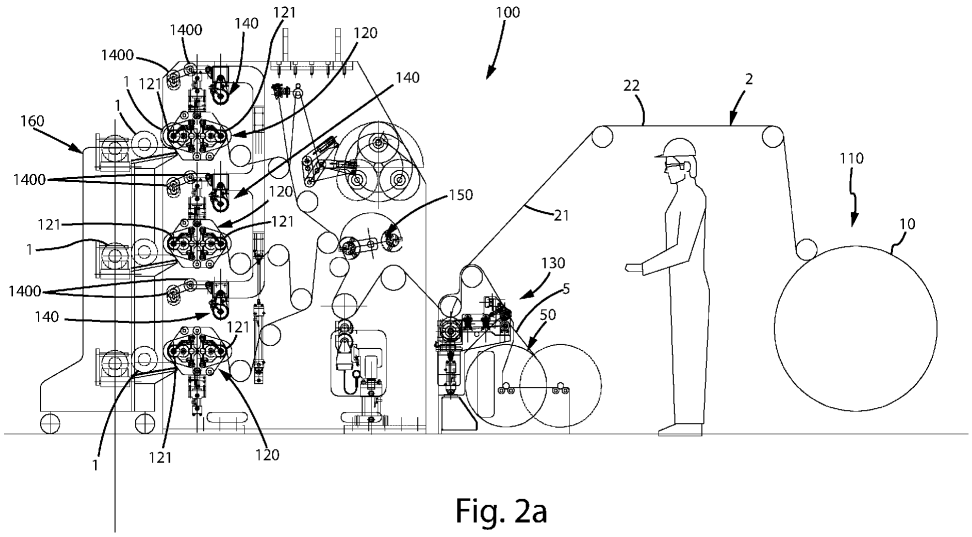



Fig. 2a

EP 4 417 558 A2

## Description

**[0001]** The present invention relates to a roll of adhesive tape. The present invention also relates to a process and a machine for making such a roll of adhesive tape.

**[0002]** The present invention is usefully employed in the field of converting tape-shaped material, for the production of rolls of adhesive tape from a larger mother reel.

**[0003]** Rolls of adhesive tape wherein a film having an adhesive-coated surface is wound in coils around a support core usually made of cardboard are known.

**[0004]** Specifically, such rolls are made from a mother reel with a predetermined diameter that is unwound into smaller rolls and wound onto a respective support core, which forms the winding core of a respective roll.

**[0005]** Support cores are known to be generally made of compressed cardboard mixed with resins and/or glues to provide support while winding the adhesive tape in forming the roll.

**[0006]** Machines are known that unwind a mother reel of adhesive tape and rewind the unwound adhesive tape into a plurality of smaller rolls of adhesive tape. In particular, the mother reel usually has a width equal to a multiple of the width of each roll and is then cut into a plurality of tapes that are diverted along staggered paths to be wound around a respective support core. In such machines, known as slitter rewinders, the support cores are fed by a hopper loader and inserted in sequence and spaced apart from each other on a same support mandrel, on which winding takes place.

**[0007]** Commercially known slitter rewinders comprise two processing groups: in a first group the support cores are sorted and loaded and the finished rolls are unloaded, while a second group unwinds the film from the mother reel and winds the tapes cut by them around the cores.

**[0008]** In addition, it is known to provide a roll of adhesive tape with an external terminal tab to make it easier to unwind the adhesive tape when first used. To form the terminal tab, the above-reported machines are known to be provided with special applying stations, placed in an intermediate position between the mother reel and the roll being wound. In particular, in such applying stations, a strip of tape-shaped material is deposited on the adhesive tape, in particular at the surface covered with adhesive material. This strip of tape-shaped material is positioned so that, once the winding of the roll is complete, the subsequent cutting of the film to separate the roll from the mother reel is carried out at this strip of tape-shaped material, which thus results in the well-known terminal tab.

**[0009]** Disadvantageously, due to the presence of glues and resins, such cores are not recyclable and therefore need to be disposed of.

**[0010]** In addition, transporting such cores from their production seats to those of the rolls of adhesive tape is expensive and burdensome as well as environmentally disadvantageous.

**[0011]** Disadvantageously, the support cores are sensitive to air humidity as they are subject to swelling when subjected to particularly humid environments, resulting in difficulties when they have to be inserted into and extracted from the support mandrel. Therefore, they must be stored in a controlled environment to prevent them from getting wet or even over-dried.

**[0012]** In practice, the presence of the core in the adhesive roll necessarily requires a management thereof, and in particular not only in relation to the logistics of its transport, but also in relation to storage thereof and handling by the machine.

**[0013]** Known slitter-rewinders are also particularly bulky, as they have to provide a unit for loading and sorting the support cores on the winding mandrel, and are particularly energy-intensive.

**[0014]** The object underlying the present invention is to overcome the above-mentioned drawbacks and, in particular, to devise a roll of adhesive tape, a process and a machine for making such a roll that are more environmentally friendly.

**[0015]** It is also an object of the present invention to make available a process and a machine for making such a roll that allow to simplify the production of the roll and that do not require a controlled environment.

**[0016]** It is also an object of the present invention to make available a process and a machine for making such a roll that allow to reduce the costs of roll production, storage and transport, particularly in terms of material costs and energy costs.

**[0017]** Another object is to provide a machine for making rolls of adhesive tape that is structurally simple and space-saving.

**[0018]** The mentioned objects, and others that will appear better later, are achieved by a roll of adhesive tape as recited in the independent claim 1, by a process as recited in claim 8, and by a machine as recited in claim 10.

**[0019]** Further characteristics of the roll of adhesive tape, process and machine are provided for in the dependent claims.

**[0020]** Further features and advantages will better appear from the description of preferred, but not exclusive, embodiments of a roll of adhesive tape and a process and machine to make it, shown by way of illustration and not limitation with the aid of the accompanying drawings:

- Figure 1 shows a perspective view of a roll of adhesive tape according to the present invention;
- Figure 2a shows a side view of a machine for making a roll of adhesive tape according to the present invention;
- Figure 2b shows a side view of the machine in Figure 2a possibly connected with a coating machine;
- Figure 3 shows a plan view of the machine in Figure 2;
- Figures 4a-4d show a perspective view of a portion of the machine of Figures 2 and 3 in different sequential steps of the process according to the present invention;

- Figures 5a-5b show a front view and a top view of a portion of the machine in Figures 2 and 3 at a particular step of the process according to the present invention;
- Figure 5c shows an enlargement of Figure 5b;
- Figure 6a shows a front perspective view of some components of two adjacent winding stations of the machine from Figures 2 and 3;
- Figure 6b shows a rear perspective view of the components in Figure 6a;
- Figures 6c-6d show a top and side view of the components in Figures 6a and 6b respectively.

**[0021]** With reference to Figures 1-4d, a roll of adhesive tape, indicated by reference number 1, a process and a machine to make such a roll 1, where the machine is indicated by reference number 100, are described hereinafter.

**[0022]** The roll 1 of adhesive tape according to the present invention comprises a film 2 having a first surface 21 covered with adhesive material and a second surface 22 opposite to the first surface 21. The film 2 is of the known type and can be, for example, a plastic film or a paper film.

**[0023]** The film 2 is wound in coils 20 with the second surface 22 facing outwards and the first surface 21 facing inwards on the roll 1 so that the first surface 21 of a coil 20 is in contact with the second surface 22 of the adjacent internal coil 20.

**[0024]** The film 2 has an external end 23 at least partly free and an internal end (not visible in the enclosed drawings). The internal end is at the first winding coil 201 of the film 2.

**[0025]** The roll 1 also comprises a core 3 on which the film 2 is wound.

**[0026]** The core 3 is placed at the internal end and is in contact with the first surface 21 of the first coil 201, i.e. the innermost winding coil of the film 2.

**[0027]** In other words, the core 3 remains attached to the film 2 by means of the contact with the first surface 21.

**[0028]** According to the present invention, the core 3 is made by winding a strip 30 in at least one coil. This strip 30 is obtained from a sheet 5.

**[0029]** In other words, the core 3 consists of a strip 30 of a sheet 5 that is wound to form at least the innermost coil of the roll 1.

**[0030]** The core 3 therefore comprises a strip 30 wound in at least one coil, so that at least the innermost coil of the roll 1 is in contact with the first coil 201 of the film.

**[0031]** Preferably, the strip 30 is flexible.

**[0032]** More preferably, the core 3 has a thickness comprised between 0.05 mm e 0.5 mm. Still preferably, the core 3 has a thickness comprised between 0.1 and 0.3 mm.

**[0033]** Advantageously, it is possible to deform a roll 1 by bending the wound film 2 and consequently the core 3, reducing the cylindrical volume V defined by the core 3 and thereby compacting the roll 1. Advantageously, space can be saved when transporting the roll 1.

**[0034]** Still preferably, the strip 30 is made of paper.

**[0035]** The paper can be of any kind, e.g. used or recycled.

**[0036]** Alternatively, the strip 30 can be made of a plastic film or other.

**[0037]** The strip 30 has substantially the same width W as the film 2.

**[0038]** The strip 30 is long enough to allow it to be wound into at least one coil. This coil is connected to the first coil 201 in which the film 2 is wound in the roll 1, i.e. the innermost coil 20 of the film 2.

**[0039]** According to the present invention, the roll 1 does not have a support core made of cardboard mixed with resins and/or glues or other substantially rigid support core provided as a separate element on which the film 2 is wound.

**[0040]** Advantageously, all the problems associated with the use of the known cardboard support core are eliminated.

**[0041]** Still preferably, the roll 1 comprises an opening tab 4 placed at the external end 23. In particular, the opening tab 4 is adapted to make it easier for a user to unwind the adhesive tape when first used, i.e. when first opening the roll 1. Note that the opening tab 4 is obtained from the same sheet 5 as the strip 30.

**[0042]** Specifically, the opening tab 4 has at least one portion glued to the first surface 21 of the film 2, so as to keep the first surface 21 separate from the second surface 22 at the external end 23 of the roll 1.

**[0043]** Still preferably, the core 3 comprises a portion of a further film of adhesive tape attached to the strip 30. This portion of further film results from the particular process by which the roll 1 according to the present invention is preferably made.

**[0044]** In particular, this further film is the residual film of the previously wound roll 1 on which the sheet 5 was deposited, subsequently cut into the strip 30 to form the core 3, as explained in the hereinafter description.

**[0045]** A process for making a roll 1 of adhesive tape as described above is also part of the present invention.

**[0046]** The process comprises a first step of providing a mother reel 10 comprising a film 2 of adhesive tape having a first surface 21 covered with adhesive material and a second surface 22 opposite to the first surface 21. In particular, the film 2 in the mother reel 10 is wound in coils and has a predetermined first length.

**[0047]** In particular, in the context of the present description, the mother reel 10 comprising the film 2 of adhesive tape refers both to a mother reel 10 in which the film is already adhesive and to a mother reel 10 in which the film, initially non-adhesive, is made adhesive by coating it with adhesive.

**[0048]** According to the first case, the adhesive tape has in fact already been prepared beforehand and is wound in a mother reel.

**[0049]** According to the second case, however, the adhesive tape is prepared on site from non-adhesive tape.

In this sense, the process thus optionally comprises a step of coating a first surface of a non-adhesive film with an adhesive to make the film 2 of adhesive tape further prepared, as explained hereinafter.

**[0050]** The process thus comprises a step of unwinding the film 2 from the mother reel 10. The unwinding of the mother reel 10 is carried out at a gradually increasing speed until a preset maximum speed is reached.

**[0051]** Concurrently with or subsequently to the step of unwinding the film 2, the process comprises a further step of winding the film 2 unwound from the mother reel 10 to form at least one roll 1 of adhesive tape. The film 2 is wound in particular onto a winding roll 121 on which the film 2 is wound to form the roll 1. The winding roll 121 is, in other words, a mandrel.

**[0052]** In the formed roll 1, the wound film 2 has a second predetermined length. In particular, the second predetermined length is shorter than the first predetermined length.

**[0053]** The step of winding the film 2 comprises a substep of sucking air through through-holes 103 arranged on the winding roller 121, so as to keep the roll 1 being wound attached to the winding roller 121.

**[0054]** More details on the through-holes 103 and winding roller 121 are reported in the hereinafter description.

**[0055]** After a film 2 of a length substantially equal to the second predetermined length has been unwound from the mother reel 10, the process provides a step of applying a sheet 5 to a section of the film 2 unwound from the mother reel 10. Thus, the sheet 5 will be applied at the external end 23 of the roll 1 once the film 2 has been cut.

**[0056]** The sheet 5 is placed on the first surface 21 of the film 2, adhering to the film 2.

**[0057]** This sheet 5 is applied to the film 2 without the further preparation of glues and/or adhesives, as it adheres to the film due to the adhesive already present on the first surface 21 of the film 2.

**[0058]** Preferably, the sheet 5 comes from an applying reel 50.

**[0059]** Preferably, the process provides to slow down the unwinding speed of the mother reel 10 during the step of applying the sheet 5.

**[0060]** The process comprises a further step of cutting the film 2 to separate the film 2 of the roll 1 being wound from the mother reel 10. In particular, this step is carried out after the sheet 5 has been applied and when the wound film 2 reaches a desired length, i.e. a length substantially equal to the second predetermined length. When the film 2 is cut, two flaps of film 2 are generated, of which a first flap is connected to the roll 1 being wound and a second flap is connected to the mother reel 10.

**[0061]** The step of cutting the film 2 provides cutting the film 2 at the sheet 5, dividing the sheet 5 into two parts. Specifically, a first part of the sheet 5 makes the opening tab 4 of the roll 1 being wound, once formed. A second part of the sheet 5 defines the strip 30 which forms the core 3 of a further roll 1 wound later. The first part of the sheet 5 is on the first flap connected to the roll 1, while the second part of the sheet 5 is on the second flap connected to the mother reel 10.

**[0062]** The sheet 5 therefore has an overall length greater than the circumferential development of the innermost coil of the roll 1, having to form, once cut, both the first part constituting the tab 4 of the wound roll 1 and the second part defining the strip 30 forming the core 3 of the roll 1 subsequently wound.

**[0063]** For example, considering an internal diameter of the roll 1 of 84 mm, the sheet 5 will have a length of approximately 280 mm from which a first part of approximately 15-19 mm forming the tab 4 of the wound roll 1 and a second part of approximately 265 mm forming the strip 30 defining the core 3 of the subsequent roll 1 will be cut.

**[0064]** After the step of cutting the film 2, it is preferably provided a further step of winding the first flap of cut film 2, i.e. the one on which the first part of the sheet 5 is also placed. In other words, with this step, the last, outermost coil of the film 2 is completed by adhering the flap of film 2 to the rest of the roll 1 until it is in contact with the first part of the sheet 5, i.e. by adhering the part of the film 2 that is adhesive. In fact, the film 2 of the cut flap will stick to the film 2 of the innermost adjacent coil until the first part of the sheet 5 is reached, where there is no longer any possibility for the film 2 to adhere to the adjacent film 2 due to the presence of the first part of the sheet 5.

**[0065]** The finished roll 1, provided with tab 4, is thereby obtained, wherein the film 2 is wound in coils with the second surface 22 facing outwards and the first surface 21 facing inwards of the roll 1 so that the first surface 21 of a coil 20 is in contact with the second surface 22 of the adjacent internal coil 20.

**[0066]** The process preferably comprises a subsequent step of unloading the finished roll 1.

**[0067]** In particular, according to the present invention, the step of unloading the finished roll 1 comprises a substep of blowing air through the aforementioned through-holes 103 arranged on the winding roller 121, so as to detach the finished roll 1 from the winding roller 121. The step of unloading the finished roll 1 comprises a further sub-step of pushing the finished roll 1 away from the respective winding roller 121, in a first direction X parallel to the axis of the winding roller 121.

**[0068]** This sub-step is performed by means of a pusher 125 that is movable along a first direction X parallel to the axis of the winding roller 121.

**[0069]** This sub-step provides in particular that the pusher 125 performs a stroke X' at least equal to the width of the winding roller 121, until the finished roll 1 is decoupled from the winding roller 121. This is followed by a further sub-step of dropping the finished roll 1 uncoupled from the winding roller 121 onto a chute 126. This chute 126 is in particular arranged in such a position as to collect the finished roll 1 and convey it to a storage station 160.

**[0070]** The process according to the present invention, after a roll 1 has been formed, comprises a step of unwinding the film 2 again from the mother reel 10 to wind a further roll 1.

**[0071]** In particular, the process according to the present invention, after the step of cutting the film 2, comprises a step of winding the strip 30 in at least one coil to form the core 3 of a further roll 1 subsequently wound. In other words, the second flap of the film 2, wherein the second part of sheet 5 is present, is wound.

**[0072]** The step of winding the strip 30 in at least one coil is preferably carried out at the same time as the step of winding the first flap of film 2 cut on the already wound roll 1.

**[0073]** More preferably, the step of winding the strip 30 is simultaneous with the step of unwinding the film 2 from the mother reel 10 to wind a further roll 1.

**[0074]** The steps described above of winding the film 2 unwound from the mother reel 10, applying a sheet 5 and cutting the film 2 are then repeated to form at least one further roll 1.

**[0075]** In particular, the step of winding the film 2 provides winding the film 2 onto the core 3 thus formed, i.e. formed by winding the strip 30, resulting from the cut of the sheet 5 previously applied to the film 2, at the end of the step of winding the previous roll 1.

**[0076]** According to the process of the present invention, preferably the strip 30 is flexible and has a thickness comprised between 0.05 mm and 0.5 mm.

**[0077]** More preferably, the strip 30 is made of paper.

**[0078]** Accordingly, the applied sheet 5 from which the strip 30 is obtained is also flexible and has a thickness comprised between 0.05 mm and 0.5 mm.

**[0079]** More preferably, the sheet 5 is made of paper.

**[0080]** Finally, a machine 100 for forming a roll 1 as described above is also part of the present invention. The machine 100 is particularly visible as a whole in Figures 2 and 3, while details are shown in Figures 4a-6d.

**[0081]** The machine 100 according to the present invention comprises an unwinding station 110 of a mother reel 10 comprising a film 2 of adhesive tape having a first surface 21 covered with adhesive material and a second surface 22 opposite to the first surface 21.

**[0082]** As described above, the film in the mother reel 10 is wound in coils and has a predetermined first length.

**[0083]** The unwinding station 110 is configured to unwind the film 2 of the mother reel 10.

**[0084]** Optionally, with reference to Figure 2b, the machine 100 can be associated to, i.e. placed in line with, a coating machine 111. The coating machine 111 is of the known type and, where provided, is placed upstream of the unwinding station 110. Thus, the machine 100 receives the film 2 directly from the coating machine 111, which will have coated with the adhesive the first surface 21 of the film 2, which will bypass the unwinding station 110. The coating machine 111 is also upstream of one or more winding stations 120, hereinafter described.

**[0085]** Advantageously, the coating machine 111 inline with one or more winding stations 120 allows the film 2 of adhesive tape to be made directly on site before it is wound.

**[0086]** In addition, if the machine 100 is associated with the coating machine 111, the machine 100 is also associated with compensating rollers 114 placed downstream of the coating machine 111 and upstream of one or more winding stations 120.

**[0087]** The machine 100 also comprises a winding station 120 configured to wind the film 2 to form at least one roll 1 of adhesive tape in which the wound film 2 has a second predetermined length, which is shorter than the first predetermined length.

**[0088]** The winding station 120 comprises at least one winding roller 121. The winding roller 121 is configured to wind the film 2 to form the roll 1. In addition, the winding roller 121 is configured to wind the strip 30 to form the core 3 of the further roll 1 wound later, as reported above in this description with respect to the process. The winding roller 121 is also configured to wind the film 2 unwound from the mother reel 10.

**[0089]** Preferably, the winding station 120 comprises two winding rollers 121.

**[0090]** Note that, according to a preferred embodiment, the machine 100 comprises two or more winding stations 120.

**[0091]** More details about the winding station 120 are reported in the hereinafter description.

**[0092]** The machine 100 also comprises an applying station 130, interposed between the unwinding station 110 and the winding station 120.

**[0093]** The applying station 130 is configured to apply a sheet 5 at a section of the film 2 unwound from the mother reel 10, placing the sheet 5 on the first surface 21 of the film 2 being unwound. In particular, according to the present invention, it is possible to make the sheet 5 adhere to the film 2 without further arranging glues and/or adhesives, as the sheet 5 adheres to the film by means of the adhesive already present on the first surface 21 of the film 2.

**[0094]** Preferably, the applying station 130 comprises an application reel 50 from which the sheet 5, from which the strip 30 and tab 4 are obtained, derives.

**[0095]** The machine 100 comprises a cut assembly 140 associated with the winding station 120. The cut assembly 140 is configured to cut the film 2 at the sheet 5 by dividing the sheet 5 into two parts. In particular, the cut assembly 140 is configured to cut the film 2 when the wound film 2 substantially reaches the second predetermined length to obtain the formed roll 1.

**[0096]** The cut assembly 140 is visible in the Figures 4a-4d together with the winding station 120. Note in particular that these figures schematise the cut assembly 140 and the winding station 120 without showing the continuity of the film 2 being wound.

**[0097]** According to a preferred embodiment, the winding station 120 comprises two of the above-mentioned winding rollers 121.

**[0098]** According to this embodiment, the winding rollers 121 are spaced from and aligned with each other, preferably along a horizontal direction. In particular, the winding rollers 121 are placed side-by-side with their respective axes parallel to each other.

**[0099]** Preferably, the machine 100 comprises a drive shaft 101 configured to move a winding roller 121 of a winding station 120.

**[0100]** Preferably, the machine 100 comprises a pair of drive shafts 101 each configured to move a respective winding roller 121 of a winding station 120.

**[0101]** Each winding roller 121 preferably comprises a friction shaft 122 configured to hold and support the film 2 while it is wound. In addition, each friction shaft 122 is configured to hold and support the strip 30 while the film 2 is being wound.

**[0102]** Each winding roller 121 is in fact associated with a clutch 123. Each clutch 123 is connected to the drive shaft 101 and configured to independently transmit motion from the drive shaft 101 to the respective winding roller 121.

**[0103]** In particular, the clutch 123 is configured to keep the pull of the film 2 being wound into a respective roll 1 constant.

**[0104]** In particular, the machine 100 comprises a number of clutches 123 equal to the number of winding rollers 121.

**[0105]** In practice, each clutch 123 is separate from the others and acts independently of the other one of the winding rollers 121. It is therefore possible to produce rolls 1 of different sizes at the same time.

**[0106]** In other words, for each roll 1 being wound, the motion is transmitted to the respective winding roller 121 by a respective clutch 123, which adjusts the winding tension according to the variation in diameter of the roll 1 being wound, due to the variation in thickness of the roll 1.

**[0107]** The control of each clutch 123 is provided by a secondary shaft (not shown).

**[0108]** Still preferably, each winding roller 121 is associated with a roll unloading system (124), configured to allow a formed roll 1 to be unloaded at, for example, a storage station 160 for formed rolls 1 or directly onto conveyor belts (not shown), adapted to transport the roll 1 to a packaging station (not shown).

**[0109]** Preferably, each winding station 120 comprises a roll unloading system 124 associated with each winding roller 121. In particular, the machine 100 comprises as many roll unloading systems 124 as there are winding rolls 121.

**[0110]** According to the preferred embodiment, in which two winding rollers 121 are provided for each winding station 120, each winding station 120 comprises two roll unloading systems 124.

**[0111]** Each roll unloading system 124 is associated with its respective winding roll 121 and is independent of the others. This makes it possible to unload the finished rolls 1 from the different winding rolls 121 at different times, depending on requirements, as visible in Figures 5b and 6a-6d.

**[0112]** In greater detail, preferably the roll unloading system 124 comprises a pusher 125 configured to push the finished roll 1 away from the winding roller 121, in a first direction X parallel to the axis of the winding roller 121. The pusher 125 is configured in particular to perform a stroke X' at least equal to the width of the winding roller 121, until the finished roll 1 is decoupled from the winding roller 121.

**[0113]** The pusher 125 is preferably made as a moving plate adapted to move along this first direction X.

**[0114]** In practice, in order to be unloaded, each wound roll 1 is pushed out and extracted from the winding roll 121.

**[0115]** The machine 1 therefore also comprises a chute 126, located at the winding station 120. In particular, the machine 1 comprises only one chute for each winding station 1 as each winding station 120 is rotatable by 180° and each finished roll 1 is unloaded at only one position of the winding station 120.

**[0116]** The roll 1 thus decoupled from the winding roller 121 can fall on such a chute 126. The chute 126 is interposed between the winding station 120 and the storage station 160 and acts as a link between these two stations.

**[0117]** Thus, preferably the winding rolls 121 are adapted to both form the roll 1 and to unload the formed roll 1.

**[0118]** Note that, as stated above, preferably the winding station 120 is rotatable and is configured to perform a rotation preferably of 180°. This makes it possible to exchange the positions of the two winding rollers 121.

**[0119]** In particular, depending on their position with respect to the mother reel 10, one of the two winding rollers 121 is connected to the film 2 unwound by the mother reel 10 and is adapted to wind the film 2 unwound by the mother reel 10, while the other winding roller 121 is adapted to unload the formed roll 1. For example, the winding roll 121 adapted to wind the film 2 unwound from the mother reel 10 is positioned at the side of the mother reel 10 while the winding roll 121 distal from the mother reel 10 is adapted to unload the roll 1.

**[0120]** Preferably, when one roll 1 is being wound on a winding roller 121, the other winding roller 121 is stationary.

**[0121]** Regarding the cut assembly 140, this comprises a blade 141 adapted to perform the cut to separate the mother reel 10 from the wound film 2, to obtain the formed roll 1. Preferably, the cut assembly 140 also comprises a pressure roller 142, coupled to the blade 141.

**[0122]** The pressure roller 142 is configured to couple with the respective winding roller 121, together with the blade 141.

**[0123]** In greater detail, the pressure roller 142 is configured to rotate around the respective winding roller 121 tangentially supporting the strip 30 just after cutting, when winding thereof takes place to form at least one coil making the core 3, until the winding of the film 2 of adhesive

tape onto the core 3 thus formed for making the next roll 1 begins again. In other words, the pressure roller 142 rotates on the winding roller 121, adhering onto the strip 30 so as to maintain the strip 30 against the winding roller 121 when it rotates, winding it.

**[0124]** Still preferably, the machine 100 comprises one or more accompanying rollers 1400. For example, the machine 100 comprises two accompanying rollers 1400, as visible in Figures 2 and 4a-4d.

**[0125]** The accompanying rollers 1400 are associated with the cut assembly 140 and are spaced from the pressure roller 142 and blade 141.

**[0126]** In particular, the accompanying rollers 1400 are adapted to support the film 2 during cutting.

**[0127]** The cut assembly 140 and accompanying rollers 1400 are configured to move closer to/away from the winding station 120. In particular, after the film 2 of the roll 1 being wound has reached a length substantially equal to the second predetermined length, the cut assembly 140 and the accompanying rollers 1400 move closer to the winding station 120, after it has been rotated by 180°, so that the blade 141 can reach the film 2 to cut it. Immediately thereafter, the winding roller 121 on which there is the flap of film 2 connected to the second part of sheet 5, i.e. the one forming the core 3, rotates to wind the strip 30 in at least one coil. At the same time, the pressure roller 142 rotates around this winding roller 121 to keep the strip 30 adhered to the winding roller 121 to form the core 3. Preferably, still on the rotating winding roll 121 on which the core 3 has been formed, the winding of the film 2, which in the meantime is being unwound from the mother reel 10, continues to form a further roll 1.

**[0128]** In Figure 4a, it can be seen that on one of the two winding rollers 121 there is a roll 1 being wound, in which the wound film 2 has substantially reached the second predetermined length.

**[0129]** Then, the winding station 120 rotates by 180°, reversing the positions of the winding rollers 121, so that the roll 1 with the wound film 2 is in the unloading position, as shown in Figure 4b.

**[0130]** Next, the cut assembly 140 and the accompanying rollers 1400 descend, as shown in Figure 4c. In particular, the blade 141 cuts the film 2 at the winding roller 121, which is in the opposite position to the unloading one. At the same time, the core 3 is formed on the respective winding roller 121, while the winding roller 121, on which the roll 1 is placed for unloading, winds the flap of the cut film 2 to close the roll 1, with the cooperation of the rollers 1400.

**[0131]** The unloading of the formed roll 1 is visible in Figure 4d.

**[0132]** With reference to Figures 5b-6d, each winding roller 121 has the above-mentioned through-holes 103.

**[0133]** The through-holes 103 are preferably circumferentially distributed on the surface of the winding roller 121. More preferably, the through-holes 103 form groups of holes 103' that extend longitudinally across the surface of the winding roller 121. In other words, the groups of holes 103 extend along a direction parallel to the axis of each winding roller 121.

**[0134]** These through-holes 103 are preferably evenly distributed over the surface of the winding roller 121.

**[0135]** Each winding roller 121 has a cavity 127 in fluid communication with the through-holes 103. This cavity 127 can be connected to a suction system (not shown) that is configured to suck air through the through-holes 103 when the roll 1 is being formed, so as to keep the roll 1 being wound attached to the winding roller 121. The cavity 127 can also be connected to a blowing system (not shown) configured to blow air through the through-holes 103 when the roll 1 is finished, to enable the roll 1 to be detached from the winding roller 121.

**[0136]** In particular, the machine 100 comprises a suction system and a blowing system for each winding station 120. The suction and blowing systems of the various winding stations 120 are independent of each other.

**[0137]** More specifically, according to the preferred embodiment providing two winding rolls 121 for each winding station 120, within a winding station 120, each winding roll 121 is adapted to alternately connect with the suction system or the blowing system, depending on whether a roll 1 on the respective winding roll 121 is being wound or unloaded.

**[0138]** In particular, in a winding station 120 one winding roller 121 is connected to the suction station and the other winding roller 121 is connected to the blowing station. When the winding station 120 rotates, the positions of the winding rollers 121 exchange and consequently the suction roller 121 that was connected to the suction station connects to the blowing station and vice versa.

**[0139]** According to the embodiment comprising two or more winding stations 120, the machine 100 comprises a dividing station 150 of the mother reel 10. The dividing station 150, shown in Figure 2, is located upstream of the two or more winding stations 120.

**[0140]** The dividing station 150 is in particular configured to cut the film 2 of the mother reel 10 in two or more films 2 having a smaller width. Each of these two or more films 2 having a smaller width is intended for a respective winding station 120.

**[0141]** Still preferably, the machine 100 comprises two or more cut assemblies 140. More preferably, the machine 100 comprises a cut assembly 140 for each winding station 120, where a cut assembly 140 is placed at the respective winding station 120.

**[0142]** Preferably, the winding stations 120 are arranged in a stack, i.e. aligned one on top of the other, as visible in Figure 2.

**[0143]** Preferably, the winding stations 120 are arranged in a row, i.e. placed side by side and aligned, as visible in Figures 3, 5b and 6a-6d. A row of winding stations 120 is known in the jargon as turret 1200.

**[0144]** Still preferably, the machine 100 comprises two or more turrets 1200. For example, as represented in the figures, in the machine 100 there are three turrets 1200 arranged in a stack.

**[0145]** Preferably, within a turret 1200, the accompanying rolls 1400 are shared between the various winding stations 120. In particular, the accompanying rollers 1400 extend substantially along the entire length of the turret 1200.

**[0146]** Preferably, each drive shaft 101 described above is common to several winding rollers 121 of different winding stations 120 aligned in a row.

**[0147]** In other words, within a single turret 1200, the motor shafts 101 are connected to all the winding stations 121. In particular, the machine 100 comprises a pair of drive shafts 101 for each turret 1200.

**[0148]** With reference to Figure 3, the machine 100 also comprises belts and gears that are enclosed in protective crankcases 300. The area 200, on the other hand, contains the components of the machine 100 described above, such as one or more unwinding stations 110, one or more applying stations 130 and one or more dividing stations 150, together with the guide rollers for the film 2 being unwound from the mother reel 10 and being wound in the winding stations 120.

**[0149]** According to the foregoing, since the core 3 on which film 2 is wound is derived from the strip 30 that is glued to the film 2, it is not necessary to load a support core onto which the film 2 is wound. Thus, advantageously, the machine 100 according to the present invention does not comprise the core loading and sorting unit.

**[0150]** The machine 100 according to the present invention is consequently less bulky than the known ones.

**[0151]** In practice, the machine 100 does not have the known one or more mandrels on which multiple cores are inserted in succession, but instead has many smaller mandrels, each having such dimensions as to be used for winding only one roll at a time.

**[0152]** The machine 100 according to the present invention is also less energy-intensive, as fewer movements and passages are overall required to make a roll 1, and thus fewer stations/units are required.

**[0153]** Still advantageously, there is no need to provide for the transport and storage of the cores, reducing costs and carbon dioxide emissions.

**[0154]** The roll of adhesive tape, process and machine thus conceived are susceptible to numerous modifications and variations, all falling within the scope of the inventive concept; moreover, all the details are replaceable by technically equivalent elements. In practice, the materials used, as long as they are compatible with the specific use, as well as the contingent dimensions and shapes, can be any according to the technical requirements.

## Claims

**1.** Roll (1) of adhesive tape comprising:

a film (2) having a first surface (21) covered with adhesive material and a second surface (22) opposite to said first surface (21), said film (2) being wound in coils (20) with the second surface (22) facing outwards and the first surface (21) facing inwards of said roll (1) so that the first surface (21) of a coil (20) is in contact with the second surface (22) of the adjacent internal coil (20); said film (2) having an external end (23) at least partially free and an internal end at the first winding coil (201) of said film (2);

a core (3) on which said film (2) is wound, said core (3) being placed at said internal end and in contact with said first surface (21) of the first coil (201);

**characterized in that**

said core (3) is made by winding a strip (30) obtained from a sheet (5) in at least one coil.

**2.** Roll (1) according to the preceding claim, wherein said strip (30) is flexible and has a thickness comprised between 0.05 mm and 0.5 mm.

**3.** Roll (1) according to claim 1 or 2, wherein said strip (30) is made of paper.

**4.** Roll (1) according to claim 3, wherein said strip (30) has substantially the same width (W) of the film (2) .

**5.** Roll (1) according to claim 3 or 4, comprising an opening tab (4) placed at the external end (23), said opening tab (4) being adapted to facilitate the unwinding of the adhesive tape to a user at a first use; said opening tab (4) being obtained from the same sheet (5) of said strip (30).

**6.** Roll (1) according to any one of the preceding claims, wherein said core (3) comprises a portion of a further film of adhesive tape fixed to said strip (30).

**7.** Roll (1) according to any one of the preceding claims, free of a substantially rigid support core, particularly made of cardboard mixed with resins and/or glues.

**8.** Process for making a roll (1) of adhesive tape according to any one of claims 1-7, said process comprising:

- providing a mother reel (10) comprising a film (2) of adhesive tape having a first surface (21) covered with adhesive material and a second surface (22) opposite to said first surface (21); said film (2) in said mother reel (10) being wound in coils and having a first predetermined length;
- unwinding the film (2) from said mother reel (10);
- winding the film (2) unwound from said mother reel (10) to form at least one roll (1) of adhesive tape wherein the wound film (2) has a second predetermined length shorter than said first pre-

determined length;
- after a film (2) of a length equal to said second predetermined length has been unwound from the mother reel (10), applying a sheet (5) at a section of the film (2) unwound from the mother reel (10), said sheet (5) being positioned on the first surface (21) of the film (2) ;
- when said wound film (2) substantially reaches said second predetermined length, cutting said film (2) to separate said film (2) of said roll (1) in winding from said mother reel (10); said film (2) being cut at the sheet (5), by dividing the sheet (5) in two parts; a first part of the sheet (5) making the opening tab (4) of the roll (1) in winding, when formed; a second part of the sheet (5) defining the strip (30) forming the core (3) of a further roll (1) successively wound;
- unwinding again the film (2) from the mother reel (10) to wind a further roll (1);

said process comprising, after said step of cutting the film (2), a step of:

- winding the strip (30) in at least one coil to form the core (3) of said further roll (1) successively wound.

**9.** Process according to claim 8, wherein said step of winding the film (2) comprises a sub-step of:

- sucking air through through-holes (103) arranged on a winding roller (121) on which the film (2) is wound to form the roll (1), so as to keep the roll (1) being wound attached to the winding roller (121).

**10.** Process according to claim 9, comprising a step of unloading the finished roll (1) following the step of cutting the film (2); said step of unloading the finished roll (1) comprising the sub-steps of:

- blowing air through said through-holes (103) arranged on the winding roller (121) to detach the finished roll (1) from the winding roller (121);
- pushing the finished roll (1) away from the respective winding roller (121), in a first direction (X) parallel to the axis of the winding roller 121, until the finished roll (1) is uncoupled from the winding roller (121);
- dropping the finished roll (1) uncoupled from the winding roller (121) onto a chute (126) to convey said roll (1) to a storage station (160).

**11.** Machine (100) for making a roll (1) of adhesive tape according to any one of claims 1-7, comprising:

- an unwinding station (110) of a mother reel (10) comprising a film (2) of adhesive tape having a first surface (21) covered with adhesive material and a second surface (22) opposite to said first surface (21); said film (2) in said mother reel (10) being wound in coils and having a first predetermined length; said unwinding station (110) being configured to unwind the film (2) of the mother reel (10),
- a winding station (120) configured to wind said film (2) to form at least one roll (1) of adhesive tape wherein the wound film (2) has a second predetermined length shorter than said first predetermined length; said winding station (120) comprising at least one winding roller (121) configured to wind the strip (30) to form the core (3) of the further roll (1) successively wound,
- an applying station (130), interposed between said unwinding station (110) and said winding station (120); said applying station (130) being configured to apply a sheet (5) at a section of the film (2) unwound from the mother reel (10), by positioning said sheet (5) on the first surface (21) of the unwinding film (2);
- a cut assembly (140), associated with said winding station (120); said cut assembly (140) being configured to cut said film (2) at the sheet (5) by dividing said sheet (5) in two parts when said wound film (2) substantially reaches said second predetermined length to obtain said formed roll (1).

**12.** Machine (100) according to claim 11, wherein the winding station (120) comprises two winding rollers (121), said winding station (120) being rotatable to exchange the positions of said winding rollers (121).

**13.** Machine (100) according to claim 12, comprising:

- a pair of drive shafts (101), each configured to move a respective winding roller (121) of a winding station (120),
- a number of clutches (123) equal to the number of winding rollers (121); each winding roller (121) being associated with a clutch (123); each clutch (123) being connected to the drive shaft (101) and configured to independently transmit motion from the drive shaft (101) to the respective winding roller 121; said clutch (123) being configured to maintain constant the film pull (2) being wound in a respective roll (1).

**14.** Machine (100) according to claim 12 or 13, wherein each winding station (120) comprises a roll unloading system (124) associated with each winding roller (121); said roll unloading system (124) comprising a pusher (125) configured to push the finished roll (1) away from the winding roller (121), in a first direction (X) parallel to the axis of the winding roller (121); said pusher (125) being configured to perform a

stroke (X') at least equal to the width of the winding roller (121), until the finished roll (1) is decoupled from the winding roller (121).

**15.** Machine (100) according to any one of claims 12-14, wherein each winding roller (121) has through-holes (103) evenly and circumferentially distributed on the surface of the winding roller (121); each winding roller (121) having a cavity (127) in fluid communication with the through-holes (103); said cavity (127) being connectable to a suction system configured to suck air through said through-holes (103) when the roll (1) is being formed to keep the roll (1) being wound attached to the winding roller (121); said cavity (127) being further connectable to a blowing system configured to blow air through said through-holes (103) when said roll (1) is finished, to allow the roll (1) to be detached from the winding roller (121).

**16.** Machine (100) according to claim 10 or 11, comprising:

- two or more winding stations (120) arranged in a row; each drive shaft (101) being common to more winding rollers (121) of different winding stations (120) aligned in a row;
- two or more cut assemblies (140), each associated with a respective winding station (120);
- a dividing station (150) of said mother reel (10), placed upstream of said two or more winding stations (120); said dividing station (150) being configured to cut the film (2) of said mother reel (10) in two or more films (2) having a shorter length.

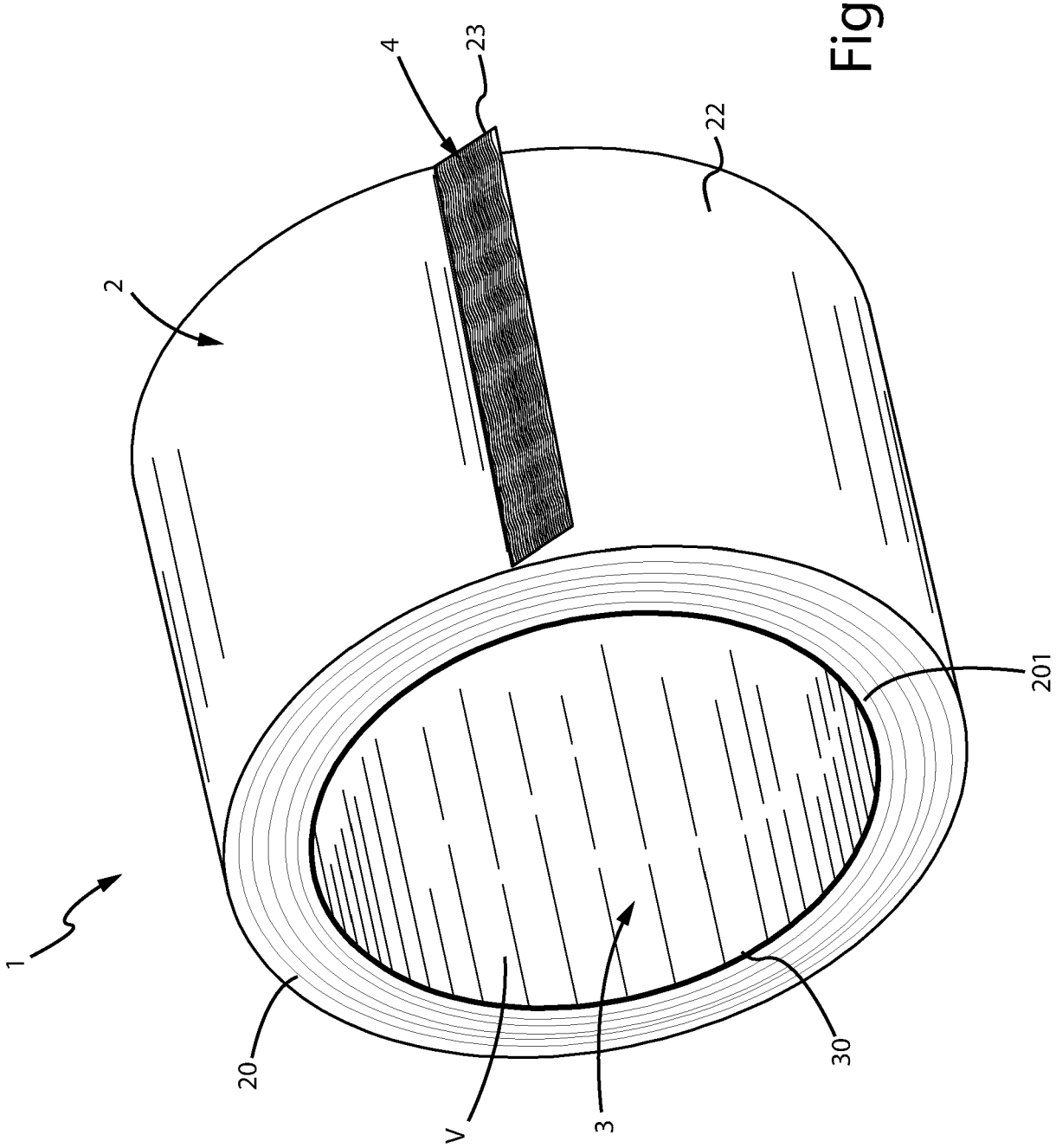



Fig. 1

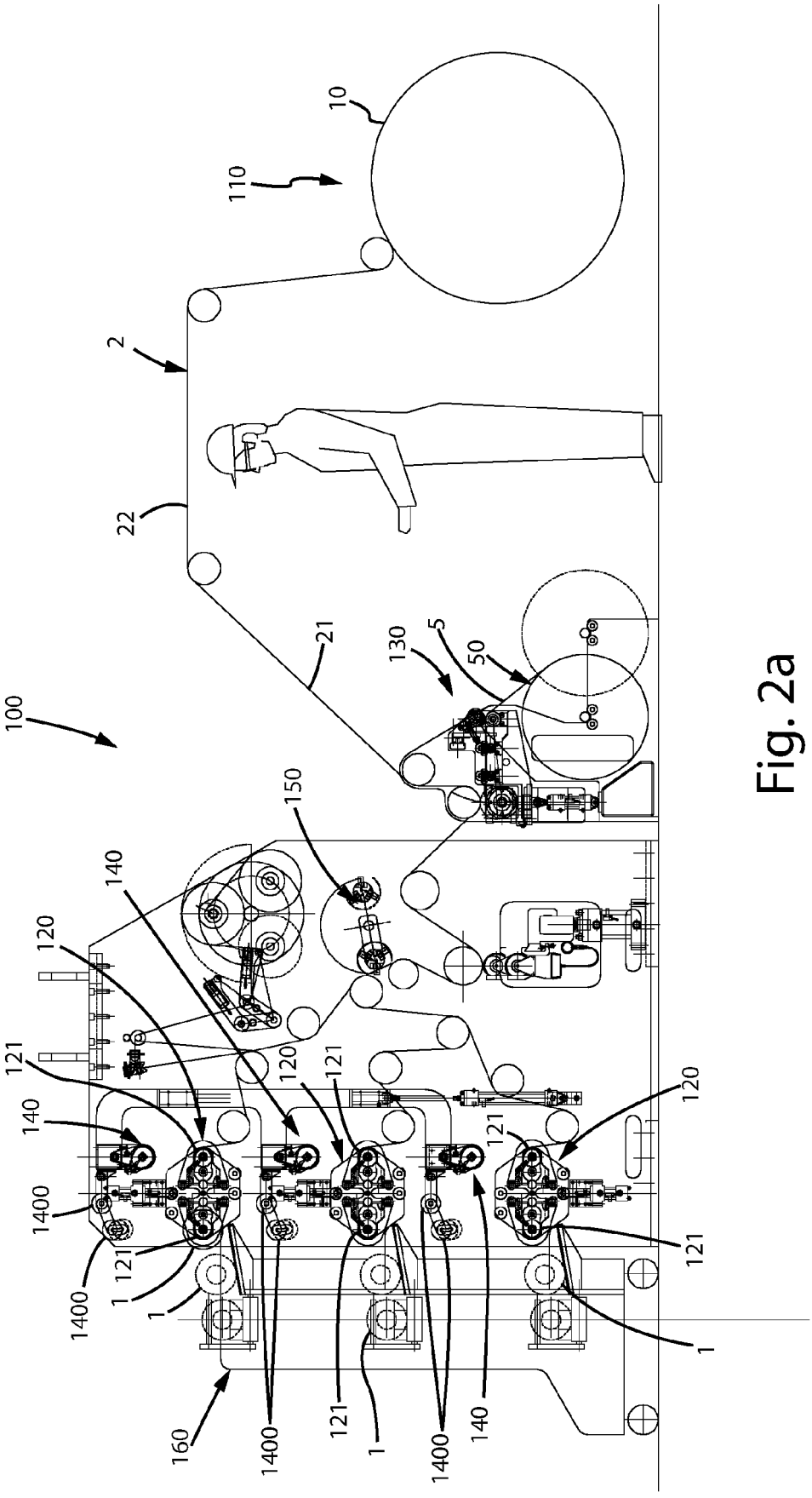



Fig. 2a

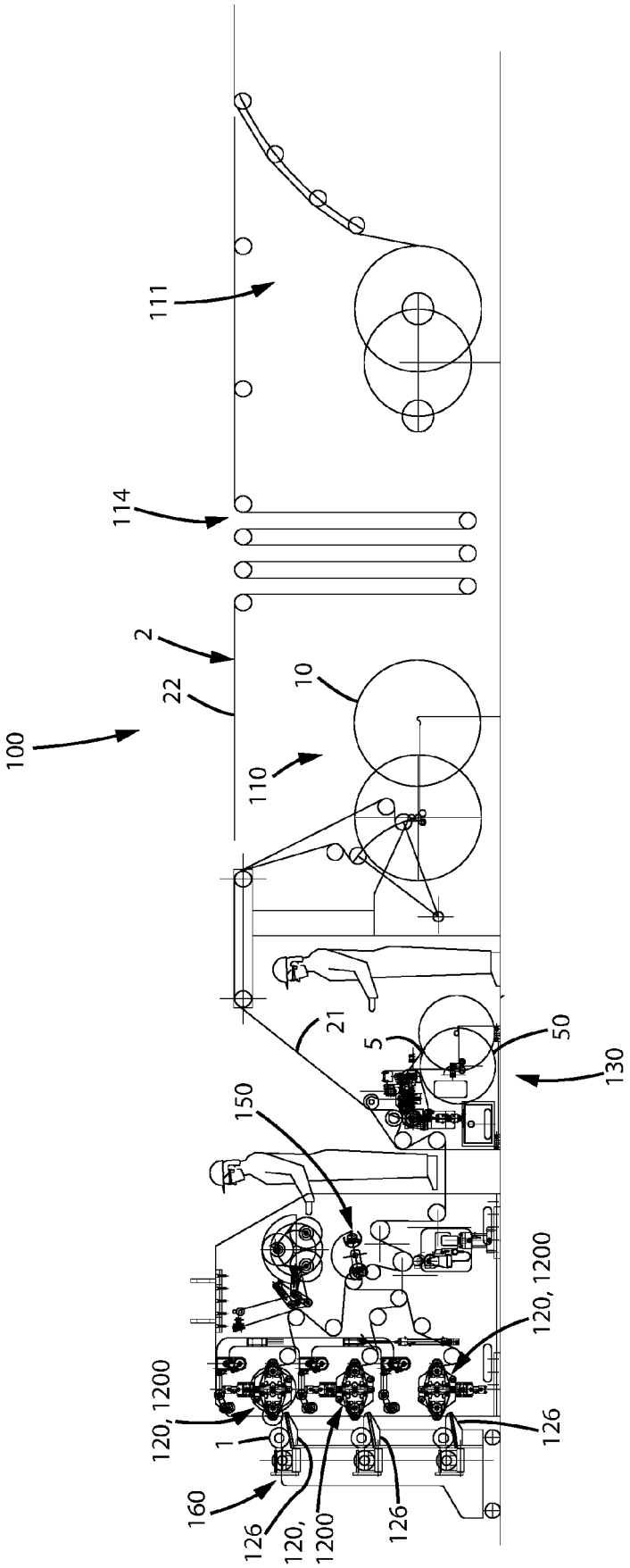

100
2
22
10
110
111
114
21
5
50
130
150
120, 1200
126
120, 1200
1
160
126
120, 1200
126

Fig. 2b

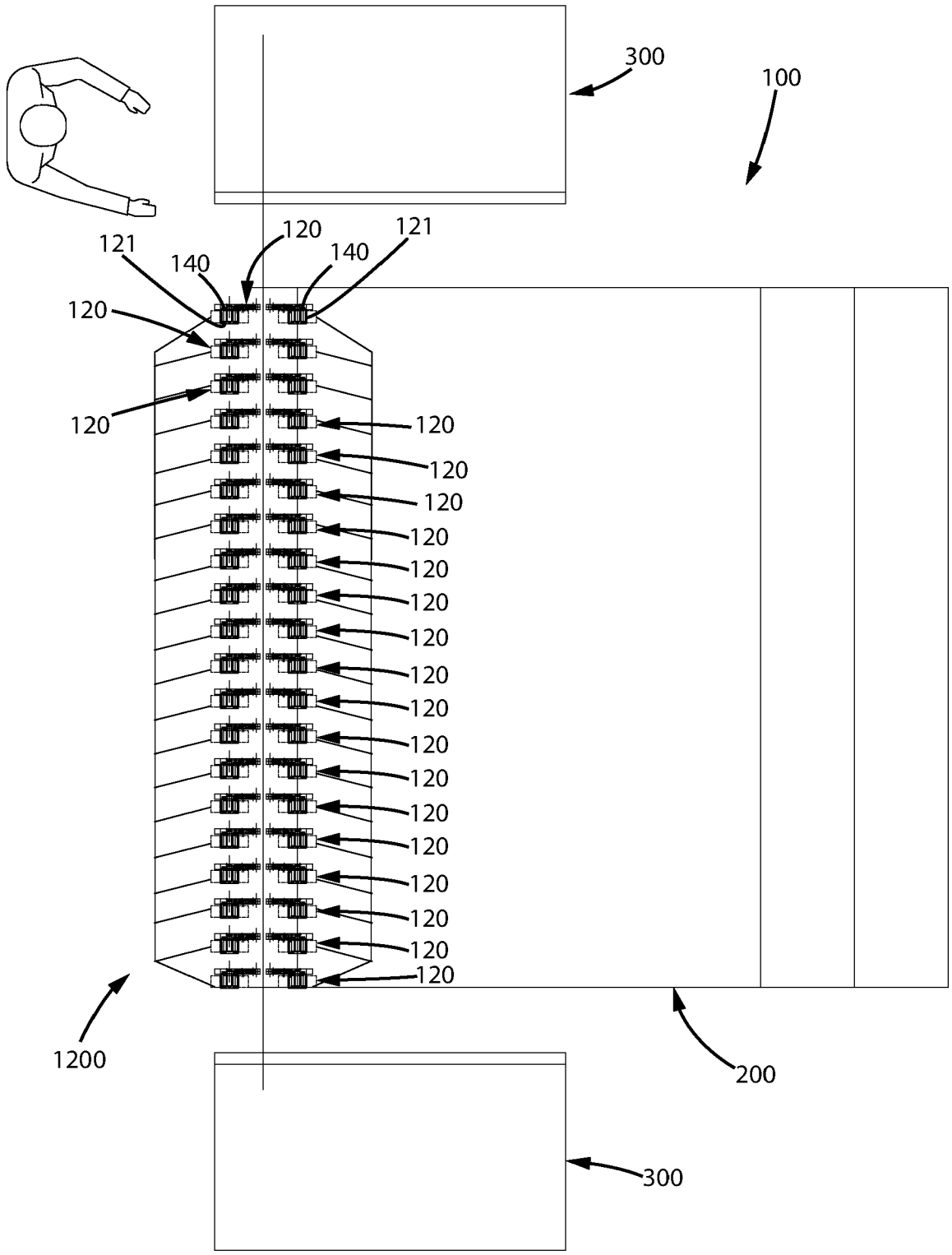

300
100
121
140
120
140
121
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
120
1200
200
300

Fig. 3

Fig. 4a

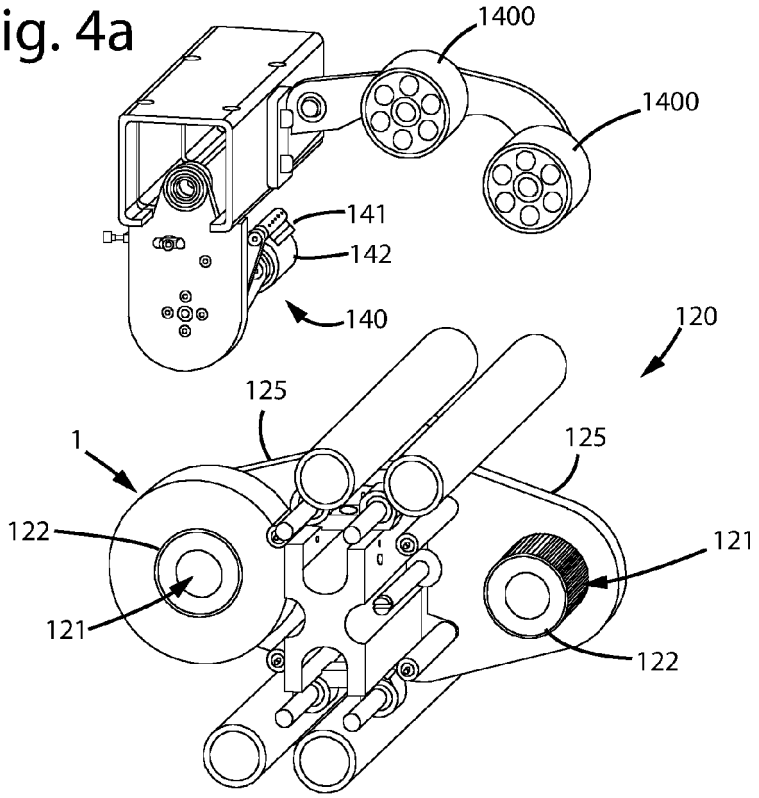

1400
1400
141
142
140
120
125
125
1
122
121
121
122

Fig. 4b

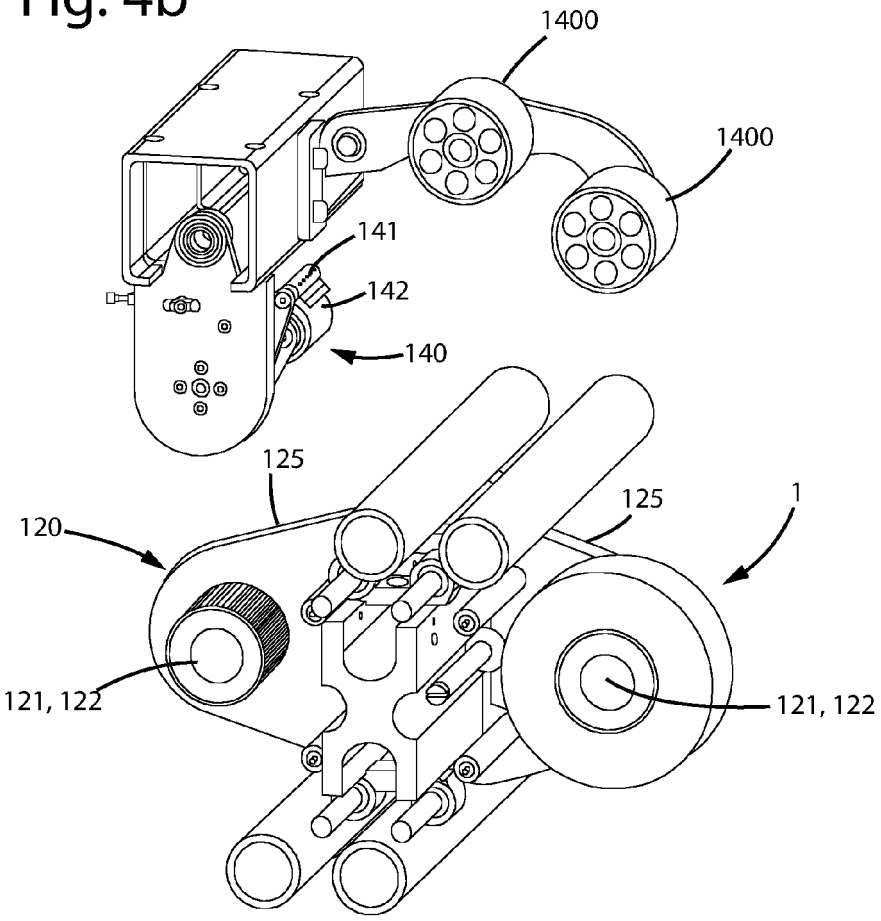

1400
1400
141
142
140
125
125
1
120
121, 122
121, 122

Fig. 4c

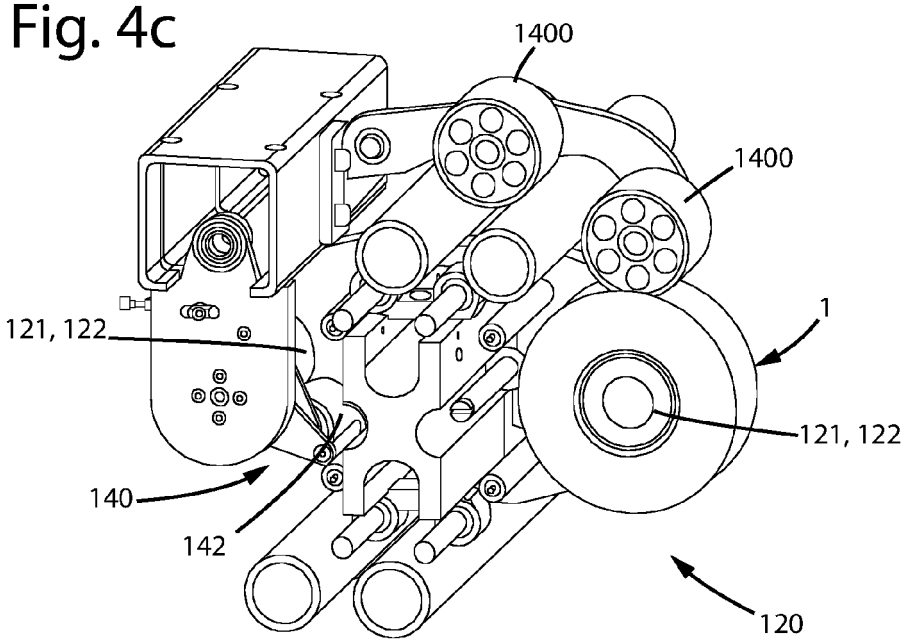
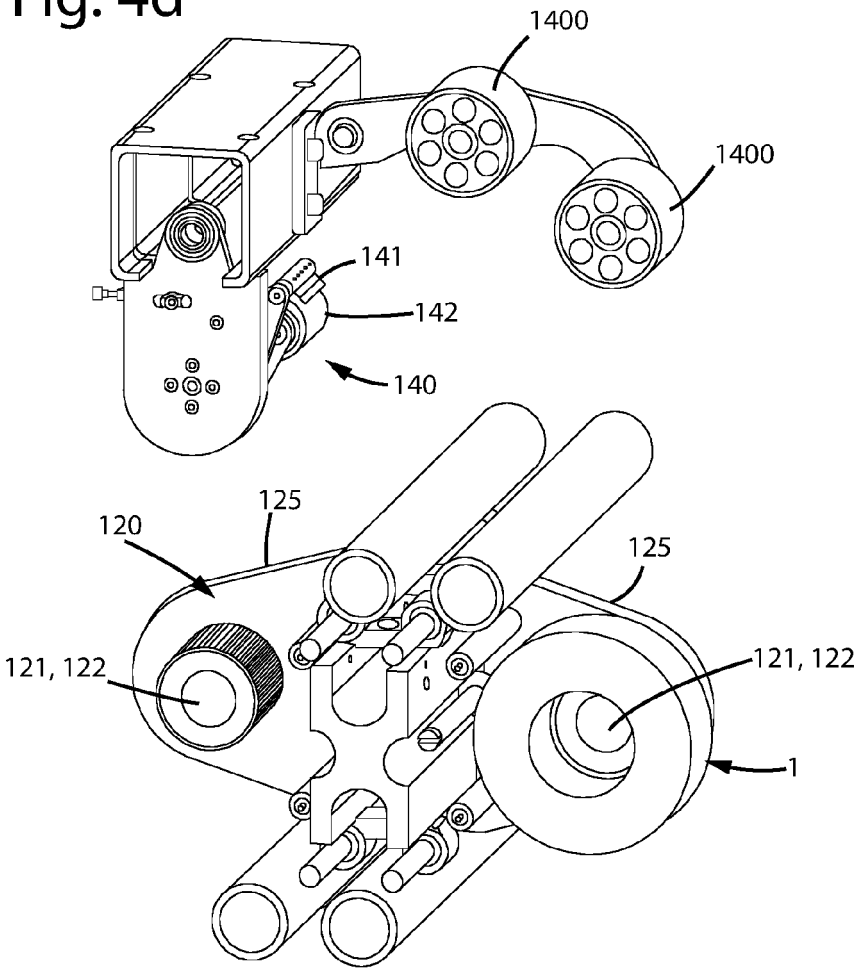

1400
1400
1
121, 122
121, 122
140
142
120

Fig. 4d


1400
1400
141
142
140
125
120
125
121, 122
121, 122
1

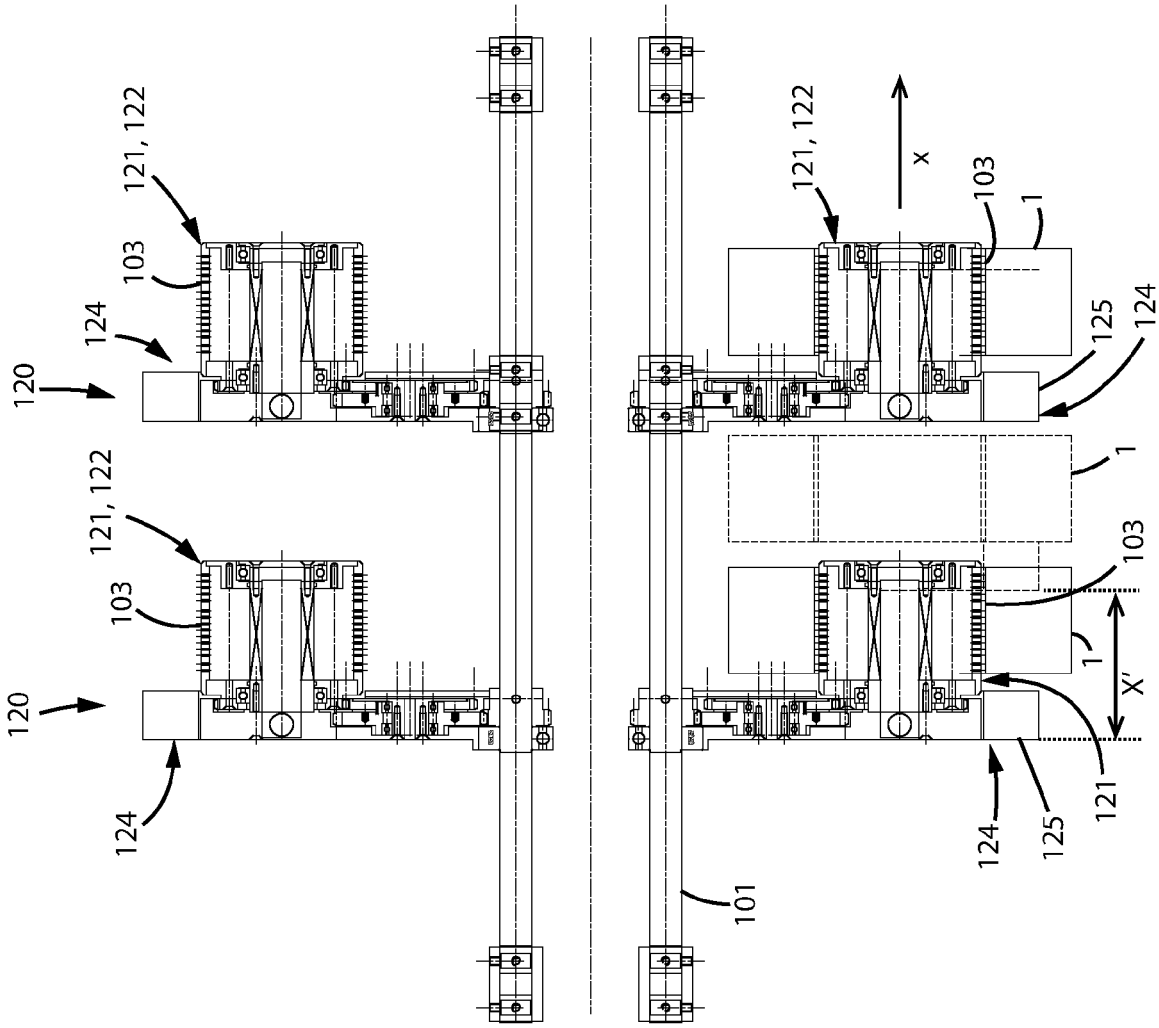



Fig. 5b

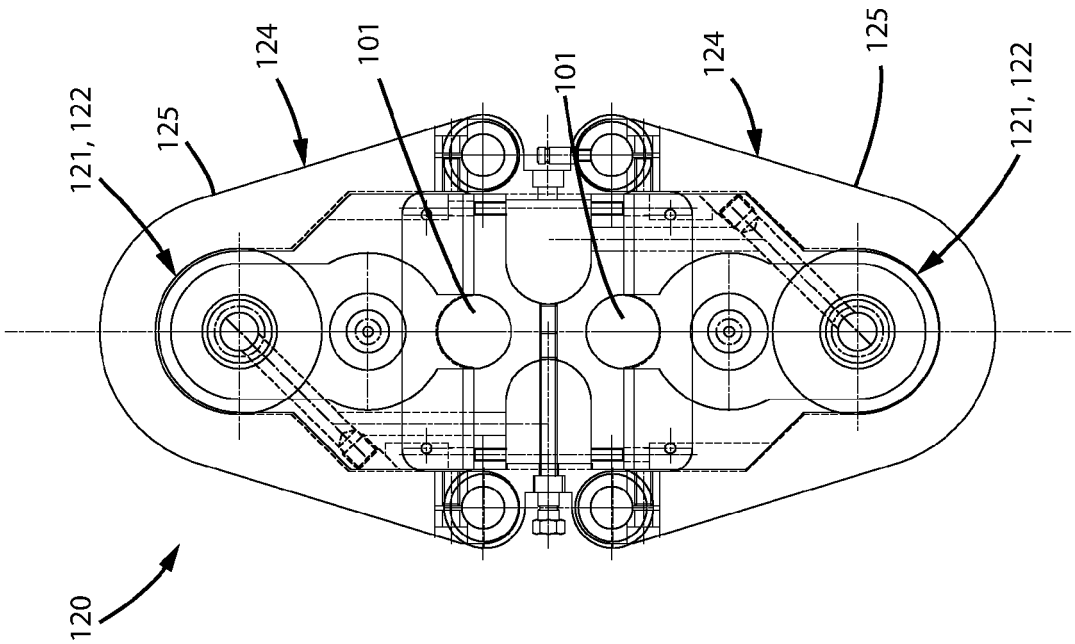



Fig. 5a

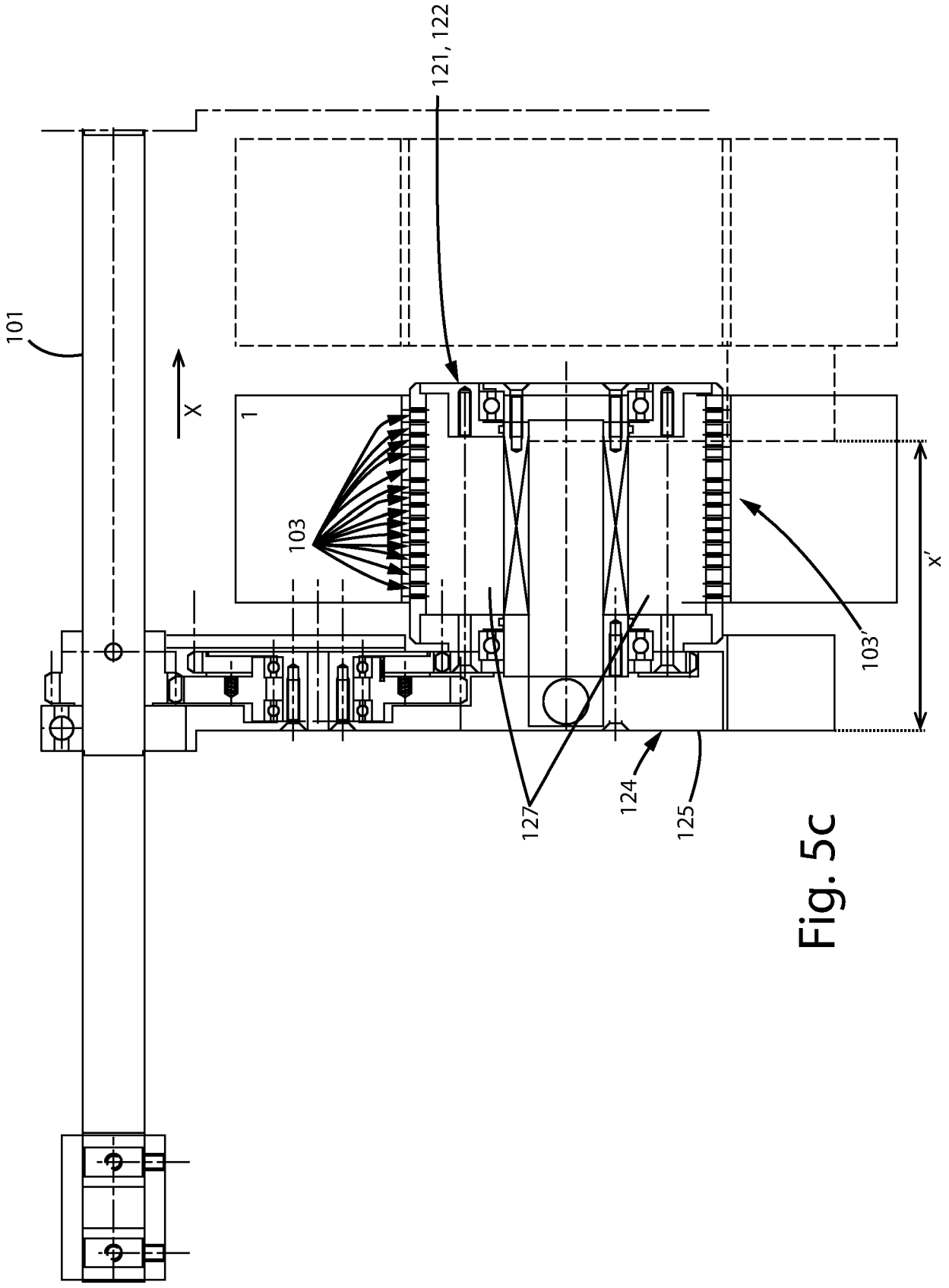



Fig. 5c

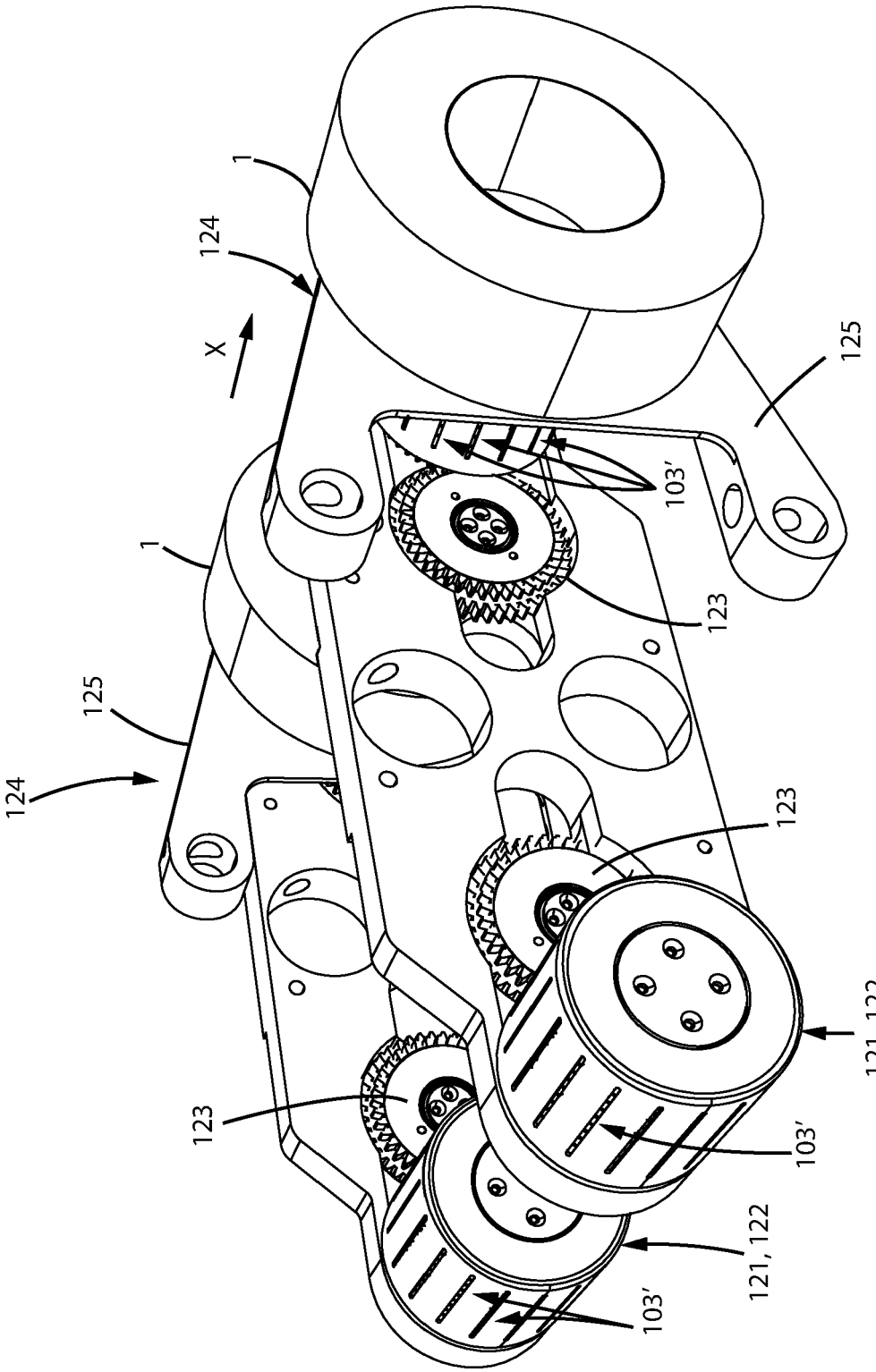



Fig. 6a

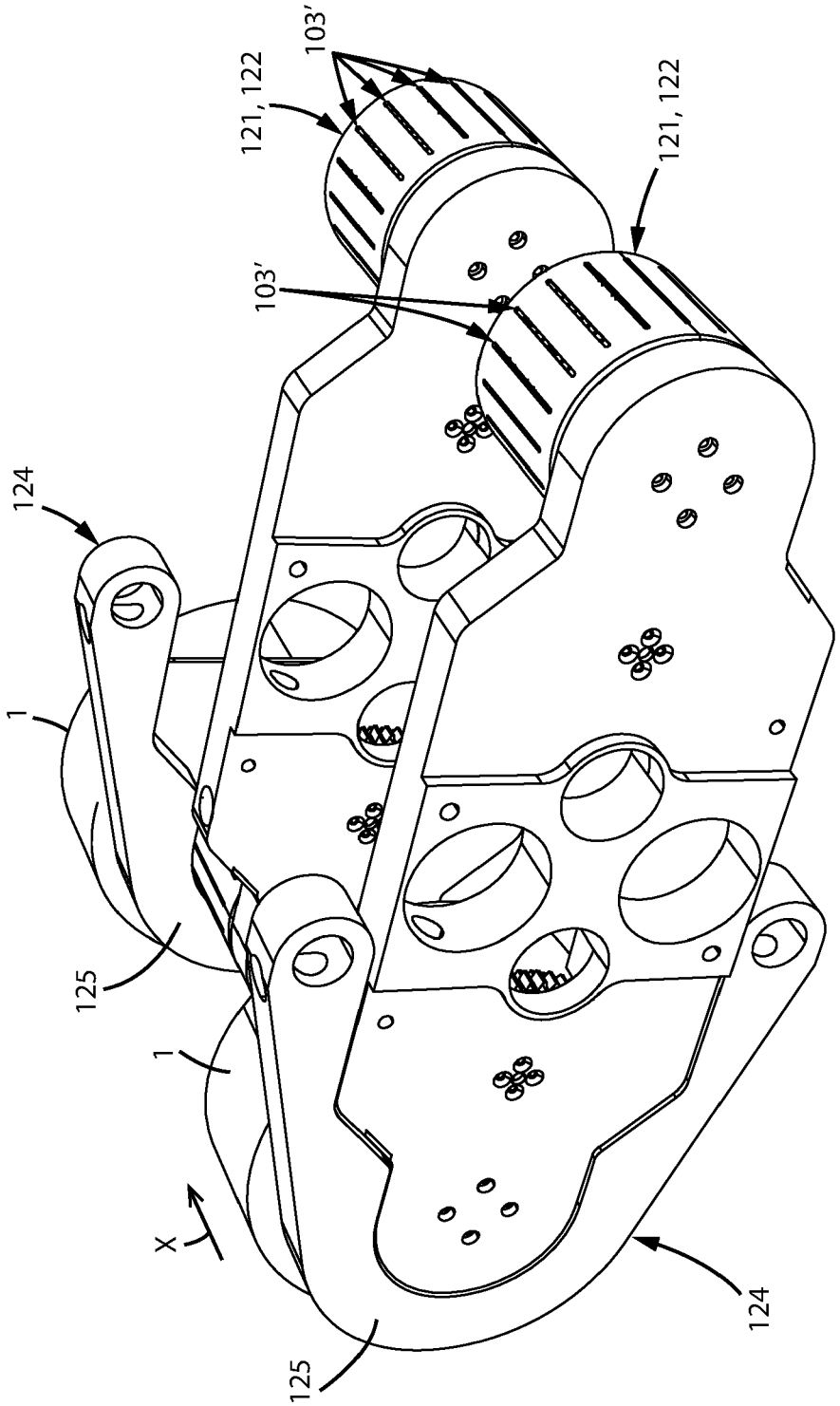



Fig. 6b

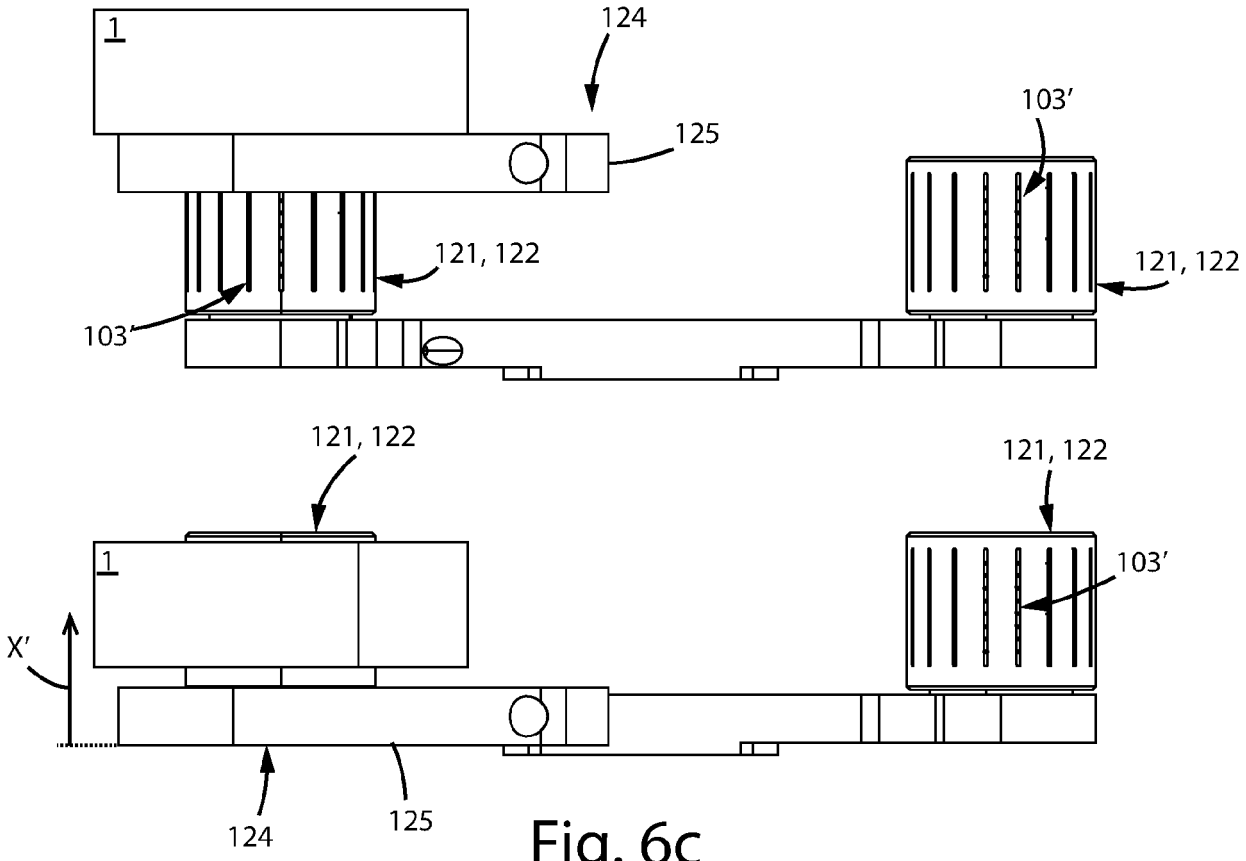

1
124
125
103'
121, 122
103'
121, 122
121, 122
121, 122
1
103'
X'
124
125

Fig. 6c

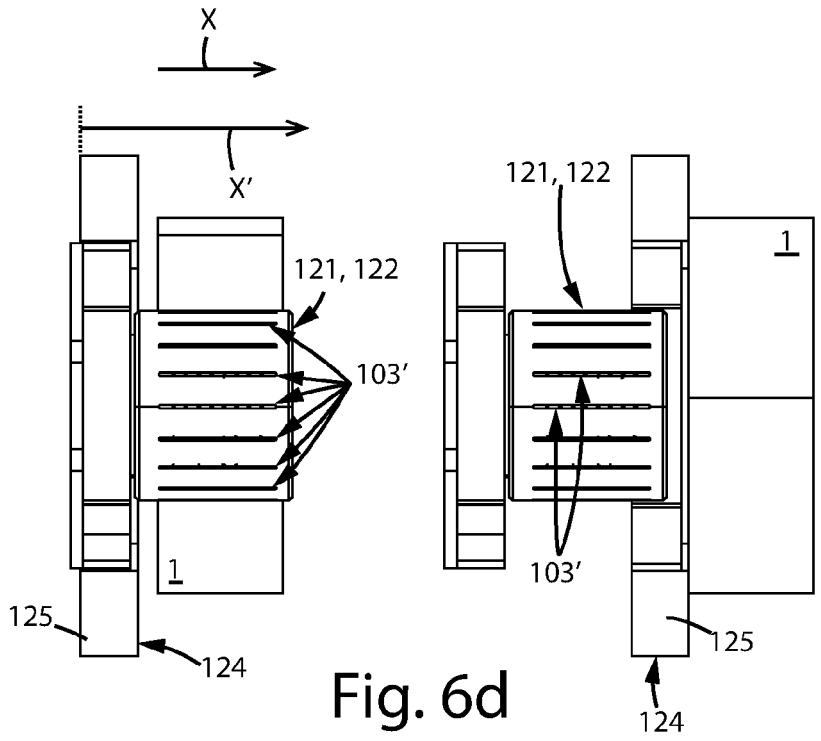

X
X'
121, 122
103'
1
125
124
121, 122
1
103'
125
124

Fig. 6d