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(71) Applicant: **Achton A/S**
4220 Korsoer (DK)

(72) Inventor: **Achton, Kim**
4220 Korsoer (DK)

(74) Representative: **Johnstone, Edward Ian et al**
Baron Warren Redfern
1000 Great West Road
Brentford TW8 9DW (GB)

(54) **DISPENSING DRUM**

(57) The present disclosure relates to a dispensing drum for a sheet material dispenser, the dispensing drum comprising first and second part-cylindrical drum members that are coupled together to form a drum body defining a central axis. The first and second drum members are coupled together by an end piece located adjacent to a first end of the drum body. The end piece comprises a first mounting formation that is engaged with a corresponding first mounting formation provided at the first end of the drum body to form a first coupling, and a second mounting formation that is engaged with a corresponding second mounting formation provided at the first end of the drum body to form a second coupling. The first coupling is configured to be formed by bringing the first mounting formations together in a first direction aligned with the central axis of the drum body, and the second coupling is configured to be formed by bringing the second mounting formations together in a second direction perpendicular to the central axis of the drum body.

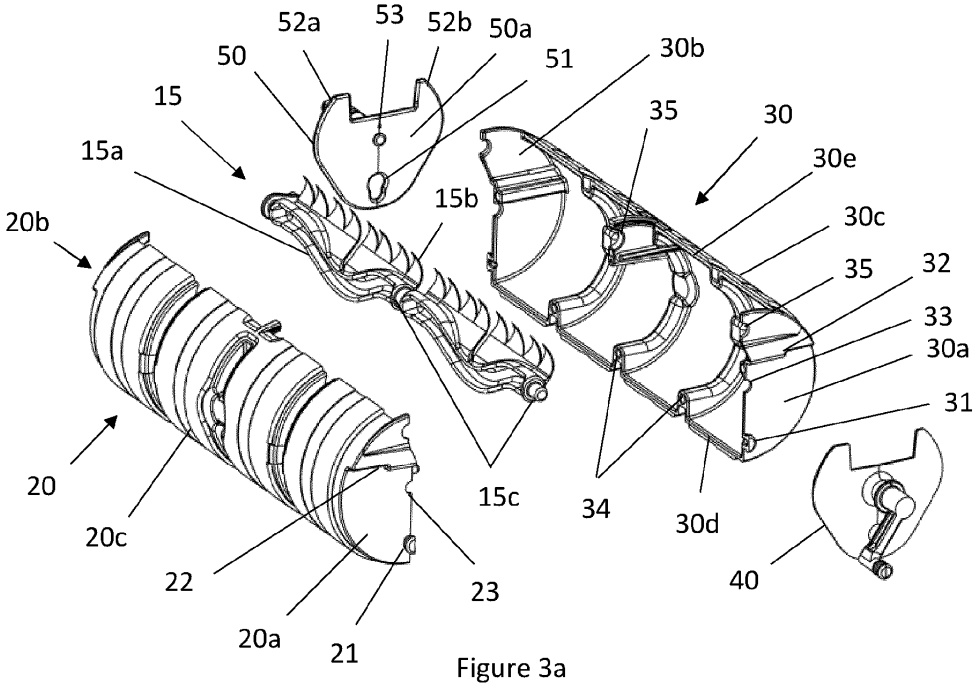

Figure 3a

EP 4 197 412 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to sheet material dispensers, and particularly, but not exclusively, to sheet material dispensers for dispensing paper towels. Aspects of the invention relate to a dispensing drum, to a sheet material dispenser including a dispensing drum, and to a method of assembling a dispensing drum.

BACKGROUND OF THE INVENTION

[0002] Paper towel dispensers come in various different forms, including simple housings from which pre-cut paper towels can be drawn and more complex dispensers which cut towels from a roll of paper towel material.

[0003] Dispensers of the former type generally require paper towels to be pre-cut and folded before being placed in the dispenser. Preparing individual paper towels in this form is time consuming and energy intensive, and generally requires the use of specialised machinery. Rolls of paper towel material suitable for use with dispensers of the latter type are less time consuming and energy intensive to produce than stacks of pre-cut and folded paper towels. However, dispenses of the latter type are themselves more complex, time consuming and expensive to manufacture than dispensers of the former type.

[0004] Dispensers that cut towels from a roll of paper towel material may include a dispensing drum including a movable cutting element that is configured to cut the paper towel material into measured sheets as the paper towel material passes around the dispensing drum. In this case the dispensing drum is generally formed by two separate drum parts that are assembled together with the cutting element located therebetween. The drum parts typically include complimentary locking formations that allow the drum parts to be snap fitted together. However, dispensing drums of this type can be challenging to assemble and disassemble. For example, it may be challenging to ensure correct alignment for each pair of locking formations before the drum parts are brought together, and to ensure that each pair of locking formations is engaged correctly after the drum parts have been brought together. For this reason it is not generally possible for multi-part dispensing drums including a movable cutting element to be assembled by machine on an automated production line.

[0005] The present invention aims to address disadvantages of known sheet material dispensers and manufacturing methods for sheet material dispensers.

SUMMARY OF THE INVENTION

[0006] According to a first aspect of the invention there is provided a dispensing drum for a sheet material dispenser, the dispensing drum comprising first and second part-cylindrical drum members that are coupled together to form a drum body defining a central axis; wherein the first and second drum members are coupled together by an end piece located adjacent to a first end of the drum body.

[0007] The end piece may comprise a first mounting formation that is engaged with a corresponding first mounting formation provided at the first end of the drum body to form a first coupling, and a second mounting formation that is engaged with a corresponding second mounting formation provided at the first end of the drum body to form a second coupling.

[0008] The first coupling may be configured to be formed by bringing the first mounting formations together in a first direction aligned with the central axis of the drum body, and the second coupling may be configured to be formed by bringing the second mounting formations together in a second direction perpendicular to the central axis of the drum body.

[0009] It will be appreciated that the first and second drum members may additionally be coupled together at a second end of the drum body opposed to the first end by a second end piece. In this case the second end piece may also be coupled to the drum body in a similar manner to the first end piece. It will further be appreciated that any features described in connection with "the end piece" may apply to either or both of the first and second end pieces.

[0010] The end piece of the present invention enables a more secure and stable connection to be formed between the first and second drum members than is found in previously known multi-part dispensing drums. The dispensing drum of the present invention is also particularly easy to assemble. In particular, the end piece of the present invention eliminates the need to include complimentary snap fit type locking formations on the first and second drum members and facilitates assembly of the dispensing drum on an automated production line.

[0011] The first mounting formation of the end piece may comprise at least one aperture formed in the end piece, and the corresponding first mounting formation of the drum body may comprise at least one protrusion that extends from the first end of the drum body in a direction aligned with the central axis of the drum body, the protrusion being received within the aperture to form the first coupling.

[0012] The protrusion may be formed by a first protruding part that is connected to the first drum member and a second protruding part that is connected to the second drum member, the first and second protruding parts being received together within the aperture provided in the end piece to form the first coupling.

[0013] The protrusion may have a generally cylindrical shape, for example a circular cylindrical shape, although other shapes are also possible. Where the protrusion is formed by first and second protruding parts the first and second protruding parts may each have a part-cylindrical shape, the first and second protruding parts cooperating to form the protrusion with the generally cylindrical shape.

[0014] The protrusion may comprise a shank portion and an enlarged portion located outboard of the shank portion with respect to the drum body. The shank portion of the protrusion may be received within the aperture provided in the end piece, and the enlarged portion of the protrusion may overhang at least a portion of the aperture.

[0015] The aperture provided in the end piece may comprise a through hole that extends through the main body of the end piece. The aperture may comprises a keyhole shaped slot including a first portion and a second portion, the first portion of the slot having a larger width than the second portion of the slot. The first portion of the slot may be configured to allow the enlarged portion of the protrusion to pass therethrough as the end piece is being assembled together with the first and second drum members, and the second portion of the slot may receive the shank portion of the protrusion therein and be overhung by the enlarged portion of the protrusion when the end piece has been fully assembled together with the first and second drum members.

[0016] The second mounting formation of the end piece may comprise at least one projecting portion that projects from a main body of the end piece in a direction perpendicular to the central axis of the drum body, and the corresponding second mounting formation of the drum body may comprise at least one recess formed in the first end of the drum body, the projecting portion being received within the recess at the end of the drum body to form the second coupling.

[0017] The second mounting formation of the end piece may comprise first and second projecting portions that project from the main body of the end piece, and the corresponding second mounting formation of the drum body may comprise a first recess formed in the first drum member and a second recess formed in the second drum member, the first projecting portion being received within the first recess and the second projecting portion being received within the second recess to form the second coupling.

[0018] The projecting portion(s) of the end piece may be planar in shape, and the recess(es) in which the projecting portion(s) of the end piece are received may comprise slot(s) extending in a plane perpendicular to the central axis of the drum body, although other shapes are also possible.

[0019] The end piece may further comprise a third mounting formation that is engaged with a corresponding third mounting formation provided at the first end of the drum body to form a third coupling, the third coupling being configured to resist movement of the end piece relative to the drum body in a plane perpendicular to the central axis of the drum body, thereby resisting disengagement of the second coupling.

[0020] The third mounting formation of the end piece may comprise at least one projection that extends towards the drum body, and the corresponding third mounting formation of the drum body may comprise at least one opening formed in the first end of the drum body, the projection being received within the opening to form the third coupling. The projection may have a generally cylindrical shape, for example a circular cylindrical shape, and the opening may be circular in shape, although other shapes are also possible. The opening may be formed at an interface between the first and second drum members by adjacent openings formed in each of the first and second drum members, and may optionally be aligned with the central axis of the drum body. The projection may be received in the opening with a snap fit connection.

[0021] The first drum member may comprise at least one engagement formation provided along a side edge thereof that is engaged with at least one corresponding engagement formation provided along a side edge of the second drum member. The engagement formations may comprise complimentary recesses and protrusions extending in a direction perpendicular to the central axis of the drum body, preferably without any snap-fit type interlocking features.

[0022] The dispensing drum may further comprise a cutting element that is mounted to at least one of the first and second drum members. The cutting element may be movable with respect to the drum body, and may be operable to cut sheet material as it passes around the dispensing drum in use. In particular, the cutting element may be movably mounted between the first and second drum members and configured to be deployed through a gap formed between adjacent side edges of the first and second drum members as the dispensing drum is rotated relative to a housing.

[0023] According to a further aspect of the present invention there is provided a sheet material dispenser comprising a dispensing drum according to the first aspect of the present invention. The sheet material dispenser may, for example, be a paper towel dispenser that is configured to dispense cut sheets of paper from a roll of paper towel material.

[0024] According to a further aspect of the present invention there is provided a method of assembling a dispensing drum for a sheet material dispenser, the method comprising: bringing first and second part-cylindrical drum members together to form a drum body; and mounting an end piece to a first end of the drum body, the end piece being configured to prevent relative movement between the first and second drum members when fully assembled together with the drum body.

[0025] The step of mounting the end piece to the first end of the drum body may comprise: moving the end piece relative to the drum body in a first direction aligned with a central axis of the drum body, wherein movement of the end piece in the first direction relative to the drum body brings a first mounting formation provided at a first end of the drum body into engagement with a first mounting formation of the end piece to form a first coupling; and moving the end piece relative to the drum body in a second direction perpendicular to the central axis of the drum body, wherein movement of the end piece in the

second direction relative to the drum body brings a second mounting formation of the end piece into engagement with a second mounting formation provided at the first end of the drum body to form a second coupling. The first and second couplings may secure the end piece to the drum body and prevent relative movement between the first and second drum members when the end piece has been fully assembled together with the drum body.

[0026] In a preferred example the end piece is moved in the first direction relative to the drum body to form the first coupling before being moved in the second direction relative to the drum body to form the second coupling. However, in other examples the end piece may alternatively be moved in the second direction relative to the drum body to form the second coupling before being moved in the first direction relative to the drum body to form the first coupling.

[0027] It will be appreciated that the first and second drum members may additionally be coupled together at a second end of the drum body opposed to the first end by a second end piece. In this case the second end piece may be fitted to the second end of the drum body using similar method steps to those used to fit the first end piece to the first end of the drum body. The first and second end pieces may be fitted to their respective ends of the drum body at the same time or alternatively one after the other.

[0028] The above-described method provides a particularly simple and effective way of assembling a multi-part dispensing drum for a sheet material dispenser that may be performed either by hand or on an automated production line. The above-described method also results in a particularly stable and secure connection being achieved between the first and second drum members.

[0029] The first mounting formation of the drum body may comprise at least one protrusion that extends from the first end of the drum body in a direction aligned with the central axis of the drum body, and the first mounting formation of the end piece may comprise at least one aperture formed in the end piece. In this case the step of moving the end piece in the first direction relative to the drum body may cause the protrusion provided on the drum body to be received within the aperture formed in the end piece to form the first coupling.

[0030] The protrusion may be formed by a first protruding part that is connected to the first drum member and a second protruding part that is connected to the second drum member. In this case the step of bringing the first and second drum members together may bring the first and second protruding parts together to form the protrusion.

[0031] The second mounting formation of the end piece may comprise at least one projecting portion that projects from a main body of the end piece in a direction perpendicular to the central axis of the drum body, and the second mounting formation of the drum body may comprise at least one recess formed in the first end of the drum body. In this case the step of moving the end piece in the second direction relative to the drum body may cause the projecting portion of the end piece to be received within the recess at the end of the drum body.

[0032] The second mounting formation of the end piece may comprise first and second projecting portions that project from the main body of the end piece, and the second mounting formation of the drum body may comprise a first recess formed in the first drum member and a second recess formed in the second drum member. In this case the step of moving the end piece in the second direction relative to the drum body may cause the first projecting portion of the end piece to be received within the first recess and the second projecting portion of the end piece to be received within the second recess.

[0033] The method may further comprise bringing a third mounting formation of the end piece into engagement with a third mounting formation provided at the first end of the drum body to form a third coupling. The third coupling may be configured to resist movement of the end piece relative to the drum body in a third direction opposed to the second direction when the end piece has been fully assembled together with the drum body. The third coupling may be engaged as the end piece reaches the end of its travel in the second direction by further inward movement of the end piece relative to the drum body in the first direction.

[0034] The third mounting formation of the end piece may comprise at least one projection that extends from the end piece in a direction towards the drum body, and the third mounting formation of the drum body may comprises at least one opening provided in at least one of the first and second drum members that receives the projection of the end piece therein when the end piece has been fully assembled together with the drum body.

[0035] The method may further comprise arranging a cutting element between the first and second drum members before the first and second drum members are brought together to form the drum body.

[0036] The step of bringing the first and second drum members together to form the drum body may bring at least one engagement formation provided along a side edge of the first drum member into engagement with at least one corresponding engagement formation provided along a side edge of the second drum member. The engagement formations may comprise complimentary recesses and protrusions extending in a direction perpendicular to the central axis of the drum body, preferably without any snap-fit type interlocking features.

BRIEF DESCRIPTION OF DRAWINGS

[0037] Embodiments of the invention will now be described by way of non-limiting example only and with reference to the accompanying drawings, in which:

Figures 1a and 1b schematically illustrate a front view and a side view of a sheet material dispenser comprising a dispensing drum;

Figures 2a and 2b schematically illustrate a dispensing drum in accordance with one possible embodiment of the present invention;

Figures 3a and 3b schematically illustrate the dispensing drum of Figures 2a and 2b in a pre-assembled or exploded state;

Figures 4 and 5 schematically illustrate cross section views through the dispensing drum of Figures 2a and 2b, and

Figures 6a to 6f schematically illustrate the dispensing drum of figures 2a and 2b at various different points during assembly of the dispensing drum.

DETAILED DESCRIPTION OF EMBODIMENTS

[0038] Figures 1a and 1b schematically illustrate a front view and a side view of a sheet material dispenser 1, in particular a paper towel dispenser, of a generally known kind. The dispenser 1 comprises a housing 2 including mounting points via which the dispenser 1 may be mounted to a wall. A bay 3 is defined within the housing 2 for receiving a roll of paper towel material 4. The roll 4 is rotatable with the housing 2 in order to allow paper from the roll 4 to be dispensed via an outlet 5 provided in the housing 2.

[0039] A dispensing drum 10 in accordance with one possible embodiment of the present invention is provided in the path between the roll 4 and the outlet 5 of the dispenser 1. A feeding roller 6 is also provided in front of the dispensing drum 10 for guiding paper towel material from the roll 4 to the dispensing drum 10, and an outlet roller 7 is provided in front of the dispensing drum 10 below the feeding roller 6 for guiding paper towel material from the dispensing drum 10 towards the outlet 5 of the housing 2.

[0040] The dispensing drum 10 is rotatable through 360 degrees with respect to the housing 2, and is provided with a spring loaded drive mechanism of a known type that is configured to rotate the dispensing drum from a launch angle back to a start position. The drive mechanism includes a radially extending arm provided at an end of the dispensing drum 10 that is rotationally fixed with respect to the dispensing drum 10 and engaged by a spring (not shown). In use, the dispensing drum 10 may be rotated away from its start position by a user pulling on a portion of the paper towel material that extends from the outlet 5 of the housing 2 and/or by a manual actuation mechanism (not shown). As the dispensing drum 10 is rotated away from its start position, the spring initially provides slight resistance to rotation of the dispensing drum 10. However, when the dispensing drum 10 reaches a launch angle of approximately 120 degrees from the start angle, the radially extending arm becomes aligned with the spring. After the launch angle has been passed the spring contracts and pulls on the radially extending arm in order to rotate the dispensing drum 10 onwards towards the start position. The spring continues to pull on the radially extending arm while the dispensing drum 10 rotates 180 degrees from the launch angle. After this point momentum of the dispensing drum 10 causes the dispensing drum 10 to continue rotating until it once again reaches the start position. It is therefore only necessary to manually rotate the dispensing drum 10 through an angle of 120 degrees from its start position in order to make the dispensing drum perform a full 360 degree rotation.

[0041] The dispensing drum 10 is also provided with a cutting element in the form of an elongate knife with serrated teeth that extends along the length of the dispensing drum 10. (The cutting element is not shown in Figures 1a and 1b, but is visible in subsequent figures.) The cutting element is movably mounted to the dispensing drum 10 and configured to be deployed outwardly from the dispensing drum 10 into the path of the paper towel material passing around the dispensing drum 10 in the angular vicinity of the launch angle in order to cut the piece of paper towel material that is being dispensed into a towel of a predetermined size. The cutting element is configured to cut the paper towel material after the dispensing drum 10 has passed the launch angle in order to ensure that a user can continue to rotate the dispensing drum 10 by pulling on the paper towel material at least until the launch angle has been reached.

[0042] The dispensing drum 10 is illustrated in its fully assembled state in Figures 2a and 2b, and in a disassembled/exploded state in Figures 3a and 3b. As shown in these figures, the dispensing drum 10 comprises a cylindrical drum body 10' with a cylindrical outer surface 10c that extends between first and second ends 10a, 10b around a central axis X. The outer surface 10c of the drum body 10' is provided with a grippy material for preventing the paper towel material from slipping with respect to the drum body 10'.

[0043] The drum body 10' is formed by a pair of part cylindrical drum members 20, 30 which are coupled together to form the drum body 10'. The first drum member 20 comprises a part cylindrical body 20c that extends between approximately semi-circular first and second end portions 20a, 20b, and the second drum member 30 similarly comprises a part cylindrical body 30c that extends between approximately semi-circular first and second end portions 30a, 30b. The first end portions 20a, 30a of the drum members 20, 30 cooperate to form the first end 10a of the drum body 10', the second end portions 20b, 30b of the drum members 20, 30 cooperate to form the second end 10b of the drum body 10', and the bodies 20c, 30c of the drum members 20, 30 together provide the outer surface 10c of the drum body 10'.

[0044] The bodies 20c, 30c of the drum members 20, 30 each include a first side edge 20d, 30d that is located towards the bottom of the dispensing drum 10 when the dispensing drum 10 is in the orientation shown in Figures 2a and 2b, and a second side edge 20e, 30e that is lo-

cated towards the top of the dispensing drum 10 when the dispensing drum 10 is in the orientation shown in Figures 2a and 2b. The first and second drum members 20, 30 engage each other along their first side edges 20d, 30d, and a plurality of engagement formations in the form of cylindrical protrusions 24 that extend outwardly from the first side edge 20d of the first drum member 20 (visible in Figure 3b) are received within a corresponding plurality of engagement formations in the form of cylindrical recesses 34 provided along the first side edge 30d of the second drum member 30 (visible in Figure 3a) in order to ensure correct alignment of the drum members 20, 30 and enhance the stability of the drum body 10'. However, a gap is present between the second side edges 20e, 30e which extends along the length of the drum body 10'.

[0045] The above-mentioned cutting element 15 is mounted between the first and second drum members 20, 30 adjacent to the gap between the second side edges 20e, 30e of the drum members 20, 30. As shown in the exploded views of Figures 3a and 3b, the cutting element 15 comprises a body 15a that extends along the length of the drum body 10', and a serrated blade 15b for cutting the sheet material into paper towels of a predetermined size that extends outwardly from the body 15a along its length.

[0046] The body 15a of the cutting element 15 also includes three mounting portions 15c each having a cylindrical section aligned with a longitudinal axis of the cutting element body 15a. One of the mounting portions15c is provided towards the mid-point of the cutting element body 15a, and the other two mounting portions 15c are provided towards the ends of the cutting element body 15a. The mounting portions 15c of the cutting element 15 are received within three cylindrical mounting recesses located inside the drum body 10', each of which is formed by cooperation between a part-cylindrical recess 25 provided adjacent to the second side edge 20e of the first drum member 20 and a corresponding part-cylindrical recess 35 provided adjacent to the second side edge 30e of the second drum member 30 (visible in Figures 3a and 3b).

[0047] The cutting element 15 is pivotable within the drum body 10' around the axis of the mounting recesses between a retracted position in which the blade 15b is located inside the drum body 10' and a deployed position in which the blade 15b protrudes through the gap between the drum members 20, 30 as shown in Figures 2a and 2b. An actuation arm 15d (visible in Figures 2b and 3b) extends radially outwardly from the body 15a of the cutting element 15 outboard of the second end 10b of the drum body 10'. The actuation arm 15d includes a protrusion that is configured to cooperate with a track provided in the dispenser housing 2 in order to control actuation of the cutting element 15, and in particular to move the cutting element 15 to the deployed position in order to cut a paper towel of a predetermined size after the dispensing drum 10 has passed the launch angle.

[0048] The first and second ends 10a, 10b of the drum body 10' are each provided with a first mounting formation in the form of a protrusion 11 that extends outwardly from the end of the drum body 10' in a direction aligned with the central axis X of the drum body 10', as shown in Figures 2b and 6c. Each of the protrusions 11 is formed by a first protruding part 21 that extends outwardly from one of the end portions 20a, 20b of the first drum member 20, and a second protruding part 31 that extends outwardly from one of the end portions 30a, 30b of the second drum member 30 at a location adjacent to the first protruding part 21, as shown in Figures 3a and 3b. Each of the protrusions 11 is generally cylindrical in shape, and includes a cylindrical shank portion via which the protrusion is connected to the drum body 10', and an enlarged tip located outboard of the shank portion.

[0049] The first and second ends 10a, 10b of the drum body 10' are also each provided with a second mounting formation in the form of a pair of recesses or slots 22, 32 that extend in a plane perpendicular to the central axis X of the drum body 10', including a first slot 22 provided in one of the end portions 20a, 20b of the first drum member 20 and a second slot 32 provided in one of the end portions 30a, 30b of the second drum member 30, as shown in Figures 3a and 3b.

[0050] The first and second ends 10a, 10b of the drum body 10' are also each provided with a third mounting formation in the form of a small circular opening 13 that extends through the end wall of the drum body 10' at a location aligned with the central axis X of the drum body 10'. Each of the openings 13 is formed by a first part-circular opening 23 provided in one of the end portions 20a, 20b of the first drum member 20, and a second part-circular opening 33 provided in one of the end portions 30a, 30b of the second drum member 30 at a location adjacent to the first part-circular opening 23, as shown in Figures 3a and 3b.

[0051] The first and second drum members 20, 30 are coupled together at the first and second ends 10a, 10b of the drum body 10' by first and second end pieces or end plates 40, 50. The end plates 40, 50 each include a planar body 40a, 50a that engages one of the ends 10a, 10b of the drum body 10'.

[0052] Each of the end plates 40, 50 comprises a first mounting formation in the form of an aperture 41, 51 that extends through its main body 40a, 40b, as shown in Figures 3a and 3b. The apertures 41, 51 each comprise a keyhole shaped slot including a first portion that is circular in shape and has a width that is slightly larger than the width of the enlarged tips of the protrusions 11, and a second portion that is connected to the first portion and has a width that is approximately equal to the width of the shank portions of the protrusions 11.

[0053] The apertures 41, 51 each receive one of the protrusions 11 that extends outwardly from an end 10a, 10b of the drum body 10' therein in order to form a first coupling 61 between the end plate 40, 50 and the drum body 10'. The shank portions of the protrusions 11 are

received within the narrower second portions of the apertures 41, 51 and the enlarged tips of the protrusions 11 overhang the apertures 41, 51 around the narrower second portions when the first and second end plates 40, 50 are fully assembled together with the first and second drum members 20, 30, as shown in Figures 2a and 2b. In this way the first couplings 61 acts to prevent outward movement of the end plates 40, 50 away from the ends 10a, 10b of the drum body 10' in a direction aligned with the central axis X of the drum body 10', as well as holding the first and second drum members 20, 30 together.

[0054] Each of the end plates 40, 50 further comprises a second mounting formation in the form of a pair of planar projecting portions or tabs 42a, 42b, 52a, 52b that extend outwardly from its main body 40a, 50a in a direction perpendicular to the central axis X of the drum body 10', as also shown in Figures 3a and 3b. For each of the end plates 40, 50 a first one of the tabs 42a, 52a is received in one of the first slots 22 provided in one of the end portions 20a, 20b of the first drum member 20 (a shown in cross section in Figure 4) and a second one of the tabs 42b, 52b is received in one of the second slots 32 provided in one of the end portions 30a, 30b of the second drum member 30 in order to form a second coupling 62 between the end plate 40, 50 and the drum body 10'.

[0055] Each of the slots 22, 32 comprises an outer wall that extends over the outer surface of the tab 42a, 42b, 52a, 52b that is received therein in order to resist outward movement of the end plate 40, 50 away from the drum body 10' in a direction aligned with the central axis X of the drum body 10'. Each of the slots 22, 32 also comprises a shoulder that is configured to engage a side surface of the tab 42a, 42b that is received therein in order to hold the first and second drum members 20, 30 together.

[0056] Each of the end plates 40, 50 further comprises a third mounting formation in the form of a small, cylindrical projection 43, 53 that extends outwardly from its main body 40a, 50a in a direction towards the drum body 10', as also shown in Figures 3a and 3b. The projections 43, 53 each extend into one of the openings 13 formed at the ends 10a, 10b of the drum body 10', as shown in cross section in Figure 5, and are received in the openings 13 with a snap-fit connection in order to form third couplings 63 between the end plates 40, 50 and the drum body 10'.

[0057] Interaction between the projections 43, 53 and the openings 13 resists movement of the end plates 40, 50 in a plane perpendicular to the central axis X of the drum body 10', thereby preventing the tabs 42a, 42b, 52a, 52b from being drawn out of the slots 22, 32 in which they are received to form the second couplings 62. However, the end plates 40, 50 are preferably formed of a material that is sufficiently compliant to allow the projections 43, 53 to be lifted out from the openings 13 by deformation of the bodies 40a, 50a of the end plates 40, 50 in order to facilitate removal of the end plates 40, 50 from the drum body 10' in case it is ever desired to disassemble the dispensing drum 10.

[0058] The first and second end plates 40, 50 each further comprise a shaft portion 45, 55 that extends outwardly from the main body 40a, 50a of the end plate 40, 50 in a direction aligned with the central axis X of the drum body 10'. The shaft portions 45, 55 of the end plates 40, 50 are configured to be rotatably received by mounting brackets provided in the housing 2 of the dispenser 1 in order to rotatably mount the dispensing drum 10 within the housing 2 of the dispenser 1.

[0059] A radially extending arm 46 extends outwardly from the shaft portion 45 of the first end plate 40 in a direction perpendicular to the central axis X of the drum body 10'. The radially extending arm 46 is configured to be engaged by a spring in order to form the above-mentioned drive mechanism for rotating the dispensing drum 10 back to its start position when the dispensing drum 10 has been rotated past the launch angle. At the other end of the dispensing drum 10, the shaft portion 55 of the second end plate 50 is longer than the shaft portion 45 of the first end plate 40 and includes a profiled end 56. The profiled end 56 of the shaft portion 55 of the second end plate 50 is configured to be coupled to an actuation mechanism that is configured to rotate the dispensing drum 10 in response to activation of a user input device such as a slider or lever in a known manner.

[0060] Assembly of the dispensing drum 10 will now be described with reference to Figures 6a to 6f.

[0061] The first and second drum members 20, 30, the cutting element 15 and the first and second end plates 40, 50 are initially all provided separately to one another, as shown in Figure 6a.

[0062] In a first step, the cutting element 15 is assembled together with one of the first and second drum members 20, 30, in this case the second drum member 30, with the mounting portions 15c of the cutting element located within the part cylindrical recesses 35 of the second drum member 30, as shown in Figure 6b.

[0063] Next, the first and second drum members 20, 30 are brought together with the protrusions 24 provided along the first side edge 20d of the first drum member 20 aligned with the corresponding recesses 34 provided along the first side edge 30d of the second drum member 30 in order to form the drum body 10', as shown in Figure 6c. The first and second drum members 20, 30 may be brought together in a direction perpendicular to the central axis X of the drum body 10' by moving one or both of the first and second drum members 20, 30 towards the other.

[0064] Next, one of the end plates 40, 50, in this case the first end plate 40, is brought into engagement with an end face 10a, 10b, in this case the first end face 10a, of the drum body 10' in a first direction A that is aligned with the central axis X of the drum body 10', as shown in Figure 6d. The wider portion of the aperture 41 formed in the end plate 40 is aligned with the protrusion 11 that extends outwardly from the end 10a of the drum body 10' as the end plate 40 is brought into engagement with

the end 10a of the drum body 10' such that the protrusion 11 is able to enter the aperture 41 to form the first coupling 61.

[0065] Next, the end plate 40 is moved in a second direction B that is perpendicular to the central axis X of the drum body 10' in order to move the tabs 42a, 42b that extend outwardly from the main body of the end plate 40 into the slots 22, 32 provided at the ends of the first and second drum bodies 20, 30 to form the second coupling 62, as shown in Figure 6e. As the end plate 40 is moved in the second direction B, the shank portion of the protrusion 11 moves into the narrower second portion of the aperture 41, thereby bringing the first coupling 61 to its fully engaged state. When the end plate 40 reaches the end of its travel in the second direction B its projection 43 becomes aligned with the opening 13 provided at the end of the drum body 10'. At this point the end plate 40 moves slightly further in the first direction A as the projection 43 enters the opening 13 to form the third coupling 63. The end plate 40 is then fully mounted to the drum body 10'.

[0066] An equivalent process is also used to mount the second end plate 50 to the first and second drum members 20, 30 at the second end 10b of the drum body 10' in order to form the completed dispensing drum 10, as shown in Figure 6f. It will be appreciated that the second end plate 50 may be coupled to the first and second drum members 20, 30 at the same times as, before or after the first end plate 40.

[0067] The above described method steps may be performed either manually or alternatively by one or more machines on an automated production line.

[0068] It will be appreciated that many modifications may be made to the above-described embodiments without departing from the scope of the present invention as defined in the appended claims.

[0069] For example, in the above-described embodiment the first coupling 61 comprises a protrusion 11 formed by a pair of projecting portions 21, 31 that extend outwardly from the end walls 20a, 30a of the first and second drum members 20, 30 and are received together within an aperture 41 formed in the end plate 40. However, in another embodiment the first coupling 61 could instead comprise a pair of spaced apart protrusions that extend outwardly from the end walls 20a, 30a of the first and second drum members 20, 30 and are received within separate apertures formed in the end plate 40, or a pair of spaced apart protrusions that extend outwardly from the end plate 40 and are received within a pair of apertures extending through the end walls 20a, 30a of the first and second drum members 20, 30.

[0070] In addition, in the above-described embodiment the second coupling 62 comprises a pair of tabs 42a, 42b that extend outwardly from the end plate 40 and are received within a pair of slots 22, 32 formed in the end walls 20a, 30a of the first and second drum members 20, 30. However, in another embodiment the second coupling 62 could instead comprise a transversely extending tabs provided on the end walls 20a, 30a of the first and second drum members 20, 30 that are received within a corresponding pair of slots formed in the end plate 40.

[0071] In addition, in the above-described embodiment the third coupling 63 comprises a projection 43 that extends outwardly from the end plate 40 and is received in an opening 13 formed between the end walls 20a, 20b of the first and second drum members 20, 30 with a snap fit connection. However, in another embodiment the third coupling 3 could instead comprise a projection that extends outwardly from the end wall 20a, 30a of one of the drum members 20, 30 and is received in an opening formed in the end plate 40 with a snap fit connection.

[0072] Other modifications will also be apparent to the skilled person.

Claims

1. A dispensing drum for a sheet material dispenser, the dispensing drum comprising first and second part-cylindrical drum members that are coupled together to form a drum body defining a central axis; wherein the first and second drum members are coupled together by an end piece located adjacent to a first end of the drum body.

2. A dispensing drum according to Claim 1, wherein the end piece comprises a first mounting formation that is engaged with a corresponding first mounting formation provided at the first end of the drum body to form a first coupling, and a second mounting formation that is engaged with a corresponding second mounting formation provided at the first end of the drum body to form a second coupling.

3. A dispensing drum according to Claim 2, wherein the first coupling is configured to be formed by bringing the first mounting formations together in a first direction aligned with the central axis of the drum body, and the second coupling is configured to be formed by bringing the second mounting formations together in a second direction perpendicular to the central axis of the drum body.

4. A dispensing drum according to Claim 3, wherein the first mounting formation of the end piece comprises at least one aperture formed in the end piece, and the corresponding first mounting formation of the drum body comprises at least one protrusion that extends from the first end of the drum body in a direction aligned with the central axis of the drum body, the protrusion being received within the aperture to form the first coupling.

5. A dispensing drum according to Claim 4, wherein the protrusion is formed by a first protruding part that is connected to the first drum member and a second

protruding part that is connected to the second drum member, the first and second protruding parts being received together within the aperture provided in the end piece to form the first coupling.

6. A dispensing drum according to Claim 4 or Claim 5, wherein the protrusion comprises a shank portion and an enlarged portion located outboard of the shank portion with respect to the drum body, wherein the shank portion of the protrusion is received within the aperture provided in the end piece, and the enlarged portion of the protrusion overhangs at least a portion of the aperture.

7. A dispensing drum according to Claim 6, wherein the aperture provided in the end piece comprises a keyhole shaped slot including a first portion and a second portion, the first portion of the slot having a larger width than the second portion of the slot, wherein the first portion of the slot is configured to allow the enlarged portion of the protrusion to pass therethrough as the end piece is being assembled together with the first and second drum members, and wherein the second portion of the slot receives the shank portion of the protrusion therein and is overhung by the enlarged portion of the protrusion when the end piece has been fully assembled together with the first and second drum members.

8. A dispensing drum according to any of Claims 3 to 7, wherein the second mounting formation of the end piece comprises at least one projecting portion that projects from a main body of the end piece in a direction perpendicular to the central axis of the drum body, and the corresponding second mounting formation of the drum body comprises at least one recess formed in the first end of the drum body, the projecting portion being received within the recess at the end of the drum body to form the second coupling.

9. A dispensing drum according to Claim 8, wherein the second mounting formation of the end piece comprises first and second projecting portions that project from the main body of the end piece, and the corresponding second mounting formation of the drum body comprises a first recess formed in the first drum member and a second recess formed in the second drum member, the first projecting portion being received within the first recess and the second projecting portion being received within the second recess to form the second coupling.

10. A dispensing drum according to Claim 8 or Claim 9, wherein the projecting portion(s) of the end piece are planar in shape and the recess(es) in which the projecting portion(s) of the end piece are received comprise slot(s) extending in a plane perpendicular to the central axis of the drum body.

11. A dispensing drum according to any of Claims 3 to 10, wherein the end piece further comprises a third mounting formation that is engaged with a corresponding third mounting formation provided at the first end of the drum body to form a third coupling, wherein the third coupling is configured to resist movement of the end piece relative to the drum body in a plane perpendicular to the central axis of the drum body, thereby resisting disengagement of the second coupling.

12. A dispensing drum according to Claim 11, wherein the third mounting formation of the end piece comprises at least one projection that extends towards the drum body, and the corresponding third mounting formation of the drum body comprises at least one opening formed in the first end of the drum body, the projection being received within the opening to form the third coupling.

13. A sheet material dispenser comprising a dispensing drum according to any preceding claim.

14. A method of assembling a dispensing drum for a sheet material dispenser, the method comprising:

bringing first and second part-cylindrical drum members together to form a drum body; and
mounting an end piece to a first end of the drum body, the end piece being configured to prevent relative movement between the first and second drum members when fully assembled together with the drum body.

15. A method according to Claim 14, wherein the step of mounting the end piece to the first end of the drum body comprises:

moving the end piece relative to the drum body in a first direction aligned with a central axis of the drum body, wherein movement of the end piece in the first direction relative to the drum body brings a first mounting formation provided at a first end of the drum body into engagement with a first mounting formation of the end piece to form a first coupling, and
moving the end piece relative to the drum body in a second direction perpendicular to the central axis of the drum body, wherein movement of the end piece in the second direction relative to the drum body brings a second mounting formation of the end piece into engagement with a second mounting formation provided at the first end of the drum body to form a second coupling.

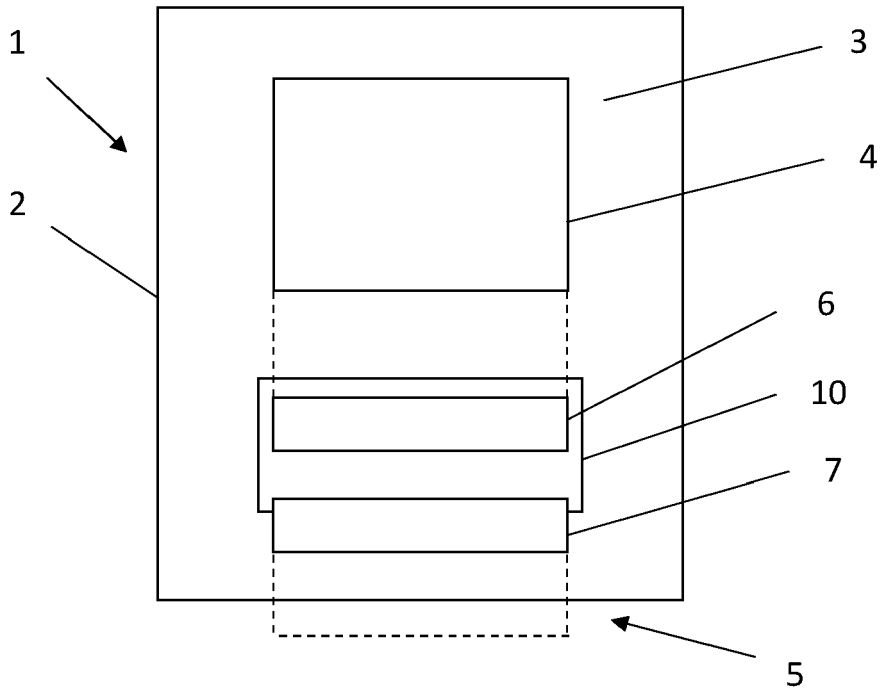

Figure 1a

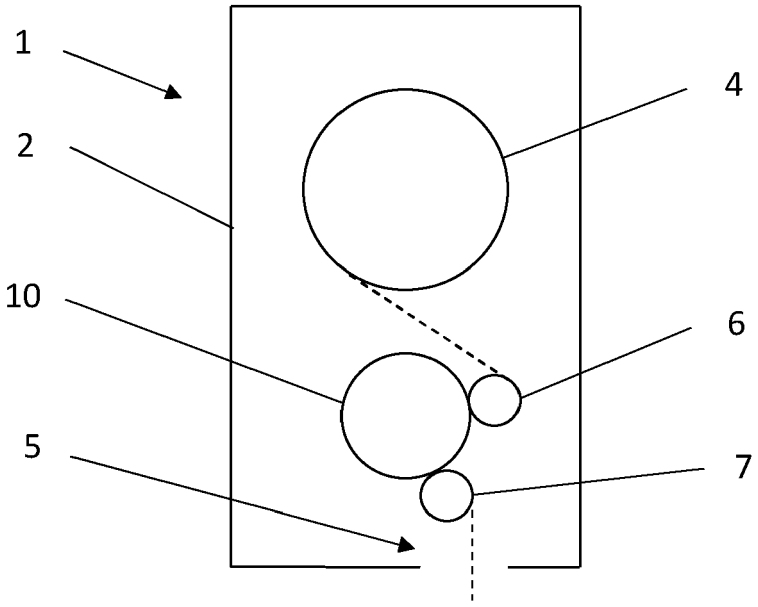

Figure 1b

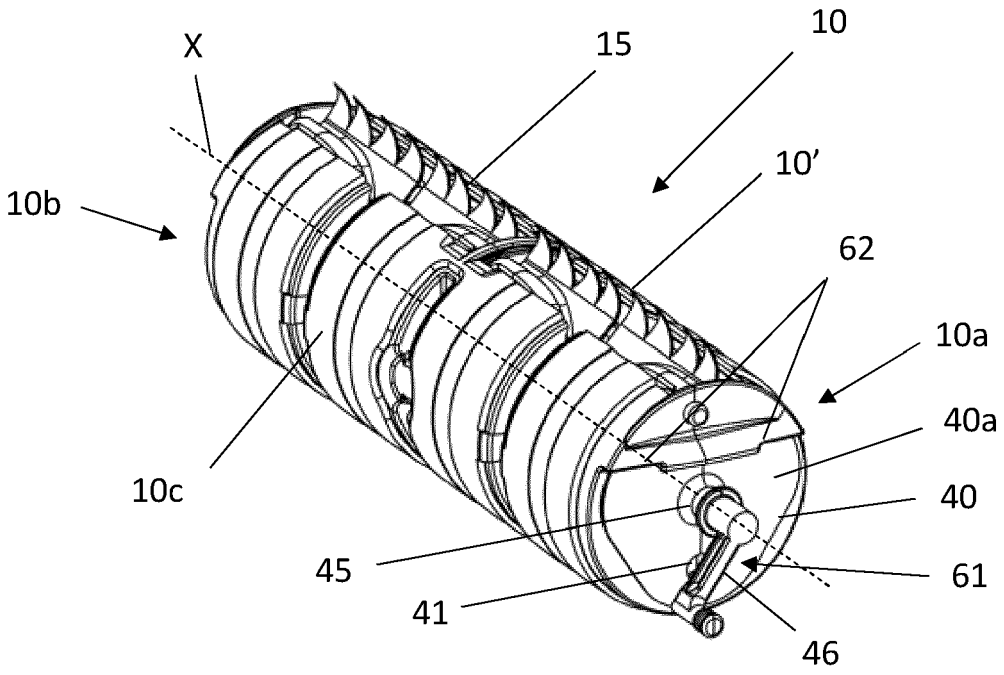

Figure 2a

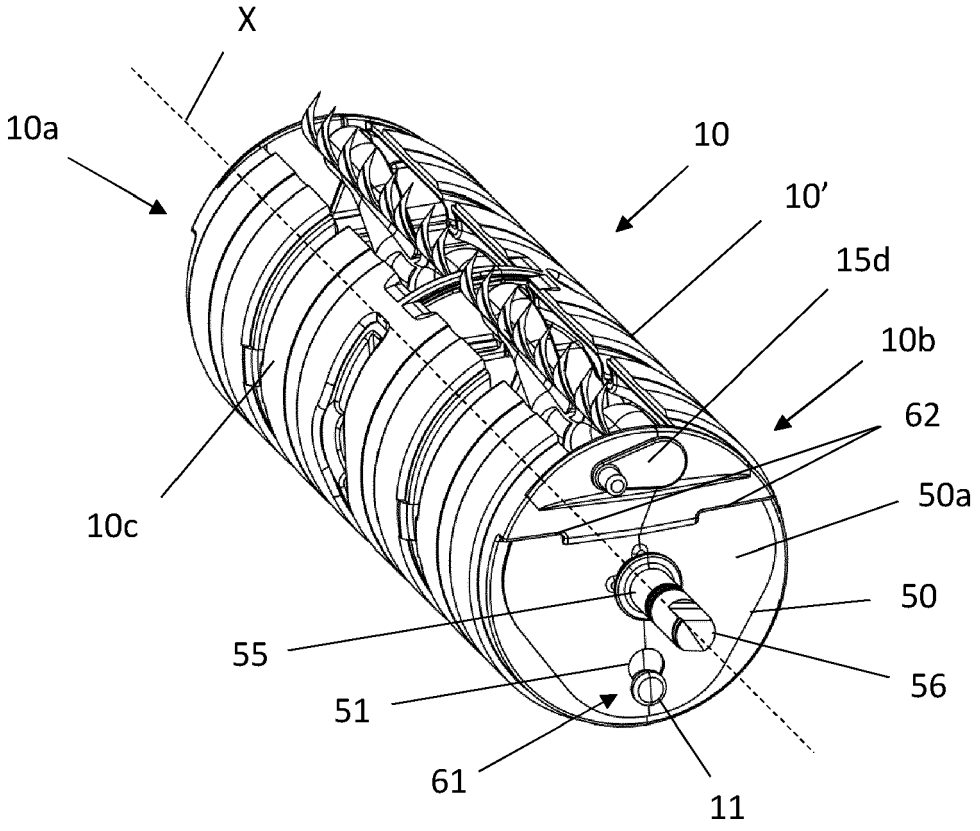

Figure 2b

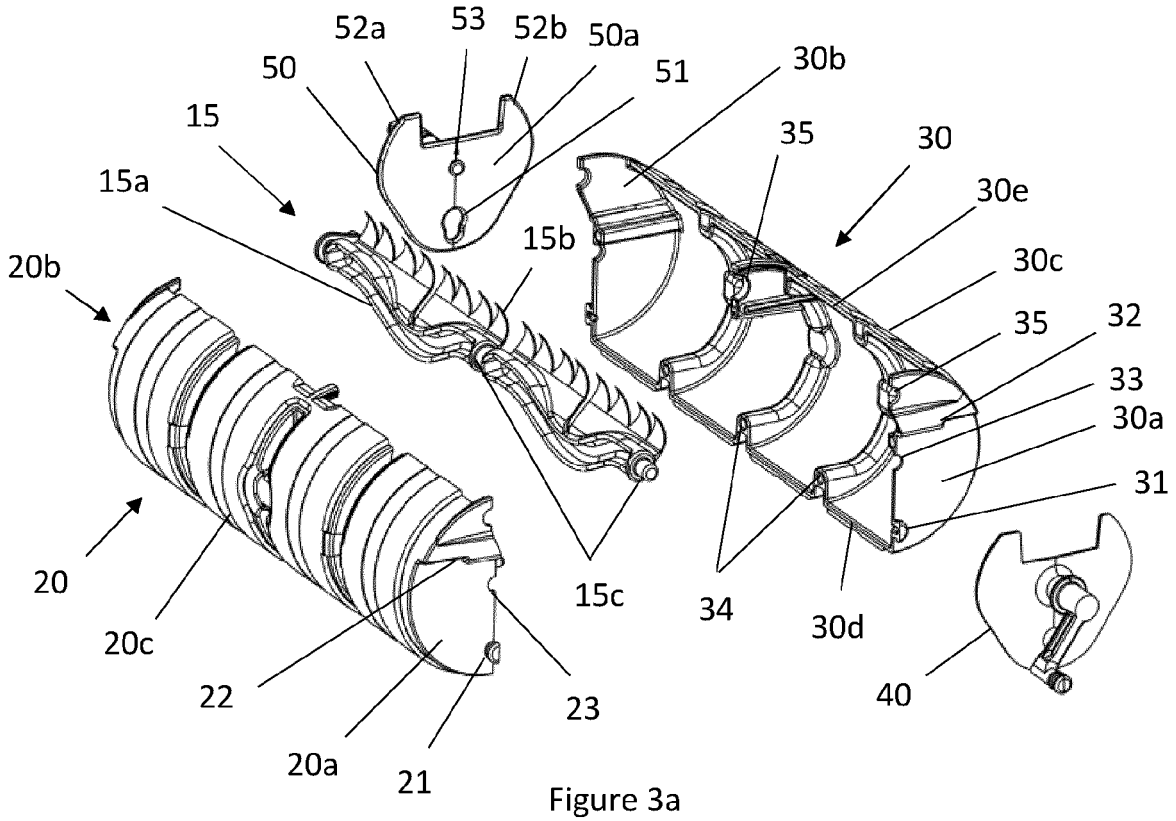

Figure 3a

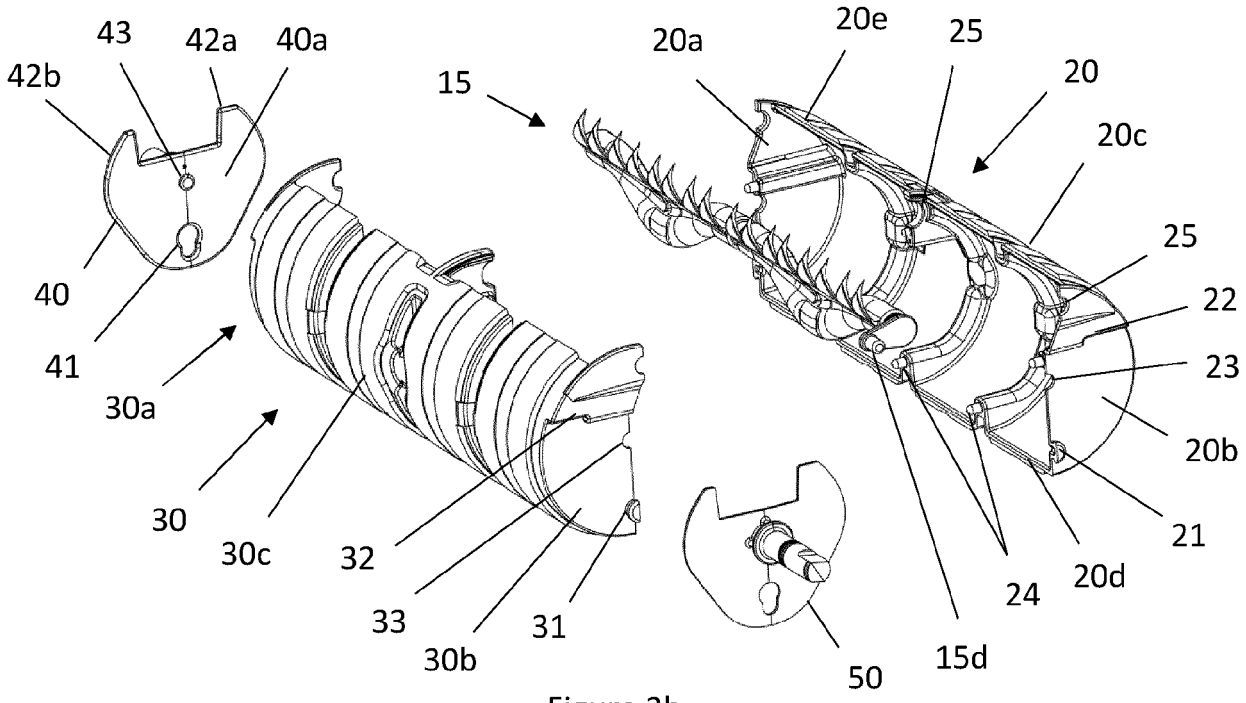

Figure 3b

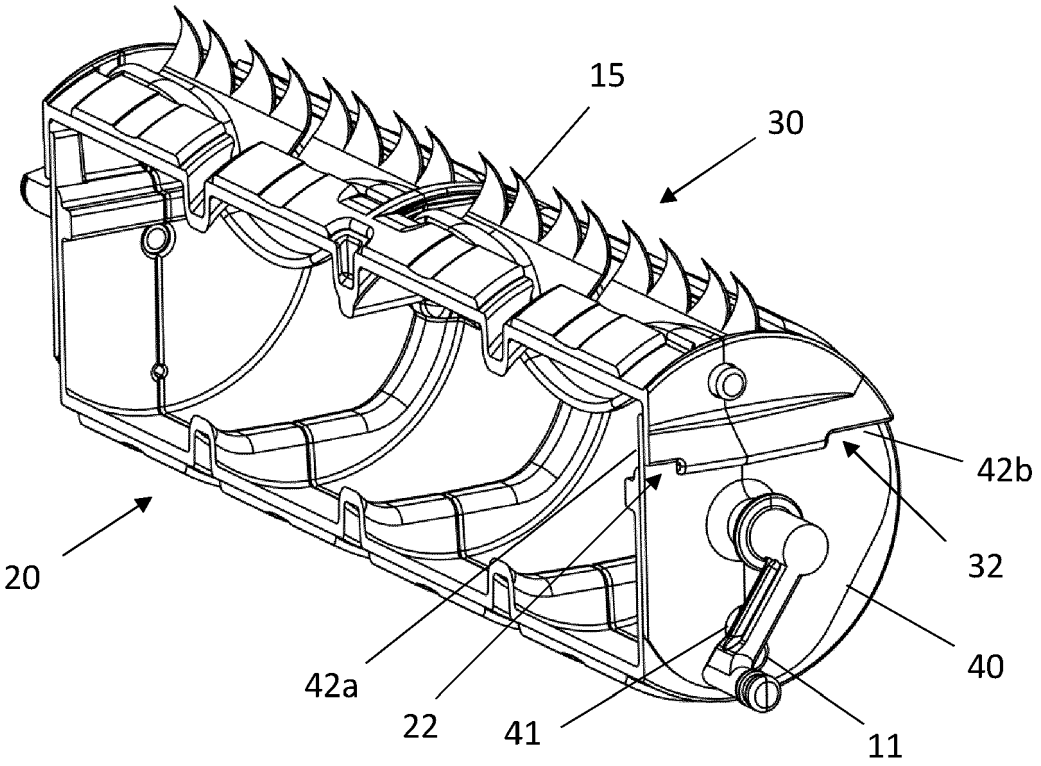

Figure 4

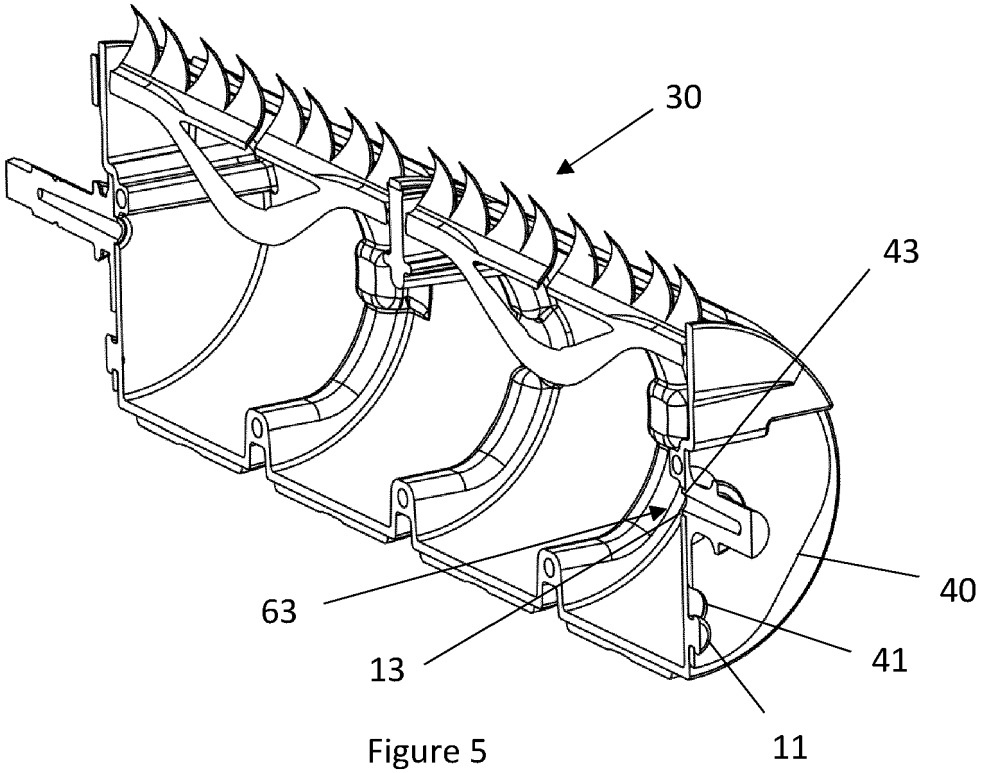

Figure 5

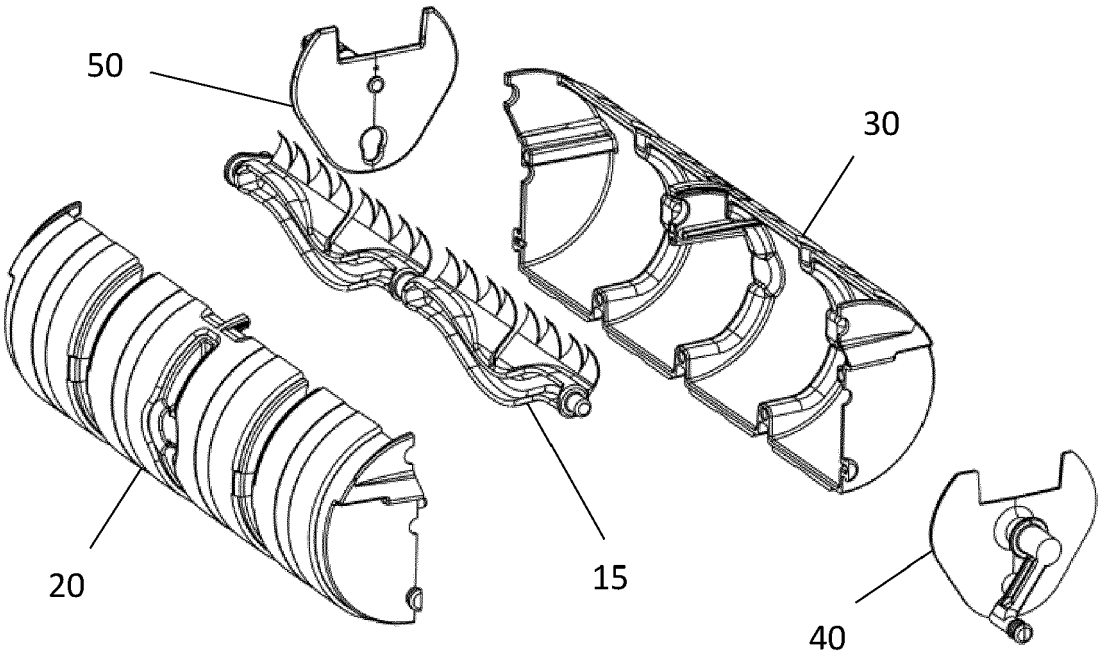

Figure 6a

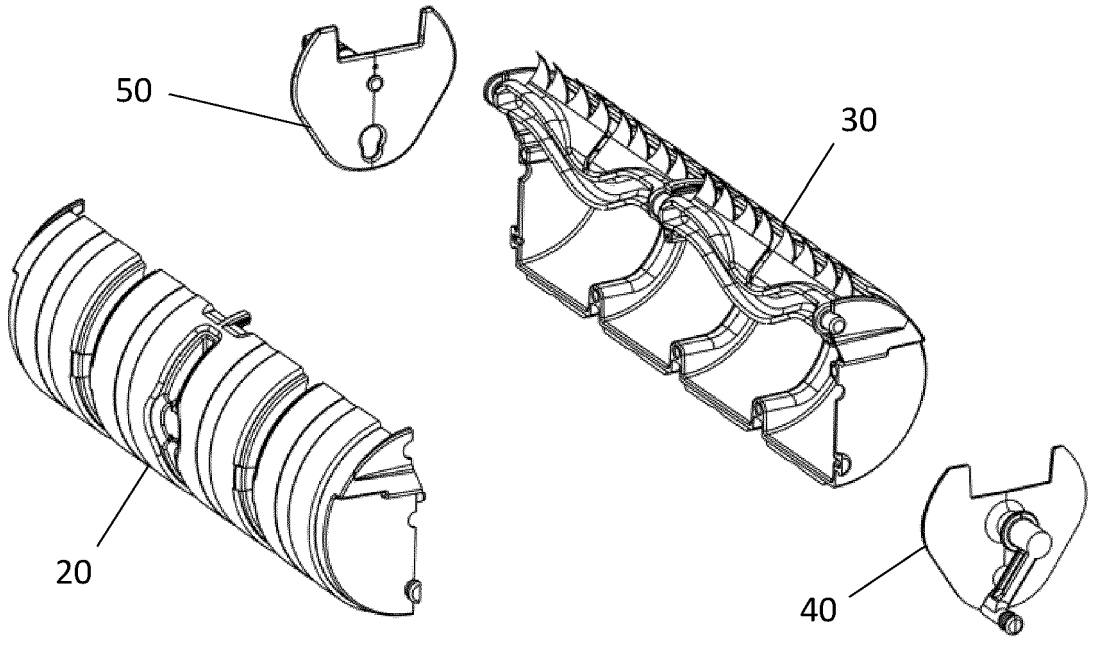

Figure 6b

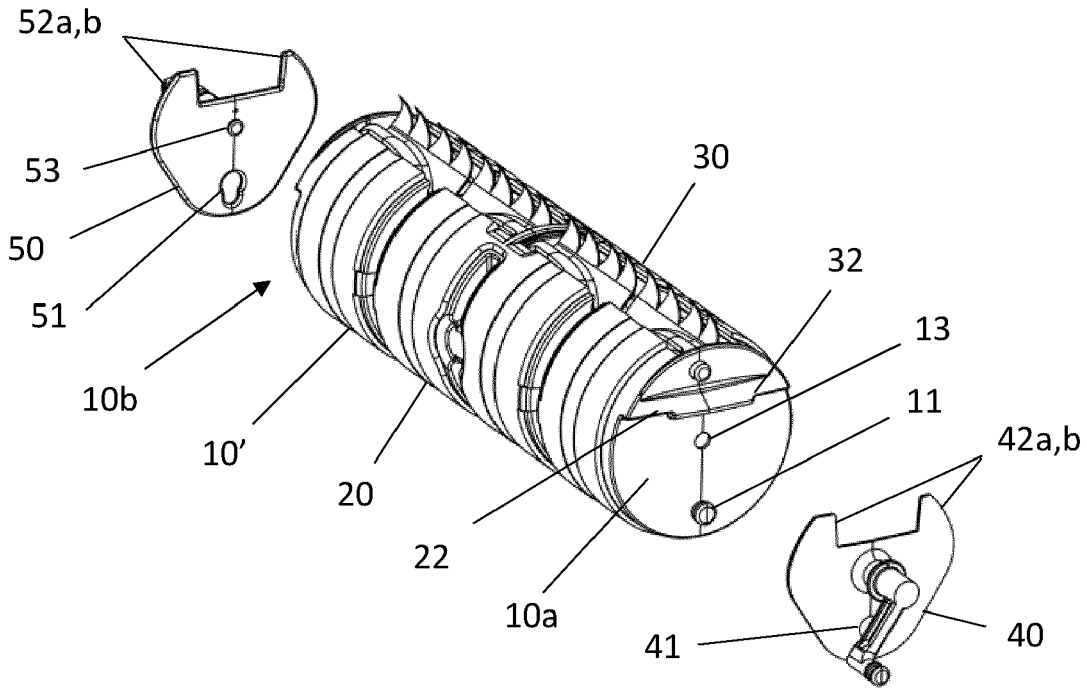

Figure 6c

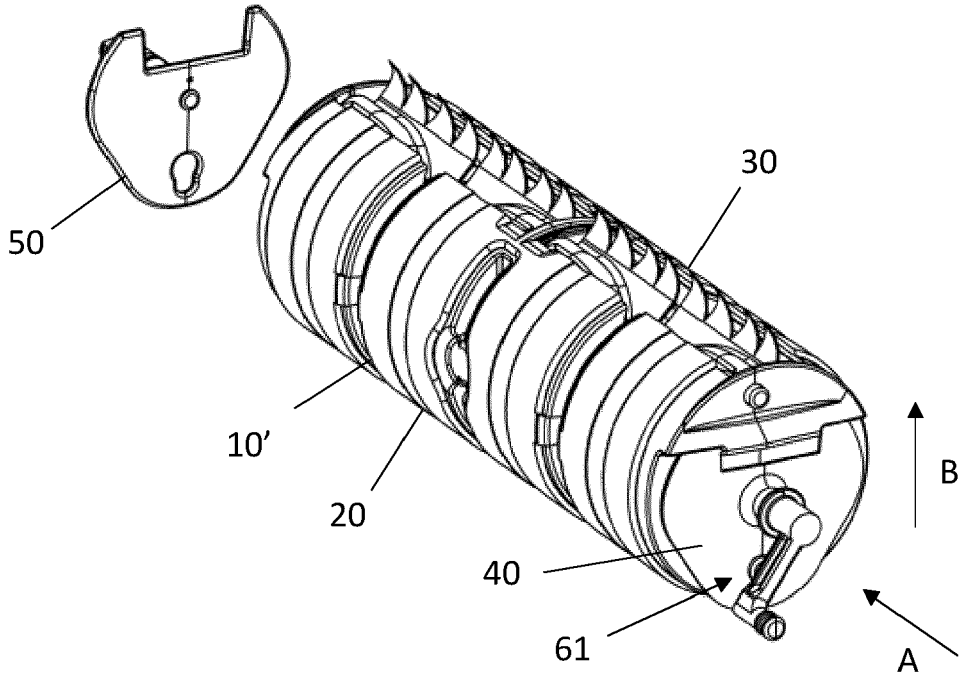

Figure 6d

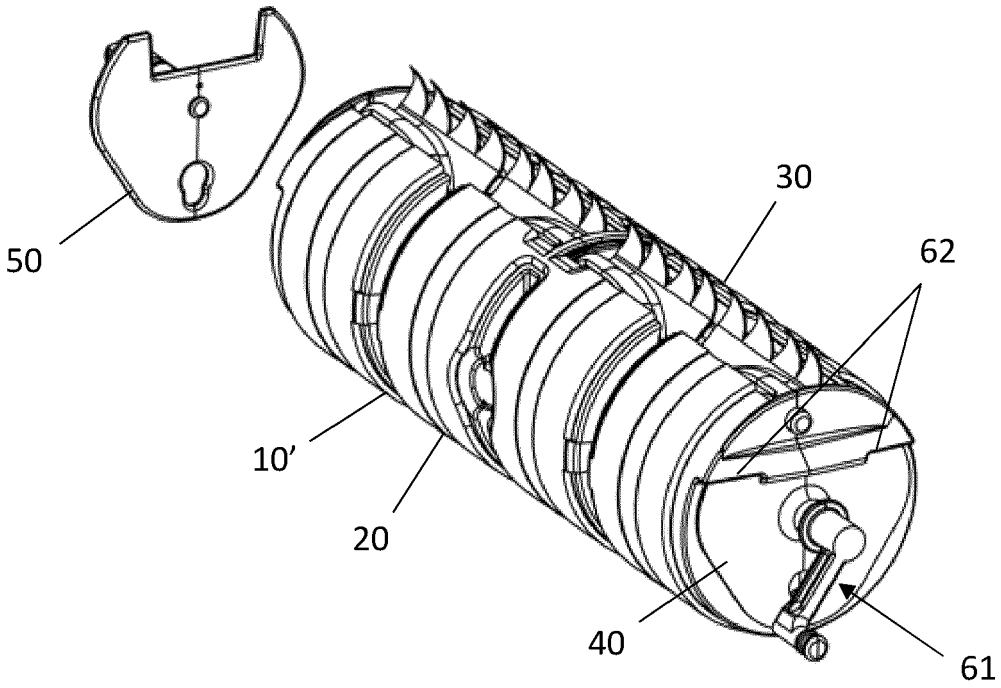

Figure 6e

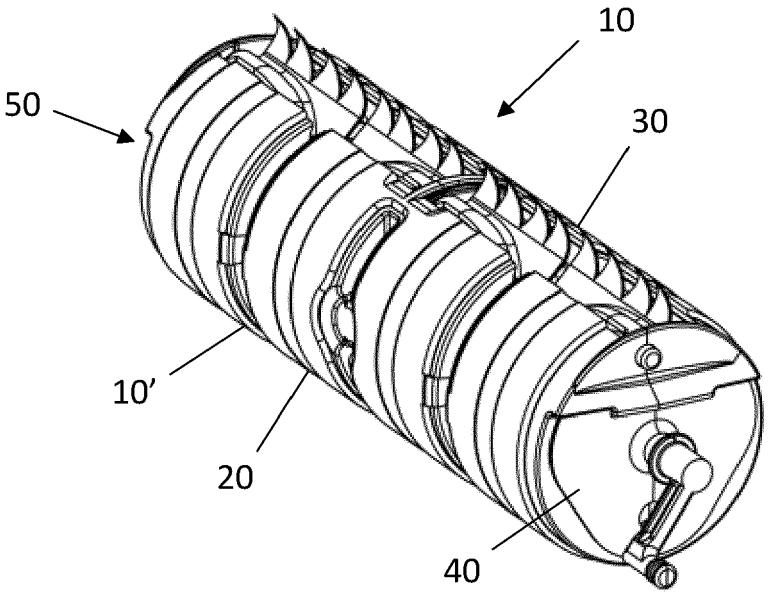

Figure 6f

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 3200

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2012/167739 A1 (LEWIS RICHARD PAUL [US] ET AL) 5 July 2012 (2012-07-05) * paragraph [0051] - paragraph [0052]; figure 6 *	1-15	INV. A47K10/36
X	JP 2007 044361 A (NIPPON PAPER CRECIA CO LTD) 22 February 2007 (2007-02-22) * paragraph [0014] - paragraph [0016]; figures *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A47K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 April 2023	Van Bost, Sonia

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 3200

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18-04-2023

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