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(54) **LED TAPE DISPENSER**

(57) A LED tape dispenser having a first spool for receiving a LED tape and a second spool for receiving an adhesive cover layer. Unspooling of the LED tape

from the first spool coincides with spooling of the cover layer onto the second spool.

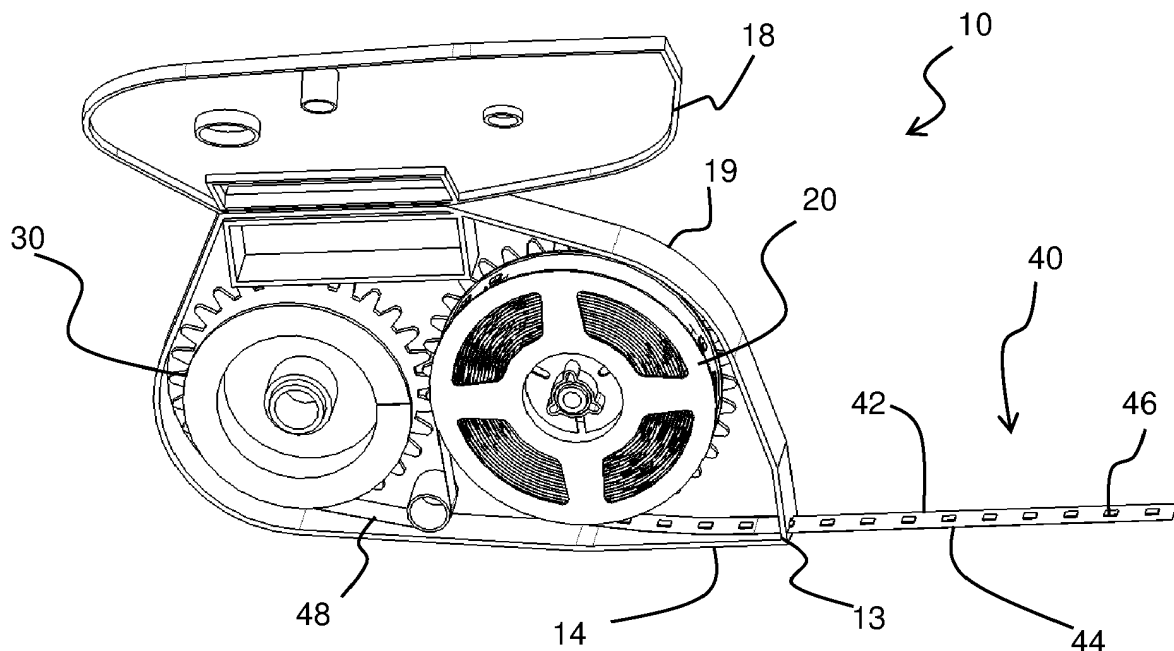


FIG. 2

Description

FIELD OF THE INVENTION

[0001] This invention relates to LED lighting device in the form of a tape or strip (known as a LED tape or LED strip), and relates in particular to a tool for applying the LED lighting device to a surface.

BACKGROUND OF THE INVENTION

[0002] LED tapes enable versatile application of lighting to objects or surfaces. LED tapes may be single color or multi-color. They may have simple on-off functionality or they may be dimmable, and they may even enable more complex color lighting effects.

[0003] LED tapes comprise a flexible printed circuit board over which one or more lines of LEDs are mounted, electrically connected by conductor traces of the printed circuit board. The underside of the printed circuit board may then have an adhesive layer (e.g., a pressure sensitive adhesive, PSA) for attaching the LED tape to a chosen surface.

[0004] The LED tape for example has a removable backing layer over the adhesive layer, which is removed when the LED tape is to be installed.

[0005] This installation is conventionally a manual process. The installer may push against the LED chips on the LED tape when removing the backing layer, and also when applying the LED tape to the surface. These actions risk damage to the LED strip.

SUMMARY OF THE INVENTION

[0006] According to examples in accordance with an aspect of the invention, there is provided a LED tape dispenser, comprising:

a first spool for receiving a LED tape having an adhesive bottom surface and a removable cover layer over the adhesive bottom surface; and
a second spool for receiving the cover layer when removed from the adhesive bottom surface.

[0007] This tape dispenser enables a LED tape to be applied to a surface with reduced risk of damage. The removal of a removable cover layer (i.e., a backing layer) onto a second spool is automatically implemented by the tape dispenser, so that the user only needs to align the LED tape being unwound from the first spool with the intended position over the surface to which the LED tape is to be applied.

[0008] The LED tape dispenser may further comprise a gear arrangement which couples the first and second spools together so that unspooling of the LED tape from the first spool coincides with spooling of the cover layer onto the second spool. This provides a way to drive the second spool which collects the removed cover layer.

[0009] The gear arrangement for example comprises a first gear which is coupled to rotate with the first spool and a second gear which is coupled to rotate with the second spool, wherein the first and second gears mesh together in use. The spools for example rotate to result in the same linear rate at which the LED tape is unspooled and the cover layer is spooled. Thus, the LED tape is advanced from the first spool at the same rate that the cover layer is peeled back.

[0010] The LED tape dispenser for example comprises an outer housing which surrounds the first and second spools (and the gear arrangement when one is provided). This protects the tape from external damage as it is contained within the housing until the tape is to be dispensed.

[0011] The outer housing for example comprises a main body and a lid, wherein shafts for the spools are integrated onto the main body, and the spools are detachably mounted on the shafts. Thus, a new LED tape may be loaded into the tape dispenser, which is then a reusable device.

[0012] The outer housing for example has an exit port from which the LED tape is delivered. By pulling the tape dispenser back, once the LED tape has been adhered to the surface in front of the tape dispenser, the tape will automatically unspool from the first spool, and the removed cover layer will automatically spool onto the second spool.

[0013] A base of the outer housing for example has a flat portion for resting against a surface when applying the LED tape to the surface, and the exit port is at an end of the flat portion. The flat portion can thus be held and slid backwardly along a surface to apply the LED tape to that surface.

[0014] A top of the housing for example has a handle area. The user may thus keep their hands away from the tape, reducing any risk of damage.

[0015] The invention also provides a LED tape system comprising:

the LED tape dispenser as defined above; and
a LED tape wound around the first spool, wherein the LED tape comprises an adhesive bottom surface and a removable cover layer over the adhesive bottom surface,
wherein the LED tape is wound around the first spool with the adhesive bottom surface facing radially outwardly.

[0016] This defines the LED tape dispenser with a loaded LED tape. The dispenser may be reusable by reloading a new LED tape, or else it may be intended for single use, in which case the loading of the LED tape is a factory operation.

[0017] The LED tape may comprise a light emitting top surface, wherein the LED tape is wound around the first spool with the light emitting top surface facing radially inwardly. The light emitting top surface for example comprises a line of LEDs provided on a flexible printed circuit

board, wherein the bottom surface of the printed circuit board comprises the adhesive bottom surface.

[0018] The LED tape is for example a low voltage (e.g. a 24V or lower) DC driven LED arrangement.

[0019] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiment(s) described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For a better understanding of the invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

- Fig. 1 shows a LED tape dispenser;
- Fig. 2 shows that an outer housing opened to reveal the spool arrangement;
- Fig. 3 shows a side view of the spool arrangement and more clearly;
- Fig. 4 shows an exploded view of the LED tape dispenser.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] The invention will be described with reference to the Figures.

[0022] It should be understood that the detailed description and specific examples, while indicating exemplary embodiments of the apparatus, systems and methods, are intended for purposes of illustration only and are not intended to limit the scope of the invention. These and other features, aspects, and advantages of the apparatus, systems and methods of the present invention will become better understood from the following description, appended claims, and accompanying drawings. It should be understood that the Figures are merely schematic and are not drawn to scale. It should also be understood that the same reference numerals are used throughout the Figures to indicate the same or similar parts.

[0023] The invention provides a LED tape dispenser having a first spool for receiving a LED tape and a second spool for receiving an adhesive cover layer. Unspooling of the LED tape from the first spool coincides with spooling of the cover layer onto the second spool.

[0024] Figure 1 shows a LED tape dispenser 10 comprising an outer housing 12 in which a spool arrangement is provided.

[0025] The outer housing 12 has an exit port 13 at a base of the front of the housing from which, in use, a LED tape 40 is delivered to a surface.

[0026] The LED tape comprises a light emitting top surface 42 on which LEDs 46 are mounted and an adhesive bottom surface 44. The light emitting top surface for example comprises a line of LEDs 46 provided on a flexible printed circuit board, and the bottom surface of the printed circuit board comprises the adhesive bottom surface 44.

The adhesive bottom surface 44 is used to bond the LED tape to a surface over which the lighting effect is to be provided. A protective removable cover layer is initially provided over the adhesive bottom surface of the LED tape, but this is removed within the outer housing as explained further below.

[0027] A base of the outer housing has a flat portion 14 for application to the surface, and the exit port 13 is at a front end of the flat portion 14. The flat portion is pushed against the surface and is slid back to apply the LED tape to that surface. As the tape dispenser is pulled back, the length of the LED tape which has been advanced from the dispenser tool increases.

[0028] The LED tape may be directed downwardly by the design of the exit port 13, so that it automatically makes contact with, and bonds to, the surface. A user may apply a small force (e.g., using a soft pad) to assist the bonding to the surface.

[0029] By pulling the tape dispenser back, once the LED tape has been initially adhered to the surface in front of the tape dispenser, the tape will automatically unspool from the spool arrangement. As will be clear from the description below, the removed cover layer will also automatically be collected.

[0030] A top of the housing 12 has a handle area 16 at which the tool is held by a user.

[0031] Figure 2 shows that the outer housing has a base part 19 and a cover 18, and it shows the cover 18 opened to reveal the spool arrangement.

[0032] The spool arrangement comprises a first spool 20 for receiving the LED tape with its removable cover layer 48 over the adhesive bottom surface 44, and a second spool 30 for receiving the cover layer 48 when removed from the adhesive surface 44.

[0033] The LED tape 40 is wound around the first spool 20 with the adhesive bottom surface 44 facing radially outwardly so that when unwound from the spool, the adhesive bottom faces the surface, i.e., it faces downwardly. The light emitting top surface faces radially inwardly over the spool.

[0034] Figure 3 shows a side view of the spool arrangement and more clearly shows a gear arrangement 22,32 which couples the first and second spools together so that unspooling of the LED tape 40 from the first spool 20 coincides with spooling of the cover layer 48 onto the second spool 30.

[0035] The gear arrangement comprises a first gear 22 which is coupled to rotate with the first spool 20 and a second gear 32 which is coupled to rotate with the second spool 30. The first and second gears mesh together in use. The gearing and spool sizes are designed such that the cover layer is wound on the second spool at the same linear rate as the advancement of the LED tape off the first spool.

[0036] The first spool 20 is unwound (i.e. decreases in outer diameter) while the second spool is wound up (i.e. increases in outer diameter). The thickness of the cover layer is also not the same as the thickness of the LED

tape. These factors mean that there will not be perfect matching of the linear rate of removal of the LED tape and the linear rate of delivery of the cover layer onto the second spool. In one example, this difference in linear rate may be accommodated by slippage of the cover layer 48 over the second spool, in particular when the linear speed of the LED tape decreases so that the second spool is rotating too fast.

[0037] The second spool may instead be sprung, so that it automatically winds far enough to retain the amount of the cover layer that has been removed by the advancement of the LED tape. Thus, the gearing between the first and second spools is optional. The second spool may instead simply automatically wind up the released cover layer caused by the advancement of the LED tape.

[0038] A gearing may be combined with a spring rotation system so that the spring system takes up any slack, but the gearing system provides the main drive of the second spool.

[0039] The removal of the removable cover layer (i.e., a backing layer) is automatically implemented by the tape dispenser, so that the user only needs to align the LED tape being unwound from the first spool with the intended position over the surface to which the LED tape is to be applied.

[0040] Figure 4 shows an exploded view of the tape dispenser. It shows that the first spool has a cog 22 mounted on a shaft 24, and the second spool 30 has a cog 32 mounted on a shaft 34. The shafts function as supports about which the spools can rotate.

[0041] The LED tape may be loaded into the housing as part of the manufacture, so that the LED tape is sold loaded into a dispenser tool. Thus user on then needs to advance the spool to guide a free end of the LED tape through the exit port 13 (assuming the tool is sold with the LED tape fully contained within the outer housing). Alternatively, the LED tape dispenser may be sold separately, and the LED tape may be sold on its respective spool, to be loaded into the tape dispenser. A first length of the cover layer then needs to be peeled back and fixed to the second spool as part of the loading operation.

[0042] The LED tape 40 is for example a low voltage (e.g. a 24V or lower) DC driven LED arrangement.

[0043] By way of example only:

the first spool 20 may have an outer diameter in the range 40mm - 50mm;

the second spool 30 may have an outer diameter in the range 20mm - 30mm.;

the LED tape may have a width in the range 8mm - 10mm;

the LED tape may have a length in the range 1m to 10m, such as around 5m; and

the LED tape may have a thickness in the range 0.5mm - 2mm, such as a 0.5mm thickness flexible PCB and 0.5mm thickness of LEDs and other components carried by the flexible PCB.

[0044] In the example above, the LED tape has a top surface with upwardly emitting LEDs. However, the LEDs could emit downwardly through a transparent flexible printed circuit board.

[0045] The LED tape dispenser may be designed for use with any particular size and design of LED tape.

[0046] Variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

[0047] The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0048] If the term "adapted to" is used in the claims or description, it is noted the term "adapted to" is intended to be equivalent to the term "configured to".

[0049] Any reference signs in the claims should not be construed as limiting the scope.

25 Claims

1. A LED tape dispenser (10), comprising:

a first spool (20) adapted for receiving a LED tape (40) having an adhesive bottom surface (44) and a removable cover layer (46) over the adhesive bottom surface (44); and
a second spool (30) adapted for receiving the cover layer (48) when removed from the adhesive bottom surface (44).

2. The LED tape dispenser of claim 1, further comprising a gear arrangement (22,32) which couples the first and second spools together so that unspooling of the LED tape (40) from the first spool (20) coincides with spooling of the cover layer (48) onto the second spool (30).

3. The LED tape dispenser of claim 2, wherein the gear arrangement comprises a first gear (22) which is coupled to rotate with the first spool (20) and a second gear (32) which is coupled to rotate with the second spool (30), wherein the first and second gears mesh together in use.

4. The LED tape dispenser of any one of claims 1 to 3, comprising an outer housing (12) which surrounds the first and second spools (20,30).

5. The LED tape dispenser of claim 4, wherein the outer housing comprises a main body (19) and a lid (18), wherein shafts (24,34) for the spools are integrated onto the main body (19), and the spools (20,30) are

detachably mounted on the shafts.

6. The LED tape dispenser of claim 4 or 5, wherein the outer housing (12) has an exit port (13) from which the LED tape (40) is delivered. 5

7. The LED tape dispenser of claim 6, wherein a base of the outer housing has a flat portion (14) for resting against a surface when applying the LED tape (40) to the surface, and the exit port (13) is at an end of the flat portion (14). 10

8. The LED tape dispenser of any one of claims 4 to 7, wherein a top of the outer housing (12) has a handle area (16). 15

9. A LED tape system comprising:
 - the LED tape dispenser (10) of any one of claims 1 to 8; and 20
 - a LED tape (40) wound around the first spool (20), wherein the LED tape comprises an adhesive bottom surface (44) and a removable cover layer (48) over the adhesive bottom surface, wherein the LED tape (40) is wound around the first spool (20) with the adhesive bottom surface (44) facing radially outwardly. 25

10. The LED tape system of claim 9, wherein the LED tape (40) comprises a light emitting top surface, wherein the LED tape is wound around the first spool (20) with the light emitting top surface facing radially inwardly. 30

11. The LED tape of claim 10, wherein the light emitting top surface comprises a line of LEDs (46) provided on a flexible printed circuit board, wherein the bottom surface of the printed circuit board comprises the adhesive bottom surface (44). 35
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12. The LED tape system of any one of claims 9 to 11, wherein the LED tape (40) is a 24V or lower DC driven LED arrangement. 45
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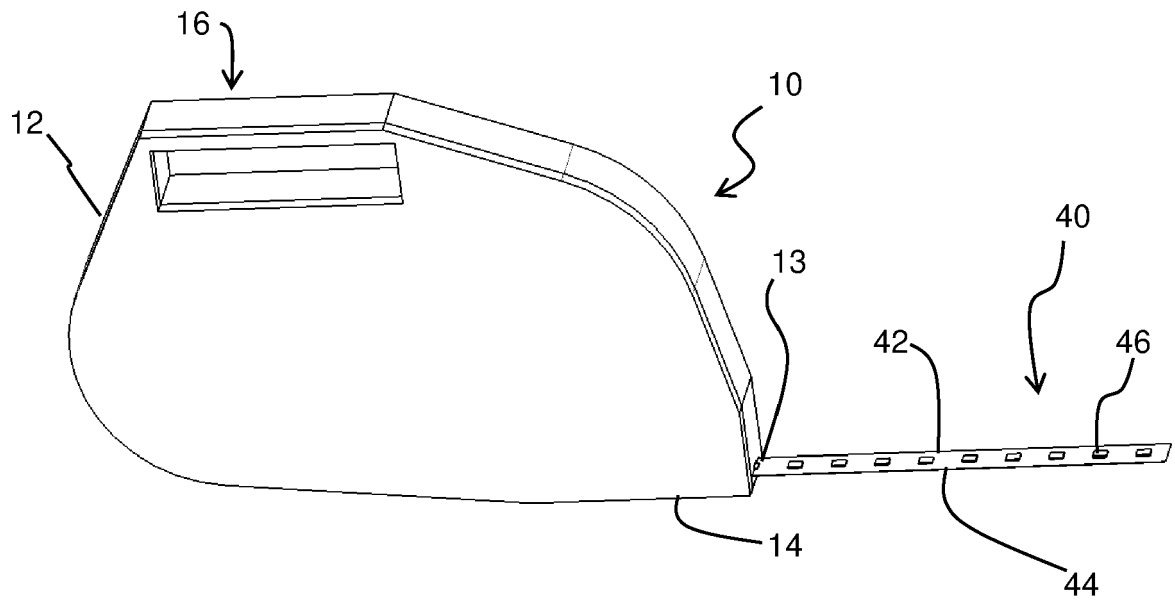


FIG. 1

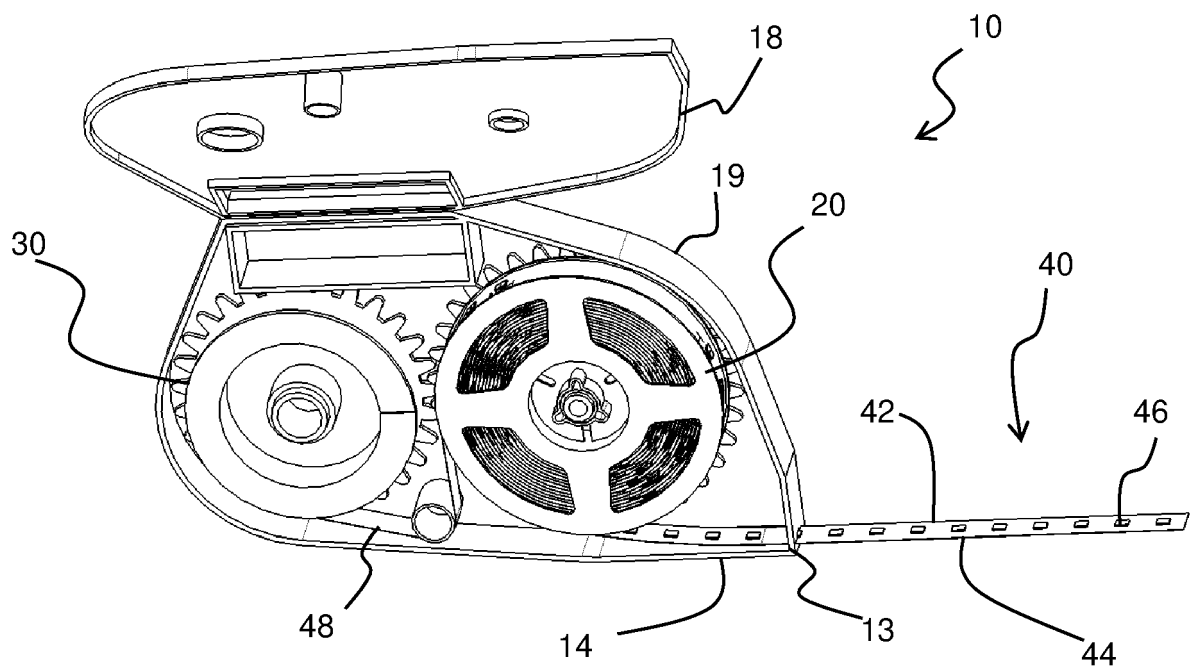


FIG. 2

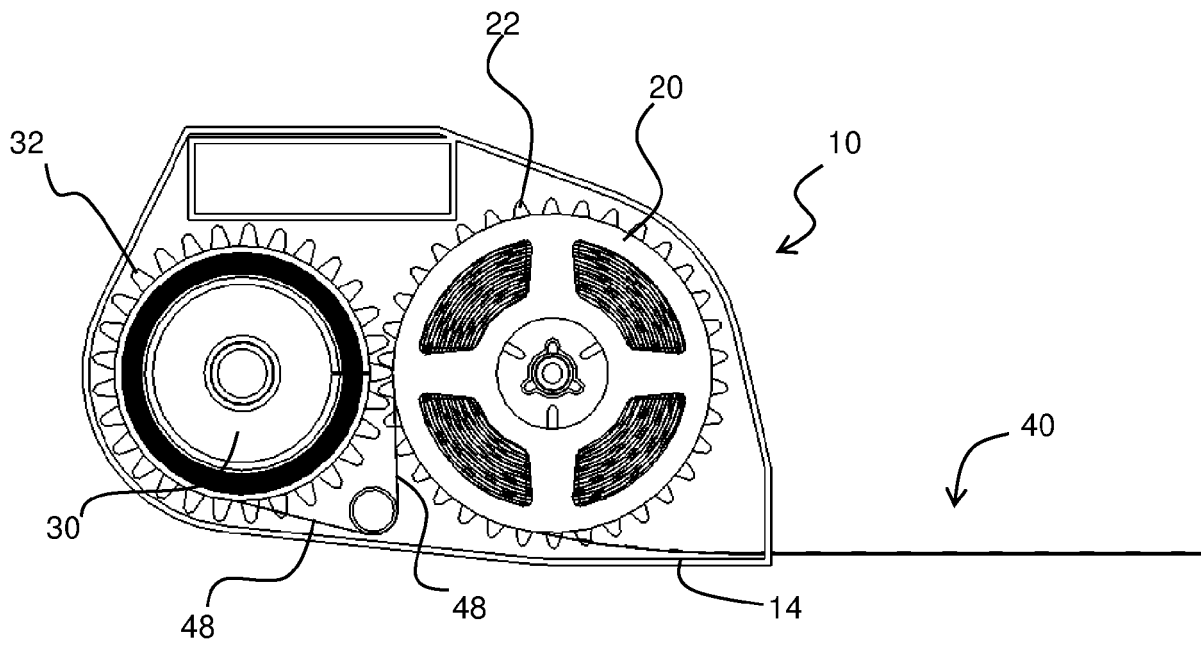


FIG. 3

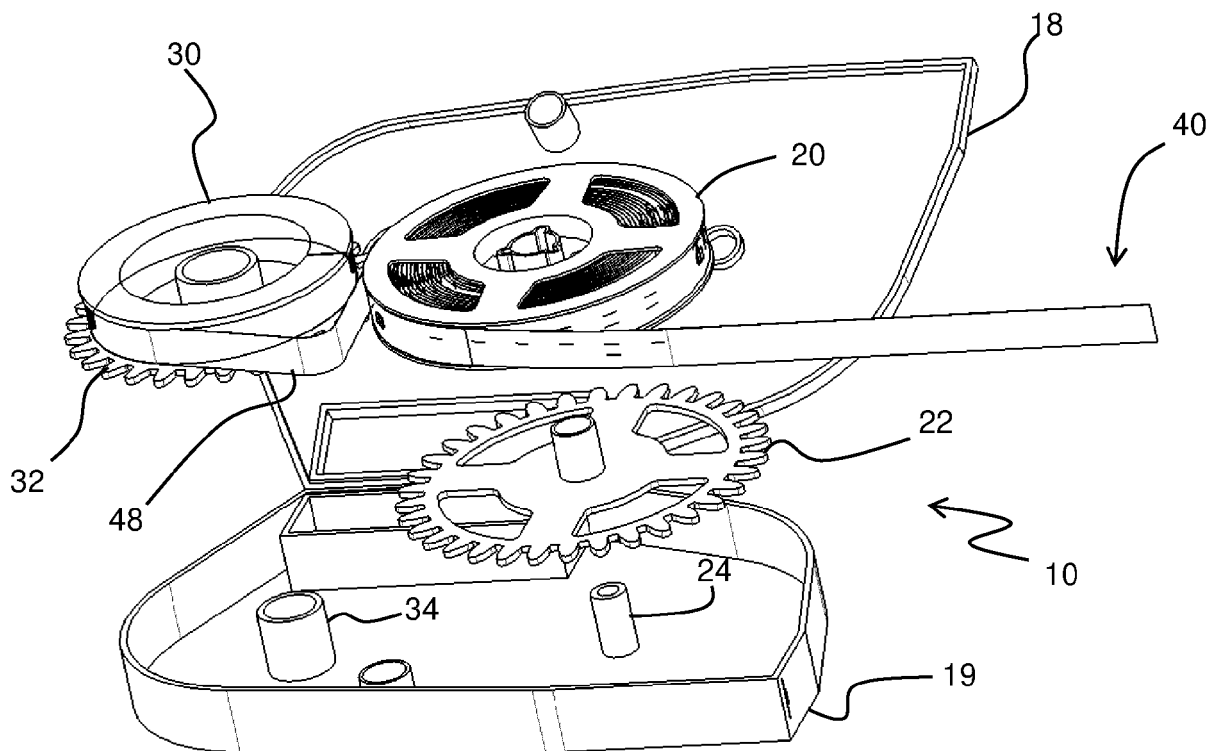


FIG. 4



EUROPEAN SEARCH REPORT

Application Number

EP 21 18 5200

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EPO FORM 1503 03.82 (P04C01)

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	CN 112 978 472 A (SUZHOU QDC MACHINE CO LTD) 18 June 2021 (2021-06-18)	1-5, 8-12	INV.
A	* figures 1-6 *	6, 7	B65H35/00
	* abstract *		B65H37/00
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A	EP 1 541 514 A1 (GLUE DOTS INTERNAT LLC [US]) 15 June 2005 (2005-06-15)	4-8	
	* paragraphs [0001] - [0004], [0006], [0067], [0068], [0070] - [0076] *		
	* figures 1-3 *		

A	US 5 364 045 A (CLAYTON EVERETT A [US] ET AL) 15 November 1994 (1994-11-15)	4-8	
	* column 1, lines 14-18 *		
	* column 2, lines 36-54 *		
	* figures 1, 2 *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65H F21V F21S
Place of search The Hague		Date of completion of the search 22 December 2021	Examiner Cescutti, Gabriel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 18 5200

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-12-2021

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