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(54) **TENSIONING DEVICE**

(57) The present disclosure provides a tensioning device for tensioning a wire (10). The tensioning device includes:a frame body (100); a slider (300) slidably mounted onto the frame body (100); a roller (400) rotatably mounted onto the slider (300) and configured to tension the wire (10) thereon; and a spring (600) compressed between the slider (300) and the frame body (100). The spring (600) pushes the slider (300) to move in a direction to tension the wire (10) to increase a tension force on the wire (10) when the tension force on the wire (10) is less than a predetermined minimum tension force; the slider (300) will move in a direction to loosen the wire (10) against the pushing of the spring (600) to reduce the tension force on the wire (10) when the tension force on the wire (10) is greater than a predetermined maximum tension force. Therefore, the tension force on the wire (10) can be controlled within a reasonable range, effectively avoiding the problem that the wire (10) cannot be transported result from the wire (10) slipping on the roller (400) due to a too small tension force or the wire (10) being pulled to be broken due to an excessive tension force, thereby ensuring a normal transportation of the wire (10).

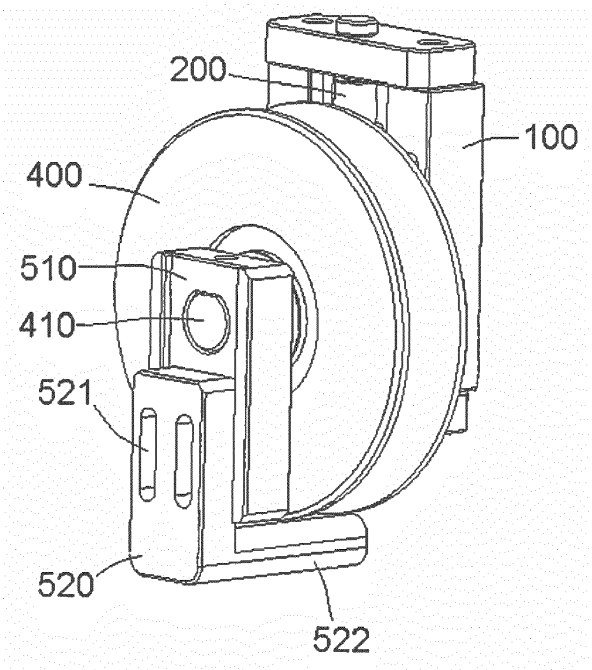

Fig. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No.201610394761.9 filed on June 6, 2016 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE DISCLOSURE

Technical Field

[0002] The present disclosure relates to a tensioning device, and especially to a tensioning device for tensioning a wire.

Description of the Related Art

[0003] In prior arts, a wire, such as a cable or an optical cable, is generally conveyed by a roller. When the wire is conveyed with a roller or rolling wheel, it is necessary to apply sufficient tension to the wire, since the roller pulls the wire through a contact friction between it and the wire, so as to achieve the conveyance of the wire. The contact friction between the roller and the wire is proportional to the tension on the wire. If the tension on the wire is too small, the contact friction will be too small to pull the wire, such that the wire will slip on the roller and wire conveyance can' t be performed. If the tension on the wire is too large, the wire may be damaged by pulling, for example, the wire is pulled off or deformed by pulling.

[0004] In the prior arts, the wire is normally tensioned by a roller with a fixed position, so that the position of the tensioning roller cannot be changed depending on the tension force on the wire during the tensioning process. Therefore, in the prior arts, there is often a problem that the wire slips on the roller due to a too small tension force or the wire is pulled to be broken off due to an excessive tension force, which both will result in that the wire can't be normally transported.

SUMMARY

[0005] The present disclosure has been made to overcome or alleviate at least one aspect of the above mentioned and other problems and disadvantages in prior arts.

[0006] According to an aspect of the present disclosure, there is provided a tensioning device configured to tension a wire, the tensioning device comprising: a frame body; a slider slidably mounted onto the frame body; a roller rotatably mounted onto the slider and configured to tension the wire thereon; and a spring compressed between the slider and the frame body, the spring is configured to push the slider to move in a direction to tension the wire so as to increase a tension force on the wire when the tension force on the wire is less than a predetermined minimum tension force; the slider is configured to be moved in a direction to loosen the wire against the pushing of the spring so as to reduce the tension force on the wire when the tension force on the wire is greater than a predetermined maximum tension force.

[0007] According to an embodiment of the present disclosure, the slider is configured to slide between a first extreme position and a second extreme position with respect to the frame body, the spring is configured to push the slider toward the first extreme position when the tension force on the wire is less than the predetermined minimum tension force, and the slider is configured to be moved toward the second extreme position against the pushing of the spring when the tension force on the wire is greater than the predetermined maximum tension force.

[0008] According to another embodiment of the present disclosure, the slider is provided with a receiving hole, and one end of the spring is received in the receiving hole of the slider and is pushed against the slider.

[0009] According to another embodiment of the present disclosure, the tensioning device further comprises a guide tube mounted onto the frame body, one end of the guide tube being fitted into the receiving hole of the slider so as to guide the slider to movie along the guide tube.

[0010] According to another embodiment of the present disclosure, the spring is received in the guide tube and the receiving hole of the slider.

[0011] According to another embodiment of the present disclosure, the slider is provided with a mounting hole, and a mounting shaft is fitted in the mounting hole, such that the roller is rotatably mounted on the mounting shaft.

[0012] According to another embodiment of the present disclosure, the tensioning device further comprises the slider is provided with a mounting hole, and a mounting shaft is fitted in the mounting hole, such that the roller is rotatably mounted on the mounting shaft.

[0013] According to another embodiment of the present disclosure, the mounting shaft protrudes from an outer side of the roller, and the blocking mechanism is mounted on one end of the mounting shaft which protrudes from the outer side of the roller.

[0014] According to another embodiment of the present disclosure, the blocking mechanism comprises a blocking portion facing an outer circumferential surface of the roller and configured for preventing the wire from slipping off from the roller.

[0015] According to another embodiment of the present disclosure, the blocking mechanism comprises: a first member mounted at an end of the mounting shaft and facing an outer side surface of the roller; and a second member connected to the first member and having a blocking portion facing an outer circumferential surface of the roller; the second member is provided with an elongated mounting groove and is connected to the first mem-

ber by a connector inserted into the mounting groove, and spacing between the blocking portion and the outer circumferential surface of the roller is allowed to be adjusted by changing the position of the connector in the mounting groove.

[0016] According to another embodiment of the present disclosure, the wire is a circular cable, and the roller is provided with a V-shaped receiving groove configured to receive the circular cable.

[0017] According to another embodiment of the present disclosure, the wire is a ribbon cable, and the roller is provided with a rectangular receiving groove configured to receive the ribbon cable.

[0018] In the embodiments according to the present disclosure, the position of the tensioning roller for tensioning the wire can be changed as a function of the change in the tension force on the wire. The roller will move in a direction to tension the wire to increase the tension force on the wire when the tension force on the wire is less than a predetermined minimum tension force. The roller will moves in a direction to loosen the wire to reduce the tension force on the wire when the tension force on the wire is greater than ae predetermined maximum tension force. Therefore, the tension force on the wire can be controlled within a reasonable range, effectively avoiding the problem that the wire cannot be transported result from the wire slipping on the roller due to a too small tension force or the wire being pulled to be broken due to an excessive tension force, ensuring a normal transportation of the wire.

[0019] Other objects and advantages of the present disclosure will become apparent from the following description of the present disclosure taken in conjunction with the accompanying drawings, and may give a comprehensive understanding of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is a schematic perspective view of a tensioning device according to an exemplary embodiment of the present disclosure;

Fig. 2 is the tensioning device shown in Figure 1, with a slider being in a first extreme position;

Fig. 3 is a cross-sectional view of the tensioning device shown in Figure 2, with the slider being in the first extreme position;

Fig. 4 is a schematic diagram showing the tensioning device shown in Fig. 1, with the slider being in a second extreme position;

Fig.5 is a cross-sectional view of the tensioning device shown in Fig. 4, with the slider being in the second extreme position; and

Fig. 6 is an enlarged schematic view of a roller of the tensioning device shown in Fig. 1 for tensioning a wire.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0021] Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

[0022] In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing.

[0023] According to a general concept of the present disclosure, there is provided a tensioning device adapted to tension a wire. The tensioning device comprises: a frame body; a slider slidably mounted onto the frame body; a roller (or rolling wheel) rotatably mounted onto the slider and configured to tension the wire located thereon; and a spring compressed between the slider and the frame body. The spring pushes the slider to move in a direction to tension the wire to increase a tension force on the wire when the tension force on the wire is less than a predetermined minimum tension force; the slider is moved in a direction to loosen the wire against the pushing of the spring to reduce the tension force on the wire when the tension force on the wire is greater than a predetermined maximum tension force.

[0024] Fig. 1 is a schematic perspective view of a tensioning device according to an exemplary embodiment of the present disclosure; Fig. 2 shows the tensioning device shown in Figure 1, with a slider 300 being in a first extreme position; Fig. 3 is a cross-sectional view of the tensioning device shown in Figure 2, with the slider 300 being in the first extreme position; Fig. 4 shows the tensioning device shown in Fig. 1, with the slider 300 being in a second extreme position; Fig. 5 is a cross sectional view of the tensioning device shown in Fig. 4, with the slider 300 being in the second extreme position.

[0025] In the illustrated embodiments, as shown in Figs. 1-5, the tensioning device is adapted to tension a wire 10 (please refer to Fig. 3 and 5) and comprises a frame body 100, a slider 300, a roller 400 and a spring 600. The slider 300 is slidably mounted onto the frame body 100 and may slide between a first extreme position (position shown in Figs. 2 and 3) and a second extreme position (position shown in Figs. 4 and 5) with respect to the frame body 100. The roller 400 is rotatably mounted onto the slider 300. The wire 10 is tensioned on the roller 400.The spring 600 is compressed between the slider

300 and the frame body 100.

[0026] In the embodiments illustrated in Figs. 1-5, as the roller 400 is mounted onto the slider 300, the roller 400 can be moved together with the slider 300 between the first extreme position (the positions shown in Figs. 2 and 3) and the second extreme position (the positions shown in Figs.4 and 5) with respect to the frame body 100.

[0027] In the illustrated embodiments, as shown in Figs. 2 and 3, the spring 600 pushes the slider 300 (and the roller 400) to move in a direction to tension the wire 10 (in a downward direction in the embodiments shown in Figs. 2 and 3) to increase the tension force on the wire 10 when the tension force on the wire 10 is less than a predetermined minimum tension force. In this way, it can ensure that the tension force on the wire 10 is always greater than the predetermined minimum tension force, so that it may effectively avoid the problem that the wire 10 cannot be transported result from the wire 10 slipping on the roller 400 due to a too small tension force, ensuring a normal transportation of the wire.

[0028] In the illustrated embodiments, as shown in Figs. 4 and 5, the slider 300 (and the roller 400) is moved in a direction to loosen the wire 10 (in an upward direction in the embodiments shown in Figs. 4 and 5) against the thrust of the spring 600 to reduce the tension force on the wire 10 when the tension force on the wire 10 is greater than the predetermined maximum tension. In this way, it can ensure that the tension force on the wire 10 is always less than the predetermined maximum tension force, so that it may effectively avoid the problem that the wire 10 is pulled to be broken due to an excessive tension force, ensuring a normal transportation of the wire.

[0029] As described above, in the illustrated embodiments, since the roller 400 for tensioning the wire 10 is mounted onto the slider 300 and can be moved together with the slider 300, the position of the roller 400 for tensioning the wire 10 can be automatically changed as a function of the change in the tension force on the wire 10, so that the tension force on the wire 10 can be controlled within a reasonable range, effectively avoiding problem that the wire slips on the roller due to a too small tension force or the wire is pulled to be broken due to an excessive tension force, thereby ensuring that the wire can be normally transported.

[0030] In an exemplary embodiment of the present disclosure, as clearly shown in Figs. 3 and 5, the slider 300 is provided with a receiving hole 320. One end of the spring 600 is received in the receiving hole 320 of the slider 300 and is pushed against the slider 300.

[0031] In the illustrated embodiments, as shown in Figs. 1-5, the tensioning device further comprises a guide tube 200 mounted onto the frame body 100, one end of the guide tube 200 being fitted into the receiving hole 320 of the slider 300 so as to guide the slider 300 to movie along the guide tube 200.

[0032] In an exemplary embodiment of the present disclosure, as clearly shown in Figs. 3 and 5, the spring 600 is received in the guide tube 200 and the receiving hole 320 of the slider 300.

[0033] In the illustrated embodiment, as shown in Figs. 1-5, the slider 300 is provided with a mounting hole 310, and a mounting shaft 410 is fitted in the mounting hole 310, such that the roller 400 is rotatably mounted onto the mounting shaft 410 via a bearing.

[0034] In an exemplary embodiment of the present disclosure, as clearly shown in Fig. 1, the tensioning device further comprises blocking mechanisms 510, 520 adapted to prevent the wire 10 from slipping off from the roller 400.

[0035] Further referring to Fig. 1, in the illustrated embodiment, the mounting shaft 410 protrudes from an outer side of the roller 400, and the blocking mechanisms 510, 520 are mounted on one end of the mounting shaft 410 which protrudes from the outer side of the roller 400.

[0036] Further referring to Fig. 1, in the illustrated embodiment, the blocking mechanism 510, 520 mainly comprise a first member 510 and a second member 520. The first member 510 is mounted at an end of the mounting shaft 410 and faces an outer side surface of the roller 400. The second member 520 is connected to the first member 510 and has a blocking portion 522 facing an outer circumferential surface of the roller 400 and configured for preventing the wire 10 from slipping off from the roller 400.

[0037] Further referring to Fig. 1, in the illustrated embodiment, the second member 520 is provided with an elongated mounting groove 521. In this way, the second member 520 may be connected to the first member 510 by a connector (not shown in the Figures) inserted into the mounting groove 521. Spacing between the blocking portion 522 and the outer circumferential surface of the roller 400 may be adjusted by changing the position of the connector in the mounting groove 521. In this way, it is not necessary to change the blocking mechanisms 510, 520 at the same time when the rollers 400 of different diameters are changed, because the spacing between the blocking portion 522 and the outer circumferential surface of the roller 400 can be adjusted by changing the position of the connector in the mounting groove 521, so that there is always a predetermined distance between the blocking portion 522 and the outer circumferential surface of the roller 400.

[0038] Fig. 6 is an enlarged schematic view of a roller 400 of the tensioning device shown in Fig. 1 for tensioning the wire 10.

[0039] In an embodiment of the present disclosure, the wire 10 may be a circular cable. In the embodiment shown in Fig. 6, the roller 400 is provided with a V-shaped receiving groove 420 adapted to receive the circular cable.

[0040] It is noted that the present disclosure is not limited to the embodiment shown in Fig. 6, and the wire 10 may be a wire of various shape, for example, a ribbon cable. In case that the wire 10 is a ribbon cable, the roller 400 may be provided with a rectangular receiving groove adapted to receive the ribbon cable.

[0041] It should be appreciated for those skilled in this art that the above embodiments are exemplary, and not limitative. For example, many modifications may be made to the above embodiments by those skilled in this art, and various features described in different embodiments may be randomly combined with each other without conflicting in configuration or principle.

[0042] Although exemplary embodiments of the present disclosure are described in detail with reference to the attached drawings, the present disclosure may be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete.

[0043] Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

[0044] As used herein, an element recited in the singular and proceeded with the word "a" or "an" should be understood as not excluding plural of said elements or steps, unless such exclusion is explicitly stated. Furthermore, references to "an embodiment", "one embodiment" of the present disclosure are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments "comprising" or "having" an element or a plurality of elements having a particular property may include additional such elements not having that property.

Claims

1. A tensioning device configured to tension a wire, the tensioning device comprising:

a frame body;
a slider slidably mounted onto the frame body;
a roller rotatably mounted onto the slider and configured to tension the wire thereon; and
a spring compressed between the slider and the frame body, wherein
the spring is configured to push the slider to move in a direction to tension the wire so as to increase a tension force on the wire when the tension force on the wire is less than a predetermined minimum tension force;
the slider is configured to be moved in a direction to loosen the wire against the pushing of the spring so as to reduce the tension force on the wire when the tension force on the wire is greater than a predetermined maximum tension force.

2. The tension device according claim 1, wherein
the slider is configured to slide between a first extreme position and a second extreme position with respect to the frame body;
the spring is configured to push the slider toward the first extreme position when the tension force on the wire is less than the predetermined minimum tension force; and
the slider is configured to be moved toward the second extreme position against the pushing of the spring when the tension force on the wire is greater than the predetermined maximum tension force.

3. The tension device according claim 2, wherein
the slider is provided with a receiving hole, and one end of the spring is received in the receiving hole of the slider and is pushed against the slider.

4. The tension device according claim 3, wherein
the tensioning device further comprises a guide tube mounted onto the frame body, one end of the guide tube being fitted into the receiving hole of the slider so as to guide the slider to movie along the guide tube.

5. The tension device according claim 4, wherein
the spring is received in the guide tube and the receiving hole of the slider.

6. The tension device according claim 1, wherein
the slider is provided with a mounting hole, and a mounting shaft is fitted in the mounting hole, such that the roller is rotatably mounted on the mounting shaft.

7. The tension device according claim 6, further comprising a blocking mechanism configured to prevent the wire from slipping off from the roller.

8. The tension device according claim 7, wherein
the mounting shaft protrudes from an outer side of the roller, and the blocking mechanism is mounted on one end of the mounting shaft which protrudes from the outer side of the roller.

9. The tension device according claim 8, wherein
the blocking mechanism comprises a blocking portion facing an outer circumferential surface of the roller and configured for preventing the wire from slipping off from the roller.

10. The tension device according claim 8, wherein the blocking mechanism comprises:

a first member mounted at an end of the mounting shaft and facing an outer side surface of the roller; and
a second member connected to the first member and having a blocking portion facing an outer

circumferential surface of the roller;
wherein the second member is provided with an elongated mounting groove and is connected to the first member by a connector inserted into the mounting groove, and
wherein spacing between the blocking portion and the outer circumferential surface of the roller is allowed to be adjusted by changing the position of the connector in the mounting groove.

11. The tension device according claim 1, wherein the wire is a circular cable, and the roller is provided with a V-shaped receiving groove configured to receive the circular cable.

12. The tension device according claim 1, wherein the wire is a ribbon cable, and the roller is provided with a rectangular receiving groove configured to receive the ribbon cable.

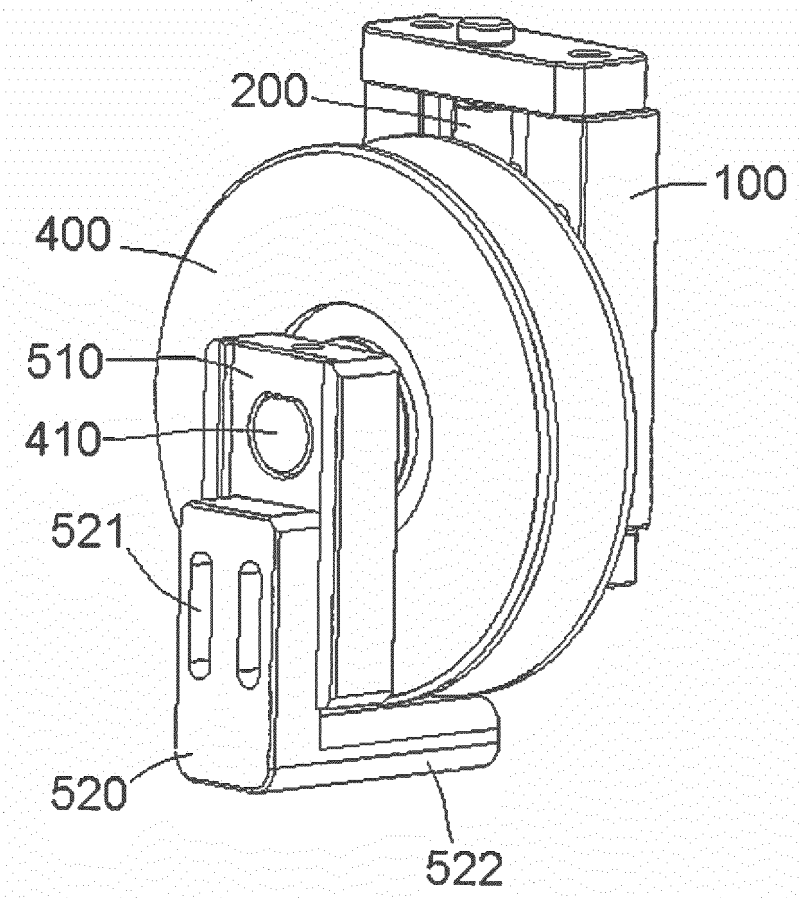

Fig. 1

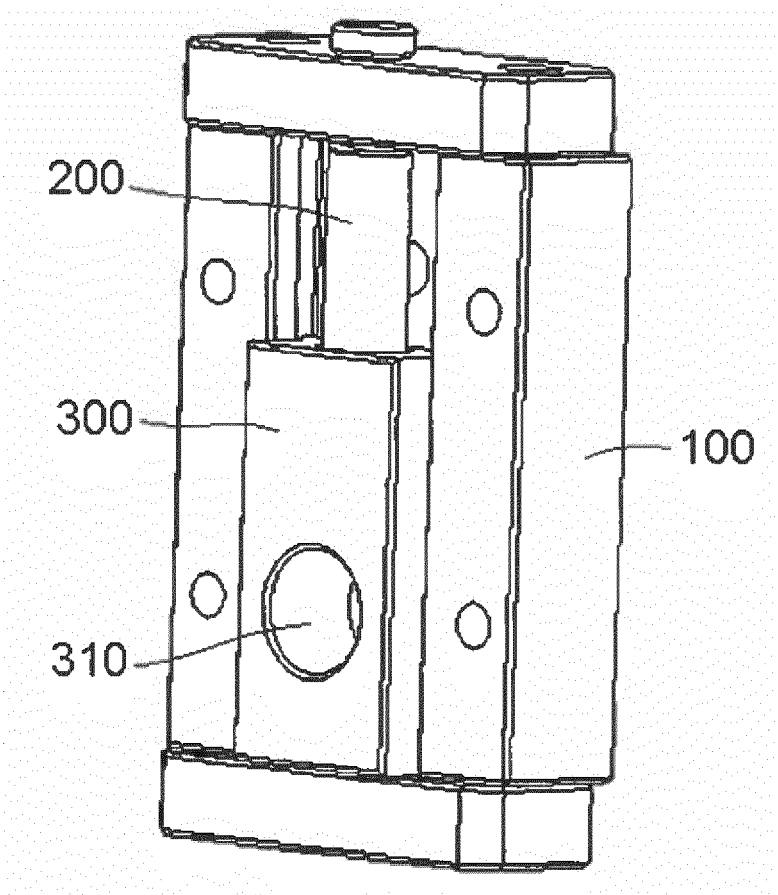

Fig. 2

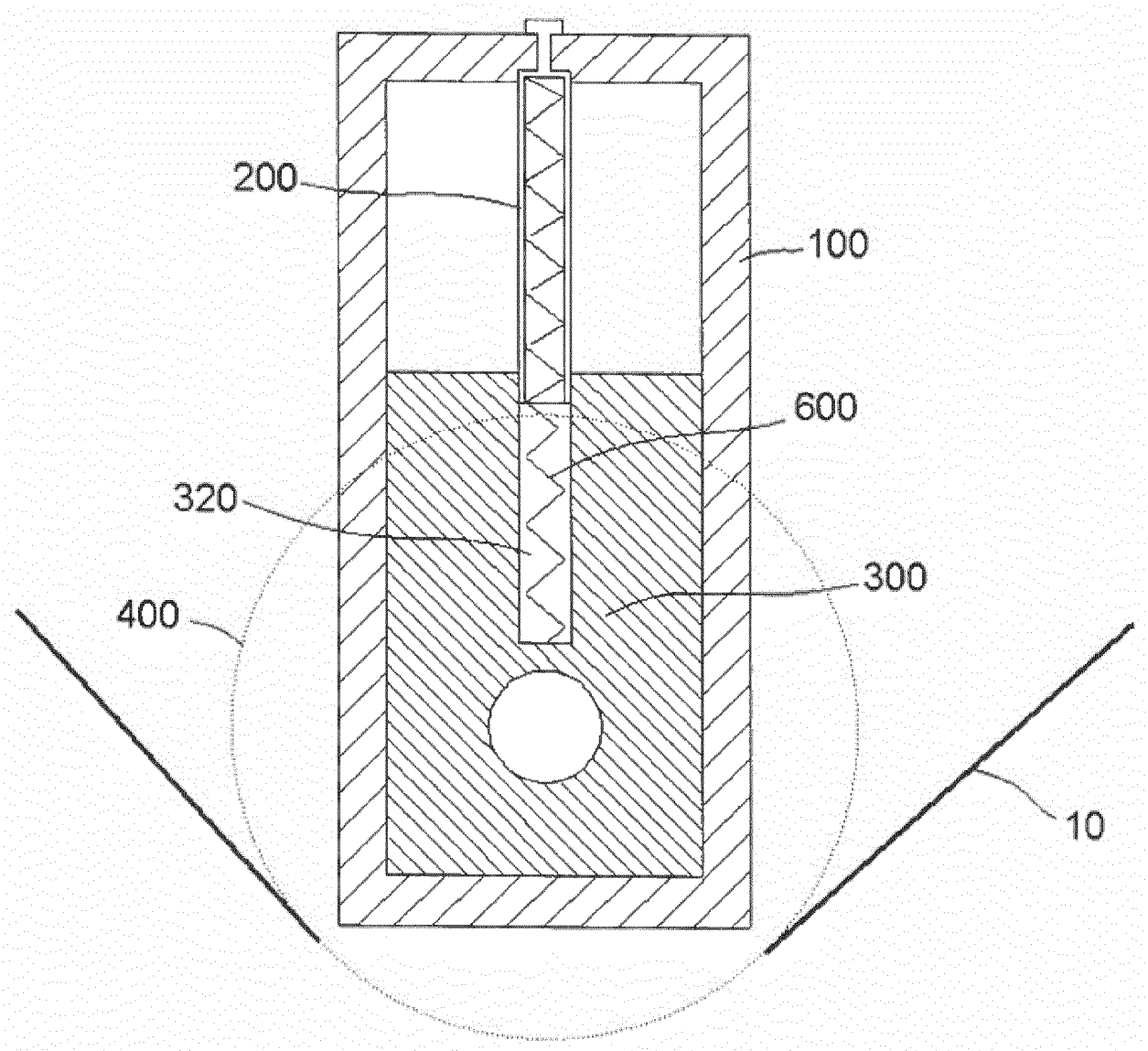

Fig. 3

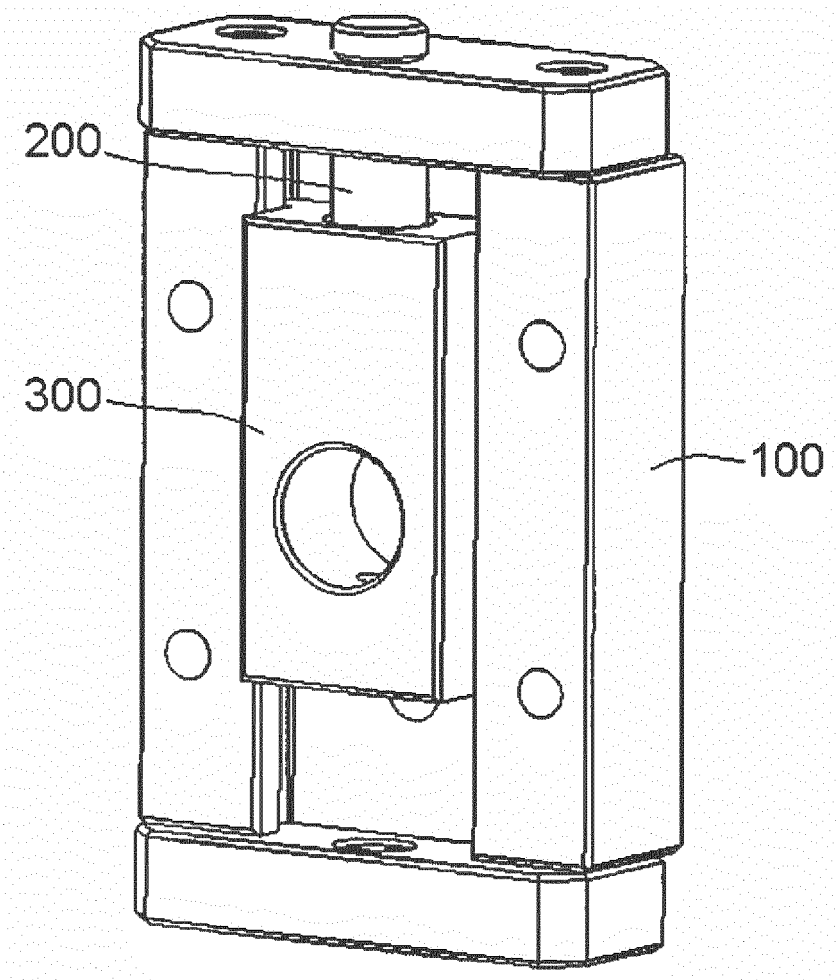

Fig. 4

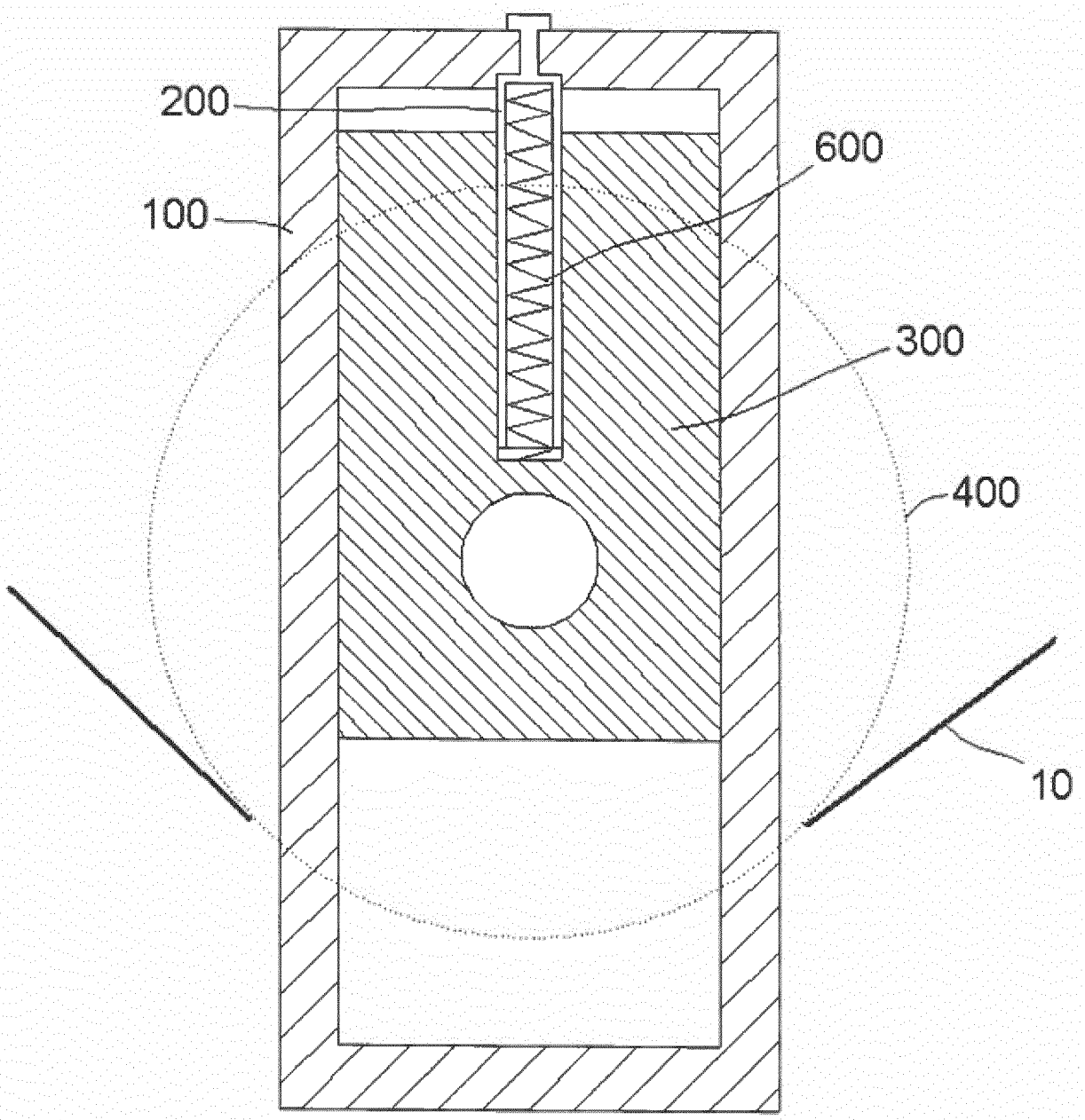

Fig. 5

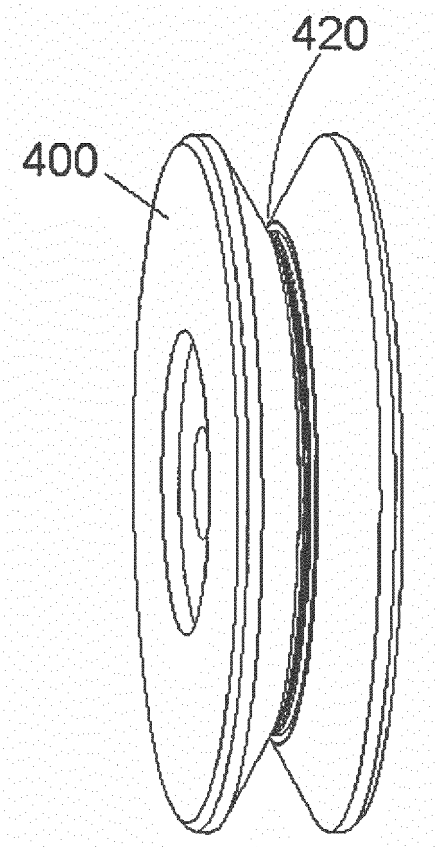

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 4570

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 Y	EP 0 013 510 A1 (DU PONT CANADA [CA]) 23 July 1980 (1980-07-23) * figure 7 * * page 7, line 22 - line 26 * -----	1-6,11, 12 7-10	INV. B65H59/36
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 October 2017	Guisan, Thierry

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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26-10-2017

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REFERENCES CITED IN THE DESCRIPTION

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