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(54) **PAPER TOWEL AND SEPARATION DEVICE OF THE PAPER**

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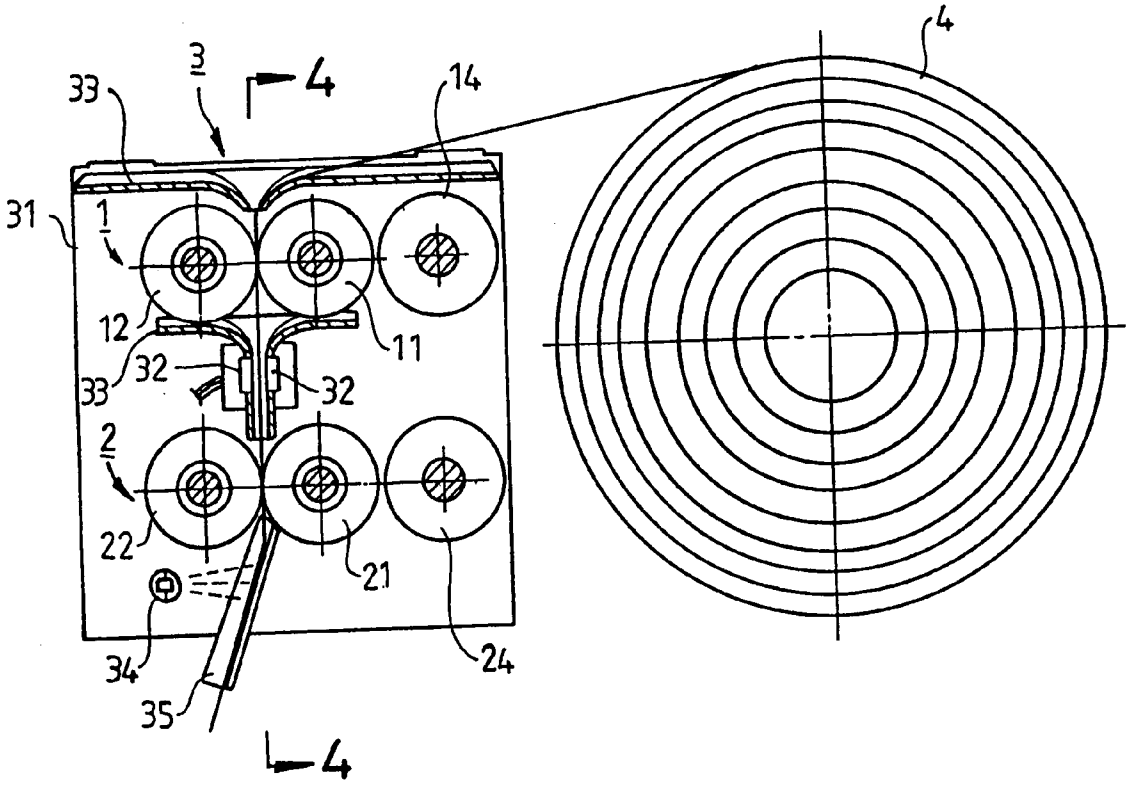
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(57) **ABSTRACT**

A separation device of a paper towel includes a housing provided with two roll sets each having at least two rolls that may be driven by a power member to rotate relative to each other at an equal speed, so that a continuous paper towel may pass between the rolls of the two roll sets and may be pulled downward. The paper towel is provided with sensing marks at a predetermined length, so that when the sensing mark of the paper towel passes through a detection member, the detection member may detect passage of the sensing mark of the paper towel, and may send a signal, so that a rotation speed difference is produced between the rolls of the two roll sets, and the paper towel passing between the rolls of the two roll sets may be torn off.



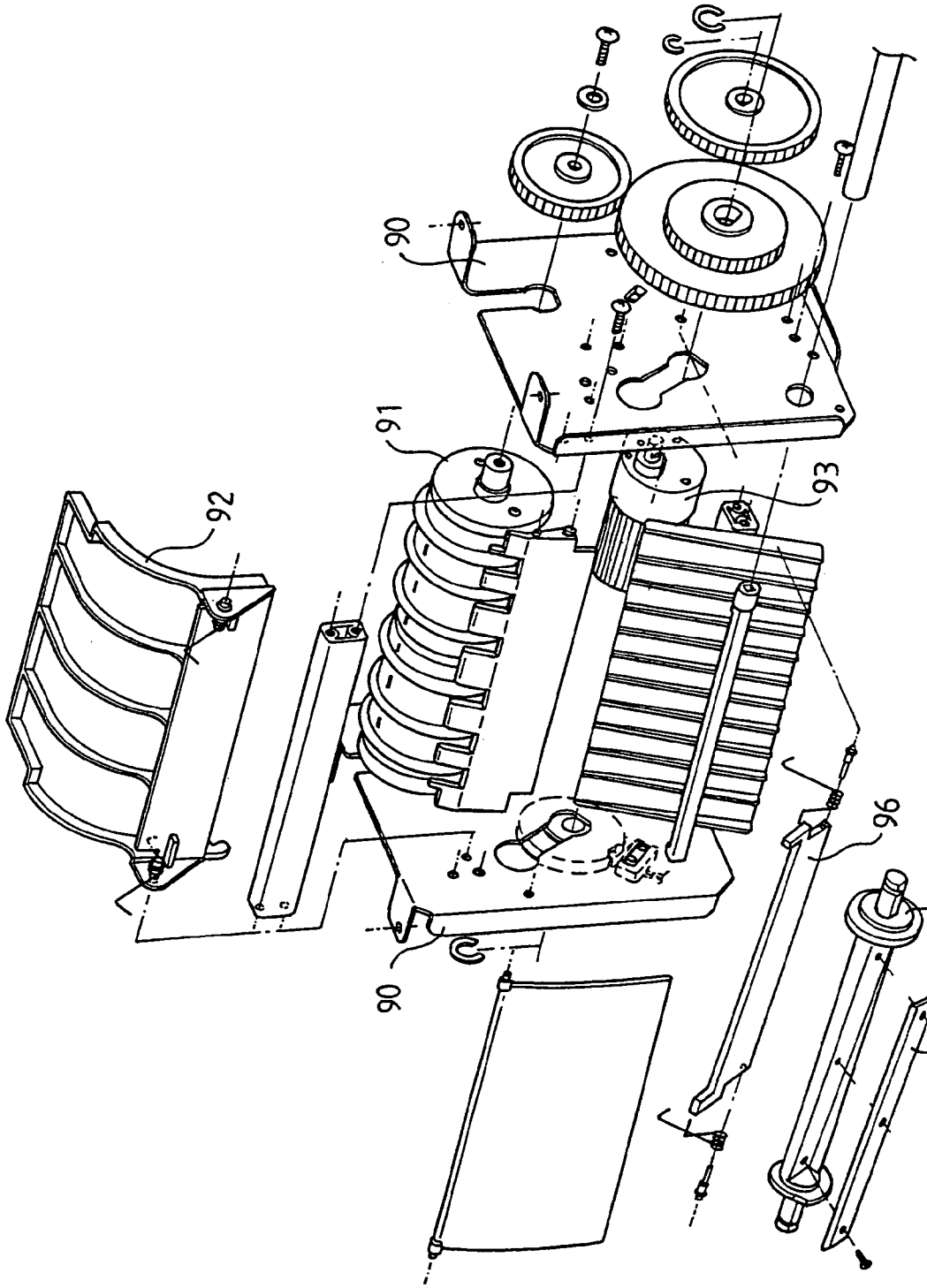


FIG. 1
PRIOR ART

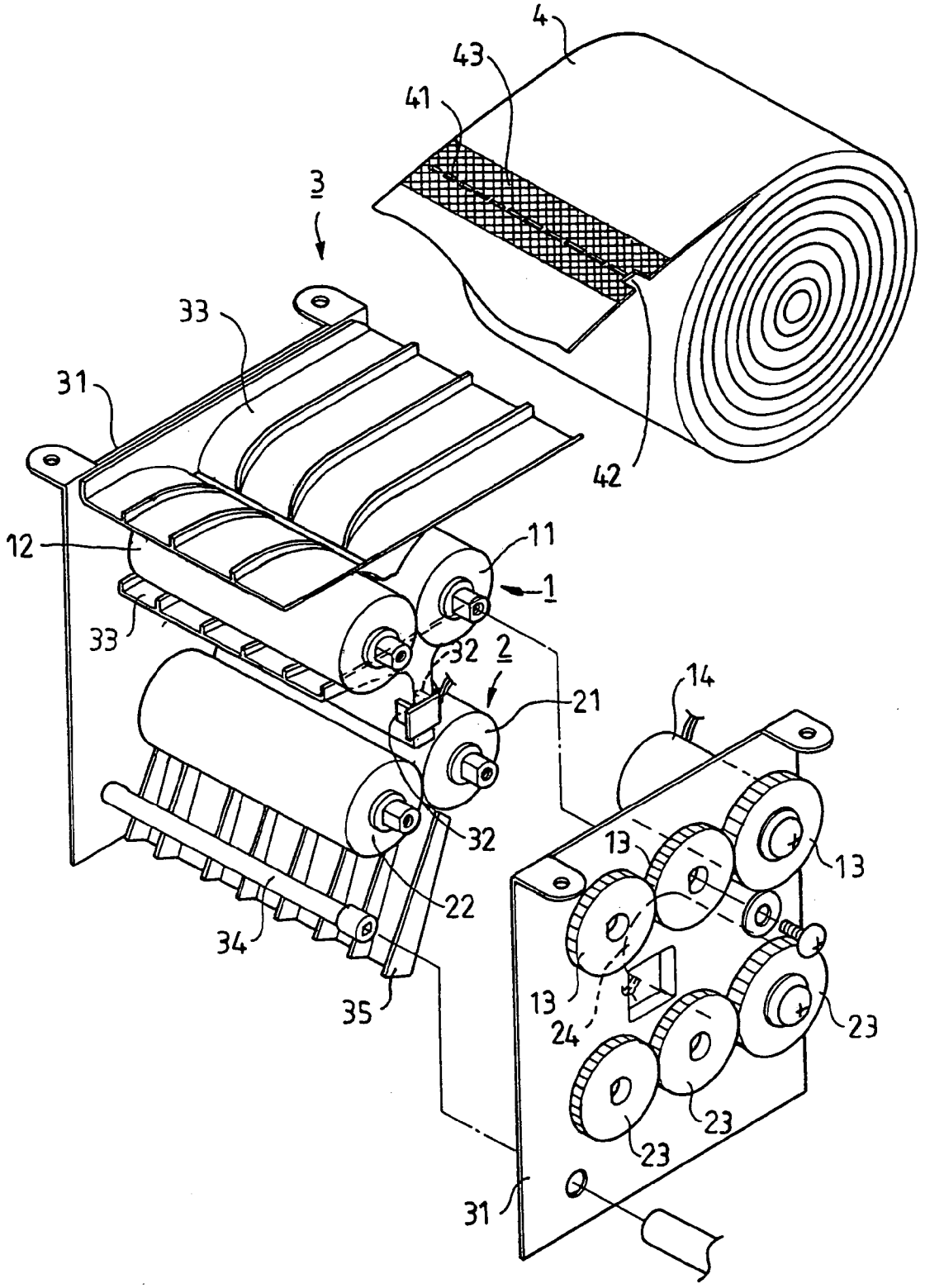

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41
3
33
31
42
12
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23
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31

FIG.2

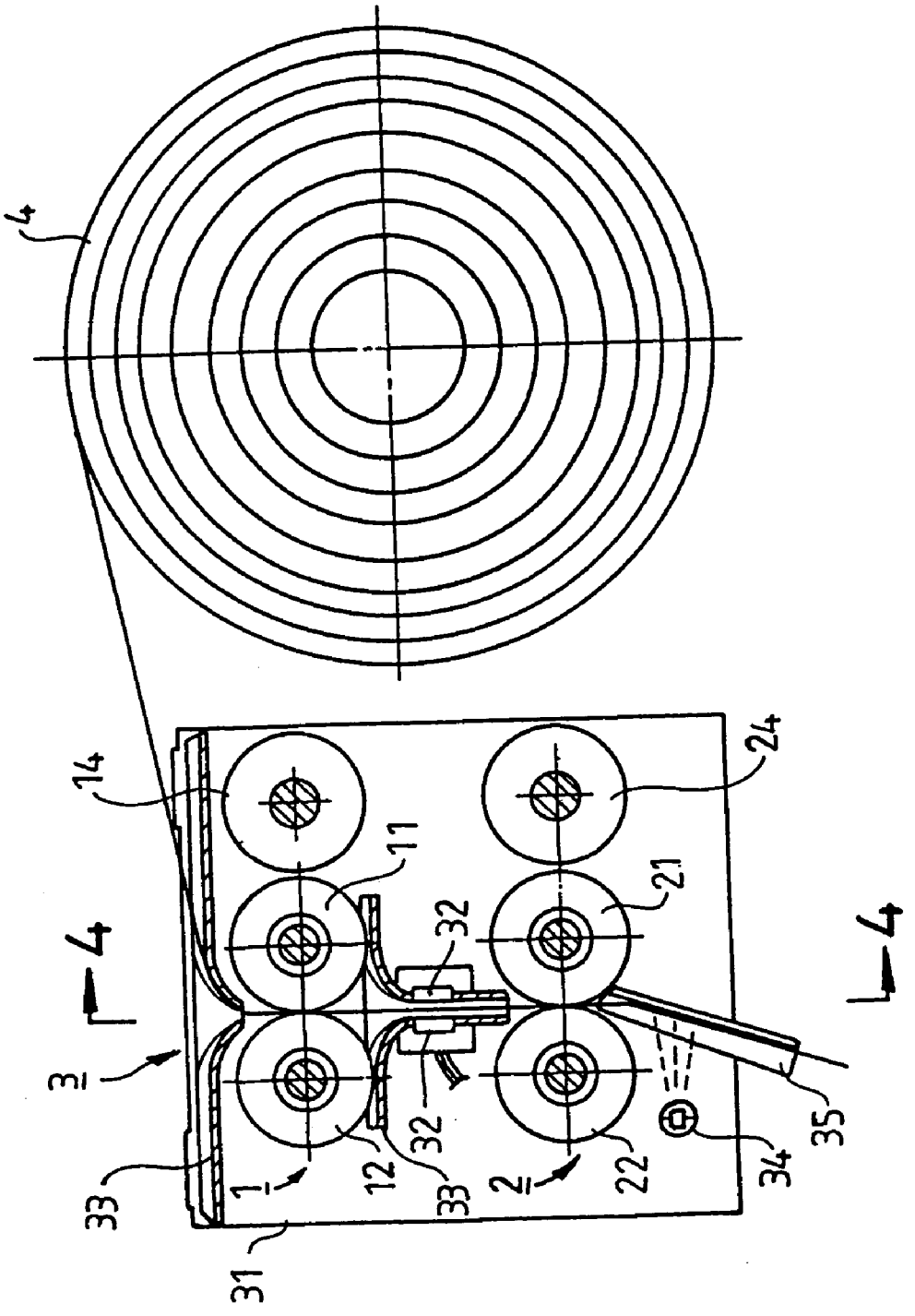


FIG.3

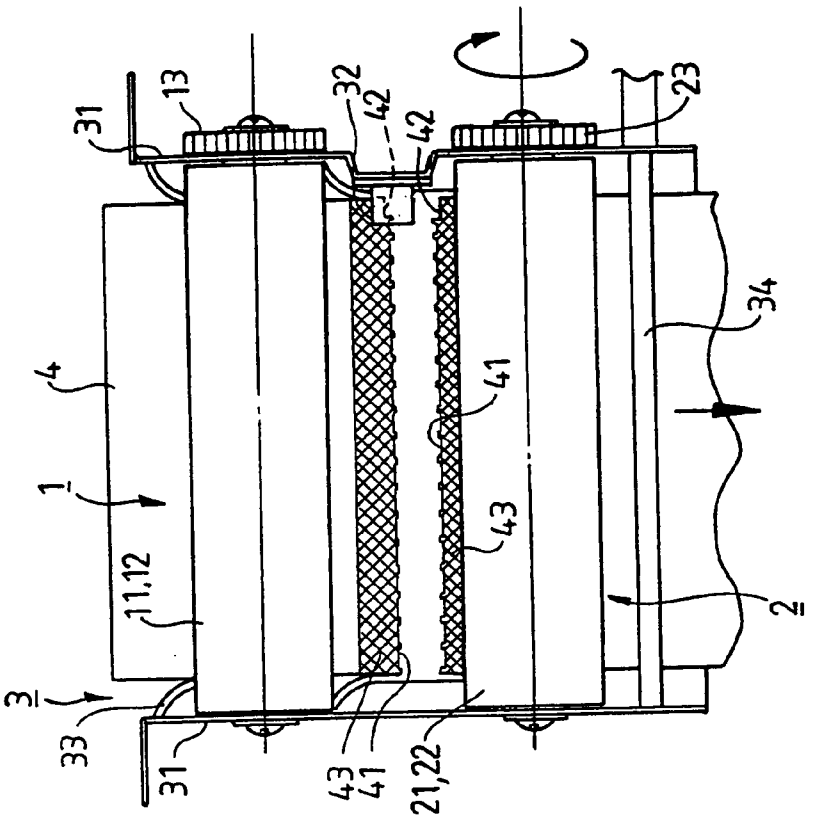

31
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32
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11,12
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21,22

FIG.5

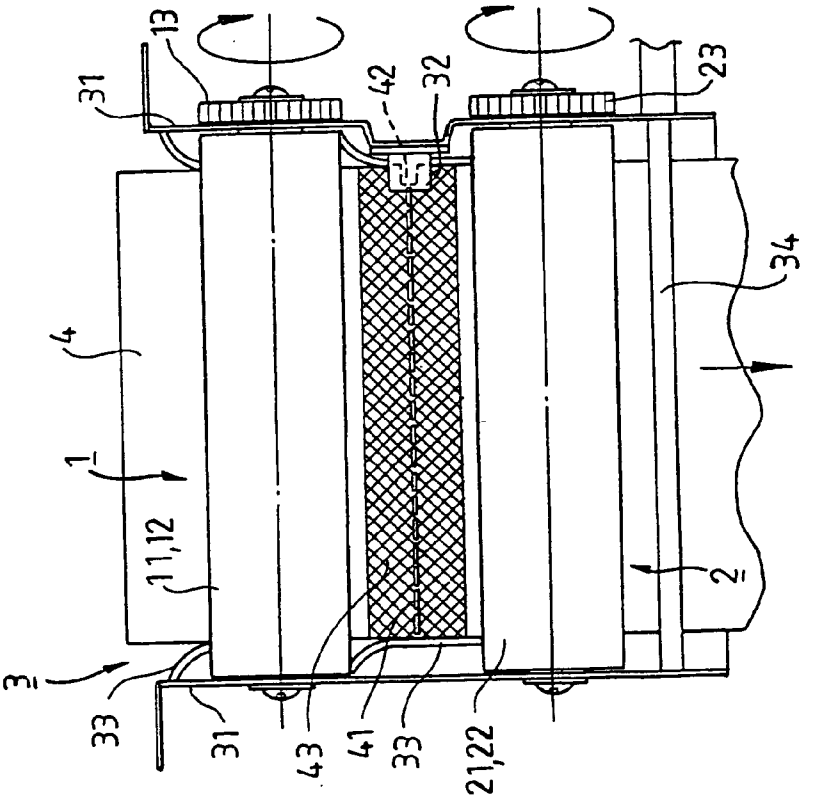

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FIG.4

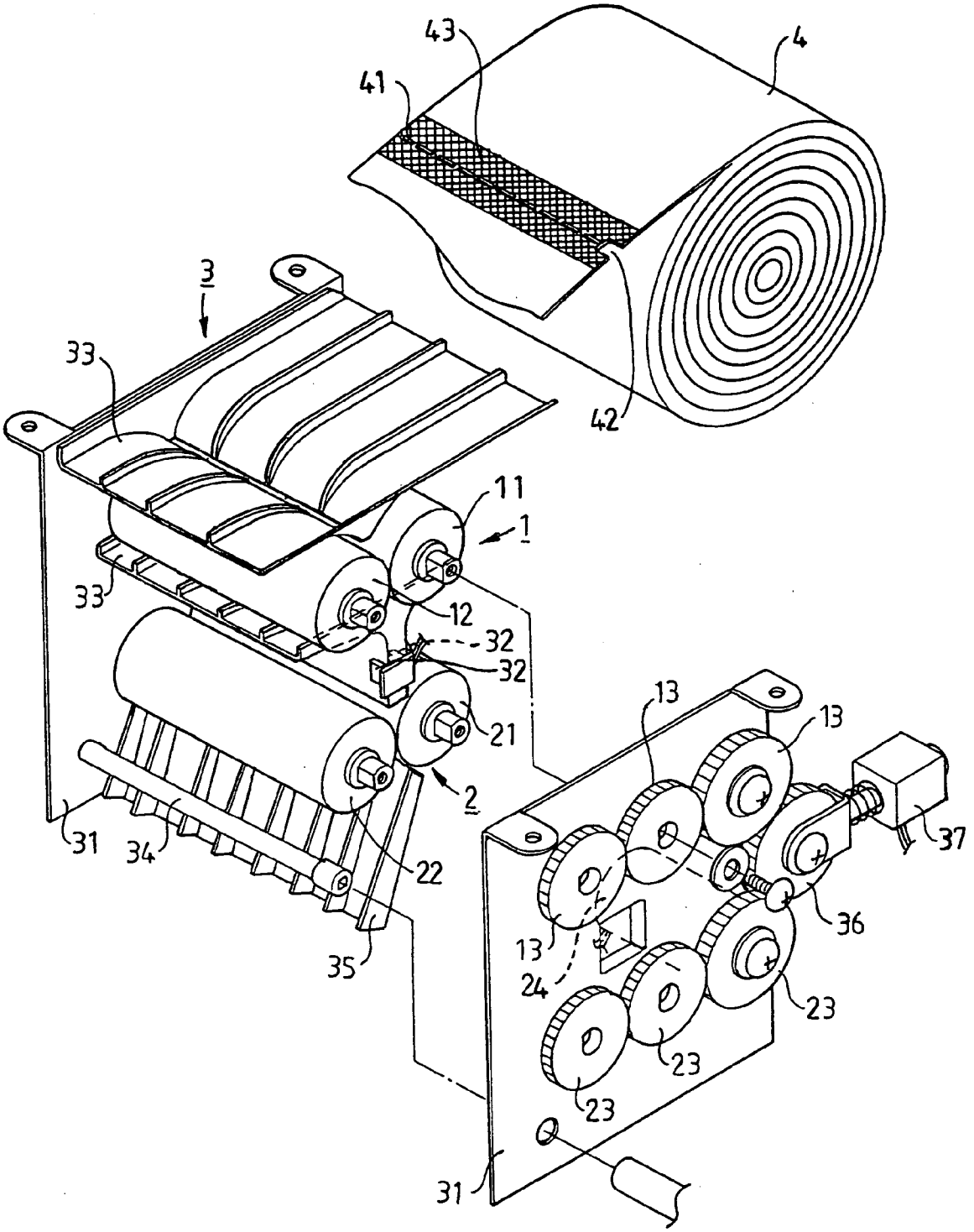

43
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41
42
3
33
11
1
33
12
32
32
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23
31

FIG. 6

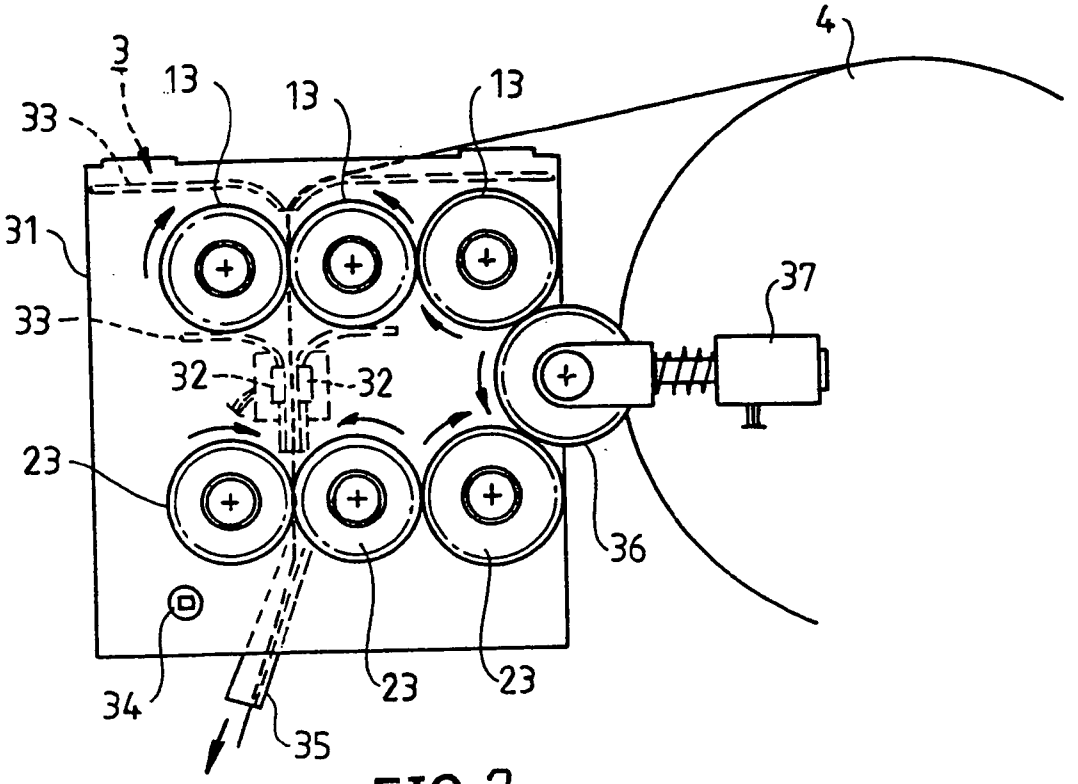

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FIG.7

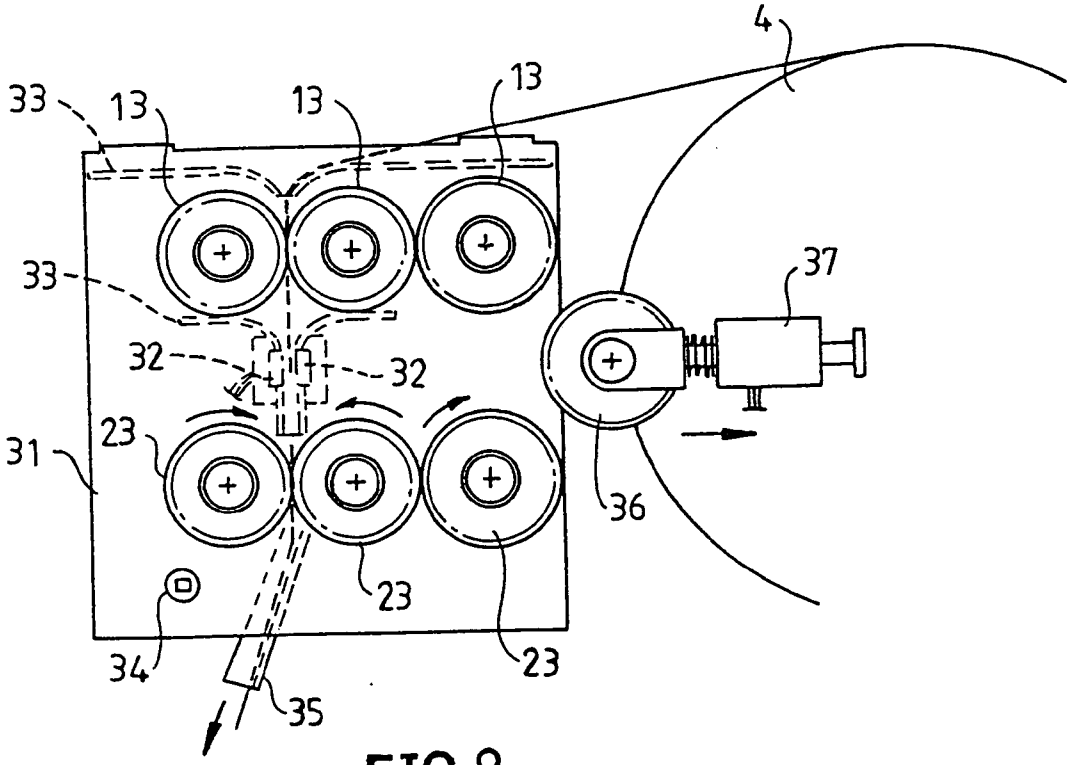

4
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13
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32
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36
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FIG.8

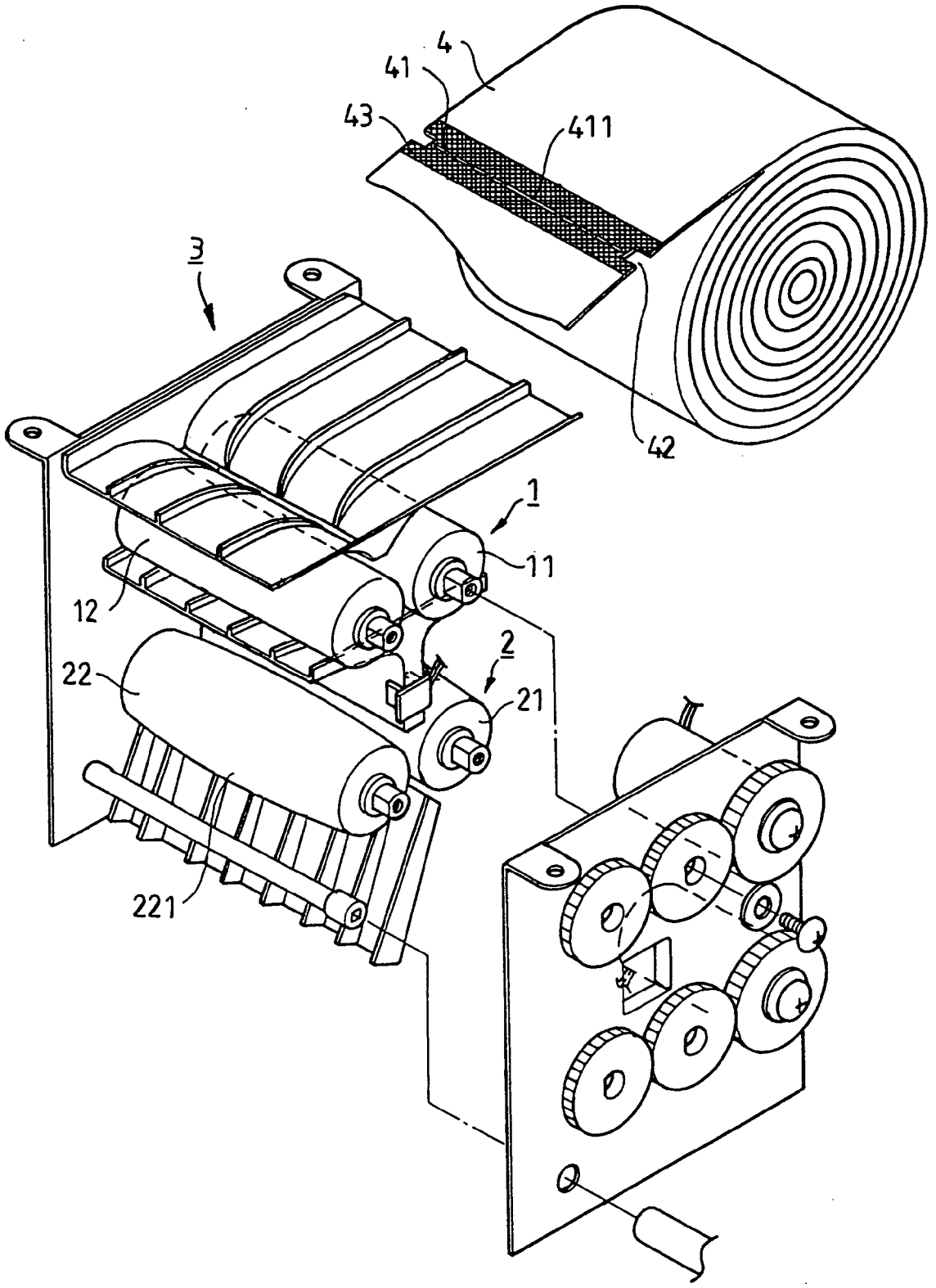


FIG.9

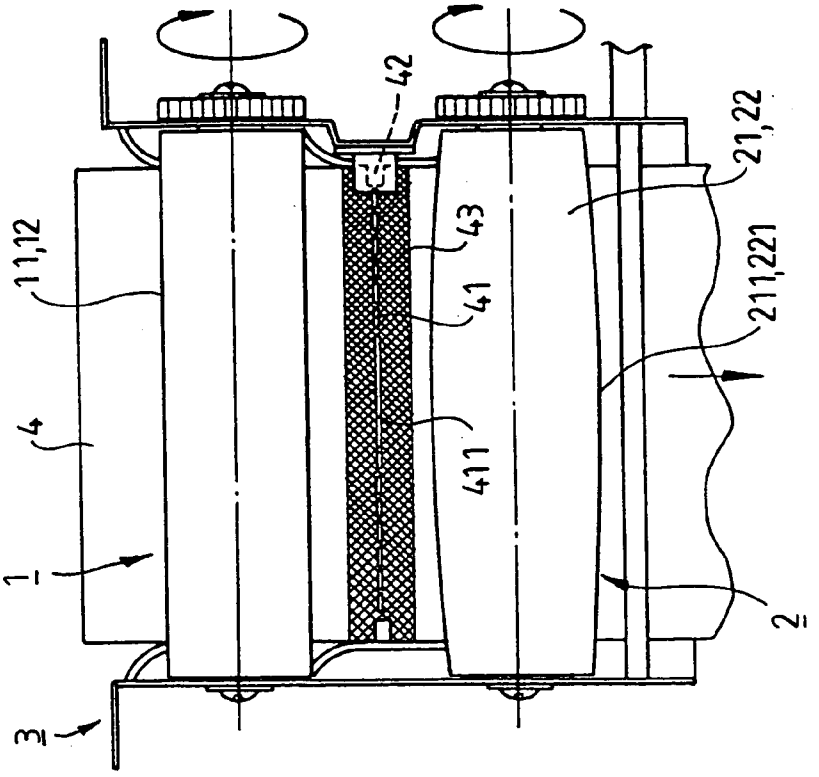


FIG.11

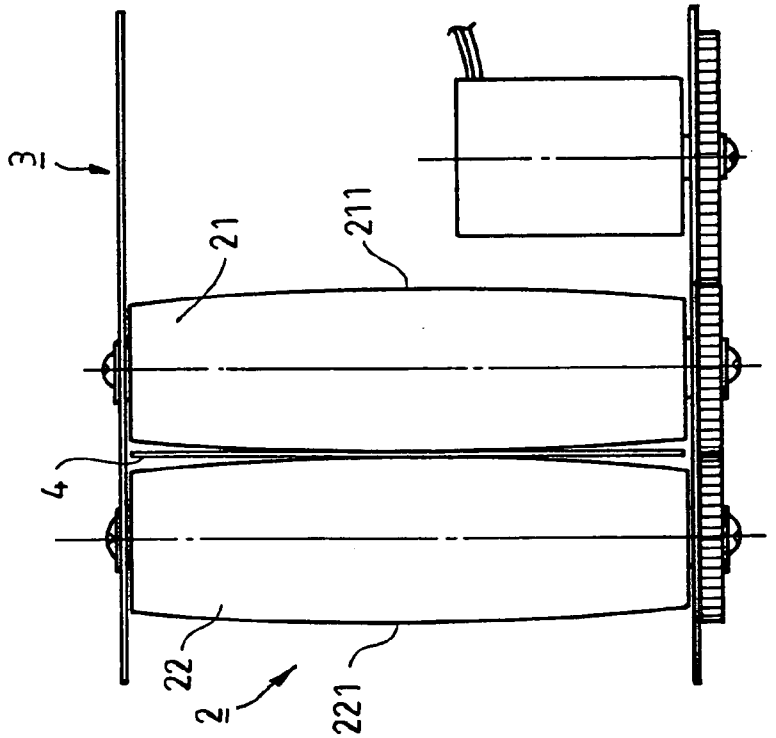


FIG.10

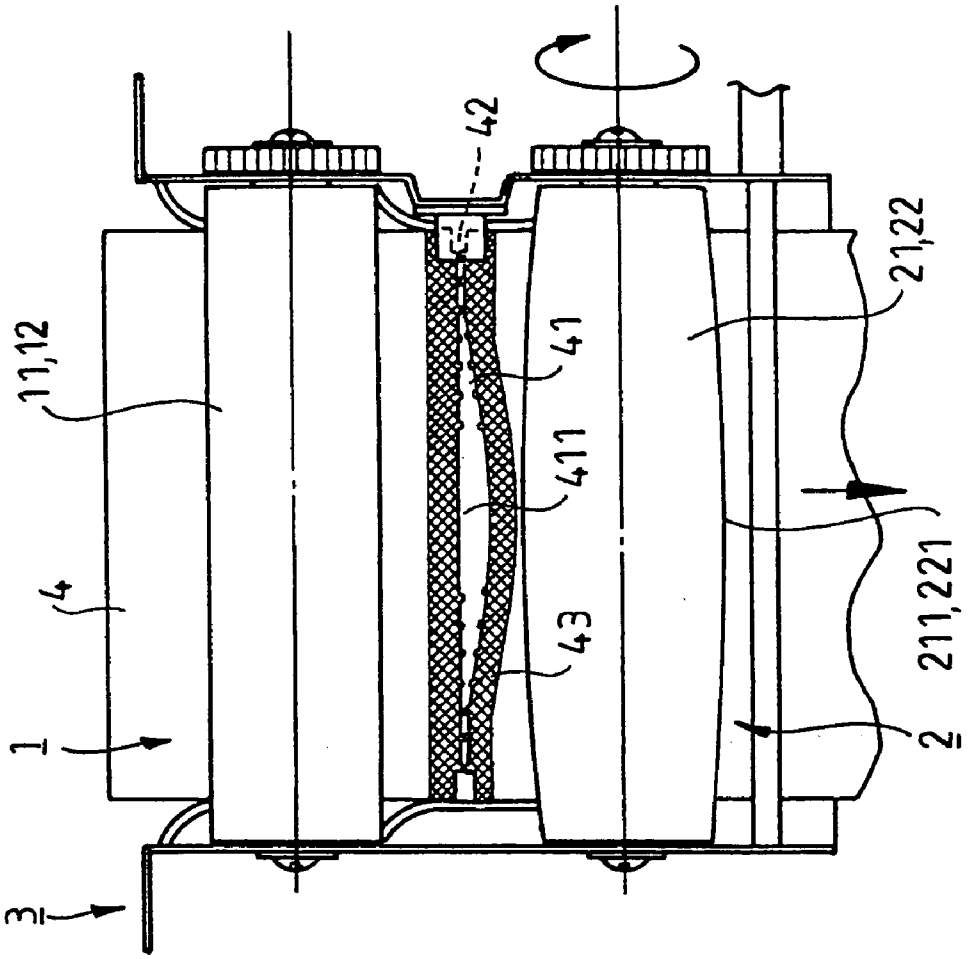


FIG. 12

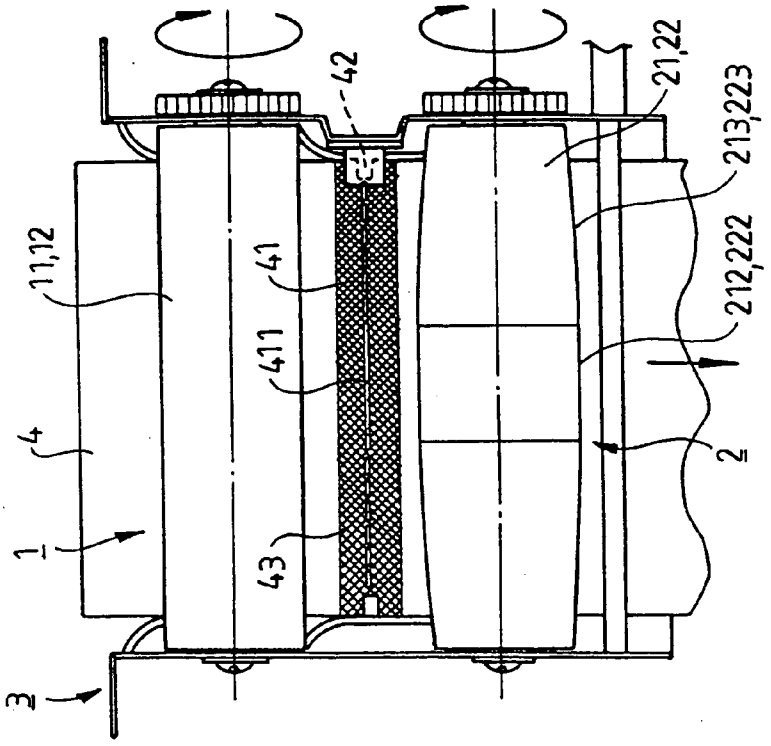

42
21,22
213,223
11,12
41
411
212,222
4
1
43
2
3

FIG. 14

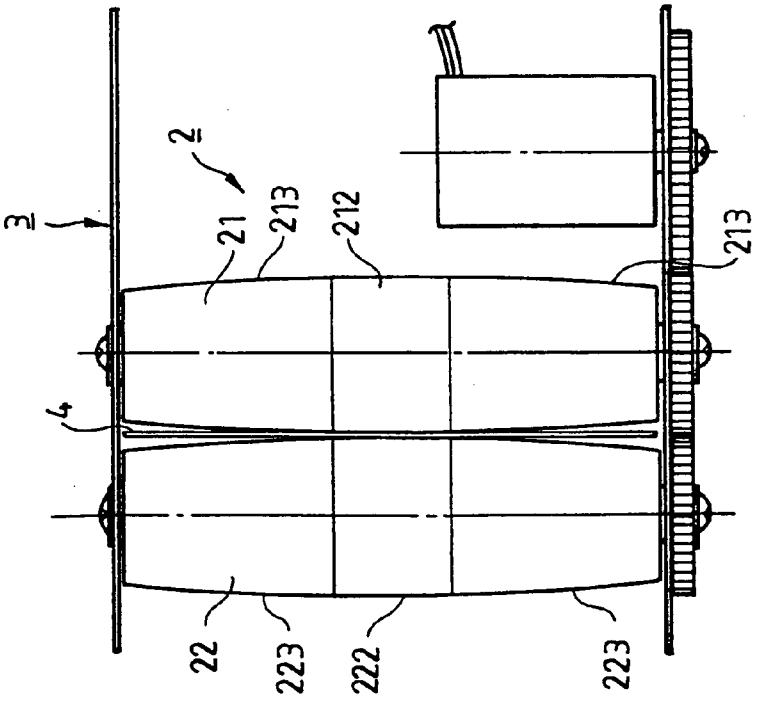

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3
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213
212
213
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223
222
223

FIG. 13

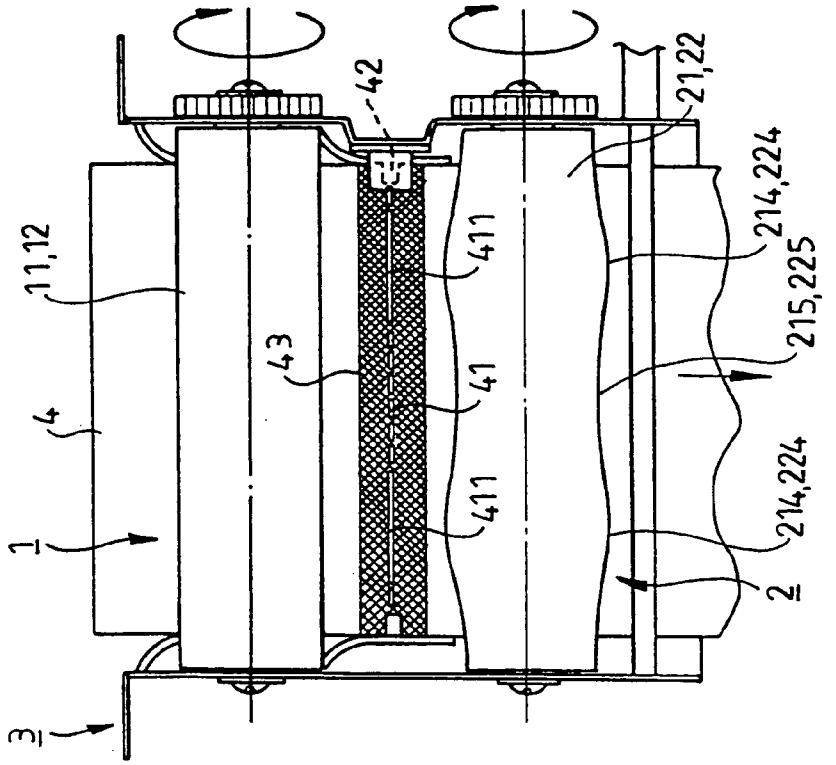

42
21,22
214,224
11,12
411
215,225
43
41
4
411
214,224
1
2
3

FIG.16

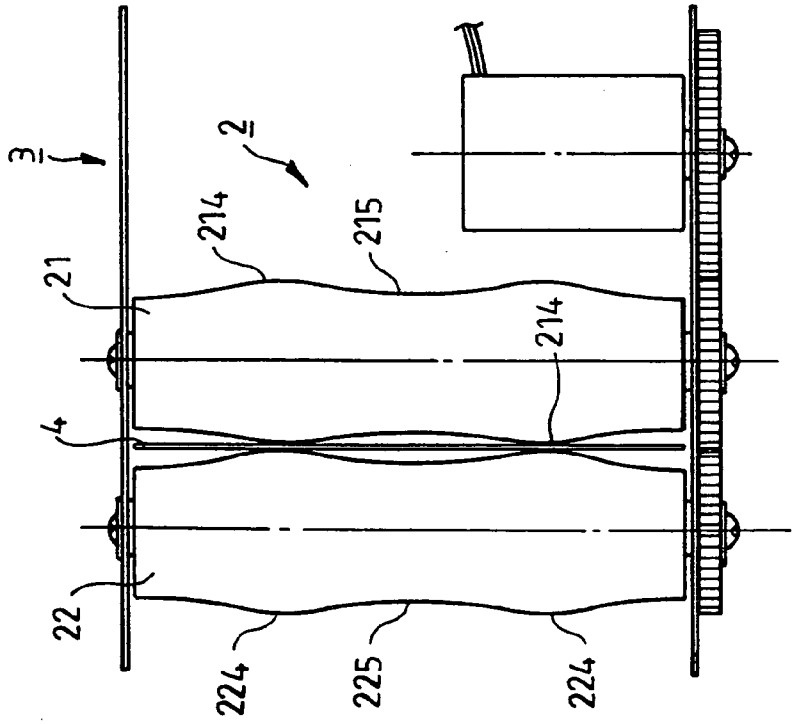

3
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214
215
21
214
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224
225
224

FIG.15

PAPER TOWEL AND SEPARATION DEVICE OF THE PAPER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a paper towel and a separation device of the paper towel, and more particularly to a separation device having a simpler construction, so that the paper towel may be separated easily.

[0003] 2. Description of the Related Art

[0004] A conventional cutting structure of a paper towel in accordance with the prior art shown in **FIG. 1** is disclosed in the applicant's Taiwanese Patent Publication No. 168262. The conventional cutting structure of a paper towel comprises two wall plates **90** between which a roll **91**, a press plate **92**, a power wheel **93**, and a blade wheel **94** are mounted. The paper is passed between the downward pressed press plate **92** and the roll **91**, and is pulled downward by the power wheel **93** and the roll **91**. The power wheel **93** may drive the roll **91** and the blade wheel **94** simultaneously. When the blade wheel **94** is rotated, the blade **95** of the blade wheel **94** contacts the chopping board **06**, thereby cutting the passing paper.

[0005] However, the blade **95** of the blade wheel **94** contacts the chopping board **06** frequently, so that the blade **95** of the blade wheel **94** is easily worn out during long-term utilization, and the cutting effect is greatly affected, thereby causing a large load in maintenance, and causing inconvenience to the user. In addition, the conventional cutting structure of a paper towel has a complicated construction.

SUMMARY OF THE INVENTION

[0006] The primary objective of the present invention is to provide a separation device of a paper towel, wherein the separation device has a simpler construction, so that the separation device may be manufactured easily, and the paper towel may be separated easily.

[0007] Another objective of the present invention is to provide a separation device of a paper towel, wherein the separation device of a paper towel needs not to provide a cutting blade set, thereby simplifying the construction, and facilitating production and assembly. In addition, the separation device of a paper towel does not have the problem of wear of the cutting blade, thereby facilitating maintenance.

[0008] A further objective of the present invention is to provide a separation device of a paper towel, wherein the paper towel may be separated easily at a predetermined length.

[0009] In accordance with the present invention, there is provided a separation device of a paper towel including a housing provided with two roll sets each having at least two rolls that may be driven by a power member to rotate relative to each other at an equal speed, so that a continuous paper towel may pass between the rolls of the two roll sets and may be pulled downward. The paper towel is provided with sensing marks at a predetermined length, so that when the sensing mark of the paper towel passes through a detection member, the detection member may detect passage of the sensing mark of the paper towel, and may send a signal, so that a rotation speed difference is produced between the rolls of the two roll sets, and the paper towel passing between the rolls of the two roll sets may be torn off. In addition, the roll faces of the multiple rolls provided by one of the two roll sets may form a non-single line, and the easily detachable line of the paper towel is formed by holes of different lengths.

[0010] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] **FIG. 1** is an exploded perspective view of a conventional separation device of a paper towel in accordance with the prior art;

[0012] **FIG. 2** is an exploded perspective view of a separation device of a paper towel in accordance with a first embodiment of the present invention;

[0013] **FIG. 3** is a side plan cross-sectional assembly view of the separation device of a paper towel as shown in **FIG. 2**;

[0014] **FIG. 4** is a cross-sectional view of the separation device of a paper towel taken along line **4-4** as shown in **FIG. 3**;

[0015] **FIG. 5** is a schematic operational view of the separation device of a paper towel as shown in **FIG. 4**;

[0016] **FIG. 6** is an exploded perspective view of a separation device of a paper towel in accordance with a second embodiment of the present invention;

[0017] **FIG. 7** is a side plan cross-sectional assembly view of the separation device of a paper towel as shown in **FIG. 6**;

[0018] **FIG. 8** is a schematic operational view of the separation device of a paper towel as shown in **FIG. 7**;

[0019] **FIG. 9** is an exploded perspective view of a separation device of a paper towel in accordance with a third embodiment of the present invention;

[0020] **FIG. 10** is a top plan assembly view of the separation device of a paper towel as shown in **FIG. 9**;

[0021] **FIG. 11** is a front plan operational view of the separation device of a paper towel as shown in **FIG. 9**;

[0022] **FIG. 12** is a schematic operational view of the separation device of a paper towel as shown in **FIG. 1**;

[0023] **FIG. 13** is a top plan view of a separation device of a paper towel in accordance with a fourth embodiment of the present invention;

[0024] **FIG. 14** is a front plan view of a separation device of a paper towel in accordance with a fourth embodiment of the present invention;

[0025] **FIG. 15** is a top plan view of a separation device of a paper towel in accordance with a fifth embodiment of the present invention; and

[0026] **FIG. 16** is a front plan view of a separation device of a paper towel in accordance with a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] Referring to the drawings and initially to **FIG. 2**, a separation device of a paper towel in accordance with a first embodiment of the present invention is shown. The paper towel **4** used in the separation device is a continuous paper made of a material such as the natural fiber, artificial fiber, synthetic fiber and the like. The paper towel **4** may have a roll-shape or a foldable shape. The paper towel **4** is provided with multiple sensing marks **42** that may be in the form of a cutout, or may be formed on the paper towel **4** in a printing or bonding manner. The paper towel **4** may be provided with a easily detachable line **41**, so that the paper towel **4** may be separated easily and smoothly. In addition, when the paper towel **4** is made of a material such as artificial fiber, synthetic fiber and the like, each of the two sides of the easily detachable line **41** is formed with a press portion **43** in a heat melted manner, thereby preventing from detachment of the fiber when the paper towel is cut.

[0028] The separation device comprises a housing **3**, a first roll set **1**, and a second roll set **2**. The paper towel **4** may pass through the first roll set **1** and the second roll set **2** respectively.

[0029] The housing **3** may construct the housing wall of the entire separation device, and has at least two wall plates **31** between which the first roll set **1** and the second roll set **2** are pivotally mounted. The housing **3** is provided with a detection member **32** that may be a conventional light control detection member. When the sensing mark **42** of the paper towel **4** passes through the detection member **32**, the detection member **32** may detect passage of the sensing mark **42** of the paper towel **4**, and may send a signal, so that the paper towel **4** may enter the first roll set **1** and the second roll set **2** easily. A guide board **33** is mounted between the two wall plates **31**, and is located above the first roll set **1** and the second roll set **2**. The housing **3** may be provided with a conventional liquid spray tube **34** to wet the passing paper towel **4**, and a guide plate **35** to guide the paper towel **4** outward.

[0030] The first roll set **1** consists of at least two rolls **11** and **12** each having two ends respectively pivoted on the wall plates **31**. The roll faces of the two rolls **11** and **12** contact with each other or almost contact with each other. The two rolls **11** and **12** of the first roll set **1** may be rotated relative to each other by driving of drive members **13**, such as gears, so that the paper towel **4** may pass between the two rolls **11** and **12**, and may be pulled downward to the second roll set **2**. The two rolls **11** and **12** of the first roll set **1** may be driven to rotate by a power member **14**.

[0031] The second roll set **2** is located at the lower side or the rear side of the first roll set **1**, and consists of at least two rolls **21** and **22** each having two ends respectively pivoted on the wall plates **31**. The roll faces of the two rolls **21** and **22** contact with each other or almost contact with each other. The two rolls **21** and **22** of the second roll set **2** may be rotated relative to each other by driving of drive members **23**, such as gears, so that the paper towel **4** may pass between the two rolls **21** and **22**, and may be pulled downward. The two rolls **21** and **22** of the second roll set **2** may be driven to rotate by a power member **24**.

[0032] Referring to **FIGS. 3 and 4**, one end of the paper towel **4** is guided to pass through the two rolls **11** and **12** of the first roll set **1** and pass through the two rolls **21** and **22** of the second roll set **2**, and may be pulled downward by rotation of the first roll set I and the second roll set **2**. At this time, the first roll set **1** and the second roll set **2** may be rotated at an equal speed. When the sensing mark **42** of the paper towel **4** passes through the detection member **32**, the detection member **32** may detect passage of the sensing mark **42** of the paper towel **4**, and may send a signal, so that power member **14** of the first roll set **1** may stop operation or reduce its velocity. Thus, a pulled force is applied on the paper towel **4** between the first roll set **1** and the second roll set **2**, so that the paper towel **4** may be separated from the easily detachable line **41** (see **FIG. 5**), and the separated paper towel **4** may be pulled downward by the two rolls **21** and **22** of the second roll set **2**, to be guide outward by the guide plate **35**.

[0033] Referring to **FIG. 6**, a separation device of a paper towel in accordance with a second embodiment of the present invention is shown.

[0034] The housing **3** is provided with a clutch wheel **36** whose movement may be controlled by a controller **37** such as an electromagnetic valve. When the sensing mark **42** of the paper towel **4** passes through the detection member **32**, the detection member **32** may detect passage of the sensing mark **42** of the paper towel **4**, and may send a signal, so that the clutch wheel **36** may detach from the drive members **13** and **23** of the first roll set **1** and the second roll set **2**, and may mesh with the drive members **13** and **23** of the first roll set I and the second roll set **2** again after a predetermined period of time.

[0035] The first roll set **1** is not provided with a power member, while the second roll set **2** has a power member **24**. Thus, when the clutch wheel **36** meshes with the drive members **13** arid **23** of the first roll set **1** and the second roll set **2** as shown in **FIG. 7**, the rolls **11**, **12**, **21** and **22** of the first roll set **1** and the second roll set **2** may be rotated at an equal speed, and the paper towel **4** may be pulled downward. When the clutch wheel **36** detaches from the drive members **13** and **23** of the first roll set **1** or the second roll set **2** as shown in **FIG. 8**, the rolls **11** and **12** of the first roll set **1** may stop rotating. Thus, a pulled force is applied on the paper towel **4** between the first roll set **1** and the second roll set **2**, so that the paper towel **4** may be separated from the easily detachable line **41**.

[0036] Referring to **FIG. 9**, a separation device of a paper towel in accordance with a third embodiment of the present invention is shown. The paper towel **4** used in the separation device is a continuous paper made of a material such as the natural fiber, artificial fiber, synthetic fiber and the like. The paper towel **4** may have a roll-shape or a foldable shape. The paper towel **4** is also provided with multiple sensing marks **42** that may be in the form of a cutout, or may be formed on the paper towel **4** in a printing or bonding manner. The paper towel **4** may be provided with a easily detachable line **41**, so that the paper towel **4** may be separated easily and smoothly. In addition, when the paper towel **4** is made of a material such as artificial fiber, synthetic fiber and the like, each of the two sides of the easily detachable line **41** is formed with a press portion **43** in a heat melted manner, thereby preventing from detachment of the fiber when the paper towel is cut. Further, the easily detachable line **41** in the preferred embodiment may be constructed by holes of different

lengths, including at least one elongated hole **411** which is larger than other holes **412** on the easily detachable line **41**.

[**0037**] The first roll set **1** consists of at least two rolls **11** and **12**. The roll faces of the two rolls **11** and **12** of the first roll set **1** contact with each other or almost contact with each other. The two rolls **11** and **12** of the first roll set **1** may be rotated relative to each other by driving of drive members, such as gears, so that the paper towel **4** may pass between the two rolls **11** and **12**, and may be pulled downward to the second roll set **2**.

[**0038**] Referring to **FIGS. 10 and 11**, the second roll set **2** is located at the lower side or the rear side of the first roll set **1**, and consists of two rolls **21** and **22**. The two rolls **21** and **22** of the second roll set **2** may be rotated relative to each other by driving of drive members, such as gears, so that the paper towel **4** may pass between the two rolls **21** and **22**, and may be pulled downward. Each of the roll faces of the two rolls **21** and **22** may form a non-single line. In the preferred embodiment, each of the roll faces of the two rolls **21** and **22** may form an arcuate face which has a mediate section having an arcuate convex portion **211** and **221**. The arcuate convex portions **211** and **221** of the two rolls **21** and **22** contact with each other or almost contact with each other. Thus, the roll faces of the two rolls **21** and **22** only have smaller contact faces, and the contacting arcuate convex portions **211** and **221** of the two rolls **21** and **22** are aligned with the elongated hole **411** of the paper towel **4**. Thus, when a rotation speed difference is produced between the first roll set **1** and the second roll set **2**, the motor may provide a smaller drive torque to tear the paper towel **4** between the first roll set **1** and the second roll set **2** as shown in **FIG. 12**.

[**0039**] Referring to **FIG. 13**, the second roll set **2** of a separation device of a paper towel in accordance with a fourth embodiment of the present invention is shown. The second roll set **2** consists of two rolls **21** and **22**. Each of the roll faces of the two rolls **21** and **22** may form a non-single line. In the preferred embodiment, each of the roll faces of the two rolls **21** and **22** has a mediate section formed with an equal-diameter portion **212** and **222** having a larger diameter. Each of the equal-diameter portions **212** and **222** has two sides each having an oblique shoulder portion **213** and **223**. Thus, the roll faces of the two rolls **21** and **22** only have smaller contact faces, and the contacting equal-diameter portions **212** and **222** of the two rolls **21** and **22** are aligned with the elongated hole **411** of the paper towel **4** (see **FIG. 14**). Preferably, the length of the contacting equal-diameter portions **212** and **222** of the two rolls **21** and **22** is smaller than that of the elongated hole **411** of the paper towel **4**. Thus, when a rotation speed difference is produced between the first roll set **1** and the second roll set **2**, the motor may provide a smaller drive torque to tear the paper towel **4** between the first roll set **1** and the second roll set **2**.

[**0040**] Referring to **FIG. 15**, the second roll set **2** of a separation device of a paper towel in accordance with a fifth embodiment of the present invention is shown. The second roll set **2** consists of two rolls **21** and **22**. Each of the roll faces of the two rolls **21** and **22** may form a non-single line. In the preferred embodiment, each of the roll faces of the two rolls **21** and **22** is formed with a corrugated shape, thereby forming multiple convex portions **214** and **224** and multiple concave portions **215** and **225** between the multiple convex portions **214** and **224**. Thus, the roll faces of the two rolls **21** and **22** only have smaller contact faces, and the contacting convex portions **214** and **224** of the two rolls **21** and **22** are aligned with the elongated hole **411** of the paper towel **4** (see **FIG. 16**). Thus, when a rotation speed difference is produced between the first roll set **1** and the second roll set **2**, the motor may provide a smaller drive torque to tear the paper towel **4** between the first roll set **1** and the second roll set **2**.

[**0041**] Accordingly, the separation device of a paper towel in accordance with the present invention needs not to provide a cutting blade set, thereby simplifying the construction, and facilitating production and assembly. In addition, the separation device of a paper towel in accordance with the present invention does not have the problem of wear of the cutting blade, thereby facilitating maintenance. Further, the supply length of the paper towel may be set during fabrication. In comparison, in the conventional separation device of a paper towel, the tooth number of the gear and the rotation speed of the motor need to be changed when the supply length of the paper towel needs to be changed. Further, the roll faces of the two rolls of the second roll set only have smaller contact faces, and the contacting faces of the two rolls of the second roll set are aligned with the elongated hole of the paper towel, so that the paper towel between the first roll set and the second roll set may be torn out easily, and the motor for driving the first roll set and the second roll set may provide a smaller drive torque to tear the paper towel between the first roll set and the second roll set, thereby reducing loss of power.

[**0042**] Although the invention has been explained in relation to its preferred embodiment as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

1-13. (canceled)

14. A paper towel, forming a continuous paper roll, and provided with sensing marks at a predetermined length.

15. The separation device of a paper towel as claimed in claim 14, wherein the sensing mark is formed with a cutout.

16. The separation device of a paper towel as claimed in claim 14, wherein the sensing mark is formed with a cutout, or is formed on the paper towel in a printing or bonding manner.

17. The separation device of a paper towel as claimed in claim 14, wherein the paper towel is provided with a easily detachable line.

18. The separation device of a paper towel as claimed in claim 17, wherein each of the two sides of the easily detachable line is formed with a press portion.

19. The separation device of a paper towel as claimed in claim 17, wherein the easily detachable line is formed by holes of different lengths.

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