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(54) Title: APPARATUS FOR REMOVING THE WINDSHIELD OF A VEHICLE

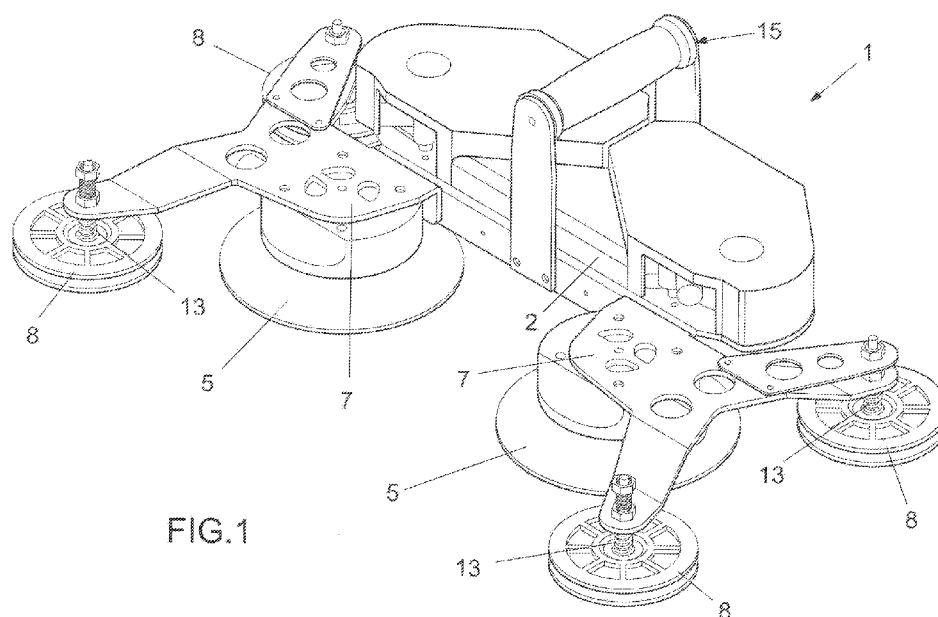


FIG.1

(57) Abstract: An apparatus for removing the windshield of a vehicle, characterized in that it comprises a plate on which there are installed two pulleys actuated by respective electric motors; a pair of fastening elements adapted to allow said plate to be fastened to the windshield of a vehicle; said plate having guiding rollers and each pulley is arranged for fastening the end of a cutting cable; the apparatus comprises an electronic part comprising a board which allows the operation by means of a remote control apparatus; the cable is windable onto the pulleys to cut the peripheral area of the windshield. This system has a feature which is different from all the current systems: it is completely autonomous in cutting the windshield of the vehicles because it no longer requires complicated maneuvers for the operator because it is provided with an automatic movement actuated by two electric motors; this is a huge advantage for safety and saving time when carrying out the cutting work.

SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
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APPARATUS FOR REMOVING THE WINDSHIELD OF A VEHICLEDESCRIPTIONField of the invention

5 The object of the present invention is an apparatus for removing the windshield of a vehicle.

Prior art

As is known, the windshield of a motor vehicle generally consists of a laminated glass, i.e. formed by two plates of glass and by one plastic intermediate layer, and is fastened peripherally to the bodywork by means of gaskets and glues.

10 The removal of the windshield is carried out by manually cutting the peripheral sealing gasket by means of a cutter or other cutting devices.

The cutting systems currently available make it difficult to carry out the cut while remaining close to the glass so as to avoid, as much as possible, contact with the top panel instrument panel and side uprights, which could be seriously damaged.

15 Another critical point is the one above the middle support for the rearview mirror and cameras.

The cutting systems currently available may also break a windshield that can be possibly recovered.

Summary of the invention

20 It is the task of the present invention to provide an apparatus which allows the windshield of a vehicle to be removed in a completely automatic and safe manner.

Within the scope of this task, it is an object of the invention to provide an apparatus which acts in a completely automatic manner when cutting the periphery of the windshield and which does not require complicated maneuvers for the operator, with
25 great advantage for safety and saving time when carrying out the cutting work.

It is a further object of the present invention to provide an apparatus which, due to its peculiar embodiment features, is capable of ensuring the broadest guarantees of reliability and safety in use.

This and other objects, which will become more apparent hereinafter, are achieved
30 by an apparatus for removing the windshield of a vehicle, characterized in that it comprises a plate on which there are installed two pulleys actuated by a motor; a fastening element adapted to allow said plate to be fastened to the windshield of a

vehicle; said plate having guiding rollers; each pulley being arranged for fastening the end of a cutting cable; said apparatus comprising an electronic part comprising a board which allows the operation by means of a remote control apparatus; said cable being windable onto said pulleys to cut the peripheral area of said windshield.

5 Brief description of the drawings

Further features and advantages of the object of the present invention will become more apparent from an examination of the description of a preferred, but not exclusive, embodiment of the invention, disclosed by way of non-limiting example, with the aid of the accompanying drawings, in which:

- 10 figure 1 is a perspective view of the apparatus of the present invention;
figure 2 is a perspective view illustrating the inner part of a windshield to which the apparatus according to the present invention is applied;
figure 3 is a cross-section view illustrating the detail of the position of the cutting cable during the cutting operation;
15 figure 4 is a cross-section view illustrating the apparatus under conditions of use;
figures 5 to 8 are external views of the windshield illustrating the sequence of the cutting operations;
figure 9 is a partially transparent plan view of the apparatus;
20 figure 10 is a perspective view of an embodiment of the apparatus according to a further aspect of the present invention;
figure 11 is a bottom perspective view of the apparatus of the preceding figure;
figure 12 is a partially transparent plan view of the apparatus of the preceding
25 figure;
figure 13 is a bottom view of the apparatus of the preceding figure.

Detailed description of the invention

- With particular reference to the reference numerals in the aforesaid drawings, the apparatus for removing the windshield of a vehicle according to the invention,
30 identified overall by numeral 1, comprises a middle plate 2 on which there are installed two pulleys 3, 4 actuated by respective electric motors with a mechanical reduction gear.

Each pulley 3 and 4 is arranged for fastening the end of a cutting cable 9.

The apparatus further comprises a pair of fastening elements 5 adapted to allow plate 2 to be fastened to the glass windshield 6.

5 The fastening elements advantageously comprise two suction cups positioned in the middle of plate 2, which allow a perfect and strong adhesion to glass 6.

Advantageously, the suction cups can be replaced by a simple operation by a pair of magnets fastened to plate 2 and by a pair of magnets (not depicted in the drawings) mounted on a handle structure which is positioned outside windshield 6 at plate 2.

10 Plate 2 has, at the side ends thereof, respective brackets 7, each of which supporting a pair of guiding rollers 8.

The brackets 7 are rocking and the pins of the rollers 8 comprise thrust springs 13 adapted to thrust the rollers 8 into contact with the surface of glass 6.

15 Each roller 8 has a felt pad 14 which allows roller 8 to lap the glass without scratching it, allowing cable 9 to work in a position which is almost parallel to the inner surface of glass 6 and very close thereto.

The apparatus comprises an electronic part comprising a board which allows the operation by means of an application managed by a smartphone.

20 The apparatus is fed by means of a feeder cable (not depicted in the drawings) which is directly connected to the 12V lighter of the vehicle or to a feeder in turn connected to the electricity grid.

25 The apparatus is advantageously provided with devices which avoid any possible dangerous circumstance: a sensor arranged in the middle of the pulleys 3 and 4 warns when the cut has been made, a timer avoids running into problems due to the incorrect installation procedure.

A further safety element is that the apparatus operates in complete absence of an operator, who monitors the apparatus from a distance by means of the smartphone application.

30 A grip 15 which is integral with plate 2 facilitates the transport and the positioning of the apparatus.

The operation of the apparatus of the present invention is as follows.

Plate 2 is applied inside windshield 6 by means of the suction cups 5 or the magnets,

according to the state of the windshield.

An end of cable 9 is hooked to a pulley 3 and cable 9 itself is caused to pass through a passageway 10 made in the fastening gasket 11 which ties windshield 6 to frame 12 of the bodywork.

- 5 Cable 9 is arranged along frame 12 at the outside of windshield 6 and is reintroduced into passageway 10 to be hooked to the other pulley 4.

The operator may therefore leave the passenger compartment and control the actuation of the pulleys 3 and 4 from a distance by means of the smartphone application, which pulleys wind the ends of cable 9, which progressively cuts gasket
10 11, as diagrammatically depicted in the sequence in figures 5 to 8.

Due to the system of guiding rollers 8, cable 9 works in a position which is almost parallel and very close to the surface of glass 6 and this avoids abrasions or breaks to the inner peripheral parts of the vehicle, such as top panel uprights and the instrument panel.

- 15 Once cable 9 has completely cut gasket 11, it is completely wound onto the pulleys 3 and 4 and the operator may detach the apparatus from the windshield and remove the windshield itself.

The apparatus of the present invention differs from each of the systems known to date because it is completely autonomous in cutting the windshield of vehicles and
20 does not require complicated maneuvers for the operator due to the automatic handling ensured by two electric motors.

This is a huge advantage from a safety perspective and allows significant time saving when carrying out the cutting work.

The electrically-moved pulley system combined with the four spring rollers allows
25 the cable to remain as close as possible to the glass so as to avoid, to the greatest extent possible, contact with the top panel instrument panel and side uprights, which could be seriously damaged with a traditional and current system, thus allowing the tool to carry out an accurate cut in complete safety.

The installation procedure eliminates the problem due to the passage of the cutting
30 cable above the middle support for the rearview mirror and cameras; this allows avoiding the cable from getting stuck or even breaking, causing the break of a glass which can be possibly recovered.

In case of complete breaking of the windshield, for example caused by an accident or the airbag inflating, the apparatus provides an alternative connection to the suction cups consisting of magnets which, being easy to apply, firmly adhere to the surface of the windshield, thus ensuring a perfect adherence under any condition.

5 Figures 10 to 13 show an embodiment of the apparatus according to a further aspect of the invention, identified as a whole by reference numeral 101, which is conceptually similar to apparatus 1 described above but was particularly researched to be used in smaller spaces, for smaller glasses, e.g. rear windows, and glasses shaped in a different manner.

10 The compact apparatus 101 comprises a middle plate 102 on which there are installed two coaxial pulleys 103 and 104 actuated by an electric motor with a mechanical reduction gear.

The pulleys 103 and 104 are arranged for fastening the end of the cutting cable.

Apparatus 101 further comprises a fastening element 105 adapted to allow plate
15 102 to be fastened to the glass panel.

The fastening element advantageously comprises a single suction cup 105 fastened to plate 102, which allows a perfect and strong adhesion to the glass.

Advantageously, the suction cup can be replaced by a simple operation by a magnet fastened to plate 102 and by a respective magnet mounted on a handle structure
20 which is positioned outside the glass at plate 102.

Plate 102 has, at an end thereof, respective brackets 107, each of which supporting a guiding roller 108.

The brackets 107 are associated at the end of the plate opposite to the end at which the suction cup 105 is associated.

25 The brackets 107 are rocking and the pins of the rollers 108 comprise thrust springs 113 adapted to thrust the rollers 108 into contact with the surface of the glass.

Each roller 108 has a felt pad 114 which allows roller 108 to lap the glass without scratching it, allowing the cable to work in a position which is almost parallel to the inner surface of the glass and very close thereto.

30 Apparatus 101 comprises an electronic part comprising a board which allows the operation by means of an application managed by a smartphone.

Apparatus 101 is fed by means of a feeder cable (not shown in the drawings) which

is directly connected to the 12V lighter of the vehicle or to a feeder in turn connected to the electricity grid.

Advantageously, apparatus 101 is provided with devices which avoid any possible dangerous circumstance: a sensor arranged in the middle of the pulleys 103 and 104 warns when the cut has been made, a timer avoids running into problems due to the incorrect installation procedure.

A further safety element is that the apparatus operates in complete absence of an operator, who monitors the apparatus from a distance by means of the smartphone application.

A grip 115 which is integral with plate 102 facilitates the transport and the positioning of the apparatus.

The operation of the compact apparatus 101 is conceptually similar to the above-described operation of apparatus 1, however this compact embodiment with one suction cup and one motor alone is advantageous when used in smaller spaces, for smaller glasses, e.g. rear windows, and glasses shaped in a different manner than a windshield.

It practically has been ascertained how the invention achieves the preset task and objects.

Indeed an innovative, completely automated system has been created for replacing the windshield of all vehicles, which comprises four flush guiding rollers which can be adapted to all surfaces, two suction cups or four magnets for the anchoring thereof to the glass, and two electric pulleys controlled with an application used by means of a smartphone, all assembled in a single steel and aluminum structure.

The main advantages offered by this tool are to work in complete safety because it operates autonomously without any need for personnel, while the traditional systems oblige a close contact with the operator who, in the case of possible breaks of the cable or other unforeseeable circumstances, could be harmed or undergo injury.

The speed and time saved in replacing the windshield allows other tasks to be performed and makes the work less stressful and tiring, therefore improving the quality thereof also due to the monitoring of the work through the smartphone.

Naturally, any materials and dimensions may be used according to the needs.

CLAIMS

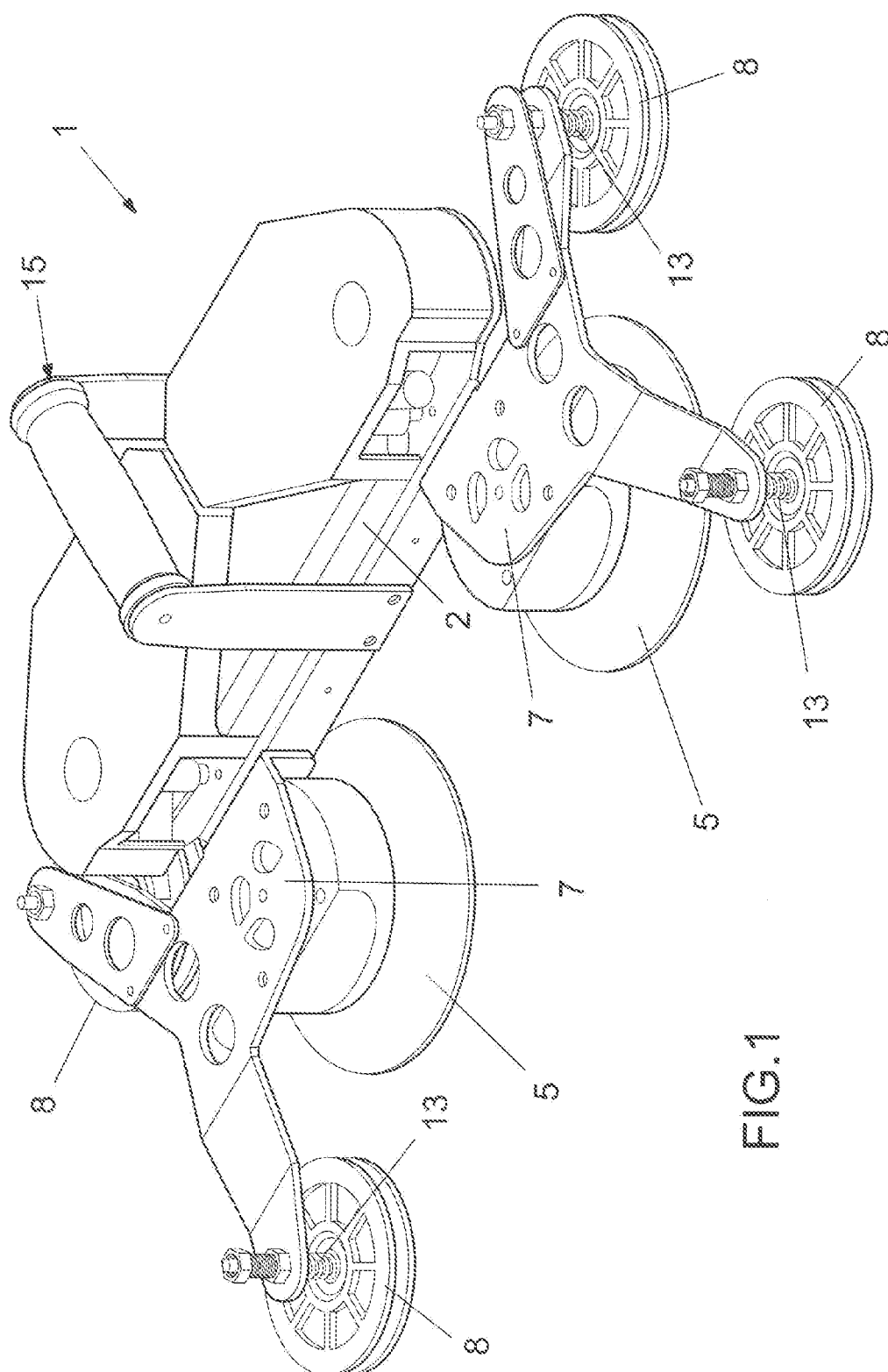
1. An apparatus for removing the windshield of a vehicle, characterized in that it comprises a plate (2, 102) on which there are installed two pulleys (3, 4, 103, 104) actuated by a motor; a fastening element (5, 105) adapted to allow said plate
5 (2, 102) to be fastened to the windshield (6) of a vehicle; said plate (2, 102) having guiding rollers (8, 108); each pulley (3, 4, 103, 104) being arranged for fastening the end of a cutting cable (9); said apparatus comprising an electronic part comprising a board which allows the operation by means of a remote control apparatus; said cable (9) being windable onto said pulleys (3, 4, 103, 104) to cut the peripheral area
10 of said windshield (6).
2. An apparatus according to claim 1, characterized in that said fastening element comprises a pair of suction cups (5) positioned in the middle of said plate (2).
3. An apparatus according to claim 1, characterized in that said fastening
15 element comprises two magnets fastened to the plate (2) and a pair of magnets mounted on a handle structure which is positioned outside the windshield (6) at the plate (2).
4. An apparatus according to claim 1, characterized in that said fastening element comprises one suction cup (105) alone associated with said plate (102).
- 20 5. An apparatus according to claim 1, characterized in that said guiding rollers (8) are mounted on rocking brackets (7) associated with the ends of said plate (2); said rollers (8) comprising thrust springs (13) adapted to thrust said rollers (8) into contact with the surface of the glass (6); each roller (8) having a felt pad (14) adapted to contact the glass (6), thus avoiding the damage thereof.
- 25 6. An apparatus according to claim 1, characterized in that said guiding rollers (108) are mounted on rocking brackets (107) associated with an end of said plate (102) opposite to the end at which said suction cup (105) is associated; said rollers (108) comprising thrust springs (113) adapted to thrust said rollers (108) into contact with the surface of the glass; each roller (108) having a felt pad (114)
30 adapted to contact the glass, thus avoiding the damage thereof.
7. An apparatus according to claim 1, characterized in that it is fed by means of a feeder cable which is directly connected to the 12V lighter of the vehicle

or to a feeder in turn connected to the electricity grid.

8. An apparatus according to claim 1, characterized in that it comprises a sensor arranged in the middle of the pulleys (3, 4, 103, 104) which warns when the cut has been made.

5 9. An apparatus according to claim 1, characterized in that it comprises a timer.

10. An apparatus according to claim 1, characterized in that said remote control apparatus is a smartphone provided with a dedicated application.



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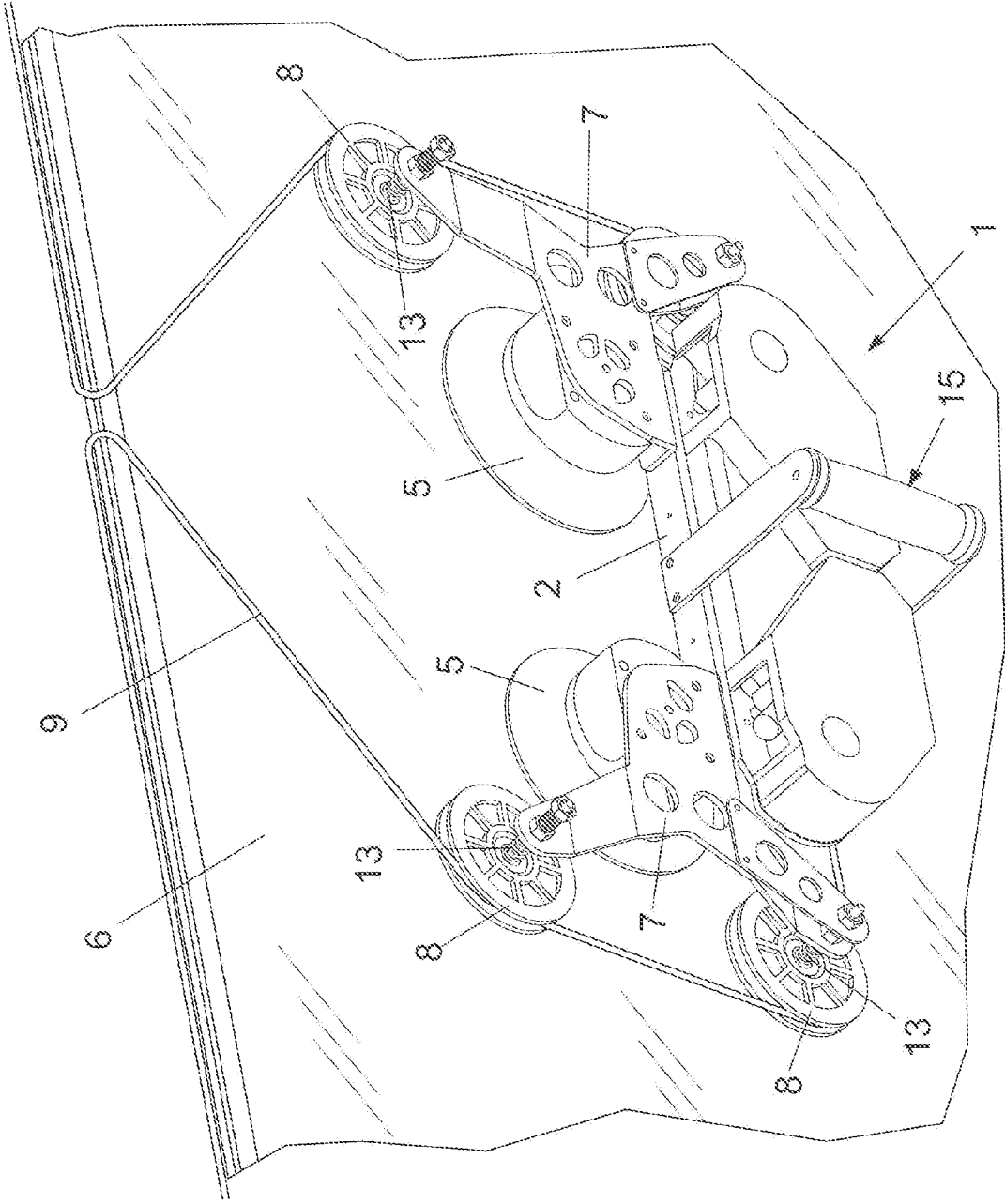
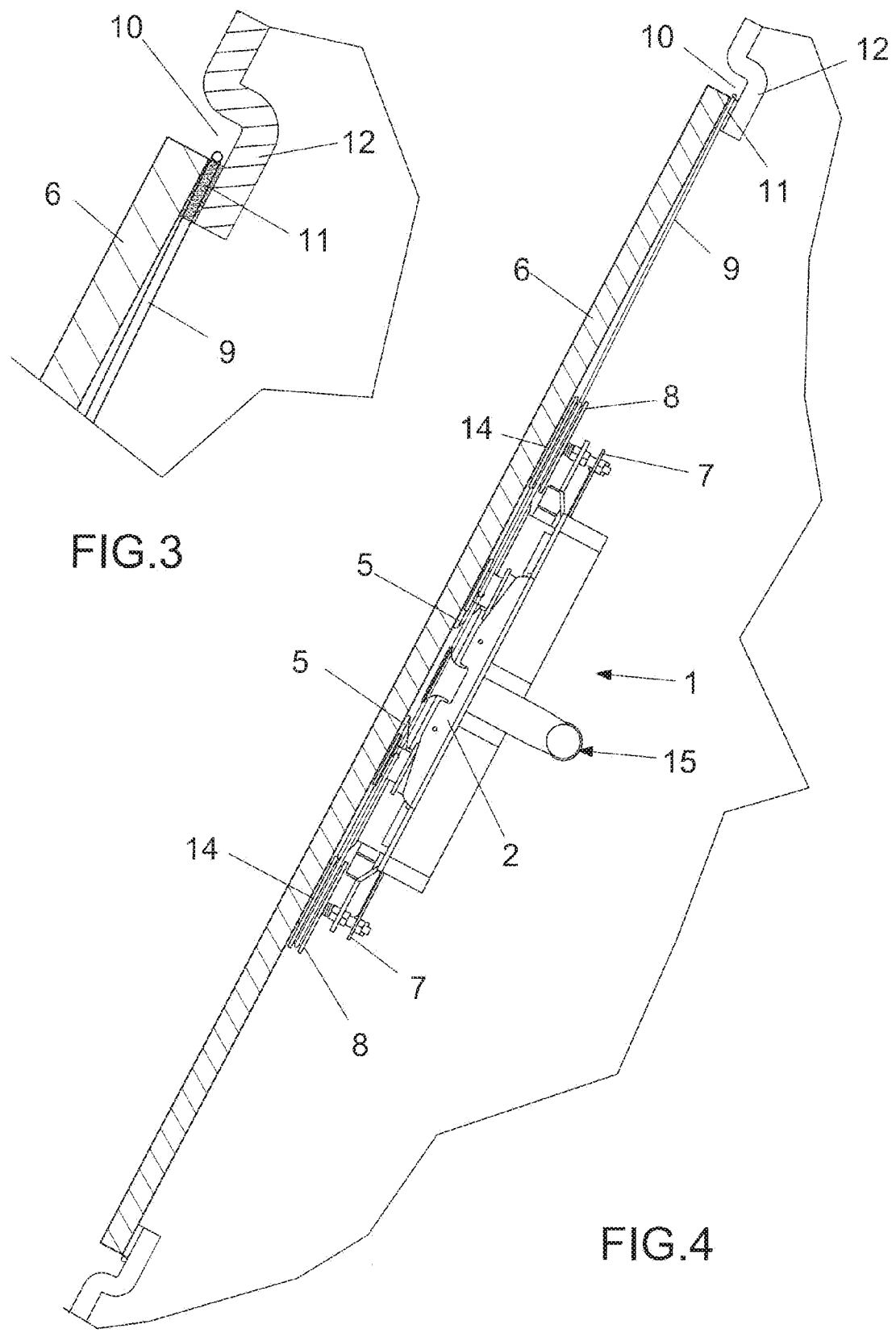


FIG.2



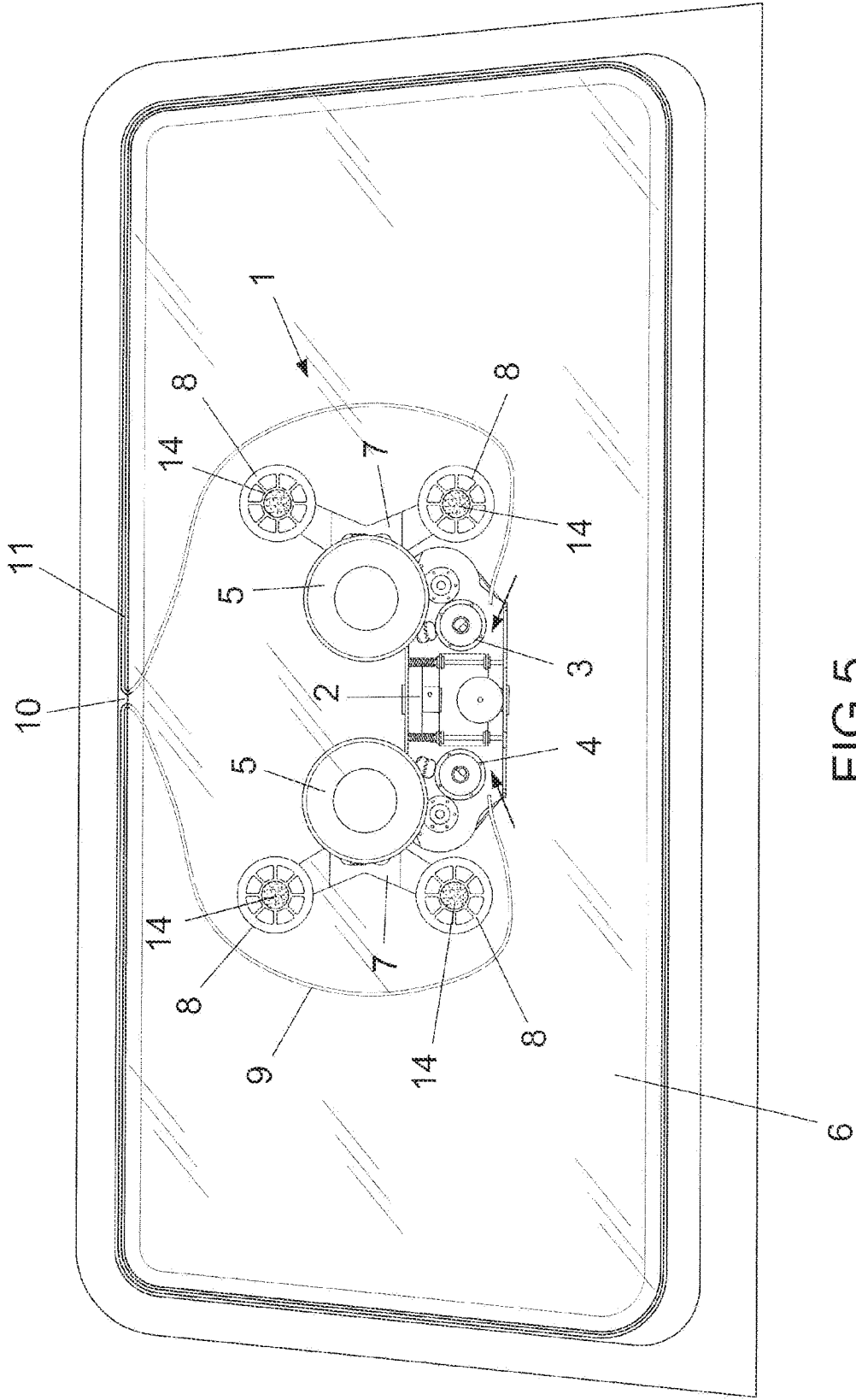


FIG. 5

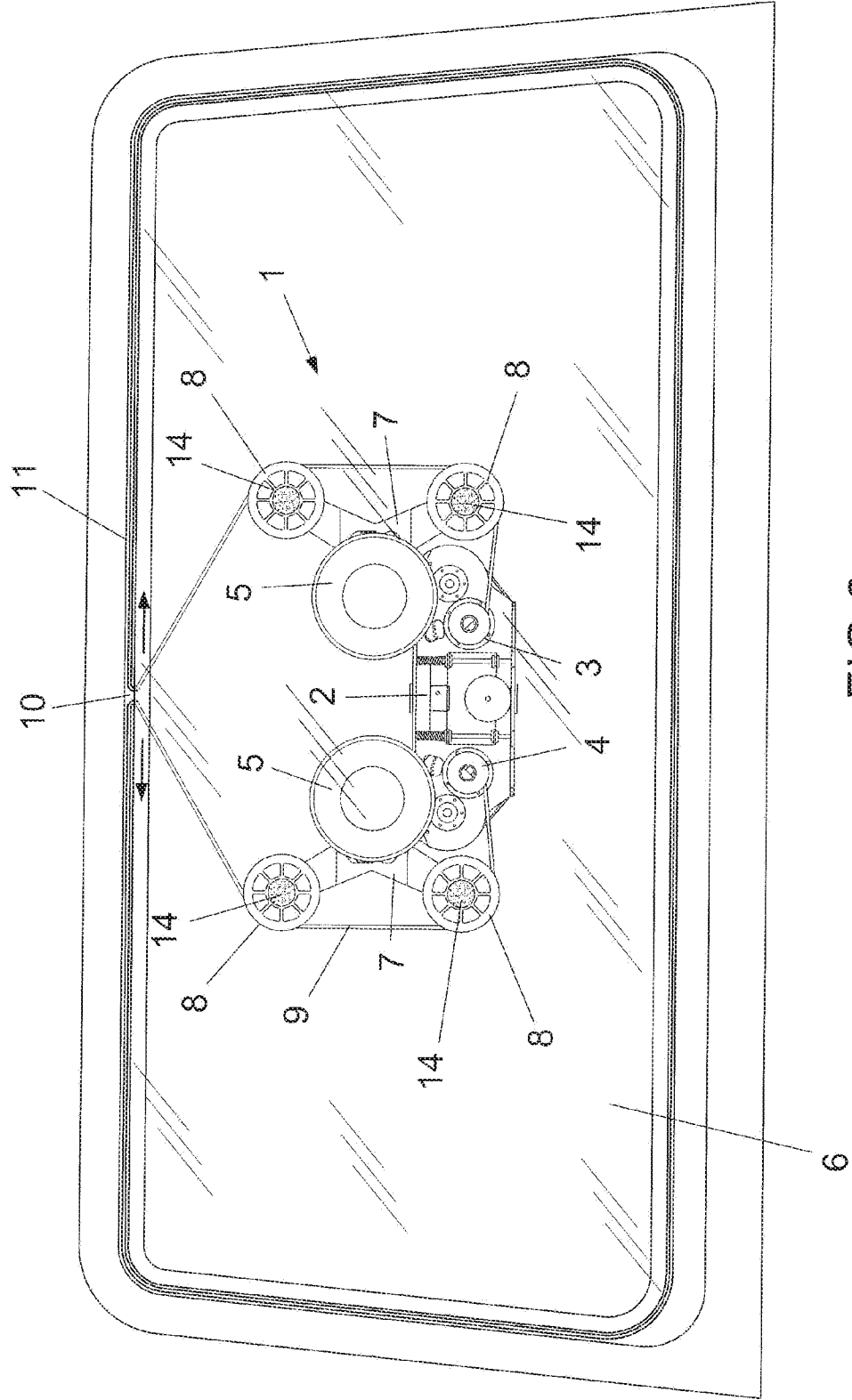


FIG.6

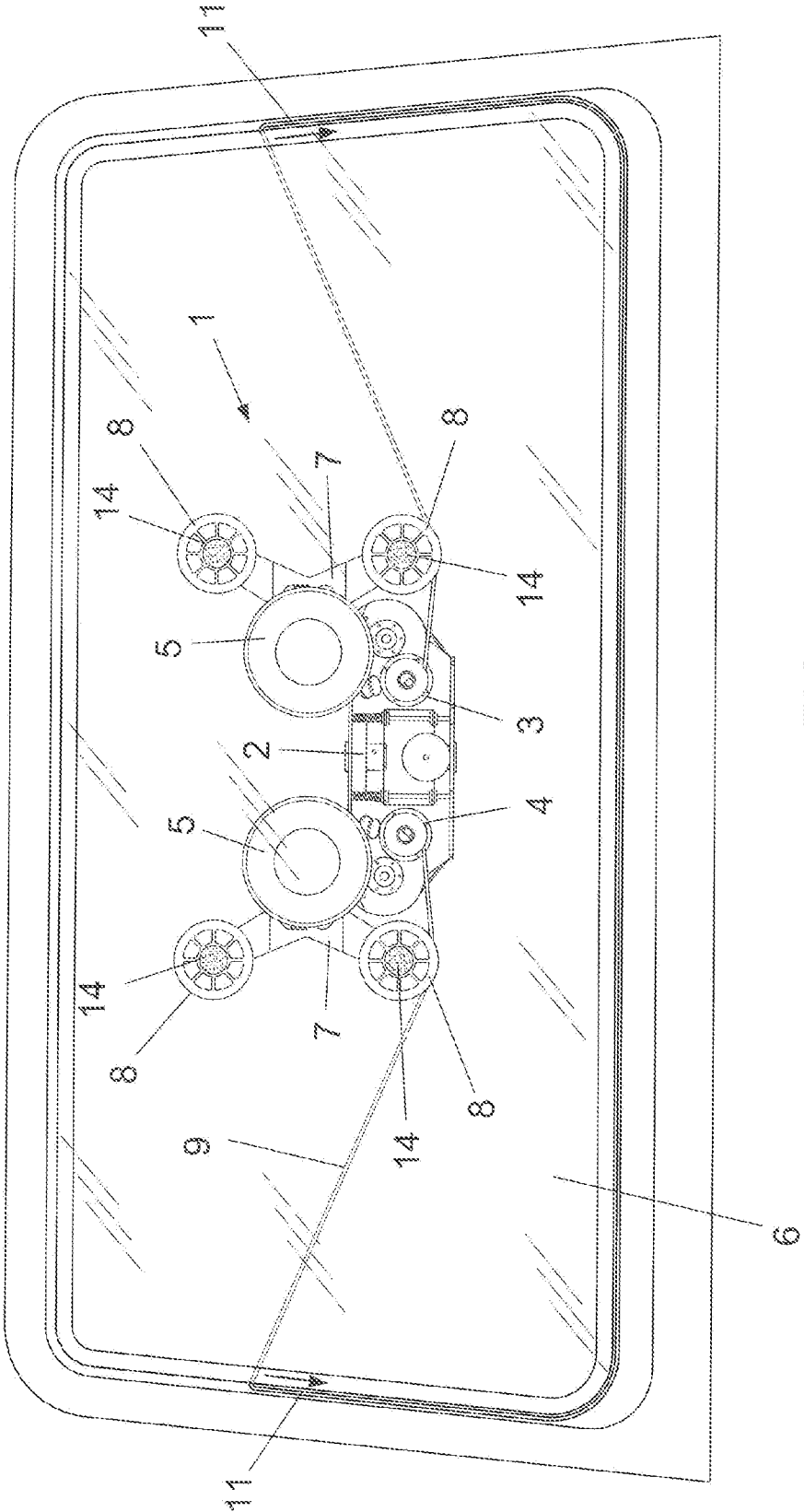
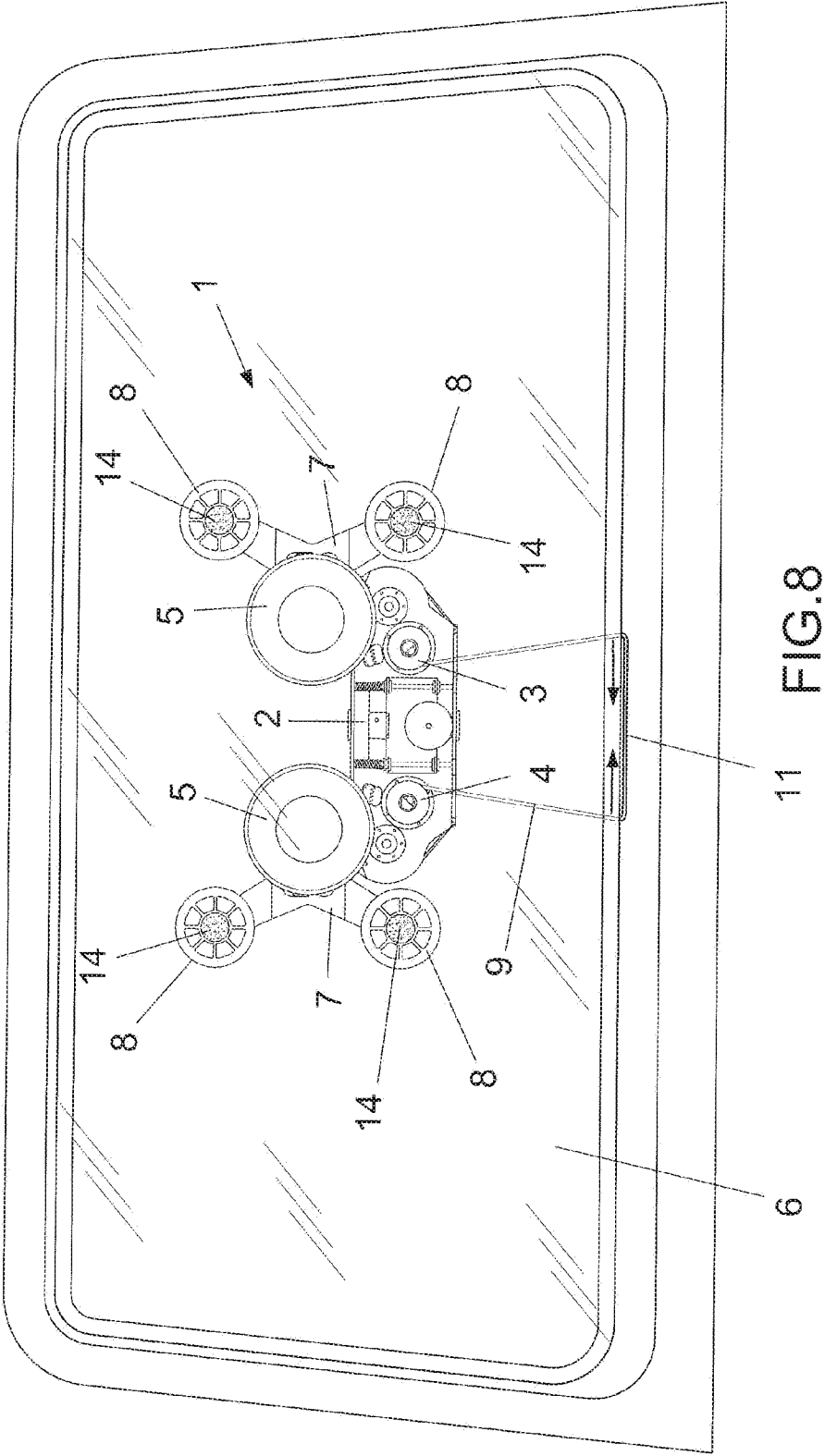


FIG. 7



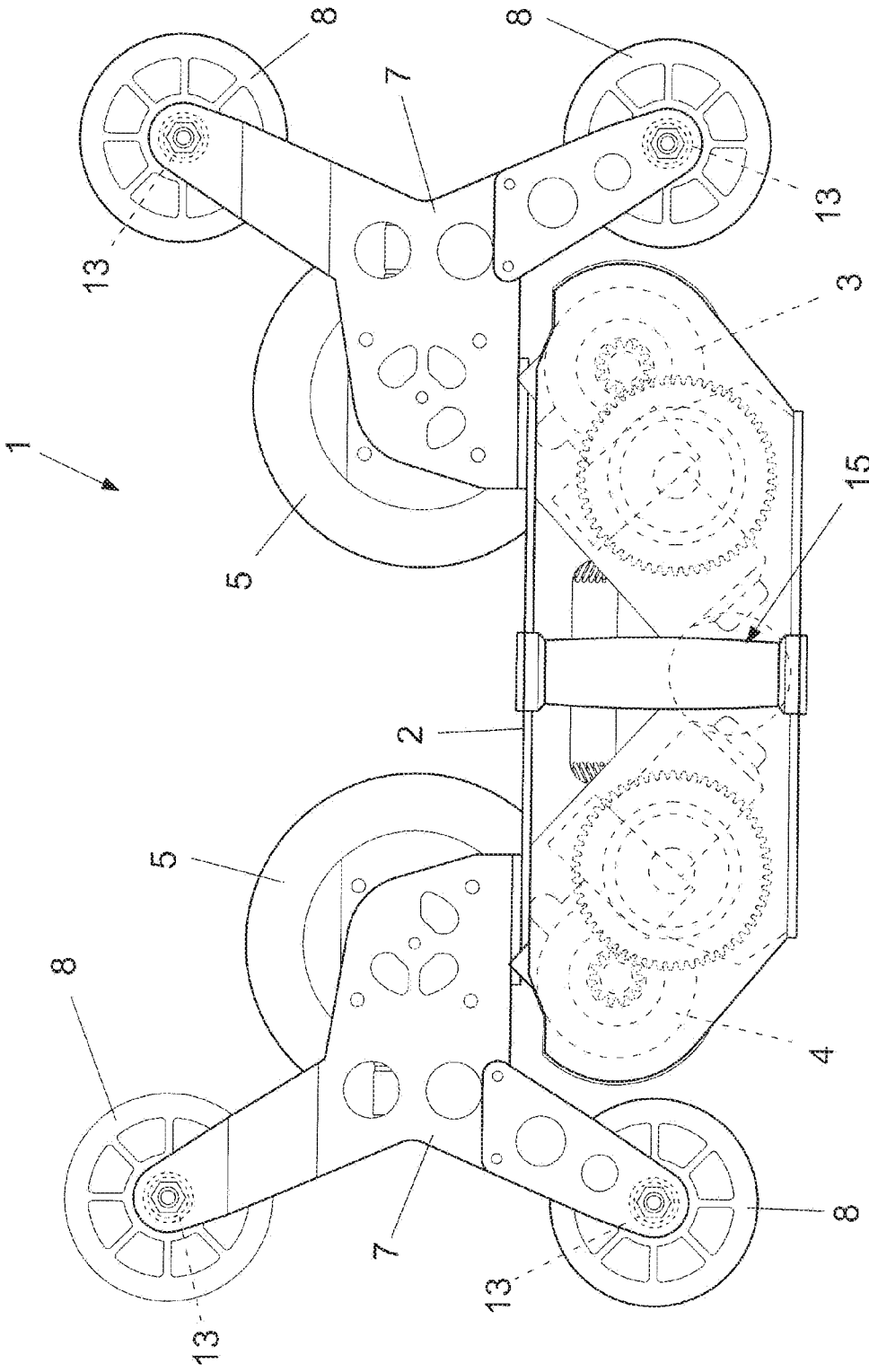
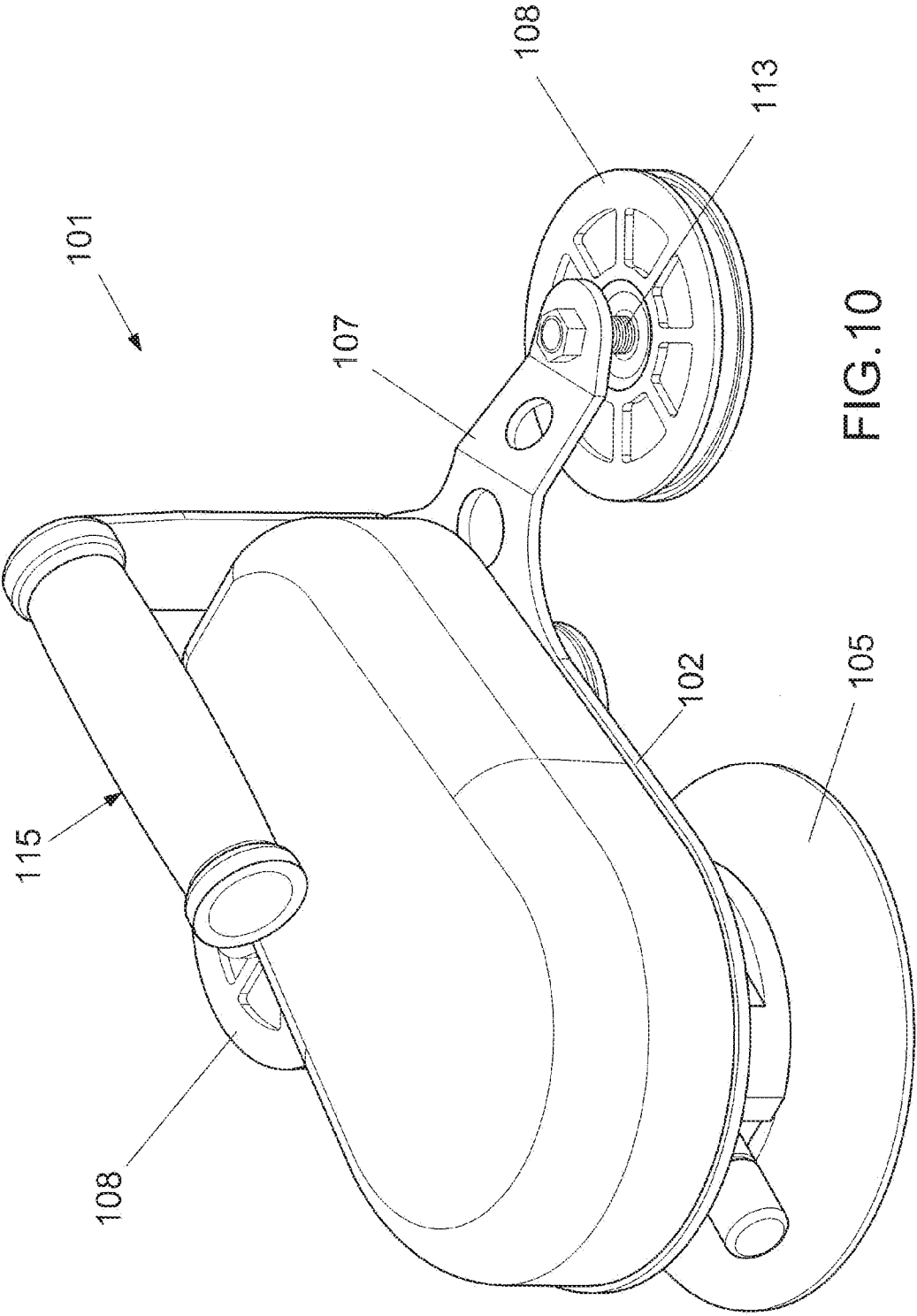


FIG.9



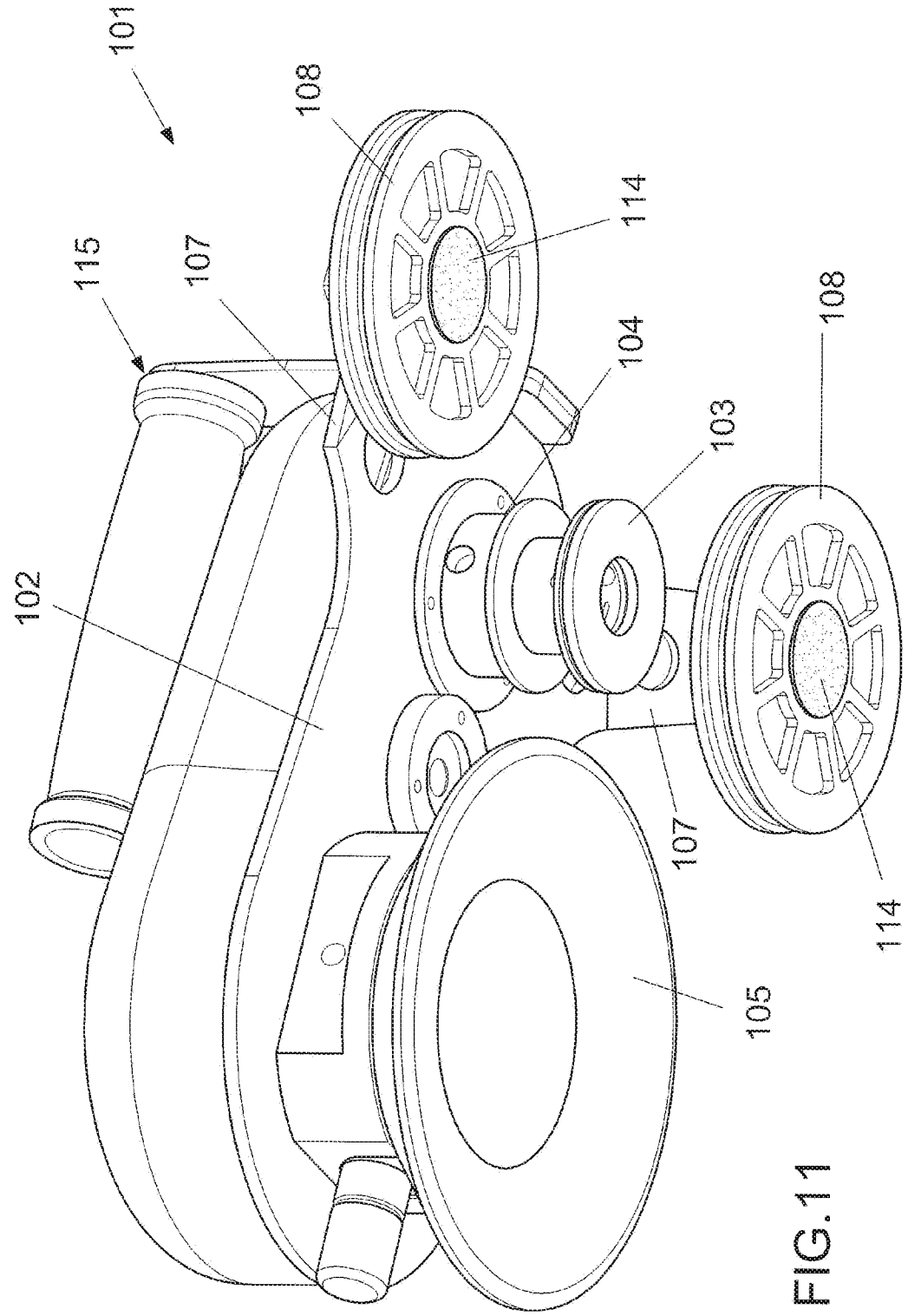


FIG.11

11/12

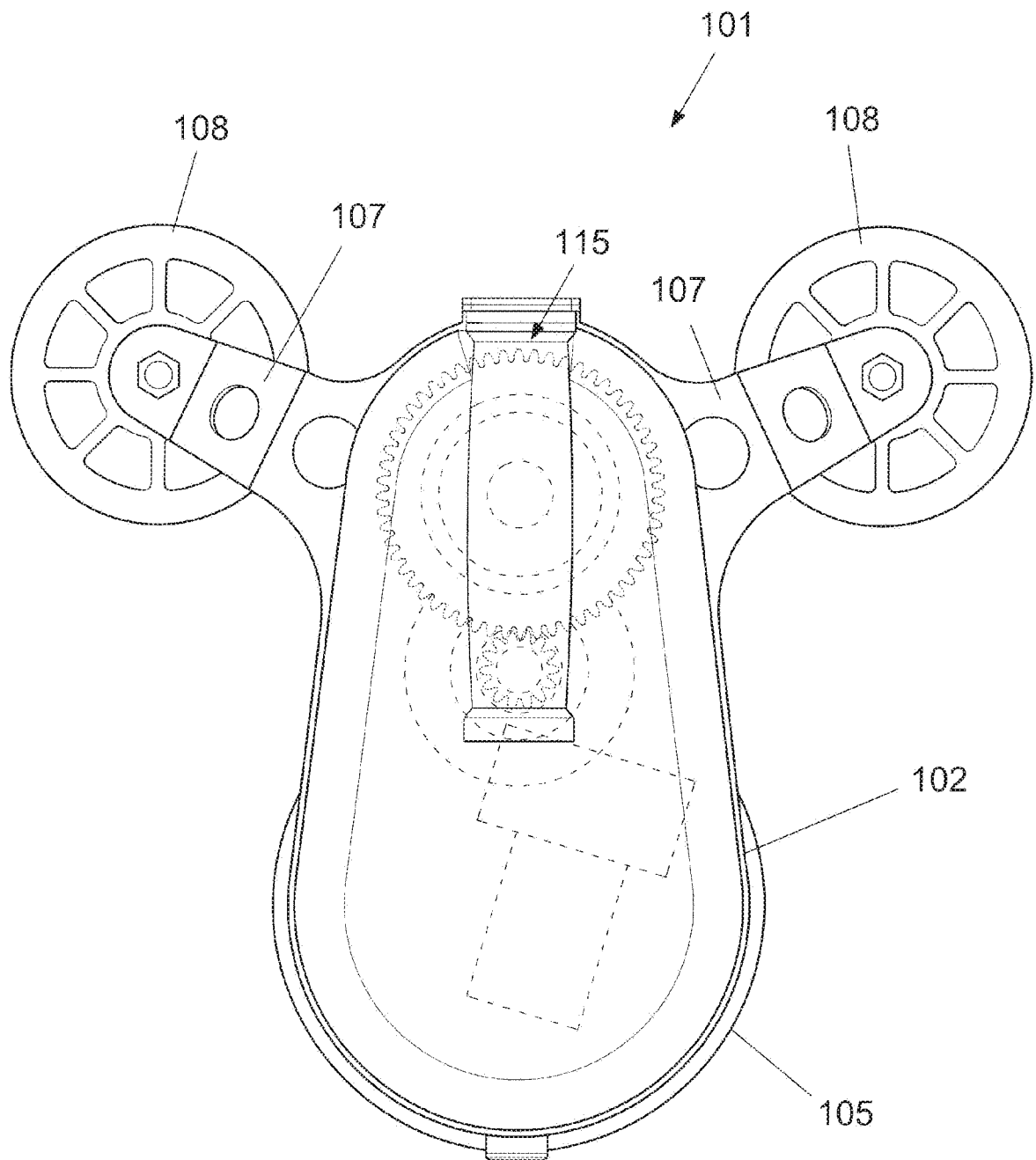


FIG.12

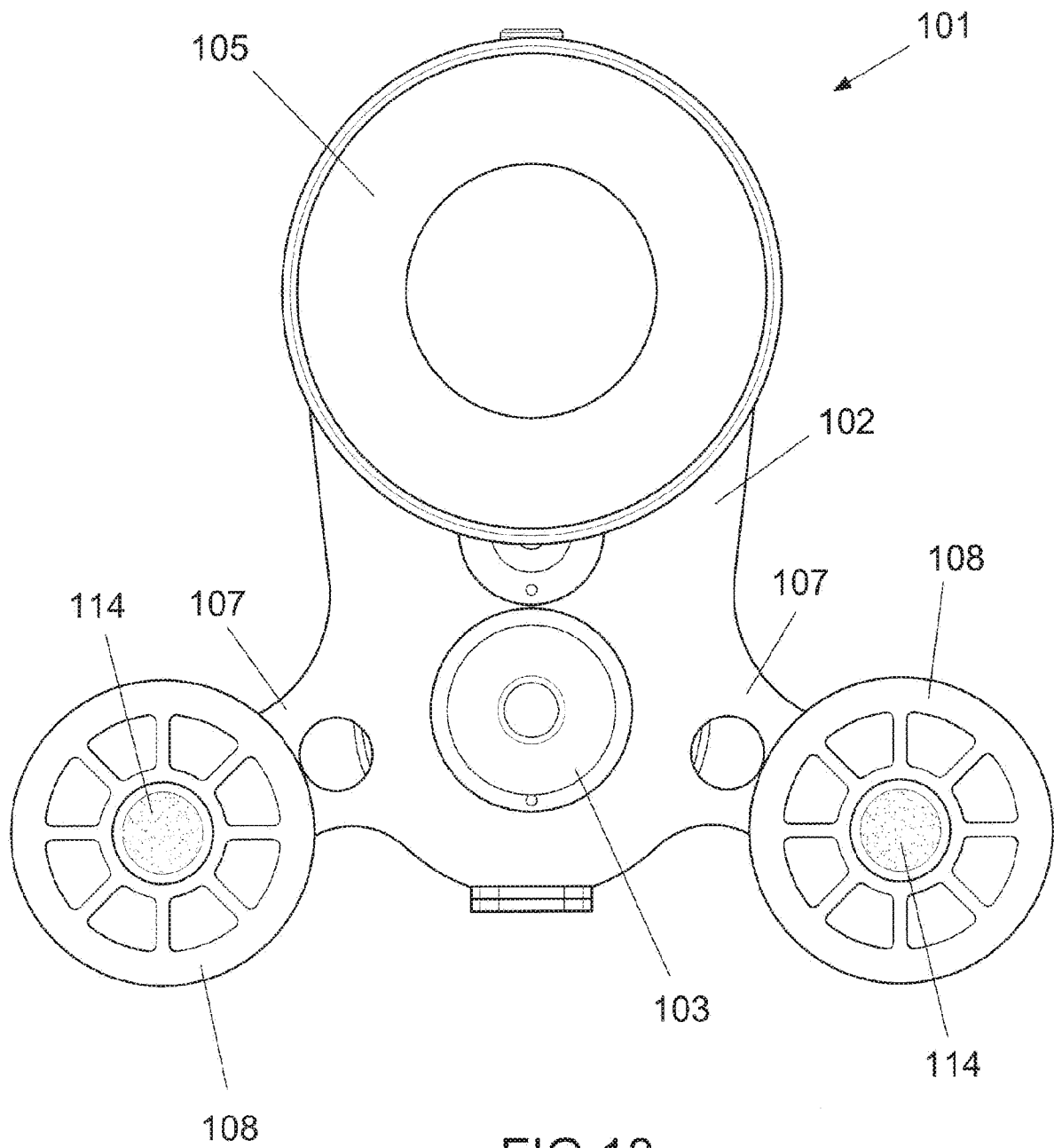


FIG.13

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B26D H04N G05B G08C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2010/067046 A1 (BELRON HUNGARY KFT ZUG BRANCH [CH]) 17 June 2010 (2010-06-17) page 4 - page 6; figures 1-4 -----	1-10
A	US 2017/157787 A1 (SKINNER LUKE J [US] ET AL) 8 June 2017 (2017-06-08) paragraph [0027] - paragraph [0049]; figure 1 -----	1,9,10



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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Maier, Michael

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2019/058804

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010067046	A1	17-06-2010	
		AU 2009326238 A1	17-06-2010
		BR PI0923267 A2	26-01-2016
		CA 2745057 A1	17-06-2010
		CA 2955163 A1	17-06-2010
		CN 102227291 A	26-10-2011
		DK 2355961 T3	22-06-2015
		EP 2355961 A1	17-08-2011
		ES 2539658 T3	02-07-2015
		GB 2465847 A	09-06-2010
		HK 1140456 A1	16-05-2013
		HR P20150654 T1	11-09-2015
		HU E025439 T2	28-04-2016
		ME 01152 B	20-03-2013
		NZ 592787 A	31-01-2014
		PL 2355961 T3	31-08-2015
		PT 2355961 E	22-07-2015
		RU 2011120478 A	20-01-2013
		SI 2355961 T1	30-10-2015
		TW 201028302 A	01-08-2010
		US 2010139471 A1	10-06-2010
		US 2013283986 A1	31-10-2013
		WO 2010067046 A1	17-06-2010

US 2017157787	A1	08-06-2017	
		CN 207223076 U	13-04-2018
		CN 208162736 U	30-11-2018
		TW M549686 U	01-10-2017
		US 2017157787 A1	08-06-2017
