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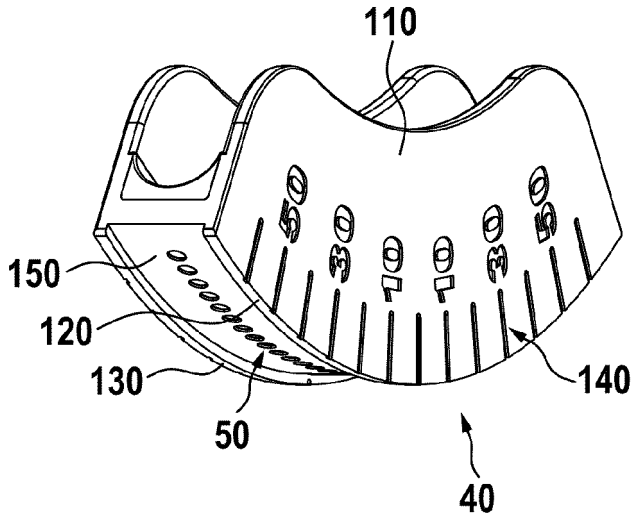
Amended claims in accordance with Rule 137(2) EPC.

(54) **MOUNTING TOOL FOR BALANCING WEIGHTS**

(57) A mounting tool (100) for balancing weights (160) has the shape of an arc segment with a curved outer side (40) forming a groove (150) with permanent magnets (250) for holding the balancing weights (160) and an inner side (50) having a handle (110).

Fig. 3



EP 3 178 612 A1

Description

Field of the invention

[0001] The invention relates to a mounting tool which is used in the assembly process of balancing weights.

Description of the related art

[0002] A magnetic beating iron is disclosed in DE 10 2013 010 618 A1. It is a mounting tool for balancing weights. The balancing weights may be attached to the boarder of a rim and kept there by a retaining spring.

[0003] DE 20 2013 011 165 U1 discloses a plier for removing self-adhesive balancing weights from the rim of a wheel.

[0004] In DE 9418651 U1 a plier for mounting and removing balancing weights is disclosed. The plier comprises a cutting tool, a hammer and a gripping tool.

Summary of the invention

[0005] The problem to be solved by the invention is to provide a simple and robust tool and method for mounting balancing weights to rims of vehicle wheels.

[0006] The solutions of the problem is described in the independent claims. The dependent claims relate to further improvements of the invention.

[0007] The mounting tool may be used to place self-adhesive balancing weights to an inner side of a rim. These balancing weights have a body defined by a width, a length and a thickness comprising of a mass material like plastic, metal or ceramics or a mix thereof.

[0008] The balancing weights may comprise magnetic material or a material with magnetic particles or with a magnetic inlay. Most preferably the balancing weight comprises a zinc body with a steel inlay.

[0009] The balancing weights further may have a self-adhesive tape at one side, by which the mass material may be held to a rim of a wheel. Multiple pieces or segments of such a mass material are held together by the strip of adhesive tape, forming a belt or a belt of balancing weights. The self-adhesive tape is protected by a liner, also called backing at the side opposite to the balancing weight segments. Before applying a balancing weight to a rim, the liner is removed.

[0010] In a first embodiment, a mounting tool for balancing weights is designed as a hand tool. The mounting tool basically may have the shape of an arc segment with a curved outer side and may also have a curved inner side, a front side, a rear side and a thickness between the front side and the rear side. Preferably, the inner side has a smaller radius than the outer side. Most preferably, the radius of the outer side is smaller than the radius of the rim to which balancing weights may be applied. The mounting tool may be made out of plastic or metal or of a mix of these materials. The mounting tool may be formed in one or multiple parts. The curved contour of the mounting tool improves the usability in an environment with limited space.

[0011] The mounting tool preferably has a handle at the inner side. The handle may be made out of one piece or may comprise a first and a second half shell or multiple parts. The handle may enable an ergonomic handling for an operator. The handle may also enable a handling of the mounting tool with an industrial robot.

[0012] The outer side may be a guiding surface for at least one balancing weight and may have a smooth surface. It preferably has a width corresponding to the width of the at least one balancing weight. The guiding surface may have a lateral guide on one side or on both sides which protrude from the guiding surface. The lateral guides preferably are parallel and have a distance defining a groove, corresponding to the width of the at least one balancing weight so that they provide a lateral stop for the at least one balancing weight. The depth of the groove may be smaller or equal than the thickness of the at least one balancing weight.

[0013] The tool may have at least one permanent magnet in close proximity to and preferably under the guiding surface or groove of the hand tool. The at least one permanent magnet have an orientation so that they attract the balancing weights to the guiding surface of the hand tool. They may be embedded or molded into the mounting tool, preferably close to the outer surface, most preferably without contacting the outer surface, preferably forming a small air gap between the magnets and the balancing weights. The outer surface may be the guiding surface. The attraction of the at least one balancing weight by the at least one permanent magnet enables to remove the liner from the adhesive tape without an additional fastener.

[0014] The outer side of the hand tool may be equipped with a weight marking on the front side comprising a center marking for centering the at least one balancing weight to the center of the imbalance at the wheel. This helps to improve the usability of the hand tool. The at least one balancing weights may be centered on the mounting tool.

[0015] The mounting tool may be loaded with at least one balancing weight from an automated dispenser with a predetermined amount of balancing weights as result of measuring the imbalance of a wheel. For this purpose the mounting tool may have a first and a second guide hole for receiving a pair of guide pins at a loading station, to bring the mounting tool in an exact position to a conveyor or any other kind of supply from the dispenser. After supplying the at least one balancing weight from the dispenser to the mounting tool, the at least one balancing weight may be attracted to the guiding surface by the at least one permanent magnet and may be shifted by hand.

[0016] A method for attaching at least one balancing weight on a rim of a wheel with the aforementioned mounting tool may comprise the steps of, measuring the imbalance of a wheel, supplying a predetermined amount of balancing weights from a dispenser to the mounting

tool which may be fixed to a loading station, transporting the mounting tool with the balancing weights to an assembly workplace, rolling the balancing weights to the inner side of the rim. It is further preferred to remove the liner before rolling the balancing weights to the inner side of the rim.

[0017] The transport of the mounting tool as well as the application process of the balancing weights with the mounting tool may be done by a worker or a robot.

Description of Drawings

[0018] In the following, the invention will be described by way of example, without limitation of the general inventive concept, on examples of embodiment with reference to the drawings.

Fig. 1 shows a preferred embodiment of a mounting tool for balancing weights.

Fig. 2 shows a mounting tool in a side view.

Fig. 3 shows the mounting tool in a perspective view.

Fig. 4 shows the mounting tool loaded with balancing weights.

Fig. 5 shows a mounting tool during it is used to apply balancing weights to a rim.

Fig. 6 shows a mounting tool used to apply an amount of balancing weights to a rim.

[0019] In Fig. 1, a preferred embodiment of a mounting tool (100) is shown. The mounting tool basically may have the shape of an arc segment with a curved outer side (40) defining a guiding surface (60) for balancing weights (160) and may also have a curved inner side (50), a front side (70), a rear side and a thickness between the front side and the rear side. Preferably, the inner side (50) has a smaller radius than the outer side (40). The mounting tool (100) is designed as a hand tool. It has a handle (110), at an inner side (50), which may comprise a first half and a second half. The tool may have a weight marking (140) on the front side (70) and preferably a center marking for centering the balancing weights to the center of the imbalance. In Fig. 2, a sectional view of the mounting tool (100) in a preferred embodiment is shown. The mounting tool (100) preferably has a fist lateral guide (120) and a second lateral guide (130) parallel to the fist lateral guide (120) and along the guiding surface (60) forming a groove (150) at the outer side (40) of the mounding tool (100). The width (10) of the groove (150) is as broad as the balancing weights (160). Under the groove (150) a number of permanent magnets (250) are placed in a way so that they attract the balancing weights (160) to the groove (150).

[0020] In Fig. 3, a perspective view of the mounting tool (100) is shown. It shows the fist and the second lateral guide (120, 130), the groove (150), the inner side (50) of the mounting tool (100).

[0021] In Fig. 4, a side view of the mounting tool (100) attached to a feeder (170) is shown. A predetermined number of balancing weights (160) are supplied from a dispenser (240) by means of a feeder. The feeder (170) may be a belt conveyor, a slider or any other kind of feeder.

[0022] In Fig. 5, a view of a rim (180) with a mounting tool (100) is shown. The mounting tool (100) is used to attach balancing weights (160) to the rim (180) with contact pressure (200) generated by the hand of a user (230) by gently rolling the mounting tool (100) which is loaded with the balancing weights (160) on the inner surface of a rim (180).

[0023] In Fig. 6, a side view of a rim (180) with a mounting tool (100) is shown. The mounting tool (100) is used to attach balancing weights (160) to the rim (180) with contact pressure (200) generated by the hand of a user (230) by gently rolling the mounting tool (100) in a direction of motion (260). The mounting tool is loaded with the balancing weights (160) on the inner surface of a rim (180). The balancing weights (250) may be held together and fixed to the rim by strip of an adhesive tape (270).

[0024] In Fig. 7, a view of a rim (180) with a mounting tool (100) is shown. The mounting tool (100) is used to attach balancing weights (160) to the rim (180) with contact pressure (200) generated by the hand of a user (230), grapping into the mounting tool (100), by gently rolling the mounting tool (100) which is loaded with the balancing weights (160) on the inner sur-face of a rim (180).

List of reference numerals

[0025]

10	width
40	outer side
50	inner side
60	guiding surface
70	front side
100	mounting tool
110	handle
120	first lateral guide
130	second lateral guide
140	weight marking
150	groove
160	balancing weights
170	feeder
180	rim
200	contact pressure
230	hand of a user
240	supply direction from a dispenser
250	permanent magnets
260	direction of motion
270	adhesive tape

Claims

1. A mounting tool (100) for at least one balancing weight (160) having the shape of an arc segment with a curved outer side (40) forming a guiding surface (150) for the at least one balancing weight (160) and an inner side (50) having a handle (110).

2. A mounting tool (100) according to claim 1,
characterized in, that
the guiding surface (150) has a first lateral guide (120) and a second lateral guide (130) parallel to the first lateral guide (120), both protruding from the guiding surface (150) and defining a groove (60).

3. A mounting tool (100) according to claim 2,
previous claims,
characterized in, that
the first lateral guide (120) and the second lateral guide (130) have a distance equal to the width (10) of the at least one balancing weight (160).

4. A mounting tool (100) according to any one of the previous claims,
characterized in, that
the depth of the groove (60) between the lateral guides (120, 130) is less or equal than than the thickness of the balancing weights (160).

5. A mounting tool (100) according to any one of the previous claims,
characterized in, that
the tool has at least one permanent magnet (250) in close proximity to the guiding surface (60) or groove (150).

6. A mounting tool (100) according to any one of the previous claims,
characterized in, that
the at least one permanent magnet (250) is embedded or molded close to the groove (60) or guiding surface (150).

7. A mounting tool (100) according to any one of the previous claims,
characterized in, that
a small air gap is provided between the at least one permanent magnet (250) and the balancing weights.

8. A mounting tool (100) according to any one of the previous claims,
characterized in, that
the front side (70) has a weight marking (140).

9. A mounting tool (100) according to claim 8,
characterized in, that
the weight marking (140) has a center marking for centering the balancing weights (250) to the center of an imbalance.

10. A mounting tool (100) according to any one of the previous claims,
characterized in, that
the mounting tool has a first and second guide hole.

11. A method for mounting balancing weights (160) to a rim with a mounting tool (100) comprising the steps of,
measuring the imbalance of a wheel,
supplying a predetermined amount of balancing weights from a dispenser to the mounting tool (100),
transporting the mounting tool (100) with the balancing weights (160) to the assembly workplace,
rolling the mounting tool (100) at an inner side of the rim (180) of a wheel to deliver the balancing weights to the wheel.

Amended claims in accordance with Rule 137(2) EPC.

1. A hand mounting tool (100) for at least one balancing weight (160) having
the shape of an arc segment with a curved outer side (40) forming a guiding surface (150) for the at least one balancing weight (160) and an inner side (50) having a handle (110) for an operator
characterized in, that
the guiding surface (150) has a first lateral guide (120) and a second lateral guide (130) parallel to the first lateral guide (120), both protruding from
the guiding surface (150) and defining a groove (60).

2. A hand mounting tool (100) according to claim 1,
previous claims,
characterized in, that
the first lateral guide (120) and the second lateral guide (130) have a distance equal to the width (10) of the at least one balancing weight (160).

3. A hand mounting tool (100) according to any one of the previous claims,
characterized in, that
the depth of the groove (60) between the lateral guides (120, 130) is less or equal than than the thickness of the balancing weights (160).

4. A hand mounting tool (100) according to any one of the previous claims,
characterized in, that
the tool has at least one permanent magnet (250) in close proximity to the guiding surface (60) or groove (150).

5. A hand mounting tool (100) according to any one of the previous claims,

characterized in, that
the at least one permanent magnet (250) is embedded or molded close to
the groove (60) or guiding surface (150).

6. A hand mounting tool (100) according to any one of the previous claims,
characterized in, that
a small air gap is provided between the at least one permanent magnet (250) and the balancing weights.

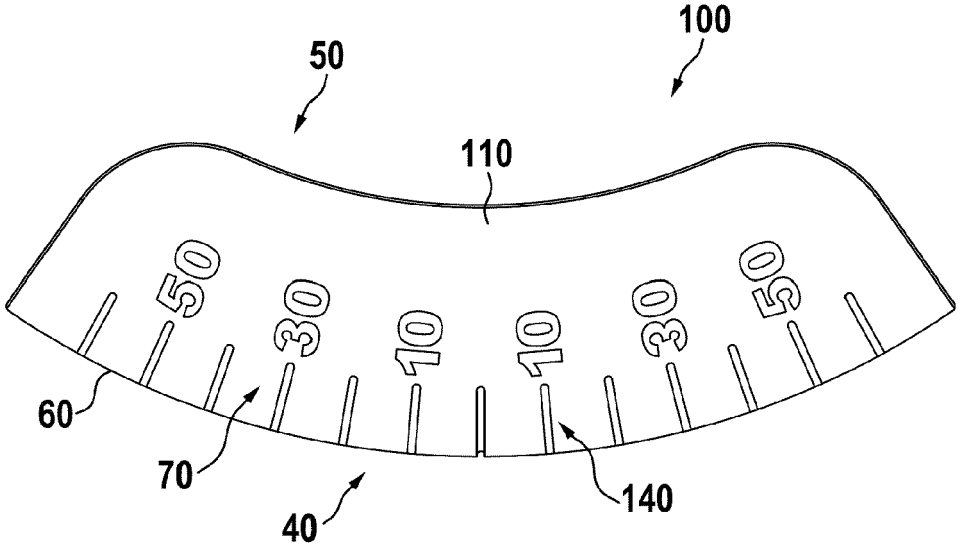
7. A hand mounting tool (100) according to any one of the previous claims,
characterized in, that
the front side (70) has a weight marking (140).

8. A hand mounting tool (100) according to claim 8,
characterized in, that
the weight marking (140) has a center marking for centering the balancing weights (250) to the center of an imbalance.

9. A hand mounting tool (100) according to any one of the previous claims,
characterized in, that
the mounting tool has a first and second guide hole.

10. A method for mounting balancing weights (160) to a rim with a hand mounting tool (100) by an operator comprising the steps of,
measuring the imbalance of a wheel,
supplying a predetermined amount of balancing weights from a dispenser to the hand mounting tool (100),
transporting the hand mounting tool (100) with the balancing weights (160) to the assembly workplace,
rolling the hand mounting tool (100) at an inner side of the rim (180) of a wheel to deliver the balancing weights to the wheel.

Fig. 1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70
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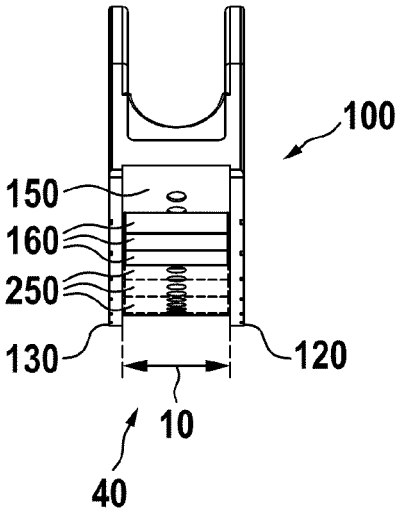
140

Fig. 2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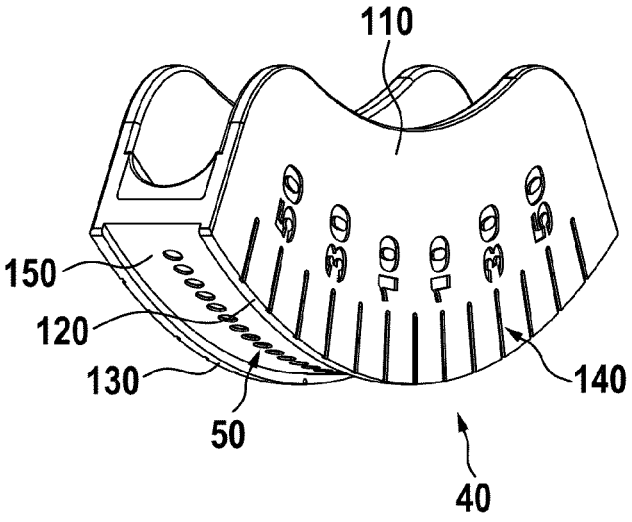
250
130
120
10
40

Fig. 3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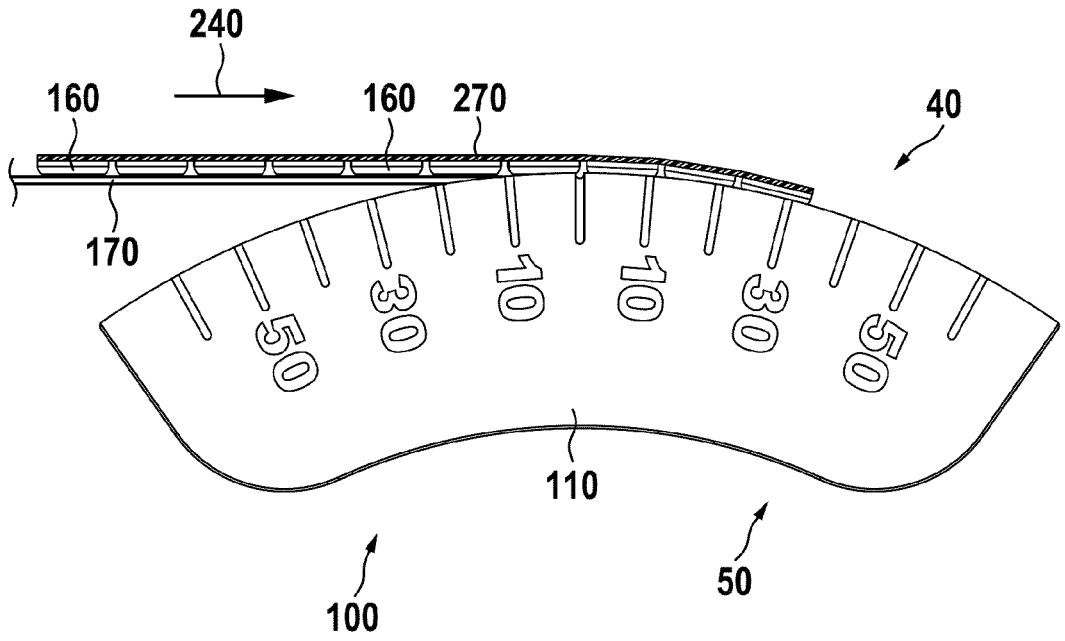
40
140

Fig. 4


240
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270
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170
50
30
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10
30
50
110
100
50

Fig. 5

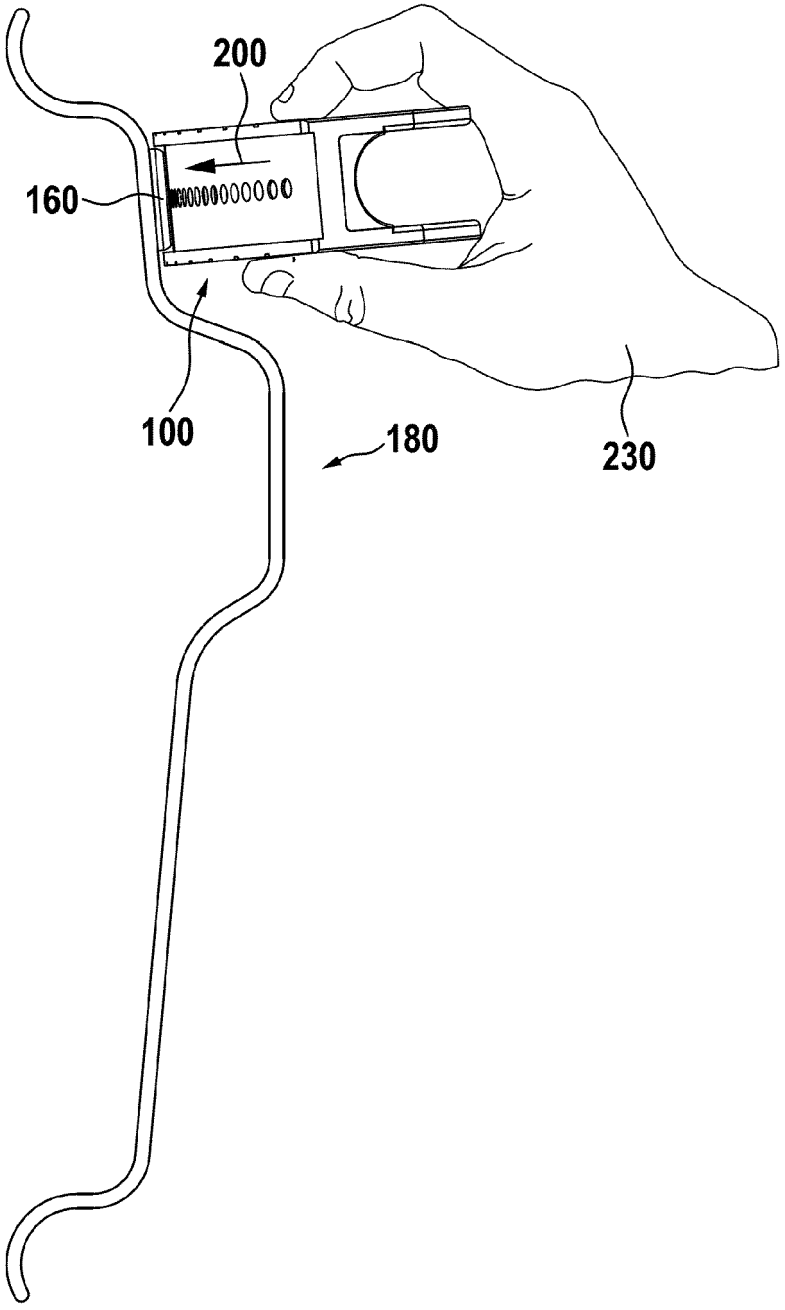


Fig. 6

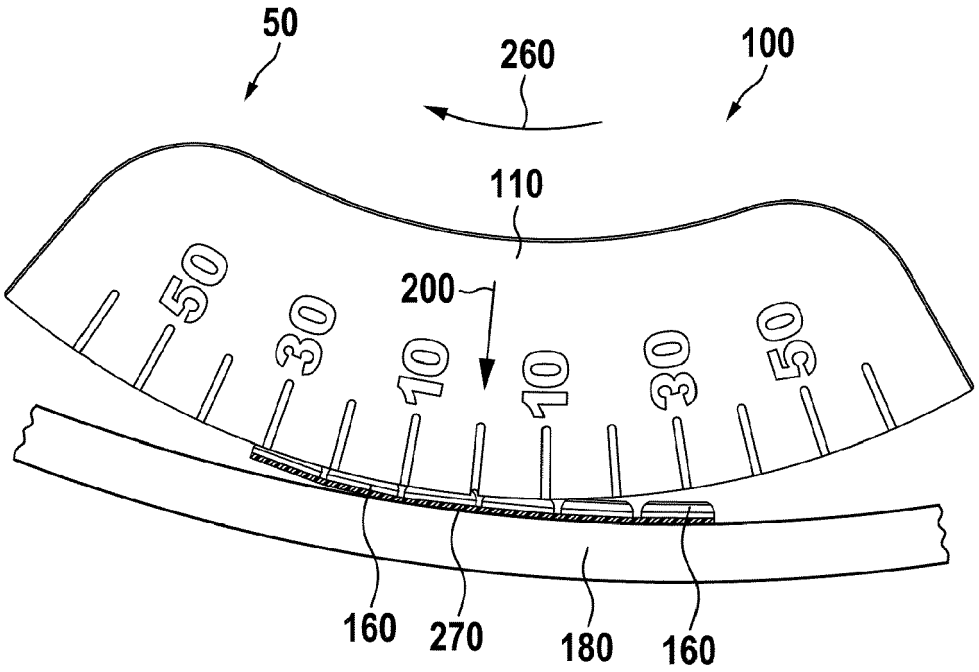
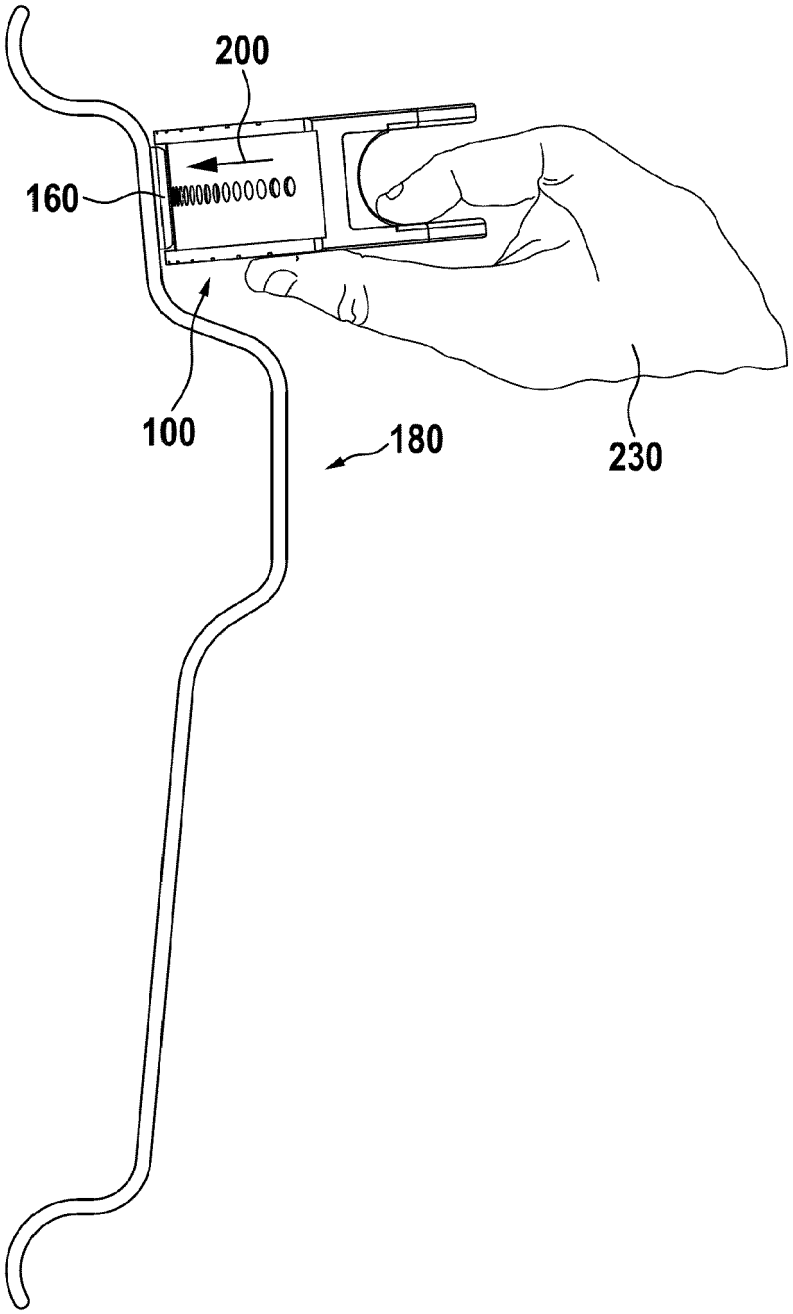


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 8717

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	EP 2 829 860 A2 (SCHENCK ROTEC GMBH [DE]) 28 January 2015 (2015-01-28) * paragraph [[0020]] *	5-7	
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			TECHNICAL FIELDS SEARCHED (IPC) B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 May 2016	Hartnack, Kai

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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24-05-2016

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