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(54) **Locking mechanism for a glove box**

Verriegelungsmechanismus für ein Handschuhfach

Mécanisme de verrouillage pour boîte à gants

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Description

[0001] The invention relates to a locking mechanism for a glove box of a vehicle.

[0002] Glove boxes for vehicles are known in the prior art. Glove boxes are located in the passenger compartments of vehicles and used to store goods. In order to lock the goods within the glove box, the glove box has a lid. The lid requires a mechanism which ensures that the goods in the glove box cannot fall out unintentionally. For this reason, the lid typically has a latch.

[0003] US 7,036,852 B2 provides a system for operating the rod of a glove box capable of reducing the number of parts by simplifying the structure for operating the rod used in a locking device of the glove box and improving productability by decreasing the size of the installation space.

[0004] EP 2 090 468 A1 provides a locking mechanism for a glove box of a vehicle comprising:

- a vertically operable handle for accessing the glove box, wherein the handle comprises a lever,
- two locking rods with pins for engagement of the pins with a counterpart locking recess of the vehicle, wherein each of the locking rods comprises a rack,
- a rotor engaging simultaneously with the rack of the locking rods, wherein the rotor comprises an appendix attached to the rotor and in contact with the lever, wherein the appendix is adapted for converting a vertical movement of the lever into a rotational movement of the rotor.

[0005] It is an objective of the invention to provide an improved locking mechanism for a glove box.

[0006] The invention is described by the independent claim. Preferred embodiments are described by the dependent claims.

[0007] A locking mechanism for a glove box of a vehicle is provided comprising a vertically operable handle for accessing the glove box, wherein the handle comprises a lever. Further, the mechanism comprises at least two locking rods with pins for engagement of the pins with a counterpart locking recess of the vehicle. Each of the locking rods comprises a rack gear. Further, the mechanism comprises a pinion engaging simultaneously with the rack gears of the locking rods, wherein the pinion comprises a bar attached to the pinion and in contact with the lever, wherein the bar is adapted for converting a vertical movement of the lever into a rotational movement of the pinion.

[0008] According to the invention, the contact region of the lever and the bar is disposed from the rotation axis of the pinion at a distance, wherein the distance is at least the diameter of the pinion. This has the advantage, that a lever action between the bar and the pinion can be used thus reducing the force necessary to operate the

handle in order to enable the rotation of the pinion and thus the horizontal movement of the locking rods.

[0009] Embodiments of the present invention may have the advantage that a vertically operable handle can be combined with a horizontally operating latch mechanism for a glove box with minimized space requirements. Only a single pinion is required and thus the number of required parts for assembly of the locking mechanism is minimized. Further, due to the minimized number of parts, the friction within the individual components is reduced thus easing the operability of the locking mechanism by vertically operating the handle.

[0010] It has to be noted that throughout the invention a vehicle is understood as any kind of transportation system including a car, van, pickup, train, ship or plane, which is capable of transporting passengers. Further, a glove box is understood as any lockable compartment within the vehicle which is able to store goods. The only requirement is that the handle of the glove box is operable by a vertical movement. Generally, a vertical movement is understood as the main movement direction when operating the handle to open the glove box. This may also comprise a further movement for example away from the glove box lid. In combination, this may thus comprise an elliptic or almost rotational movement of the handle.

[0011] In accordance with an embodiment of the invention, the pinion has two pinion gears located on opposite sides of the pinion, wherein the two pinion gears simultaneously engage directly with the rack gears. This has the advantage, that the locking rods are operated simultaneously with equal force, i.e. with even transmission of forces onto the locking rods.

[0012] In accordance with an embodiment of the invention, the lever has a direction of extension from the handle towards the bar, wherein the direction of the extension of the lever and the axis of the pinion are laterally displaced with respect to one another.

[0013] In accordance with an embodiment of the invention, the locking mechanism further comprises a lock cylinder attached to the handle, wherein the lever is attached to the lock cylinder. Preferably, the axis of the lock cylinder and the axis of the pinion are excentric.

[0014] In accordance with an embodiment of the invention, the lever has a direction of extension from the handle towards the bar, wherein the direction of extension of the lever and the axis of the lock cylinder are laterally displaced with respect to one another. This may have several advantages. A first advantage may be that by only a small movement of the handle and thus the lock, a large displacement of the lever is obtained. As a consequence, a user of the locking mechanism only has to for example pull the handle and displace it vertically over a rather little distance, whereas nevertheless the pinion is operated smoothly for completely disengaging the pins from the counterpart locking recess of the vehicle.

[0015] A further advantage may be given in case of the embodiment that the lock cylinder, the lever and the bar

are arranged in that a rotational movement of the lock cylinder permits enabling or disabling the contact of the lever and the bar. In this embodiment, by the rotational movement of the lock cylinder locking or unlocking the glove box can be realized. In the unlocked state, the bar is in contact with the lever, whereas in the locked state, due to the rotation of the latch and thus the lever, the lever is pivoting sideways from the bar in case the handle is operated. Thus, in the locked state there is no force transmission contact between the lever and the bar such that there is no way to cause a rotational movement to the pinion and thus a horizontal movement to the locking rods.

[0016] It has to be noted, that within the contact area of the bar and the lever, both the bar and the lever preferably have corresponding flat surface shapes. However, any other surface shapes are also possible.

[0017] In accordance with an embodiment of the invention, the locking mechanism further comprises a resetting spring for providing a torque force resetting the rotational movement of the pinion. For example, the resetting spring comprises a torsion spring or a clock spring. By this spring, the rotational movement of the pinion and thus the disengagement of the pins from the counterpart locking recess of the vehicle upon operation of the handle is reset as soon as the handle is not operated anymore by the user. In a further embodiment, the handle itself may also comprise a resetting spring thus forcing the handle back to its original position.

[0018] In the following, preferred embodiments of the invention are described in greater detail by way of example only.

Fig. 1 illustrates a schematic view of a glove box,

Fig. 2 illustrates a locking mechanism for a glove box in the non-operated state of the handle,

Fig. 3 shows the illustration of Fig. 2 in the operated state of the handle,

Fig. 4 is a schematic front view of the locking mechanism of Fig. 2.

[0019] Similar embodiments will be designated by the same reference numerals.

[0020] Fig. 1 schematically illustrates a glove box 100 with a locking mechanism. The glove box 100 comprises a lid 122 which can rotate in direction 104 away from the interior space of the glove box upon operation of the locking mechanism. The locking mechanism is operated by pulling up the handle 120 in vertical direction 106. The pulling of the handle may also comprise a movement component in the direction away from the interior space of the glove box. Due to this pulling of the handle 120, the locking mechanism (not fully visible) in Fig. 1 is operated and the locking rods 114 and 116 are disengaged with their locking pins 118 from respective recesses 110

located in support parts 108 of the vehicle.

[0021] As a consequence, by vertical movement of the handle 120 into direction 106, i.e. the vertical z-direction of the vehicle, the locking rods 114 and 116 are moved in a horizontal direction, for example the y-direction of the vehicle. The y-direction of the vehicle is the lateral direction of the vehicle, the x-direction is the longitudinal direction of the vehicle and the z-direction is the direction perpendicular to the x and y-direction, i.e. the vertical direction of the vehicle.

[0022] Fig. 2 shows a perspective view of the locking mechanism in a non-operated stage of the handle 120. The handle 120 comprises a lever. Further, in Fig. 2 the locking rods each comprise a respective rack gear 200 (the rack gear 200 of the locking rod 114 is not visible in Fig. 2). A pinion 204 is engaging simultaneously with the rack gears 200 of the locking rods 114 and 116. Further, the pinion 204 comprises a bar 208 attached to the pinion 204 and in contact with the lever 206. The bar 208 is adapted for converting a vertical movement of the lever 206 into direction 212 into a rotational movement of the pinion 204.

[0023] By the rotational movement of the pinion 204, the locking rod 114 is moved to the left direction, whereas the locking rod 116 is moved into the right direction. This results in a disengagement of the pins of the locking rods 114 and 116 from the respective locking recesses of the vehicle.

[0024] The pinion 204 has two pinion gears 202 located on opposite sides of the pinion 204. These two pinion gears 202 engage simultaneously and directly with the respective rack gears 200 of the locking rods 114 and 116. As a consequence, by movement of the latch 206 into direction 212, the bar 208 is also pushed into direction 212. This results in a rotation of the pinion 204 in a counter-clockwise direction. As a consequence, at the same time the locking rods 114 and 116 are moving. Thus, by means of the two pinion gears 202, an even transmission of forces onto the locking rods 114 and 116 is provided. Further, due to the pinion gears 202 being located on opposite sides of the pinion 204, the locking rods 114 and 116 can be arranged almost mirror inverted in the glove box. As a consequence, a constant movement process of the locking rods 114 and 116 upon operation of the handle 120 can be ensured.

[0025] This is shown in detail in Fig. 3. Fig. 3 shows the locking mechanism of Fig. 2 in a state in which the handle 120 is pulled up in the vertical direction 106. Due to the movement of the handle 120 into the vertical direction, which may comprise a rotational movement 106, the lever 206 is moved into the direction 212. This pushes the bar 208 which is in contact with the lever 206 into the same direction 212. As a consequence, the pinion 204 to which the bar 208 is attached is rotated counter-clockwise. The two pinion gears 202 engaged with the rack gears 200 thus push the locking rods 114 and 116 in a horizontal movement. This results in the above described disengagement of the pins of the two locking rods from

the counterpart locking recess of the vehicle.

[0026] In order to limit a movement of the pinion and thus the locking rods 114 and 116, the pinion or the bar comprises a stop bar 210. The stop bar 210 limits the rotational movement of the pinion 204 and thus the movement of the bar 208 to a predefined extent.

[0027] Further shown in Fig. 3 is a lock cylinder 112. The lever 206 is attached to the lock cylinder 112. By a rotational movement in counter-clockwise direction 300, the lock cylinder can be rotated thus disabling the contact between the lever 206 and the bar 208. For this purpose, the direction of extension of the lever 206 and the axis of the lock cylinder 112 are laterally displaced with respect to one another. In the contact enabled state of the lock cylinder 112, the lateral displacement of the extension of the lever and the axis of the lock cylinder is in vertical direction.

[0028] Fig. 4 shows a front view of the locking mechanism discussed with respect to Fig. 2. The locking rods 116 and 118 can be clearly seen including the respective pins 118 for engagement with the non-visible counterpart locking recesses of the vehicle. The bar 208 and the lever 206 of Fig. 2 both have a flat and even contact region which maximizes the area of force transmission between the lever 206 and the bar 208. Further, the contact region of the lever and the bar which is the region 404 in Fig. 4 is disposed from the rotation axis of the pinion 204 by a distance 402. This distance 402 is at least the diameter 400 of the pinion 204. This maximizes the lever action at the bar 208 and thus minimizes the force required in order to operate the bar and thus the locking mechanism. Nevertheless, the total size of the locking mechanism is kept small.

[0029] By means of a movement of the handle (grip handle) into the z-direction, for example by means of a rotational movement about 30 degrees, a force is transmitted from the handle over the lever onto the bar of the pinion. As a result, the pinion is rotated. This results in a movement of the rack gears and thus the locking rods in a horizontal direction (y-direction). After the locking rods reached their final position, the pins of the locking rods are disengaged from the counterpart locking recesses of the vehicle and the lid of the glove box can be opened. Upon releasing the handle 120, no force is acting anymore onto the bar 208. Preferably, the handle comprises a spring mechanism which forces the handle and thus the lever back into its non-operated position, i.e. the position shown in Fig. 2. Further, by means of a resetting spring comprised with the pinion 204, the rotational movement of the pinion 204 is reset via a torque force. As a consequence, without a force acting from the lever onto the bar, the torque force forces the pinion 204 in a clockwise rotation. Thus, the locking rods 114 and are moving back into their original position shown in Fig. 2.

List of Reference Numerals

[0030]

100	glove box
104	direction
106	rotational direction
108	vehicle structure
5 110	recess
112	lock cylinder
114	locking rod
116	locking rod
118	pin
10 120	handle
122	glove box lid
200	rack gear
202	pinion gears
204	pinion
15 206	lever
208	bar
210	stop bar
212	direction
300	direction
20 400	diameter
402	distance
404	area

25 Claims

1. A locking mechanism for a glove box (100) of a vehicle comprising:
 - 30 - a vertically operable handle (120) for accessing the glove box (100), wherein the handle (120) comprises a lever (206),
 - 35 - at least two locking rods (114; 116) with pins (118) for engagement of the pins (118) with a counterpart locking recess of the vehicle, wherein each of the locking rods (114; 116) comprises a rack gear,
 - 40 - a pinion (204) engaging simultaneously with the rack gears (200) of the locking rods (114; 116), wherein the pinion (204) comprises a bar (208) attached to the pinion (204) and in contact with the lever (206), wherein the bar (208) is adapted for converting a vertical movement of the lever (206) into a rotational movement of the pinion (204), and
 - 45 - wherein the contact region (404) of the lever (206) and the bar (208) is disposed from the rotation axis of the pinion (204) at a distance (402), wherein the distance (402) is at least the diameter (400) of the pinion (204).
2. The locking mechanism of claim 1, wherein the pinion (204) has two pinion gears (202) located on opposite sides of the pinion (204), wherein the two pinion gears (202) simultaneously engage directly with the rack gears (200).

3. The locking mechanism of claim 1 or 2, wherein the lever (206) has a direction of extension from the handle (120) towards the bar (208), wherein the direction of extension of the lever (206) and the axis of the pinion (204) are laterally displaced with respect to one another. 5
4. The locking mechanism of any of the previous claims, wherein the locking mechanism further comprises a lock cylinder (112) attached to the handle (120), wherein the lever (206) is attached to the lock cylinder (112). 10
5. The locking mechanism of claim 4, wherein the axis of the lock cylinder (112) and the axis of the pinion (204) are excentric. 15
6. The locking mechanism of claim 4 or 5, wherein the lever (206) has a direction of extension from the handle (120) towards the bar (208), wherein the direction of extension of the lever (206) and the axis of the lock cylinder (112) are laterally displaced with respect to one another. 20
7. The locking mechanism of claim 6, wherein the lock cylinder (112), the lever (206) and the bar (208) are arranged in that a rotational movement of the lock cylinder (112) permits enabling or disabling the contact of the lever (206) and the bar (208). 25
8. The locking mechanism of any of the previous claims, further comprising a resetting spring for providing a torque force resetting the rotational movement of the pinion (204). 30
9. The locking mechanism of claim 8, wherein the resetting spring comprises a torsion spring or a clock spring. 35

Patentansprüche

1. Verriegelungsmechanismus für ein Handschuhfach (100) eines Fahrzeugs, umfassend: 45
 - einen vertikal zu betätigenden Griff (120) für einen Zugriff auf das Handschuhfach (100), wobei der Griff (120) einen Hebel (206) umfasst,
 - mindestens zwei Verriegelungsstäbe (114; 116) mit Stiften (118) zum Eingreifenlassen der Stifte (118) in eine als Gegenstück dienende Verriegelungsaussparung des Fahrzeugs, wobei jeder von den Verriegelungsstäben (114; 116) eine Zahnstange umfasst,
 - ein Ritzel (204), das gleichzeitig mit den Zahnstangen (200) der Verriegelungsstäbe (114; 116) in Eingriff ist, wobei das Ritzel (204) eine Stange (208) aufweist, die am Ritzel (204) be-

festigt ist und mit dem Hebel (206) in Kontakt steht, wobei die Stange (208) dafür ausgelegt ist, eine vertikale Bewegung des Hebels (206) in eine Drehbewegung des Ritzels (204) umzuwandeln.

- wobei die Kontaktregion (404) des Hebels (206) und der Stange (208) einen Abstand (402) zur Drehachse des Ritzels (204) aufweist, wobei der Abstand (402) zumindest so groß ist wie der Durchmesser (400) des Ritzels (204).

2. Verriegelungsmechanismus nach Anspruch 1, wobei das Ritzel (204) zwei Antriebsritzel (202) aufweist, die auf einander entgegengesetzten Seiten des Ritzels (204) angeordnet sind, wobei die beiden Antriebsritzel (202) gleichzeitig direkt mit den Zahnstangen (200) in Eingriff sind.
3. Verriegelungsmechanismus nach Anspruch 1 oder 2, wobei der Hebel (206) eine Verlaufsrichtung vom Griff (120) zur Stange (208) aufweist, wobei die Verlaufsrichtung des Hebels (206) und die Achse des Ritzels (204) in Bezug aufeinander seitlich versetzt sind.
4. Verriegelungsmechanismus nach einem der vorangehenden Ansprüche, wobei der Verriegelungsmechanismus ferner einen Verriegelungszyylinder (112) aufweist, der am Griff (120) befestigt ist, wobei der Hebel (206) am Verriegelungszyylinder (112) befestigt ist.
5. Verriegelungsmechanismus nach Anspruch 4, wobei die Achse des Verriegelungszyinders (112) und die Achse des Ritzels (204) exzentrisch sind.
6. Verriegelungsmechanismus nach Anspruch 4 oder 5, wobei der Hebel (206) eine Verlaufsrichtung vom Griff (120) zur Stange (208) aufweist, wobei die Verlaufsrichtung des Hebels (206) und die Achse des Verriegelungszyinders (112) in Bezug aufeinander seitlich versetzt sind.
7. Verriegelungsmechanismus nach Anspruch 6, wobei der Verriegelungszyylinder (112), der Hebel (206) und die Stange (208) so angeordnet sind, dass eine Drehbewegung des Verriegelungszyinders (112) den Kontakt zwischen Hebel (206) und Stange (208) zulässt oder verhindert.
8. Verriegelungsmechanismus nach einem der vorangehenden Ansprüche, ferner eine Rückstellfeder aufweisend, die ein Drehmoment bereitstellt, das die Drehbewegung des Ritzels (204) zurückstellt.
9. Verriegelungsmechanismus nach Anspruch 8, wobei die Rückstellfeder eine Torsionsfeder oder eine Uhrfeder umfasst.

Revendications

1. Mécanisme de verrouillage pour une boîte à gants (100) d'un véhicule, comprenant :

- une poignée actionnable verticalement (120) pour l'accès à la boîte à gants (100), la poignée (120) comprenant un levier (206),
- au moins deux tiges de verrouillage (114 ; 116) avec des goupilles (118) pour l'engagement des goupilles (118) avec un renforcement de verrouillage correspondant du véhicule, chacune des tiges de verrouillage (114 ; 116) comprenant un engrenage à crémaillère,
- un pignon (204) apte à s'engager simultanément avec les engrenages à crémaillère (200) des tiges de verrouillage (114 ; 116) comprend une barre (208) reliée au pignon (204) et en contact avec le levier (206), la barre (208) étant adaptée pour convertir un mouvement vertical du levier (206) en un mouvement de rotation du pignon (204),
- dans lequel la région de contact (404) du levier (206) et de la barre (208) se trouve à une distance (402) de l'axe de rotation du pignon (204), la distance (402) étant au moins égale au diamètre (400) du pignon (204).

2. Mécanisme de verrouillage selon la revendication 1, dans lequel le pignon (204) possède deux engrenages de pignon (202) situés sur des côtés opposés du pignon (204), les deux engrenages de pignon (202) étant aptes à s'engager directement avec les engrenages à crémaillère (200).

3. Mécanisme de verrouillage selon la revendication 1 ou 2, dans lequel le levier (206) présente une direction d'extension allant de la poignée (120) vers la barre (208), la direction d'extension du levier (206) et de l'axe du pignon (204) étant décalées latéralement l'une par rapport à l'autre.

4. Mécanisme de verrouillage selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de verrouillage comprend en outre un cylindre de verrouillage (112) relié à la poignée (120) le levier (206) étant relié au cylindre de verrouillage (112).

5. Mécanisme de verrouillage selon la revendication 4, dans lequel l'axe du cylindre de verrouillage (112) et l'axe du pignon (204) sont excentriques.

6. Mécanisme de verrouillage selon la revendication 4 ou 5, dans lequel le levier (206) présente une direction d'extension allant de la poignée (120) vers la barre (208), la direction d'extension du levier (206) et l'axe du cylindre de verrouillage (112) étant déca-

lées latéralement l'une par rapport à l'autre.

7. Mécanisme de verrouillage selon la revendication 6, dans lequel le cylindre de verrouillage (112), le levier (206) et la barre (208) sont agencés de manière à ce qu'un mouvement de rotation du cylindre de verrouillage (112) permette la mise en contact ou la mise hors contact du levier (206) et de la barre (208).

8. Mécanisme de verrouillage selon l'une quelconque des revendications précédentes, comprenant en outre un ressort de rappel pour fournir une force de couple rappelant le mouvement de rotation du pignon (204).

9. Mécanisme de verrouillage selon la revendication 8, dans lequel le ressort de rappel comprend un ressort de torsion ou un ressort d'horloge.

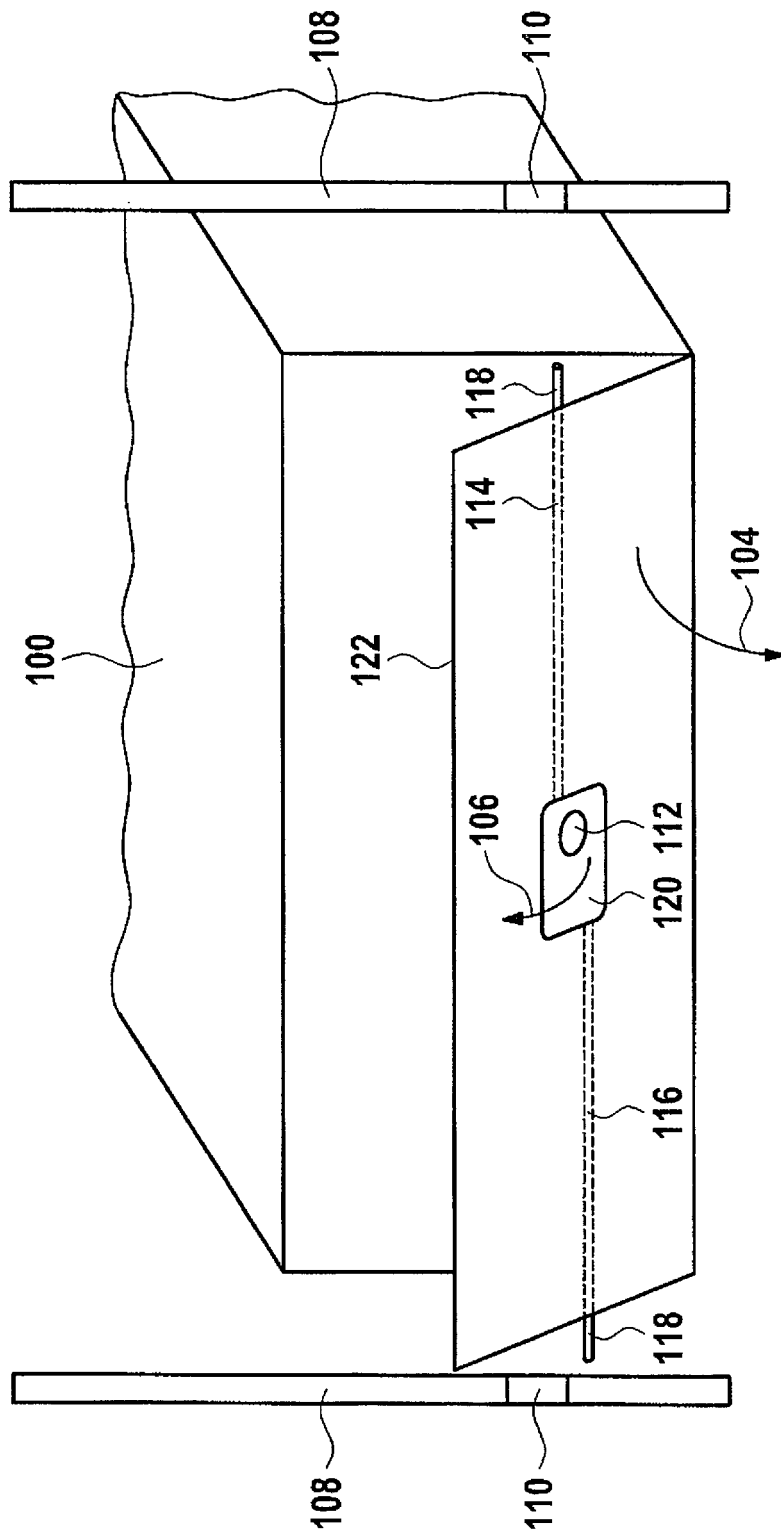


Fig. 1

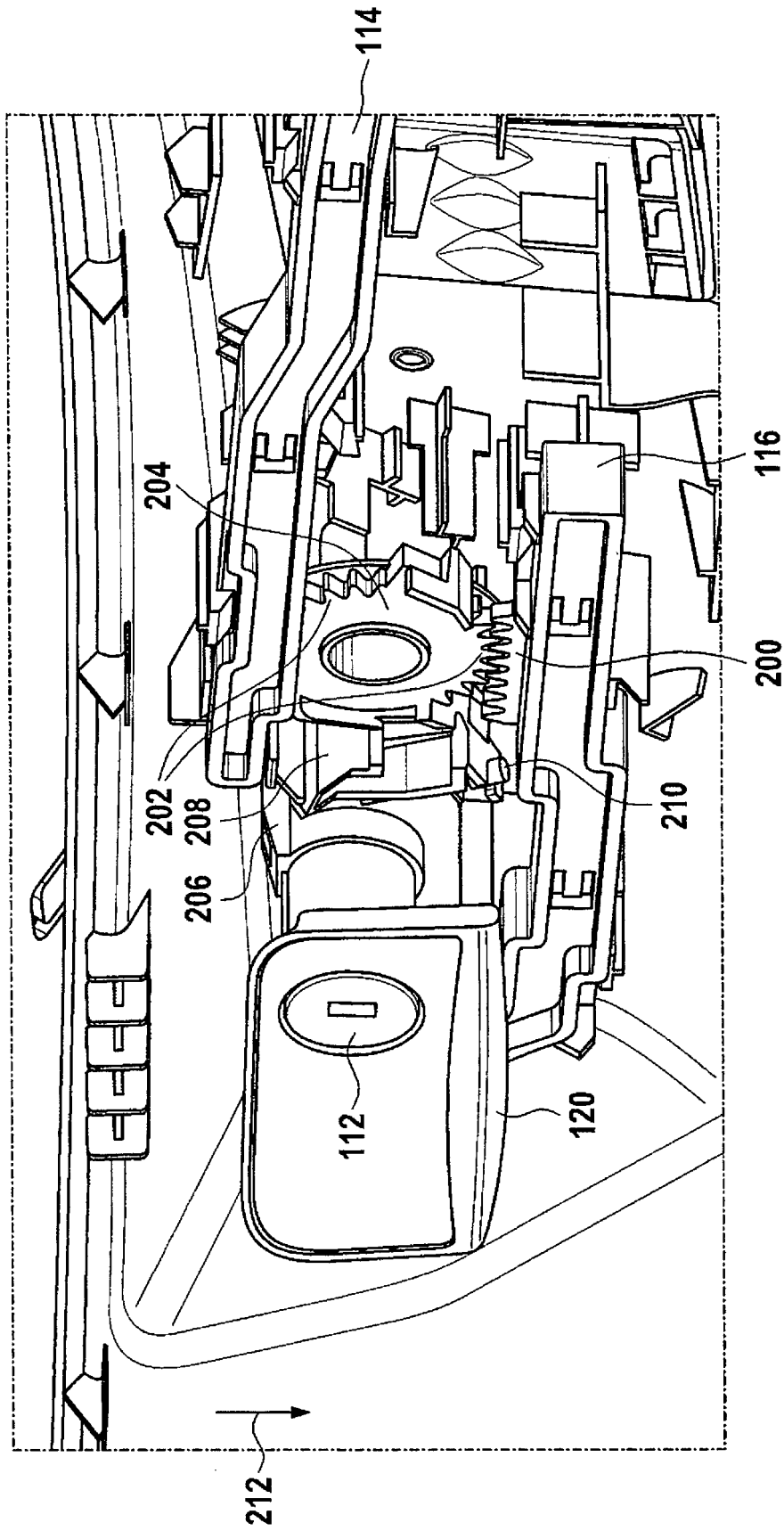


Fig. 2

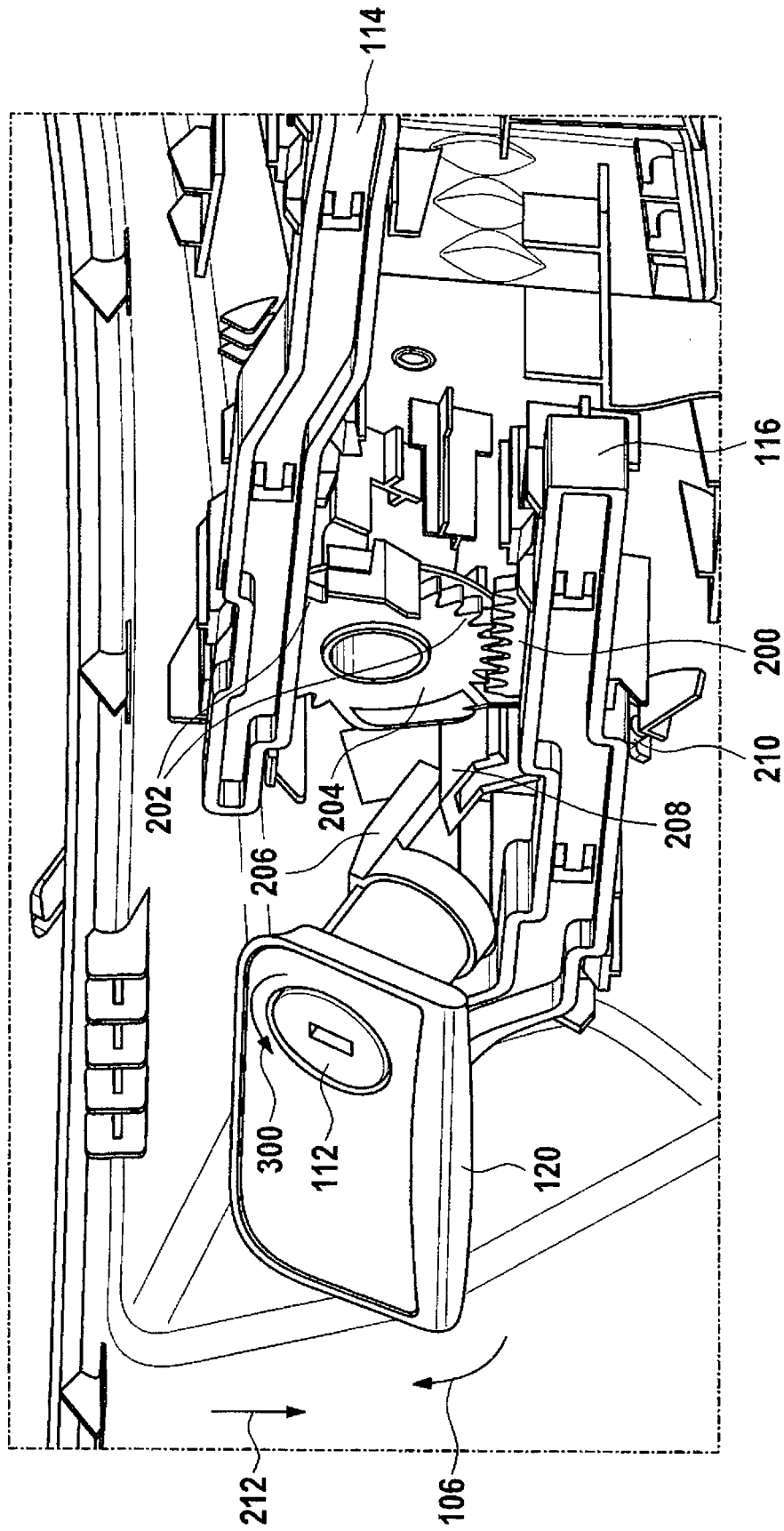


Fig. 3

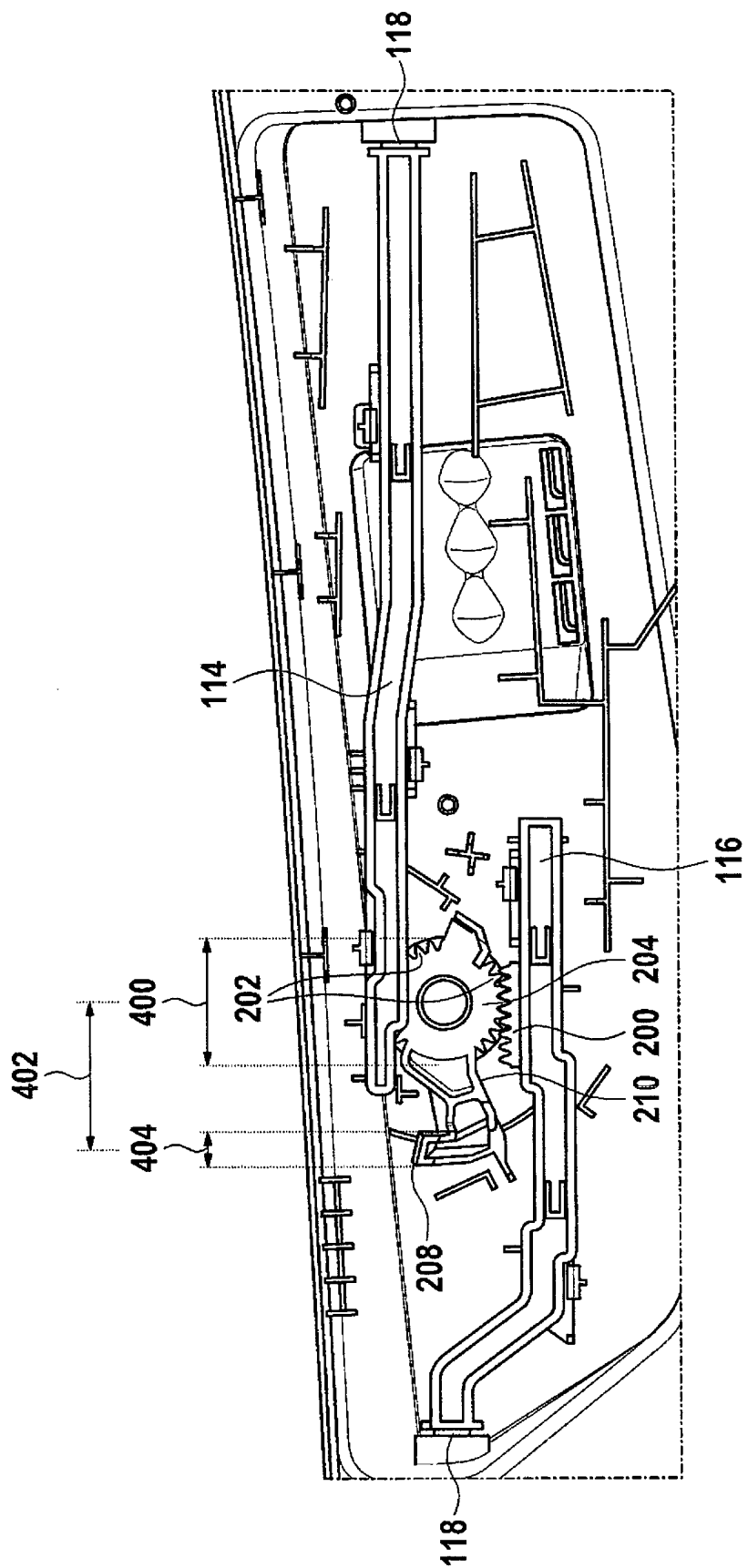


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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