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(54) **Manhole cover lock**

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Description

[0001] The present invention relates to a manhole cover lock to be provided on the underside of a manhole cover, comprising a locking member that can be brought into and away from a locking position relatively to a ring or frame in which the manhole cover can be placed, whereby raising of the manhole cover is prevented in the locking position.

[0002] Several such manhole cover locks are known.

[0003] EP patent application No. 0761885 describes a locking element 12 for a manhole cover. The locking element is brought to the locking position by being *rotated,* whereby two "wings" on the locking element enter respective recesses 11 in boxes 10. A bolt 9 inserted through a hole in the cover 4 has a bolt head 8 situated in a recess 7 in the upper side of the cover 4. The locking element 12 is "hanging" on the bolt 9, and upon further rotation of the bolt 9 the "wings" on the locking element 12 will be pressed against the upper sides of the respective recesses 11 in the boxes 10 and cause that the cover 4 is tightened against the upper end of the walls 2. Thus, the bolt cannot be bent. It can only be screwed (rotated). The bolt 9 comprises a completely stiff rod 23.

[0004] NO patent publication No. 157429 describes a manhole cover lock comprising a locking member connected to a spring, whereby the spring acts to keep the locking member in a locking position below an edge of a frame for the manhole cover. In order to move the locking member away from the locking position a tool is inserted through a hole in the cover and bends the spring.

[0005] SE patent publication No. 416483 describes a similar solution where the locking member is a pivotable arm held in a locking position below the edge of a manhole cover frame by a spring. In order to move the arm away from the locking position a tool is inserted through a hole in the cover and causes pivoting of the arm away from the locking position.

[0006] GB patent No. 2085946 describes a similar solution where the locking member is a leaf spring which has a free end held in a locking position below the edge of a manhole cover frame. The opposite end of the leaf spring is fastened to the cover. In order to move the free end of the leaf spring away from the locking position a tool is inserted through a hole in the cover and causes bending of the free end of the spring away from the locking position.

[0007] DE patent No. 666368 describes an inspection hole for an aircraft. A disc closing the hole has a locking member in the form of a leaf spring, one end of which is kept in a locking position behind an edge of the hole. For instance a finger can be inserted through an opening in the disc in order to push down the middle portion of the leaf spring, whereby the locking end of the leaf spring is withdrawn from its locking position.

[0008] EP patent application No. 0383374 describes a locking mechanism for a manhole cover, comprising a shaft mounted vertically through a hole in the cover close to the edge thereof. The upper end of the shaft is situated in a cavity which opens upwardly, and has such a shape that it can be coupled to a tool inserted in the cavity. On the underside of the cover the shaft protrudes through a boss, and the lower end of the shaft holds a locking member. Turning of the shaft causes turning of the locking member between a locking position and an open position. Such a locking mechanism can easily be brought to the open position without the use of a special tool. The shaft is visible from above, and can be turned by use of a standard tool, whereby unauthorized persons can open the cover.

[0009] WO 00/03097 describes a manhole cover having a locking mechanism requiring a somewhat specialized tool for opening it. A locking member is fastened to a shaft being supported horizontally, and can be turned by use of a tool having a head particularly adapted to the end of the shaft. The locking mechanism consists of a large number of parts, and assembling of the mechanism is complicated.

[0010] The purpose of such locks is to prevent unauthorized persons from opening the lock and the manhole cover. It may be of essential importance that unauthorized persons cannot get access to the manhole and cause damage to equipment situated in the manhole, and there is of course an aspect of safety to prevent unauthorized persons from removing a manhole cover, because an open manhole in a road or other places may represent a serious danger, in that persons and animals may fall into the manhole, or that vehicles or users of bicycles can be seriously damaged or injured if a wheel hits the ring or frame. An important aspect of some known manhole cover locks is that unauthorized persons shall not easily realize how the locks can be opened or which type of tool is required.

[0011] The present invention relates to a manhole cover lock as specified introductorily, and which is characterized by the features appearing from the appended claim 1. Embodiments of the lock are specified in the dependent claims.

[0012] The manhole cover lock according to the invention comprises a locking member pivotably provided on the underside of the manhole cover, in order to be moved between a locking position and an unlocking position, the locking member being coupled to an end of a flexible rod, the opposite end of the rod being fastened to the underside of the manhole cover. The rod has such a shape in an unloaded condition that the locking member is kept in the locking position. The rod is flexible in the vertical plane, and by being bent down in the portion between the ends it will cause that the locking member is pivoted to an unlocking position relatively to the ring or frame supporting the manhole cover. In order to permit bending of the rod a hole is provided in the manhole cover in the region above the rod, between its ends, and the middle portion of the rod can be bent down in that an operator inserts a rod-shaped tool through the hole and pushes the rod down, whereby the rod is bent. Thereby, the lock-

ing member is pivoted and brought away from the locking position. It will be practically impossible that unauthorized persons can realize that the lock can be opened by inserting a tool and push it against the rod, on the background that the manhole will normally be dark. However, in order to ensure that unlocking cannot be done by unauthorized persons, the hole in the manhole cover can be closed by a plug, for which a special tool is required for removal, and/or the plug can be lockable in the hole.

[0013] The locking member may be such shaped and located that when the manhole cover is placed in a ring or frame, the locking member hits an inner edge or bead in the ring or frame and is forced to move radially inwardly, as the rod is bent, and when the locking member has passed the edge, the rod straightens and moves the locking member to the locking position. Because the rod straightens automatically when not being exposed to bending, it is ensured that the lock always is in the locking position when the rod is not bent.

[0014] Such a manhole cover lock can be used alone when the manhole cover is hinged, in that the lock is mounted in a distance from the hinges. For manhole covers that are not hinged, two or more locks can be used, placed in a mutual distance around the cover. The rod may be of such a material and have such a shape that it can easily be bent down in the middle portion, for instance by being an elongated plate, which can be fastened to the locking member and the manhole cover, respectively, by its ends. The elongated plate may be for instance of plastics, rubber or steel. The elongated plate has a small bending stiffness in the vertical direction.

[0015] The locking member is pivotable and comprises two pivot shafts supported in sidewalls integral with or fastened to the underside of the manhole cover. The rod must of course be such adapted with respect to shape and length that the locking member is in the locking position when the rod is in an unloaded condition, i.e. straightened relatively to the bent condition it takes when being pushed down in its middle portion.

[0016] The invention will in the following be explained more detailed, with reference to the accompanying drawings, which show examples of embodiments of the invention.

Fig. 1 shows, in an exploded view, elements included in the invention.

Fig. 2 shows in a perspective view a lock according to the invention, with the locking member in the locking position.

Fig. 3 shows in a perspective view the lock shown in Fig. 2, with the locking member moved away from the locking position.

Fig. 4 shows in a perspective view the underside of a manhole cover, with the lock according to the invention mounted thereon.

Fig. 5 shows in a perspective view an embodiment of a pivotable locking member included in the lock according to the invention.

[0017] Fig. 1 shows a pivotable locking member 1, having pivot pins 2 to be supported in two sidewalls 3 to be fastened to the underside of a manhole cover or cast integrally with the manhole cover. Each sidewall 3 has a recess 4 for one of the pins 2 on the locking member 1. Moreover, Fig. 1 shows a rod in the form of an elongated plate 5, having a recess 6 for fastening to the locking member 1. Reference is made to Fig. 5, showing a head 14 on the locking member 1, delimited by two grooves 15, whereby the plate 5 can be moved sideways onto the locking member 1. At the opposite end of the plate 5, as shown in Fig. 4, is a hole 7, through which a screw or pin 9 can be inserted and screwed or inserted into a hole in the manhole cover. The plate 5 is mounted by being inserted between two blocks 8, each of which having a groove for the plate 5. The blocks are fastened to the manhole cover in a suitable manner, or they may be cast integrally with the manhole cover. The length of the plate 5 is such that when the plate is fastened to the locking member 1 and the manhole cover, respectively, the locking member is held in the locking position, swung out towards the outer edge of the manhole cover, whereby a locking claw 16 on the locking member 1 (Figs. 2, 3 and 5) is gripping below a circumferential bead in a ring in which the manhole cover is supported in the use position.

[0018] Fig. 1 also shows a tool 10 that can be used for unlocking the lock. The end of the tool 10 oppositely of the handle has a special shape adapted to a hole in the manhole cover.

[0019] Fig. 2 shows the lock in the locking position. The locking member 1, being supported in the sidewalls 3 by the pivot pins 2, has been pivoted outwardly relatively to the center of the manhole cover, whereby the locking claw 16 grips below a ring-shaped bead 13 in the ring 12 which supports the manhole cover 11. The locking member 1 is kept in the locking position in that the plate 5, being fastened to the manhole cover 11 and the locking member 1, respectively, is straightened due to its elasticity, because the plate mainly is straight when not subjected to any bending load.

[0020] Fig. 3 shows the lock moved out of the locking position. This has taken place by insertion of a tool 10, for instance as shown in Fig. 1, through a hole in the manhole cover 11, situated above the plate 5, and pushing the tool against the plate 5, whereby the plate 5 is bent down in its middle portion. Thereby, the locking member 1 has been pivoted away from the locking position, and the locking claw 16 is situated radially inwardly from the ring-shaped bead 13 in the ring 12 and can pass the ring-shaped bead 13 when the manhole cover is raised.

[0021] Fig. 4 shows the underside of a manhole cover 11, having a lock according to the invention mounted thereon. The lock is shown in the locking position, like in Fig. 2. The locking member 1, being supported in the sidewalls 3 on the manhole cover 11, has been pivoted outwardly and is kept in this position by the plate 5 which

connects the locking member 1 and the manhole cover 11. The plate has been inserted between two blocks 8 fastened to the manhole cover 11, and is fastened to the manhole cover 11 by means of a screw or pin 9 at the center of the manhole cover 11.

[0022] Fig. 5 shows a locking member 1 included in the lock. The locking member has two pins 2 in order to be supported in two sidewalls on the manhole cover. A locking claw 16 can come into a locking position relatively to a ring-shaped bead in a ring supporting the manhole cover. The locking member 1 has a head 14 delimited by two grooves 15. A plate 5 as shown in Fig. 1 can be moved sideways onto the locking member 1, in that the recess 6 shown in Fig. 1 accomodates the portion 17 of the locking member situated between the grooves 15.

[0023] It will be understood that the rod or elongated plate can be fastened to the locking member and the manhole cover by other means than shown.

Claims

1. A manhole cover lock to be provided on the underside of a manhole cover (11), comprising a locking member (1) that can be brought into and away from a locking position relatively to a ring or frame (12) in which the manhole cover can be placed, whereby raising of the manhole cover is prevented in the locking position,
   characterized in that the locking member (1) is coupled to one end of a flexible rod (5) capable of being bent elastically in a vertical direction, the opposite end of the rod being fastened to the underside of the manhole cover, the rod having such a shape in an unloaded condition that the locking member (1) is kept in the locking position, and by being bent down in the portion between the ends it will cause that the locking member is pivoted to an unlocking position relatively to the ring or frame (12) supporting the manhole cover.

2. A manhole cover lock according to claim 1, in which the rod (5) is an elongated plate of mainly straight shape in a unloaded condition.

3. A manhole cover lock according to claim 1 or 2, in which the rod (5) is made of plastics, rubber or steel.

4. A manhole cover lock according to any of the claims 1 - 3, in which a hole is provided in the manhole cover (11) in the region above the rod, for insertion of a rod-shaped tool for pushing down the middle portion of the rod, whereby the rod is bent, the hole in the manhole cover being lockable.

Patentansprüche

1. Schachtabdeckungsschloss, das auf der Unterseite einer Schachtabdeckung (11) bereitgestellt werden soll und das ein Verriegelungselement (1) umfasst, das in eine Verriegelungsstellung in Bezug auf einen Ring oder Rahmen (12), in dem die Schachtabdekkung angeordnet werden kann, und aus dieser heraus gebracht werden kann, wodurch das Anheben der Schachtabdeckung in der Verriegelungsstellung verhindert wird,
   dadurch gekennzeichnet, dass das Verriegelungselement (1) mit einem Ende eines biegbaren Stabs (5), der elastisch in einer senkrechten Richtung gebogen werden kann, verbunden ist, wobei das entgegengesetzte Ende des Stabs an der Unterseite der Schachtabdeckung befestigt wird, wobei der Stab in einem unbelasteten Zustand eine derartige Form aufweist, dass das Verriegelungselement (1) in der Verriegelungsstellung gehalten wird und er durch Herunterbiegen in den Abschnitt zwischen den Enden bewirken wird, dass das Verriegelungselement in eine Entriegelungsstellung in Bezug auf den Ring oder Rahmen (12), der die Schachtabdekkung stützt, geschwenkt wird.

2. Schachtabdeckungsschloss nach Anspruch 1, wobei der Stab (5) eine längliche Platte mit im Wesentlichen gerader Form in einem unbelasteten Zustand ist.

3. Schachtabdeckungsschloss nach Anspruch 1 oder 2, wobei der Stab (5) aus Kunststoff, Gummi oder Stahl hergestellt ist.

4. Schachtabdeckungsschloss nach einem der Ansprüche 1 - 3, wobei in der Schachtabdeckung (11) im Bereich über dem Stab ein Loch zum Einsetzen eines stabförmigen Werkzeugs zum Herunterdrükken des Mittelabschnitts des Stabs, wodurch der Stab gebogen wird, bereitgestellt wird, wobei das Loch in der Schachtabdekkung verriegelbar ist.

Revendications

1. Verrou de couvercle de regard destiné à être disposé sur la face inférieure d'un couvercle de regard (11), comprenant un élément de verrouillage (1) qui peut être amené dans et hors d'une position de verrouillage par rapport à une bague ou un cadre (12) dans lequel le couvercle de regard peut être disposé, ce par quoi l'ouverture du couvercle de regard est empêchée dans la position de verrouillage,
   caractérisé par le fait que l'élément de verrouillage (1) est couplé à une extrémité d'une tringle souple (5) capable d'être incurvée élastiquement dans une direction verticale, l'extrémité opposée de la tringle

étant fixée à la face inférieure du couvercle de regard, la tringle ayant une forme telle que, dans un état non chargé, l'élément de verrouillage (1) est maintenu dans la position de verrouillage, et que, par son incurvation vers le bas dans la partie entre les extrémités, elle amène l'élément de verrouillage à pivoter dans une position de déverrouillage par rapport à la bague ou au cadre (12) supportant le couvercle de regard.

2. Verrou de couvercle de regard selon la revendication 1, dans lequel la tringle (5) est une plaque allongée de forme principalement rectiligne dans un état non chargé.

3. Verrou de couvercle de regard selon la revendication 1 ou 2, dans lequel la tringle (5) est réalisée en matière plastique, en caoutchouc ou en acier.

4. Verrou de couvercle de regard selon l'une quelconque des revendications 1 à 3, dans lequel un trou est prévu dans le couvercle de regard (11) dans la région située au-dessus de la tringle, pour l'introduction d'un outil en forme de tige en vue de pousser vers le bas la partie centrale de la tringle, ce par quoi la tringle est incurvée, le trou dans le couvercle de regard étant verrouillable.

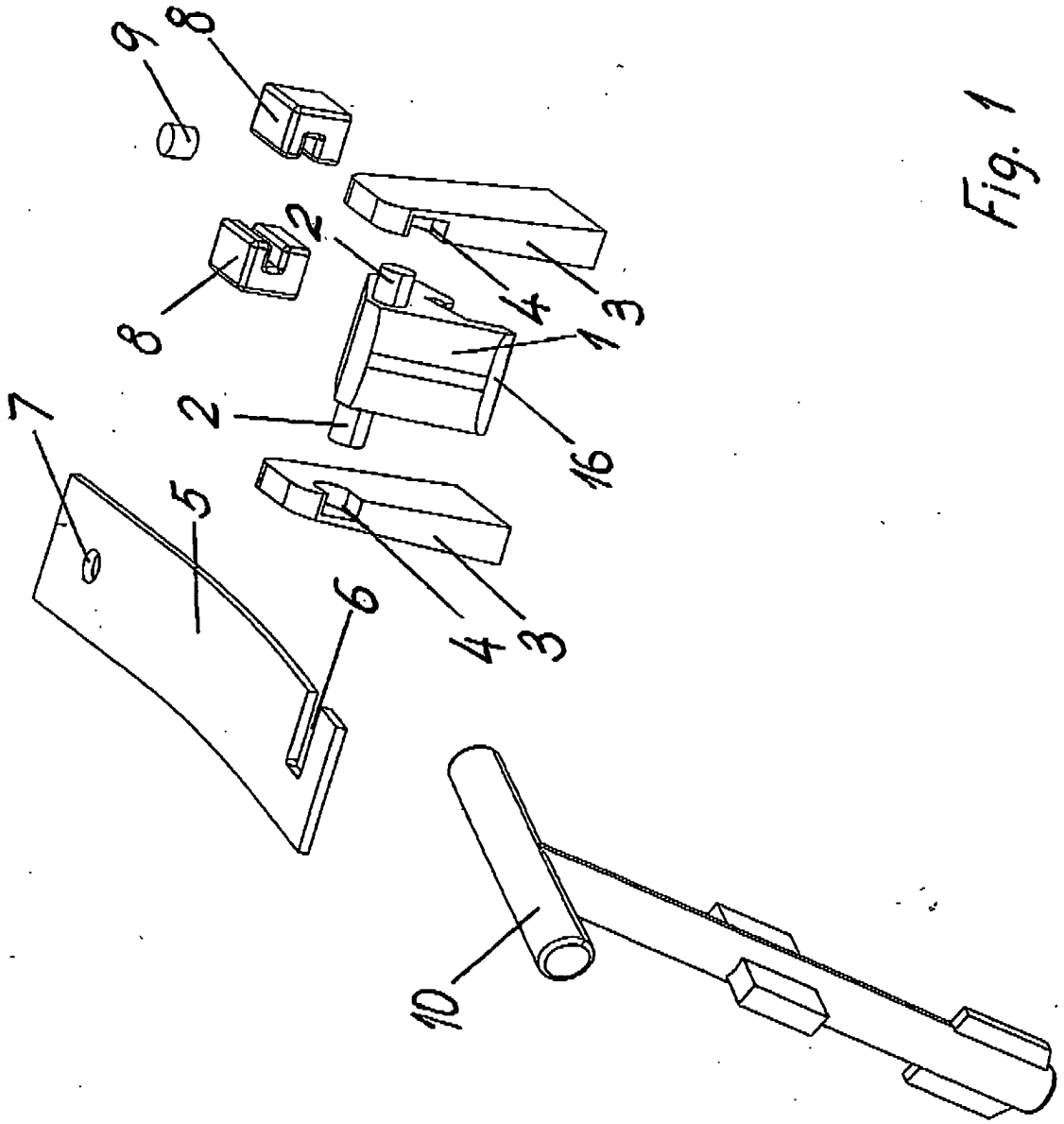


Fig. 1

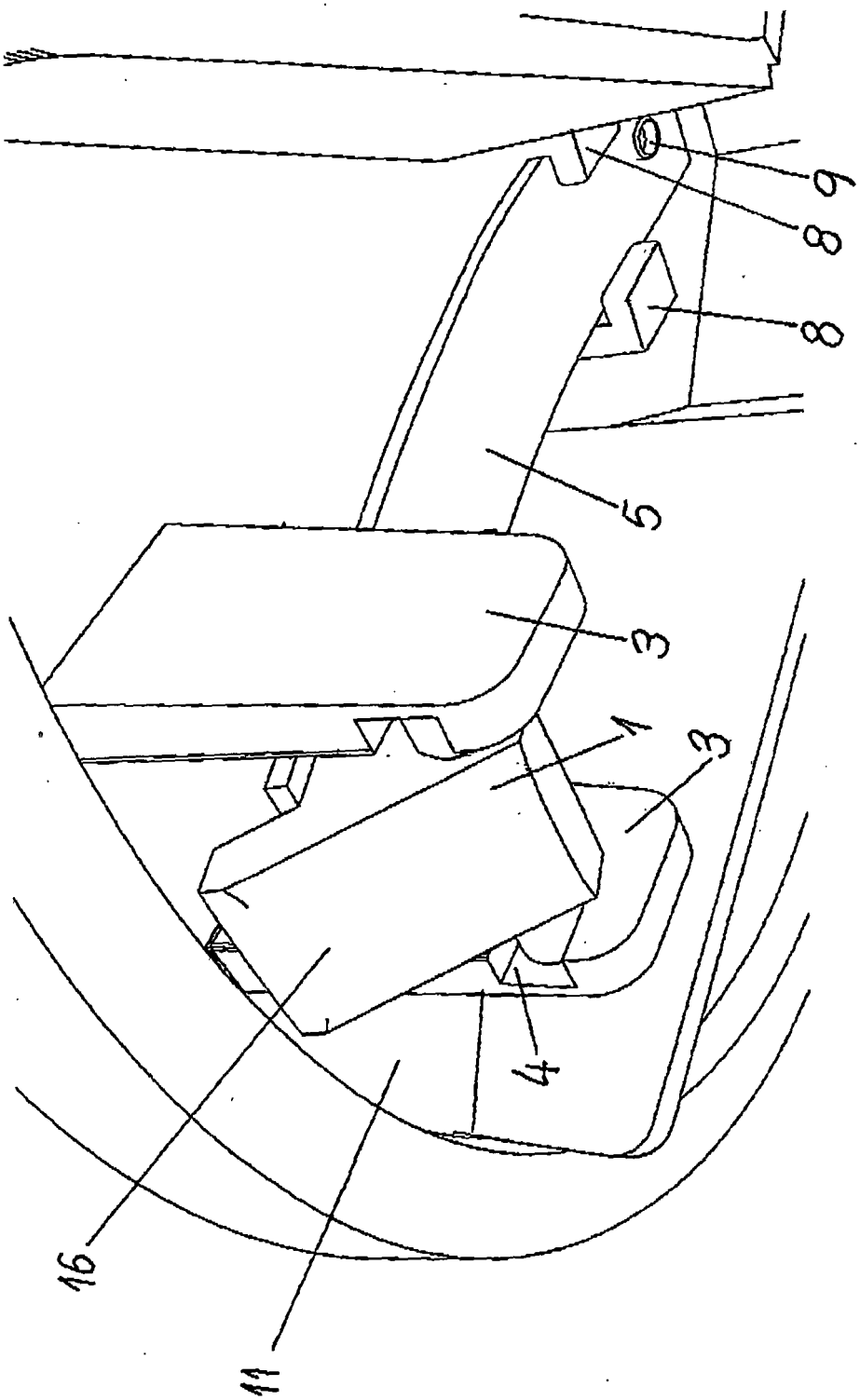


Fig. 2

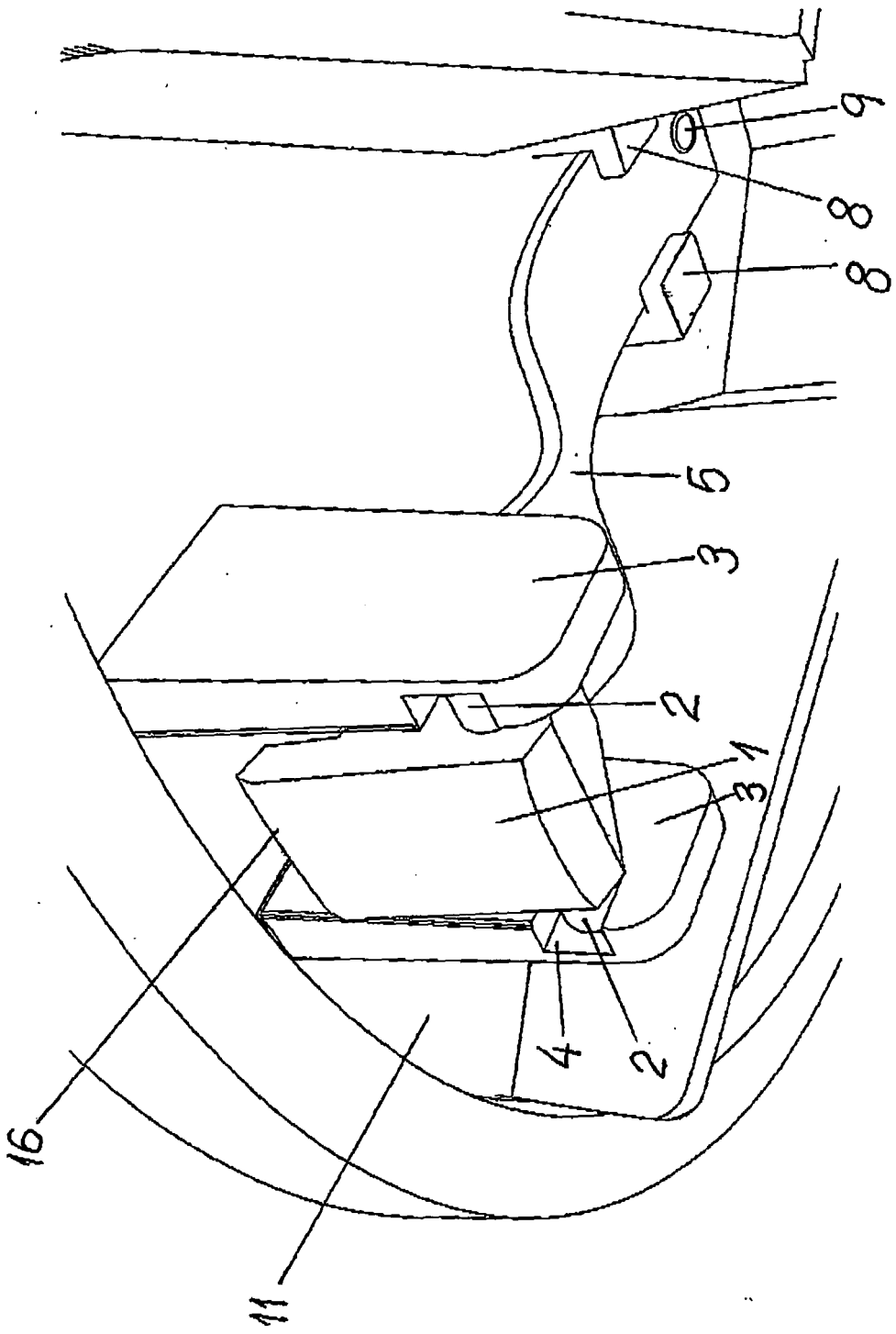


Fig. 3

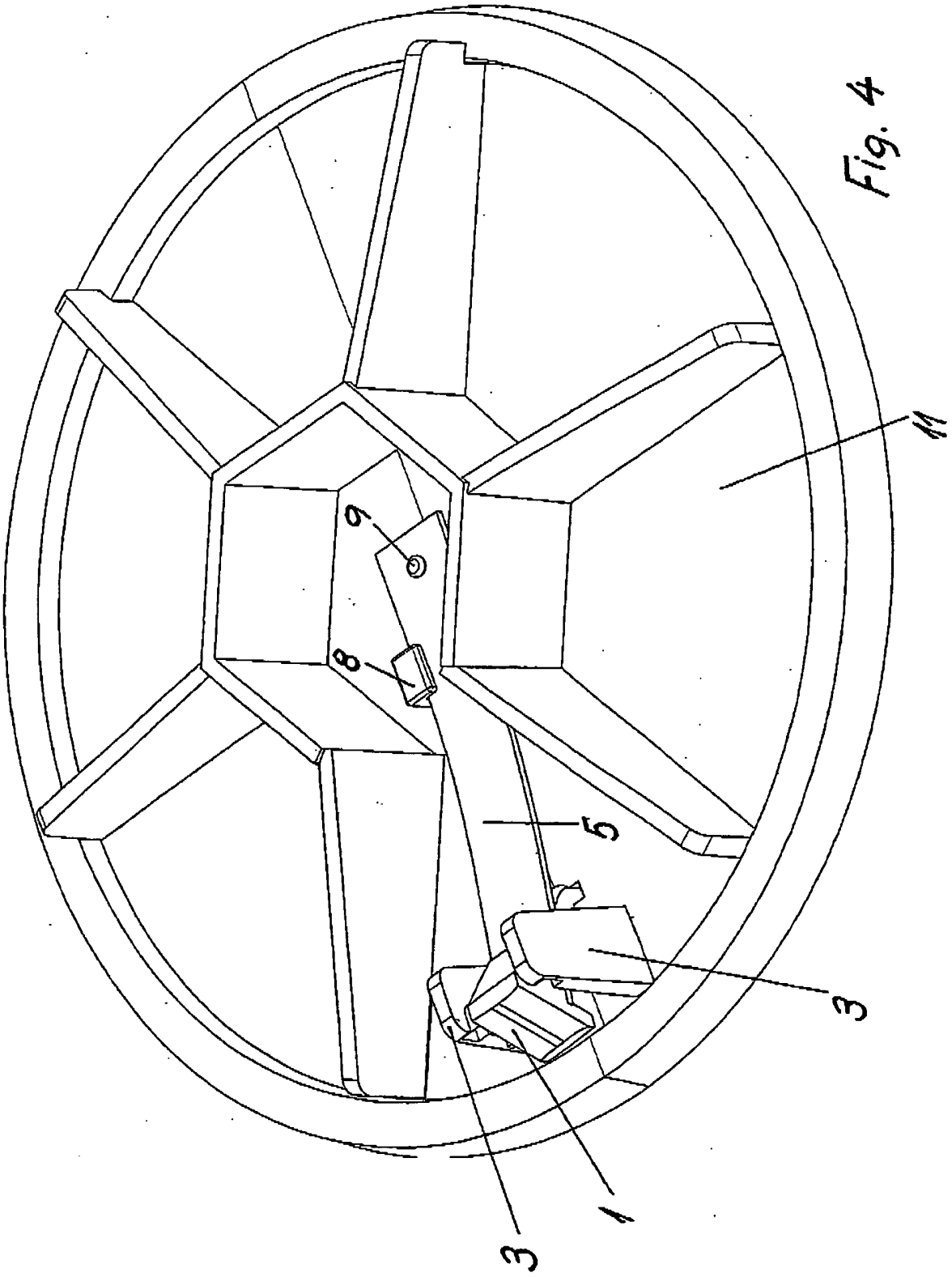


Fig. 4

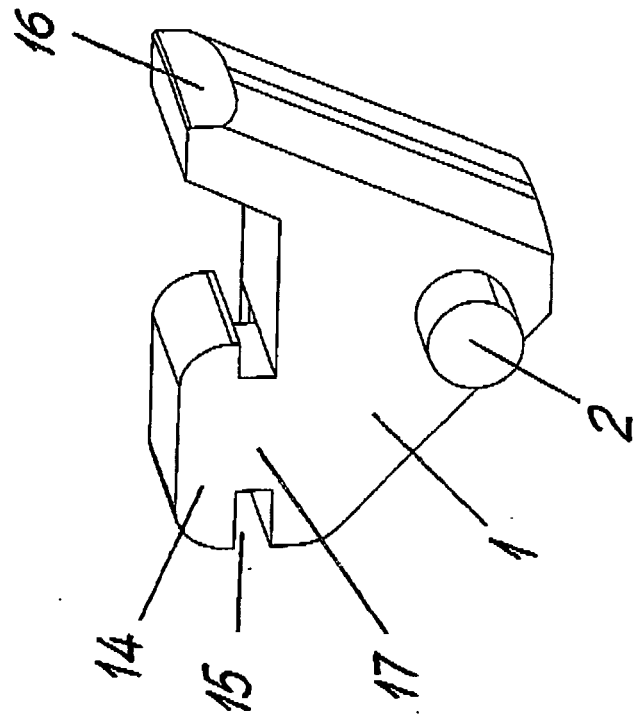


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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- NO 157429 **[0004]**
- SE 416483 **[0005]**
- GB 2085946 A **[0006]**
- DE 666368 **[0007]**
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- WO 0003097 A **[0009]**