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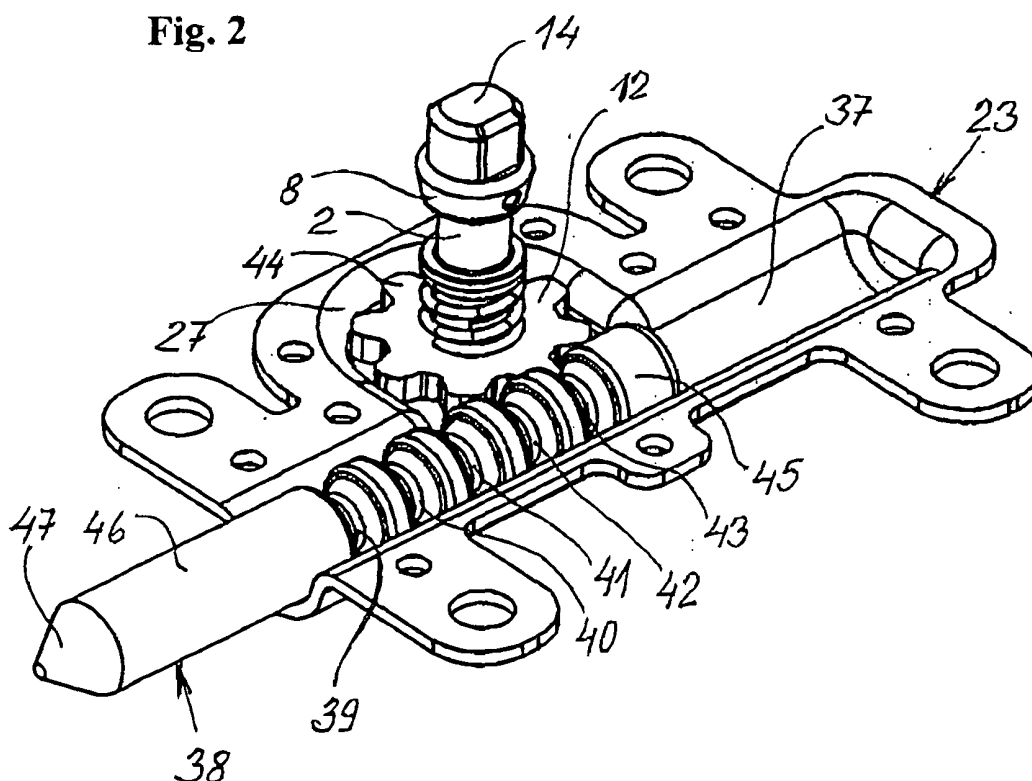
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(54) **Locking device, esp. for covers, caps, door and window wings**

(57) A locking device, especially for covers, caps, door and window wings, comprising a case (22) having a bottom (23) and a cover (24), wherein a teathed pinion (12) is accommodated in pivoting manner inside the case (22) and a locking pin (38) is arranged tangentially slidingly thereto. A circular socket (27) is arranged at least in the bottom (23), the teathed pinion (12) is accommodated in a pivoting manner in the circular socket (27), a

vertically shifting control pin (2) is arranged in the axis of the teathed pinion (12), wherein a longitudinal socket (37) is arranged at least in the bottom (23) and oriented tangentially with respect to the teathed pinion (12), the locking pin (38) being arranged slidingly in the longitudinal socket (37) and being provided with annular notches (39, 40, 41, 42) at its central part, by means of which the locking pin (38) engages the respective teeth (44) of the teathed pinion (12).

Fig. 2



Description

Field of the art

[0001] The invention relates to a locking device, especially for covers, caps, door and window wings, the locking device comprising a case having a bottom and a cap, wherein a toothed pinion is pivoted inside the case and tangentially slidingly thereto a locking pin is arranged in the case.

Background of the invention

[0002] Several locking devices for said use are known, however, the closest prior art is disclosed in the Japanese Patent No. 261920 which describes an elastically arranged vertical pivot shaft, onto which a toothed pinion is fastened for an engagement with a rod having a lateral gearing. A lateral handle is provided on the lower part of the shaft under the bottom of the case, inside which the apparatus is arranged. The upper end of the shaft is formed for an application of a tackle key. By pulling the lateral handle against the spring tension the toothed pinion gets into engagement with the lateral gearing of the rod and by a following turning the rod is shifted and inserted into the respective opening in the cover frame or pulled out of said opening in the cover frame.

[0003] The drawbacks of the above apparatus consist in that the toothed pinion has to be vertically shifted in order to get into engagement with the ratchet and therefore there might be some difficulties to interlock the teeth of the pinion with the teeth of the rod precisely. Moreover, said rod has got a circular cross section and the teeth are on one side only, so that the rod may be guided without any rotation. Because of the vertical shifting of the pinion the case is rather high. Said device allows only a mechanical locking of a cover or a cap in the closed position and it may prevent from an unauthorised opening from outside only. The device does not comprise any safety elements preventing any unauthorised manipulation. As the toothed rod has got its teeth on one side only, the rod has to be oriented at mounting and the orientation must be ensured during the use.

Summary of the invention

[0004] The objective of the invention is to provide a locking device, especially for covers, caps, door and window wings, comprising safety elements for preventing any undesirable manipulation, being of a relatively small size and easily mounted and comprising a small number of components, thus favourably effecting the production costs. The locking device has to be suitable for covers located in roadways, too, i.e. in a place substantially polluted by a mixture of water, sand and other mechanical dirt.

[0005] Said objectives are achieved and the above mentioned disadvantages are removed with a locking de-

vice, especially for covers, caps, door and window wings, comprising a case having a bottom and a cover, wherein a toothed pinion is pivoted inside the case and tangentially slidingly thereto a locking pin is arranged, wherein according to the invention a circular socket is arranged at least in the bottom, the toothed pinion is pivoted in the circular socket, a vertically shifting control pin is arranged in the axis of the toothed pinion and wherein a longitudinal socket is arranged at least in the bottom and oriented tangentially with respect to the toothed pinion, the locking pin being arranged slidingly in the longitudinal socket and being provided at its central part with annular notches by means of which the locking pin engages the respective teeth of the toothed pinion.

[0006] According to a preferred embodiment of the invention the control pin is provided with two adapted ends, wherein a driver is fixed on the first adapted end, the driver having a shaped head for a control key provided with a complementary shaped hollow and the second adapted end is provided with a transversally arranged securing pin for an engagement with stop noses formed outside the bottom of the case uniformly around a bearing aperture of the control pin, wherein the central part of the control pin is provided with a carrier collar for a pressure spring arranged between the carrier collar and the toothed pinion.

[0007] It is also advantageous to provide the first adapted end of the control pin with a pair of mutually parallel flattened surfaces so that the driver having a complementary shaped hollow may be set thereon forming a fixed joint and to provide the second adapted end of the control pin with another pair of mutually parallel flattened surfaces so that the toothed pinion having a complementary shaped through-hole may be set thereon forming a fixed joint.

[0008] It is also advantageous to provide the locking pin with an elongated end behind the last annular notch to stop the action of the toothed pinion in the locked position by an engagement of its respective tooth with the cylindrical surface of the elongated end and with a locking part before the first annular notch for stopping the action of the toothed pinion in the unlocked position by an engagement of its respective tooth with the cylindrical surface of the locking part of the locking pin.

[0009] It is also advantageous to form stop noses as a part of the bottom of the case by bending the material out of the bearing aperture.

[0010] The locking device according to the invention may comprise longer screws with spacing bushings to mount it spaced from the cover and with pressure springs arranged between the head of a longer screw and the bottom of the case for a tighter attachment of the cover to the frame optionally using a seal.

[0011] An advantage of the locking device according to the invention is that the teeth of the toothed pinion are engaged permanently and with the annular notches of the locking device so that it is not necessary to assure the position of the toothed pinion. As the toothed pinion

is arranged in the case to pivot only and not to be height adjusted the height of the case could be reduced considerably. It is especially advantageous that for any unauthorised person the unlocking of the cover is made difficult by the code of the key and by the shaped head of the driver as well by the stop noses outside the bottom of the case which are intended for the engagement with the securing pin.

Brief description of the drawings

[0012] An exemplifying embodiment is shown at the drawings, wherein Fig. 1 depicts an axonometric bottom view of the exploded locking device, Fig. 2 depicts an axonometric top view of the bottom of the locking device in the locked position, the cover being removed from the case, Fig. 3 depicts an axonometric top view of the closed case of the locking device, Fig. 4 depicts an axonometric bottom view of the sewer cover in a frame with an installed locking device, Fig. 5 depicts an enlarged bottom view of the locking device installed on the sewer cover, Fig. 6 depicts a cross sectional view of a part of the sewer cover and of its frame with a part of the locking device taken along line VI-VI in Fig. 5, Fig. 7 depicts a cross sectional view of the locking device mounted on the sewer cover by means of spacing bushings, springs and longer screws, taken along the line VII-VII in Fig. 8 but revolved, for 180°, and Fig. 8 depicts a bottom view of a circular sewer cover inserted into a frame and provided with a pair of locking devices.

Exemplifying embodiments of the invention

[0013] The locking device, especially for covers, caps, door and window wings, i.e. covers 1, comprises a control pin 2 having cylindrical form with two adapted ends 3, 4 and provided with a carrier collar 5 in the middle part of the control pin 2. According to the first exemplifying embodiment the first adapted end 3 of the control pin 2 is provided with a pair of flattened surfaces 6, 7 which are parallel to each other, to be inserted into a driver 8 having a complementary cavity 9 to form a fixed joint; and the second adapted end 4 of the control pin 2 is provided with another pair of flattened surfaces 10, 11 which are parallel to each other, to be inserted into a teathed pinion 12 having a complementary through-hole 13 to form a fixed joint. The driver 8 is provided with a shaped head 14 to be inserted into a control key 15, e.g., a tackle key, as shown partially in Fig. 6. The first adapted end 3 of the control pin 2 is provided with a lateral through hole 16 and the driver 8 is provided with a corresponding lateral opening 17, too, to be connected with a safety pin 18. The second adapted end 4 of the control pin 2 has got at its end another lateral through opening 19 for a securing pin 20. In the assembled state the teathed pinion 12 is mounted on the second end 4 of the control pin 2 and a pressure spring 21 is set on the control pin 2 between said teathed pinion 12 and the carrier collar 5. The

assembly as described above is arranged in a case 22 (Fig. 3) consisting of a bottom 23 and a cover 24, wherein the circumferential edge 25 of the cover 24 corresponds to the circumferential edge 26 of the bottom 23. The teathed pinion 12 is floating in a circular socket 27 (Fig. 2) formed in the bottom 23 of the case 22 and the second adapted end 4 of the control pin 2 goes through a bearing aperture 28 (Fig. 1) formed in the bottom 23 of the case 22. Four evenly spaced stop noses 29, 30, 31, 32 are formed around the bearing aperture 28 outside the bottom 23, e.g. by bending out its material. Gaps 33, 34, 35, 36 between those are intended for an insertion of the securing pin 20. The bottom 23 of the case 22 is provided with a longitudinal socket 37 arranged tangentially with respect to the circular socket 27 and intended for a locking pin 38, which has got a cylindrical form and a part of the locking pin 38 is provided with annular notches 39, 40, 41, 42, 43 for the engagement with the teeth 44 of the teathed pinion 12. The locking pin 38 has got an extended end 45 behind the last annular notch 43, the extended end 45 being intended for stopping the motion of the teathed pinion 12 in the locked position by the engagement of its respective tooth 44 with the cylindrical surface of the extended end 45, and it has got a locking part 46 before the first annular notch 36 for stopping the motion of the teathed pinion 12 in the unlocked position by the engagement of its respective tooth 44 with the cylindrical surface of the locking part 46. The free end of the locking pin 38 is provided with a taper 47 having a conical or spherical form.

[0014] To enable a closing of the case 22 by the cover 24 the cover 24 is provided with a circular socket 27a formed according to the inner components and a longitudinal socket 37a for the locking pin 38. The cover 24 is connected with the bottom 23 by means of rivets 45 (Fig. 3). When the locking device is assembled, only the driver 8 with a part of the control pin 2 extends beyond the cover 24. In some cases the cover 24 may be flat without the circular socket 27a and without the longitudinal socket 37a, in case the circular socket 27 and the longitudinal socket 37 in the bottom 23 are of deeper form.

[0015] As may be seen in Figs. 4 and 5 the locking device is to be mounted on the lower side of the cover 1 at its edge so that the locking pin 38 immediately after it has started shifting out of the case 22 gets into the locking aperture 49 in the frame 50, which is mounted e.g. in a roadway (not shown). Where necessary the opposite end 51 of the cover 1 may be provided with another locking device 52, as shown in Fig. 8 or with at least one bolt 53, the exemplifying embodiment of Fig. 4 comprises two bolts 53. In this case the cover 1 is inserted into the frame 50 with its opposite end 51 first so that the bolt 53 gets under the lower edge of the frame 50 and then the insertion of the cover 1 may be completed. The cover 1 is provided with an operational hole 54 above the driver 8, the operational hole 54 being intended for an insertion of the control key 15 and for putting its shaped hollow 55

(Fig. 6) on the shaped head 14 of the driver 8. The shaped hollow 55 of the control key 15 and the shaped head 14 of the driver 8 have to be identical. But it is possible to use several alternative embodiments of the matched forms for various locking devices to ensure that it may be difficult for an unauthorised person to open the cover 1. In this way the code of the whole locking device is formed.

[0016] The locking device is fastened to the cover by means of screws 56 (Fig. 5) driven into the cover 1 from the lower side. As shown in Fig. 7 the locking device and a possible another locking device 52 may also be spaced apart fastened to the cover 1 by means of longer screws 57. Spacing bushings 58 may be applied on the longer screws 57 between the lower side of the cover 1 and the locking device and a possible another locking device 52. A pad 60 is put under the head 59 of each longer screw 57 and a pressure spring 61 is mounted between the pad 60 and the bottom 23 of each locking device to enable a tighter fastening of the cover 1 during the locking by means of the locking pin 38, e.g. into the seal 62. As the whole locking device is arranged under the cover 1 at a distance, its function is good even in an environment highly polluted with a mixture of water and dirt. The free space around the shaped head 14 of the driver 8 makes a smooth insertion of the control key 15 possible.

[0017] The locking device according to the invention works as follows:

A locking of the cover 1 into the frame 50 is achieved in that the operating person inserts the control key 15 into the operational hole 54 in the cover 1 and the shaped hollow 55 of the control key 15 is set on the respective shaped head 14 of the driver 8. Continually pressing on the control key 15 against the force of the pressure spring 21 the securing pin 20 is shifted out of a pair of opposing securing gaps of the total number of four securing gaps 33, 34, 35, 36 between the stop noses 29, 30, 31, 32 depending on the actual insertion of the locking pin 20. So continually pressing the control key 15 it may be consequently turned and before finishing the whole rotation for 180° the operating person releases the pressure on the control key 15 and finishes the rest of the 180° without any pressure. The control key 15 being in that position the pressure spring 21 returns the control pin 2 in its original position, wherein the securing pin snaps in the respective pair of the securing gaps 33, 34, 35, 36. As the control key 15 is turned, the teathed pinion 12 is turned as well and it gets gradually with its teeth 44 into engagement with the annular notches 39, 40, 41, 42 on the locking pin 38 which is shifted in the longitudinal sockets 37, 37a in the bottom 23 and in the cover 24 of the case 22 of the locking device. The shifting locking pin 38 gets with its locking part 46 into the locking aperture 49 in the frame 50 (Fig. 4 and 5) or at least under an edge of the frame 50 (Fig. 7, 8). If the pressure on the control

key 15 is released in the position between 0° to 90°, the locking pin 20 snaps into the respective pair of securing gaps 33, 34, 35, 36 and prevents any further movement of the locking pin 38 into the locking position. After the pressure on the control key is renewed the locking movement of the locking pin 38 is completed. Such an arrangement is important to enhance security against any unauthorised manipulation with the cover 1, especially in case of an unauthorised attempt to take the cover 1 out of the frame 50. First it is necessary to use the control key 15 having a shaped hollow 55 which is complementary to the shaped head 14 of the driver 8. The unauthorised person unlike the authorised person does not know the suitable control key 15, which may be used for the respective cover 1, because there may be many possible shapes of the shaped head 14 of the driver 8. If the unauthorised person succeeds in turning the driver 8 using an alternate tool instead of the control key 15, there is another problem caused by an intentional complication of the necessary mode of turning, as there must be a constant pressure on the control pin 2 to keep the securing pin free and to prevent it from snapping into the securing gaps 33, 34, 35, 36 between the stop noses 29, 30, 31, 32 before the opening of the cover 1 is completed. In case the locking device is mounted on the cover 1 as shown in Fig. 7, i.e. using the longer screws 57 with spacing bushings 58 and the pressure springs 61, upon locking the cover 1 at first the locking pin 38 gets with its taper 47 under an edge of the frame 50 and moving further on the thicker locking part 46 of the locking pin 38 gets under the edge too. During said movement the case 22 of the locking device is shifted against the action of the pressure springs 61, by means of which the cover 1 is more tightly pressed against the frame 50 which may be provided with a sealing 62.

Industrial applicability

[0018] The locking device, especially for covers, caps, door and window wings, according to the invention may be used especially for sewer covers and manhole covers as a protecting element against vandalism, theft and for a protection of covers made of recyclable materials, especially plastics, which have got a low weight and therefore they may get released from the frames and may be drawn out of the frames if loaded by heavy motor vehicles.

List of reference numerals

[0019]

- 1 covers
- 2 control pin
- 3 first adapted end

4 second adapted end
 5 carrier collar
 6 flattened surfaces
 7 flattened surface
 8 driver
 9 shaped cavity
 10 flattened surface
 11 flattened surface
 12 teathed pinion
 13 through-hole
 14 shaped head
 15 control key
 16 through hole
 17 opening
 18 safety pin
 19 through opening
 20 securing pin
 21 pressure spring
 22 case
 23 bottom
 24 cover
 25 circumferential edge
 26 circumferential edge
 27 circular socket
 27a circular socket
 28 bearing aperture
 29 stop nose
 30 stop nose
 31 stop nose
 32 stop nose
 33 securing gap
 34 securing gap
 35 securing gap
 36 securing gap
 37 longitudinal socket
 37a longitudinal socket
 38 locking pin
 39 annular notch
 40 annular notch
 41 annular notch
 42 annular notch
 43 annular notch
 44 tooth
 45 elongated end
 46 locking part
 47 taper
 48 rivet
 49 locking aperture
 50 frame
 51 opposite end
 52 another locking device
 53 bolt
 54 operational hole
 55 shaped hollow
 56 screw
 57 longer screw
 58 spacing bushing
 59 head

60 pad
 61 pressure spring
 62 seal

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Claims

1. A locking device, especially for covers, caps, door and window wings, comprising a case (22) having a bottom (23) and a cover (24), wherein a teathed pinion (12) is accommodated in pivoting manner inside the case (22) and a locking pin (38) is arranged tangentially slidingly thereto, **characterised in that** a circular socket (27) is arranged at least in the bottom (23), the teathed pinion (12) is accommodated in a pivoting manner in the circular socket (27), a vertically shifting control pin (2) is arranged in the axis of the teathed pinion (12), wherein a longitudinal socket (37) is arranged at least in the bottom (23) and oriented tangentially with respect to the teathed pinion (12), the locking pin (38) being arranged slidingly in the longitudinal socket (37) and being provided with annular notches (39, 40, 41, 42) at its central part, by means of which the locking pin (38) engages the respective teeth (44) of the teathed pinion (12).
2. The locking device according to claim 1, **characterised in that** the control pin (2) is provided with two adapted ends, wherein a driver (8) having a shaped head (14) for a control key (15) provided with a complementary shaped hollow (55) is fixed to a first adapted end (3) and a second adapted end (4) is provided with a transversally arranged securing pin (20) for an engagement with stop noses (29, 30, 31, 32) formed outside the bottom (23) of the case (22) uniformly around a bearing aperture (28) of the control pin (2), wherein the central part of the control pin (2) is provided with a carrier collar (5) for a pressure spring (21) arranged between the carrier collar (5) and the teathed pinion (12).
3. The locking device according to claim 1 or 2, **characterised in that** the first adapted end (3) of the control pin (2) is provided with a pair of mutually parallel flattened surfaces (6, 7) so that the driver (8) having a complementary shaped hollow (9) may be set thereon forming a fixed joint and the second adapted end (4) of the control pin (2) is provided with another pair of mutually parallel flattened surfaces (10, 11) so that the teathed pinion (12) having a complementary shaped through-hole (13) may be set thereon forming a fixed joint.
4. The locking device according to claim 1, **characterised in that** the locking pin (38) has an elongated end (45) behind the last annular notch (43) to stop the action of the teathed pinion (12) in the locked position by an engagement of its respective tooth

(44) with the cylindrical surface of the elongated end (45) and a locking part (46) before the first annular notch (39) for stopping the action of the teathed pinion in the unlocked position by an engagement of its respective tooth (44) with the cylindrical surface of the locking part (46) of the locking pin (38). 5

5. The locking device according to claim 2, **characterised in that** the stop noses (29, 30, 31, 32) are a part of the bottom (23) of the case (22) and that they are formed by bending the material out of the bearing aperture (28). 10

6. The locking device according to claim 1, **characterised in that** it comprises longer screws (57) with spacing bushings (58) to mount it spaced from the cover (1) and with pressure springs (61) arranged between the head (59) of a longer screw (57) and the bottom (23) of the case (22) for a tighter attachment of the cover (1) to the frame (50), optionally using a seal (62). 15 20

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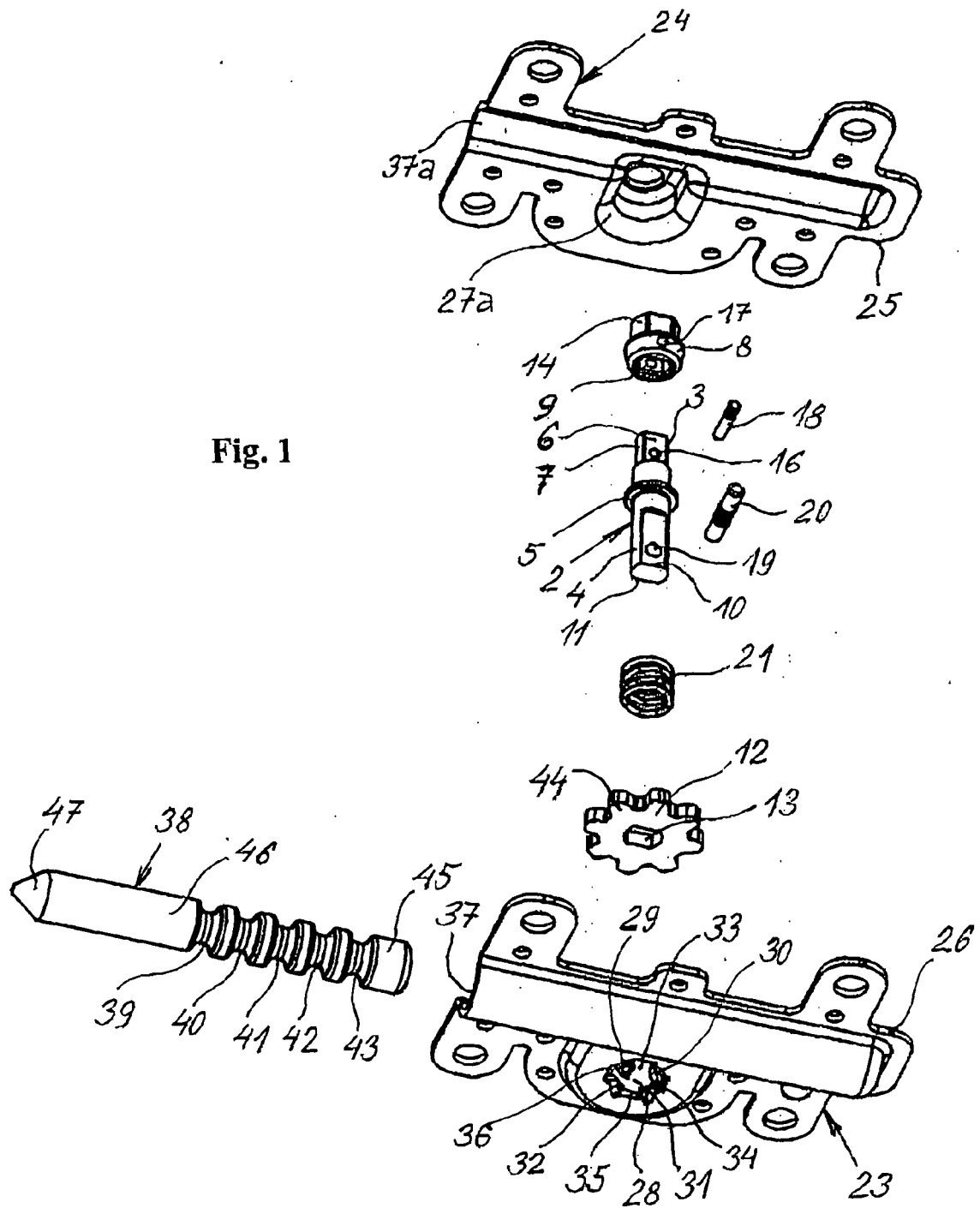


Fig. 2

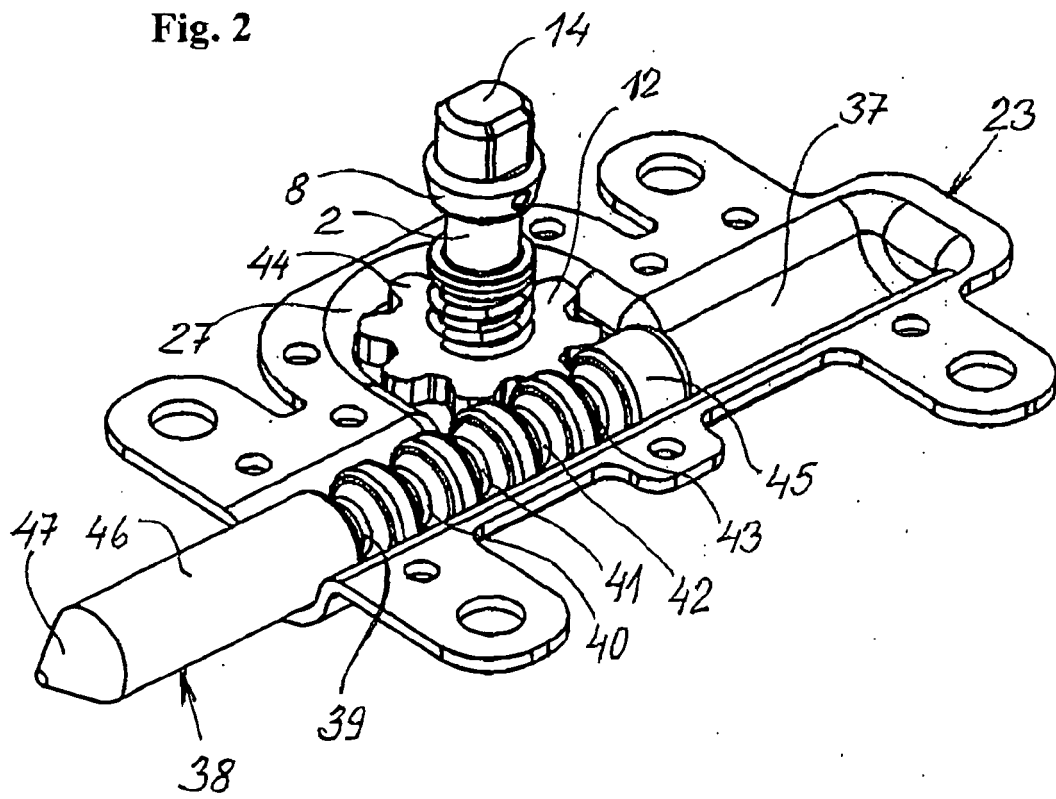


Fig. 3

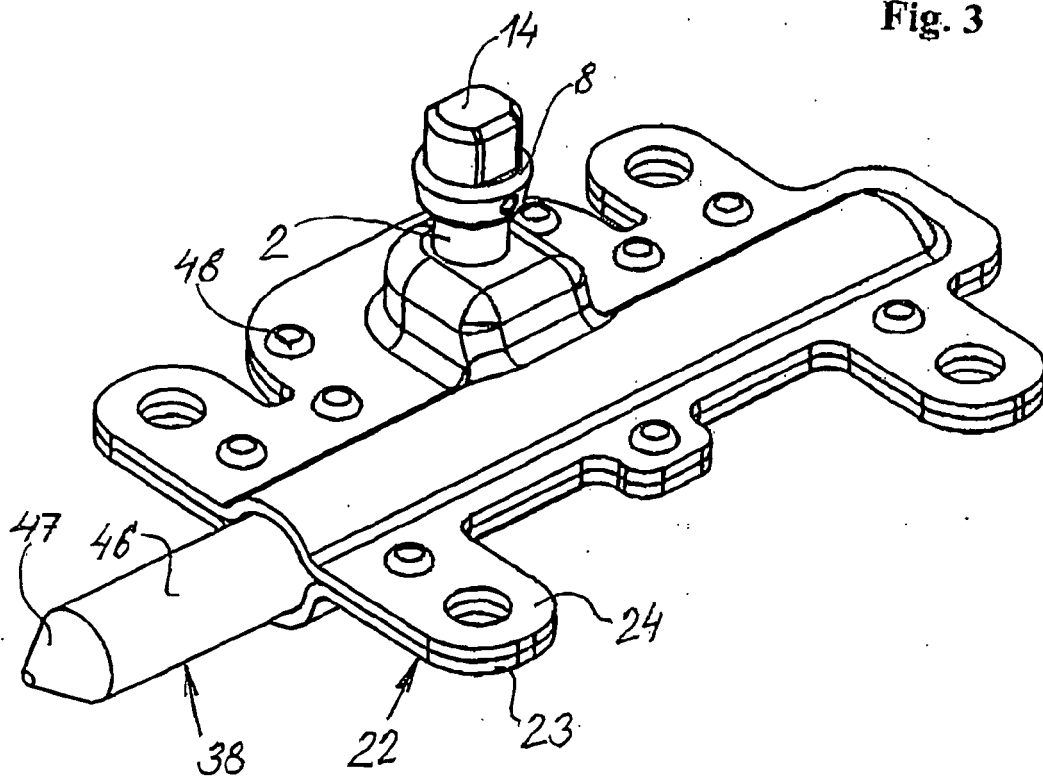


Fig. 4

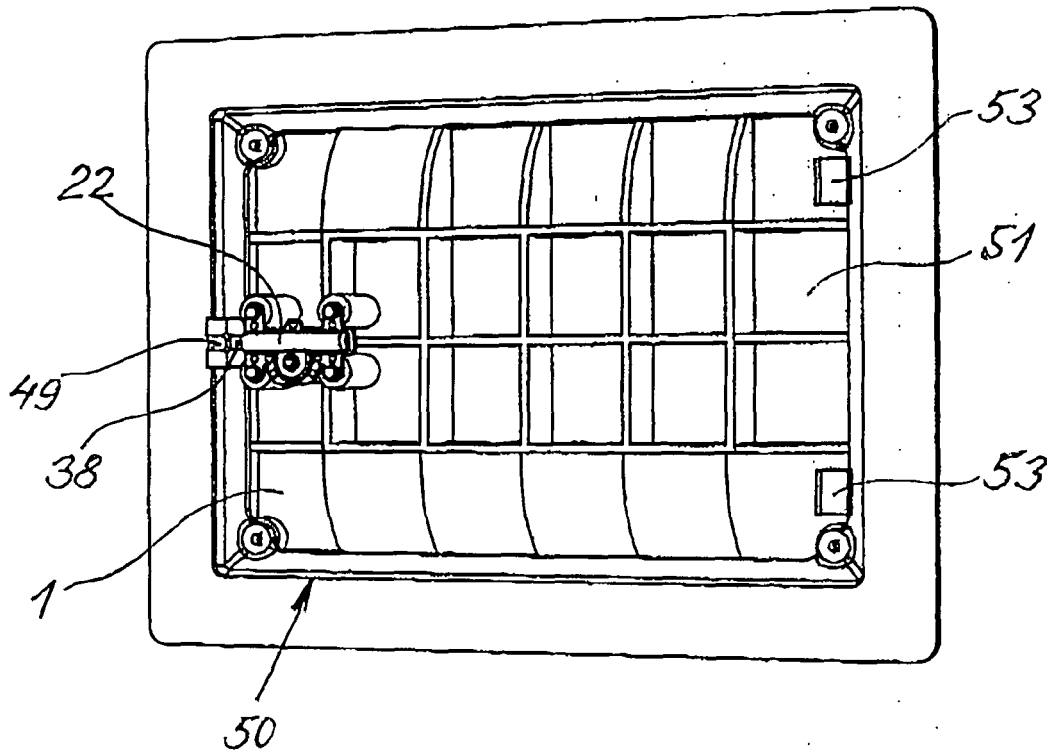


Fig. 5

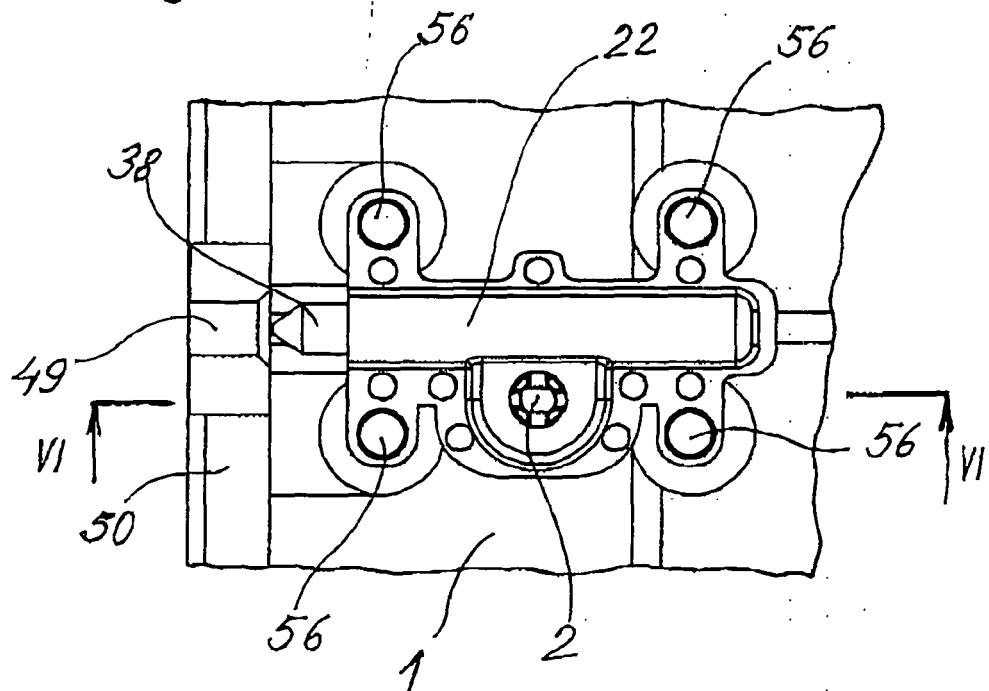


Fig. 6

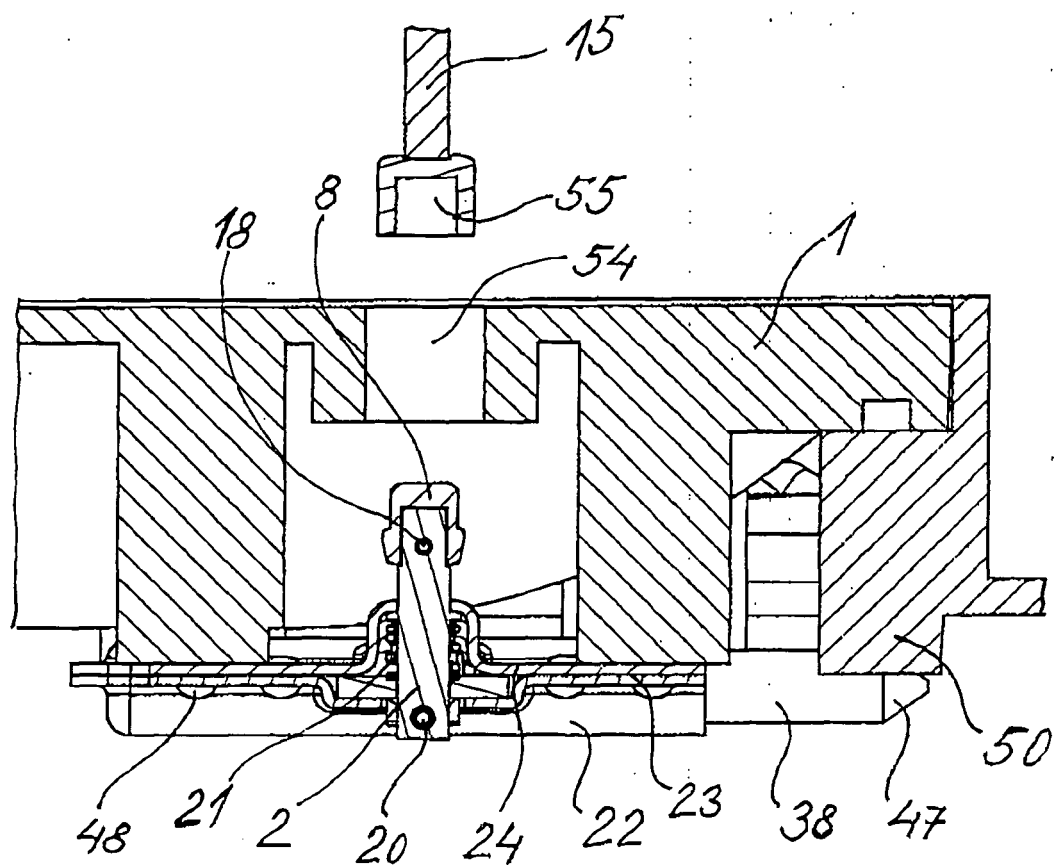


Fig. 7

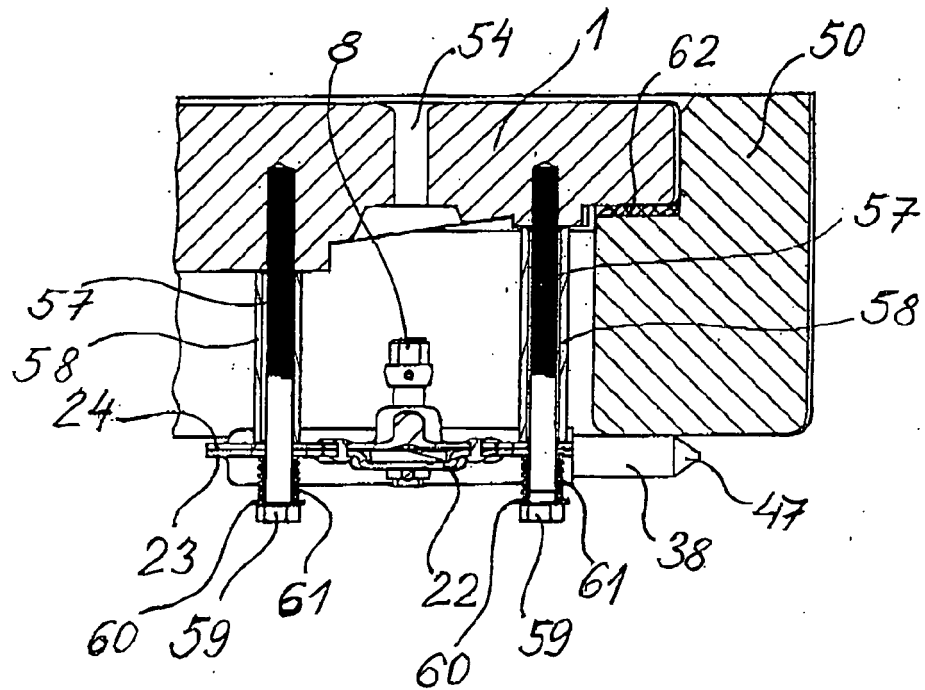
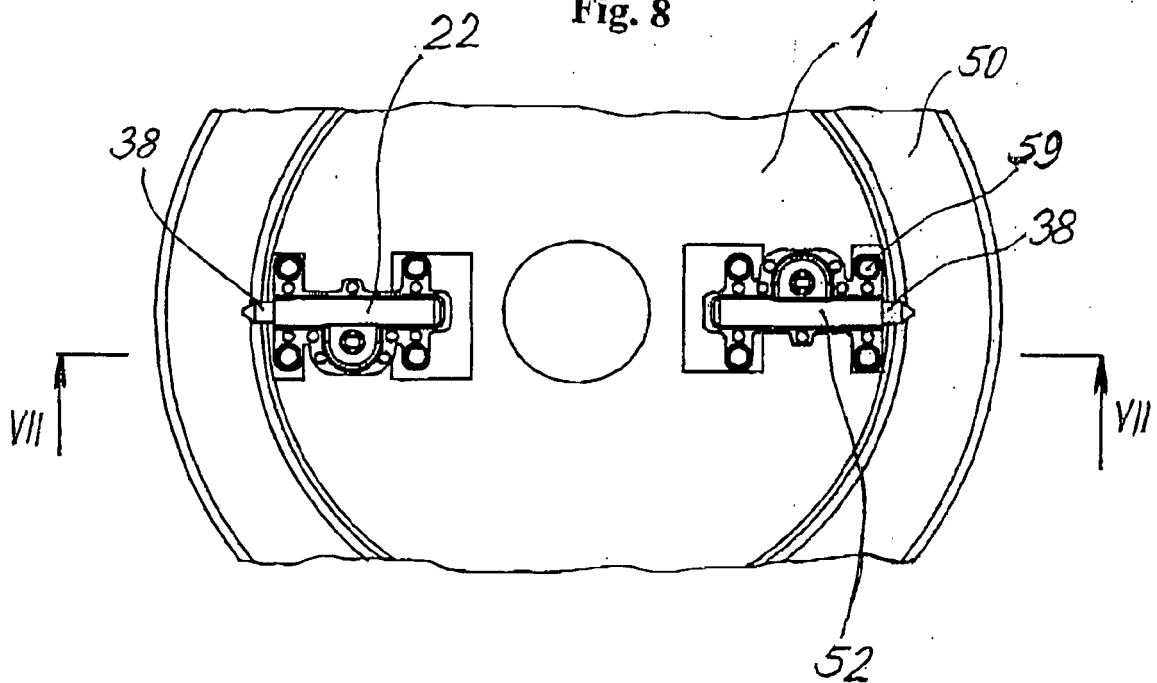


Fig. 8



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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