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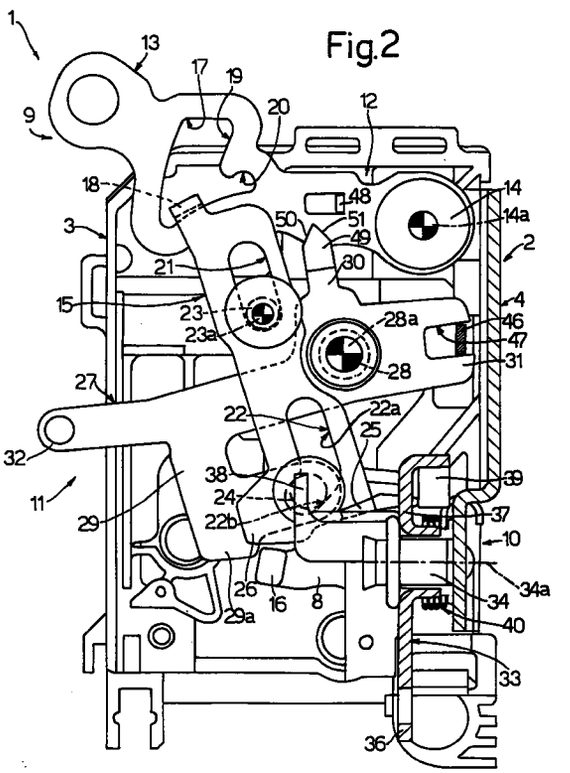
(54) Lock for the door of a vehicle

(57) Lock (1) for the door of a vehicle, in which a striker mechanism (12) is disposed between an external control lever (13) and an internal control lever (33) of the said lock (1) in order to prevent contemporaneous actuation of the two levers (13, 33), the striker mechanism (12) having a first striker element (48) formed by stamping the external control lever (13) and a second striker element (30) defined by a radial arm (30) extending towards the said first element (48) from a safety lever (27) disposed in a respective position for preventing opening of the lock (1).

Fig.2



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Description

This invention relates to a lock for the door of a vehicle.

In particular, this invention relates to a lock of the type comprising a closing mechanism having a fork and a stop adapted to block the said fork in a position for closing the lock, a first opening mechanism which can be connected to an external handle of the door in order to open the lock from the outside and comprising an external control lever movable between a normal position and an opening position, and a transmission lever coupled in a selectively releasable manner to the external control lever and unidirectionally engageable with the said stop, a safety mechanism adapted to release the said transmission lever from the external control lever and in turn comprising a safety lever positively coupled to the transmission lever and movable between an inhibiting position in which the transmission lever is released from the external control lever, thereby preventing the lock being opened from the outside, and an enabling position in which the transmission lever is constrained by the external control lever, thereby allowing for opening of the lock, and a second opening mechanism which can be connected to an internal handle of the door in order to open the lock from the inside and comprising an internal control lever movable between a respective normal position and a respective opening position in which it cooperates with the said transmission lever in order to actuate the said stop.

The known locks of the type described hereinabove have several disadvantages in that, if the safety lever is disposed in its inhibiting position, accidental and substantially contemporaneous actuation of the two opening control levers or of the external control lever together with the safety lever can result in forcing of the said transmission lever, which, if prolonged and/or increased beyond a limit value, could even result in breakage of the said transmission lever and could cause substantial blocking of the lock as a result of the kinematically anomalous operation of the levers, so that it therefore becomes impossible to open the door of the vehicle.

The disadvantages described hereinabove are moreover further accentuated if at least the transmission lever is made of plastic material in order to reduce the weight and noise of the lock.

The aim of this invention is to produce a lock for the door of a vehicle which does not have the disadvantages described hereinabove.

A lock for the door of a vehicle is provided according to this invention, comprising a closing mechanism having a fork and a stop adapted to block the said fork in a position for closing the lock, a first opening mechanism which can be connected to an external handle of the door in order to open the lock from the outside and comprising an external control lever movable between a normal position and an opening position, and a transmission lever coupled in a selectively releasable manner to the external control lever and unidirectionally engageable with the said stop, a safety mechanism adapted to release the said transmission lever from the external control lever and in turn comprising a safety lever positively coupled to the transmission lever and movable between an inhibiting position in which the transmission lever is released from the external control lever, thereby preventing the lock being opened from the outside, and an enabling position in which the transmission lever is constrained by the external control lever, thereby allowing for opening of the lock, and a second opening mechanism which can be connected to an internal handle of the door in order to open the lock from the inside and comprising an internal control lever movable between a respective normal position and a respective opening position in which it cooperates with the said transmission lever in order to actuate the said stop, the lock being characterised in that it moreover comprises striker means interposed between the said first opening mechanism and the said safety mechanism in order to prevent contemporaneous actuation of the said opening and safety mechanisms.

This invention will now be described with reference to the accompanying drawings illustrating one non-limiting embodiment and in which:

Figure 1 is a side elevation, partly in section and partly broken away for the sake of clarity, of a preferred embodiment of a lock according to this invention;

Figure 2 is a front elevation of the lock of Figure 1, partly in section and partly broken away for the sake of clarity, and

Figures 3 and 4 are partial front elevations, with parts broken away for the sake of clarity, of the lock of Figure 1 in two different operating positions.

With reference to Figures 1 and 2, the reference numeral 1 designates in its entirety a lock for the door (not shown) of a vehicle (not shown).

The lock 1 comprises a frame 2 adapted to be fixed to the said door and substantially defined by two walls 3 and 4 disposed transversely relative to one another and a closing mechanism 6 which is disposed substantially in the interior of the compartment 5 and in turn comprises a fork 7 adapted to cooperate with a fixed striker (not shown) integral with a pillar (not shown) of the door and a stop 8 adapted to releasably block the said fork 7 in a closing position on the striker.

The lock 1 moreover comprises two opening mechanisms 9 and 10 which are supported by the walls 3 and 4 respectively in positions substantially facing one another and can be connected respectively to an external handle and an internal handle of the door in order to open the said lock 1 from the outside and from the inside respectively. The lock 1 finally comprises a safety mechanism 11 supported by the wall 3 and adapted to prevent opening of the lock 1 at least from the outside,

and a striker mechanism 12 interposed between the mechanisms 9 and 11 in order to prevent contemporaneous actuation of the said mechanisms 9 and 11.

The mechanism 9 comprises an external control lever 13 connected in a known manner to the said external handle and mounted to rotate on a pin 14 supported by the wall 3 coaxially with a respective axis 14a transverse to the wall 3, and a transmission lever 15 which is coupled in a selectively releasable manner to the lever 13, is movable in a plane parallel to the wall 3 and is adapted to cooperate unidirectionally with a peg 16 projecting from the stop 8 for the purposes of opening the lock 1.

In particular, the lever 13 has a slot 17 engaged by a transverse projection 18 of the transmission lever 15 and is adapted to rotate about the axis 14a against the force of a helical torsion spring (not shown) mounted on the pin 14 between a raised normal position (shown in Figures 2 and 3) and a lowered opening position (shown in Figure 4) in which it is adapted to act on the stop 8 by means of the lever 15 and the peg 16 in order to open the lock 1, thereby disengaging the fork 7 from the said striker. The slot 17 is substantially L-shaped and comprises a releasing portion 19 which is formed substantially along a circumference having its centre in the axis 14a and within which the projection 18 can slide freely irrespective of the position of the lever 13, and a constraining portion 20 which extends transversely from the portion 19 to the axis 14a and within which the projection 18 is constrained in order to impart a substantially rectilinear movement to the lever 15 when the lever 13 is displaced between its operating positions.

In addition to the projection 18, the lever 15 has two slots 21 and 22 disposed successively along the said lever 15 from the said projection 18, the slot 21 extending parallel to a longitudinal axis of the lever 15 and being slidably engaged by a supporting pin 23 of the lever 15 mounted in the wall 3 coaxially with an axis 23a parallel to the axis 14a, while the bore 22 is slidably engaged by a respective peg 24 supported by the safety mechanism 11 parallel to the pin 23 and has two rectilinear portions 22a and 22b converging in an intermediate elbow defining a stable support for the said peg 24. The lever 15 finally has a further projection 25 extending on the opposite side of the projection 18 with respect to the lever 15 transversely of the said lever 15, disposed so that it corresponds with one end 26 of the lever 15 and adapted to be engaged by the opening mechanism 10, as will be explained more clearly hereinafter.

The safety mechanism 11 is adapted to act on the lever 15 by means of the peg 24 rotating the lever 15 about the axis 23a and comprises a safety lever 27 positively coupled to the said lever 15 by means of the peg 24 and movable between an inhibiting position (shown in Figures 2 and 4) in which it rotates the lever 15 by means of the peg 24 (in an anti-clockwise direction in Figure 2 and about the axis 23a) and releases the levers 13 and 15, thereby displacing the projection 18 of the lever 15 into the releasing portion 19 of the slot 17 so as to prevent the lock 1 being opened from the outside, and an enabling position (shown in Figure 3) in which it constrains the levers 13 and 15, thereby displacing the projection 18 into the portion 20 of the slot 17 so as to aglow for independent opening of the lock 1 from the inside and/or from the outside.

The lever 27 is mounted to rotate on a pin 28 supported by the wall 3 coaxially with a respective axis 28a transverse to the wall 3 and comprises three radial arms 29, 30 and 31, the arm 29 being substantially U-shaped, having an extension 32 which can be connected in a known manner to a knob (not shown) disposed in the vicinity of a window (not shown) of the door and supporting the peg 24, while the arm 31 extends on the opposite side of the said arm 29 with respect to the pin 28 and is engaged with the opening mechanism 10, and the arm 30 is disposed in an intermediate position between the arms 29 and 31 and extends transversely with respect to the said arms 29 and 31 towards the lever 13, with respect to which it is situated in a plane parallel to the wall 3, offset with respect to the plane of the said lever 13.

The opening mechanism 10 comprises an internal control lever 33 connected in a known manner to the said internal handle and mounted to rotate on a pin 34 supported by the wall 4 coaxially with a respective axis 34a transverse to the said wall 4, and an intermediate lever 35 which is engaged with the lever 27 of the safety mechanism 11 and can be selectively engaged by the lever 33 and actuated by means of a key in order to displace the said lever 27 into its enabling position or into its disabling position.

The lever 33 comprises three arms 36, 37 and 38 extending radially of the pin 34, wherein the arm 36 can be connected in a known manner to the said internal handle, the arm 37 substantially aligned with the arm 36 on the opposite side of the said arm 36 with respect to the pin 34 has a cam 39 in correspondence with one free end thereof, extending transversely from the arm 36 to the wall 4, and the arm 38 disposed in an intermediate position between the arms 36 and 37 is substantially hook-shaped and is adapted to engage with the projection 25 of the transmission lever 15 in order to displace the said lever 15 towards the peg 16 of the stop 8 and to open the lock 1. The lever 33 is moreover adapted to rotate about the axis 34a against the force of a helical torsion spring 40 (not shown) mounted on the pin 34 between a normal position (shown in Figure 1) in which the arm 38 is raised and disengaged with respect to the projection 25 and a respective opening position in which the arm 38 is engaged with the projection 25 in order to actuate the stop 8 and to open the lock 1, thereby allowing the fork 7 to be disengaged from the said striker.

The intermediate lever 35 is mounted to rotate on a respective pin 41 supported by the wall 4 coaxially with a respective axis 41a parallel to the axis 34a and can be

actuated by the lever 33 against the force of a bistable spring 42 (of a known type) engaged at one end by a portion 43 extending transversely of a radial arm 44 of the said lever 35 and at the other end by the wall 4. The lever 35 is connected to a control rod (not shown) which is coupled to the arm 44 and can be actuated by the key in order to enable or disable the mechanism 11 acting on the lever 27 of the said mechanism 11, and comprises in addition to the said arm 44 a shaped cam 45 extending transversely of a lower end of the arm 44 and on the same side of the cam 39 and a further radial arm 46 disposed on the opposite side of the arm 44 with respect to the pin 41 and positively engaged inside a notch 47 formed through a free end of the arm 31 of the lever 27.

Finally, as described hereinbefore, the striker mechanism 12 is interposed between the mechanisms 9 and 11 in order to prevent the possibility of the mechanisms 9 and 11 being actuated contemporaneously with the lever 27 disposed in the inhibiting position, and comprises a first striker element defined by a tooth 48 which is disposed transversely relative to the lever 13 in an intermediate position between the slot 17 and the pin 14 and is formed by stamping the said lever 13, and a second striker element defined by the arm 30 and adapted to cooperate positively with the first striker element in order to prevent contemporaneous movement of the lever 13 and the lever 27.

In particular, the arm 30 comprises a free end 49 which is disposed partially above the lever 13 on the opposite side of the wall 3 with respect to the said lever 13 and is moreover substantially in the shape of an isosceles triangle the base of which is integral with the arm 30 and two sides 50 and 51 of which are inclined relative to one another and with respect to a major longitudinal axis of the said arm 30 and are directed towards the lever 15 and towards the pin 14 respectively. The side 51 is adapted to come into contact with the tooth 48 so as to prevent subsequent relative movement between the lever 13 and the lever 27.

When in use, once the lever 27 has been rotated into its inhibiting position, the arm 46 is rotated by the safety mechanism 11 such that the cam 45 is displaced into a position in which it interferes with a trajectory of the cam 39 of the said lever 33 and such that, as the lever 33 is displaced successively from its normal position to its opening position, the cam 39 intercepts the cam 45, thereby displacing the said lever 27 into its enabling position.

In particular, when the lever 27 is disposed in its inhibiting position during use, rotation of the lever 13 from the normal position to the opening position will bring the tooth 48 behind the side 51, as a result of which the said rotation of the lever 13 is stopped, thereby at the same time preventing any rotation of the lever 33 by virtue of the connection between the said lever 33 and the arm 30 by means of the arms 31 and 46.

It can be deduced from the above description that the presence of the striker mechanism 12 prevents the transmission lever 15 and, in particular, the projection 18 from being subjected to abnormal stress and from thereby possibly causing breakage or causing the levers to strike one another as a result of deformation.

Claims

1. Lock (1) for the door of a vehicle, comprising a closing mechanism (6) having a fork (7) and a stop (8) adapted to block the said fork (7) in a position for closing the lock (1), a first opening mechanism (9) which can be connected to an external handle of the door in order to open the lock (1) from the outside and comprising an external control lever (13) movable between a normal position and an opening position, and a transmission lever (15) coupled in a selectively releasable manner to the external control lever (13) and unidirectionally engageable with the said stop (8), a safety mechanism (11) adapted to release the said transmission lever (15) from the external control lever (13) and in turn comprising a safety lever (27) positively coupled to the transmission lever (15) and movable between an inhibiting position in which the transmission lever (15) is released from the external control lever (13), thereby preventing the lock (1) being opened from the outside, and an enabling position in which the transmission lever (15) is constrained by the external control lever (13), thereby allowing for opening of the lock (1), and a second opening mechanism (10) which can be connected to an internal handle of the door in order to open the lock (1) from the inside and comprising an internal control lever (33) movable between a respective normal position and a respective opening position in which it cooperates with the said transmission lever (15) in order to actuate the said stop (8), the lock (1) being characterised in that it moreover comprises striker means (12) interposed between the said first opening mechanism (9) and the said safety mechanism (11) in order to prevent contemporaneous actuation of the said opening (9) and safety mechanisms (11).

2. Lock according to claim 1, characterised in that the said striker means (12) comprise inhibiting means to prevent displacement of at least the said safety lever (27) from the enabling position to the inhibiting position with the said external control lever (13) disposed substantially in the opening position.

3. Lock according to claim 1 or claim 2, characterised in that the said striker means (12) comprise first and second striker elements (48, 30) which can engage with one another and are interposed between the said safety lever (27) and the said external control lever (13).

4. Lock according to claim 3, characterised in that the said first striker element (48) is associated with the said external control lever (13) and the said second striker element (30) is associated with the said safety lever (27).

5. Lock according to claim 4, characterised in that the said second striker element (30) is defined by a radial arm (30) of the said safety lever (27), the radial arm (30) extending from the safety lever (27) to the said external control lever (13).

6. Lock according to claim 5, characterised in that the said radial arm (30) comprises a substantially triangular free end (49).

7. Lock according to claim 4, 5 or 6, characterised in that the said first striker element (48) is defined by a tooth (48) transverse to the said external control lever (13).

8. Lock according to claim 7, characterised in that the said tooth (48) is formed by the said internal control lever (33) by stamping the said internal control lever (33).

9. Lock according to any one of the preceding claims, characterised in that the said safety mechanism (11) comprises an intermediate lever (35) engaging with the said safety lever (27) and engageable by the internal control lever (33) when the safety lever (27) is disposed in its inhibiting position in order to position the said safety lever (27) in its enabling position.

10. Lock according to claim 9, characterised in that the said intermediate lever (35) can be actuated by means of a key.

Fig.1

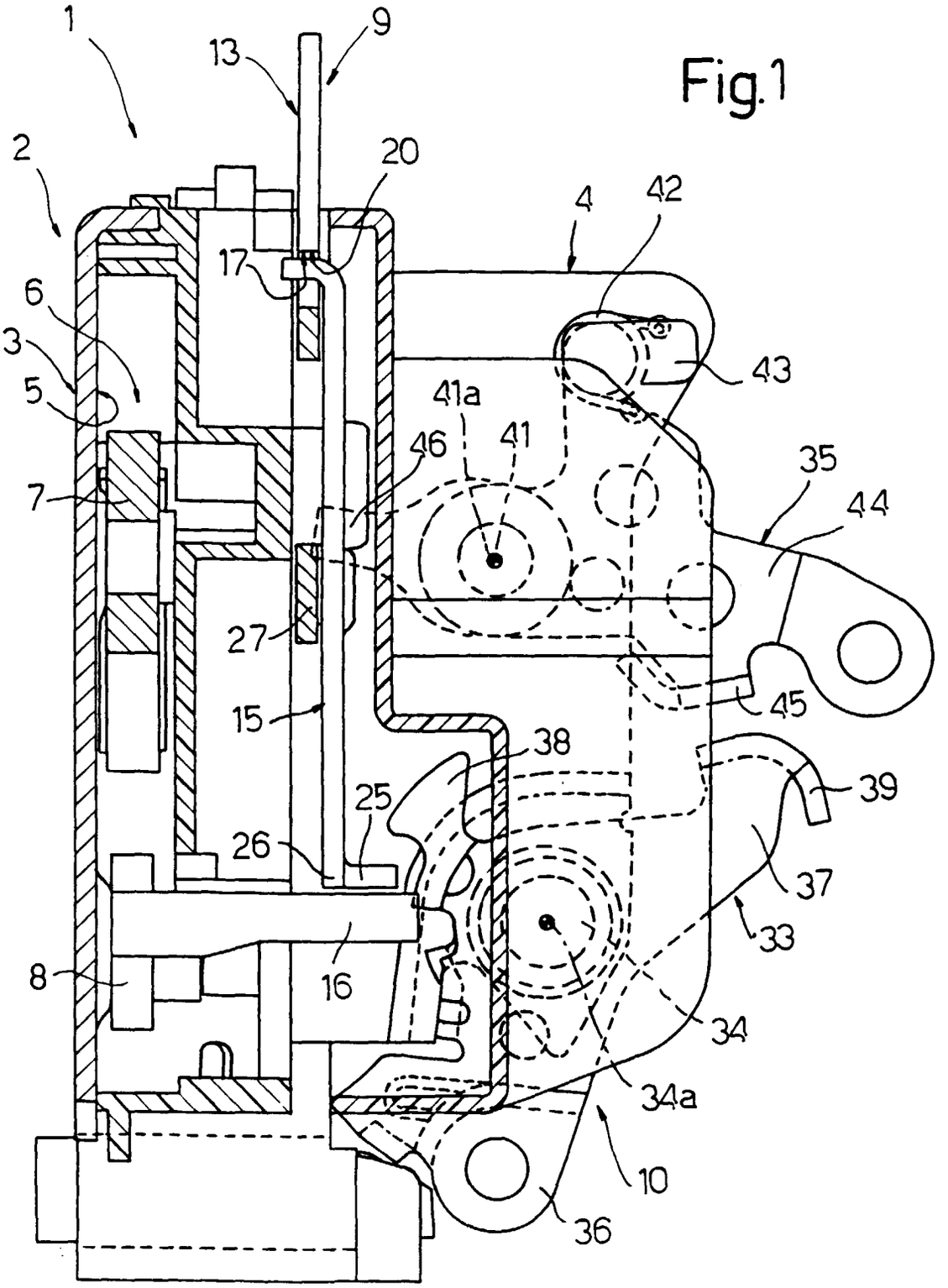
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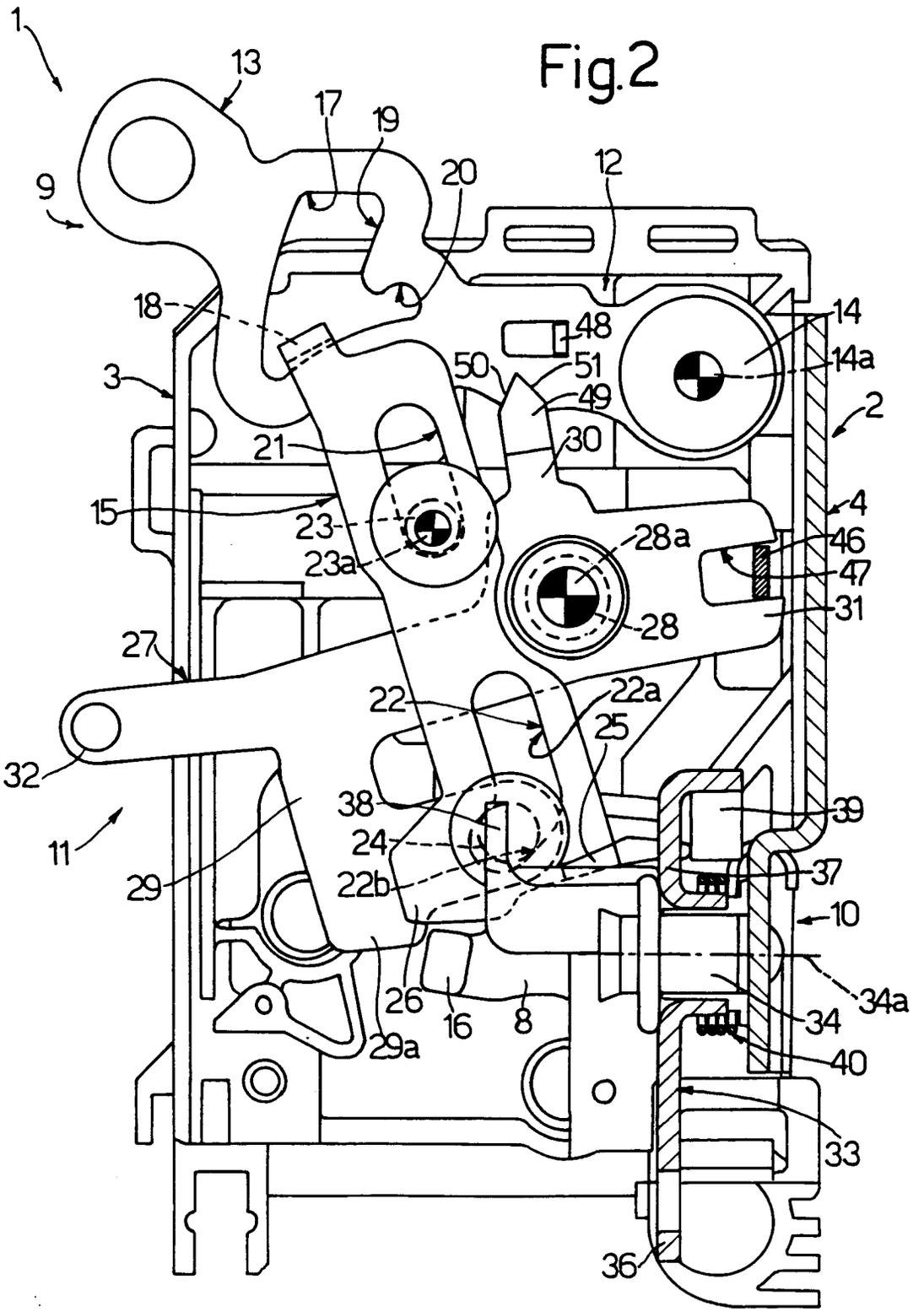
Fig.2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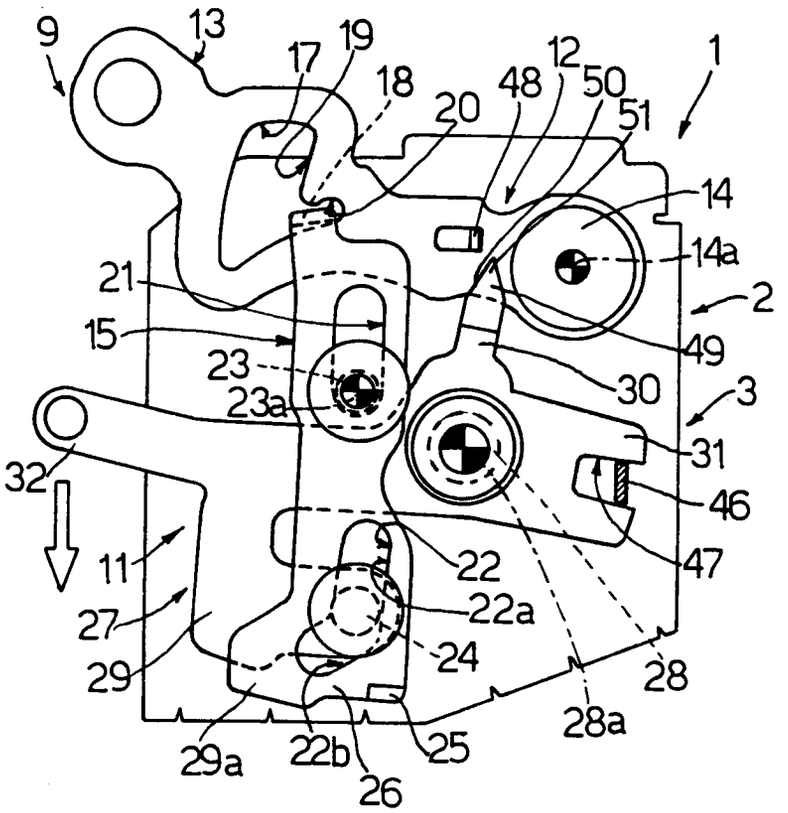
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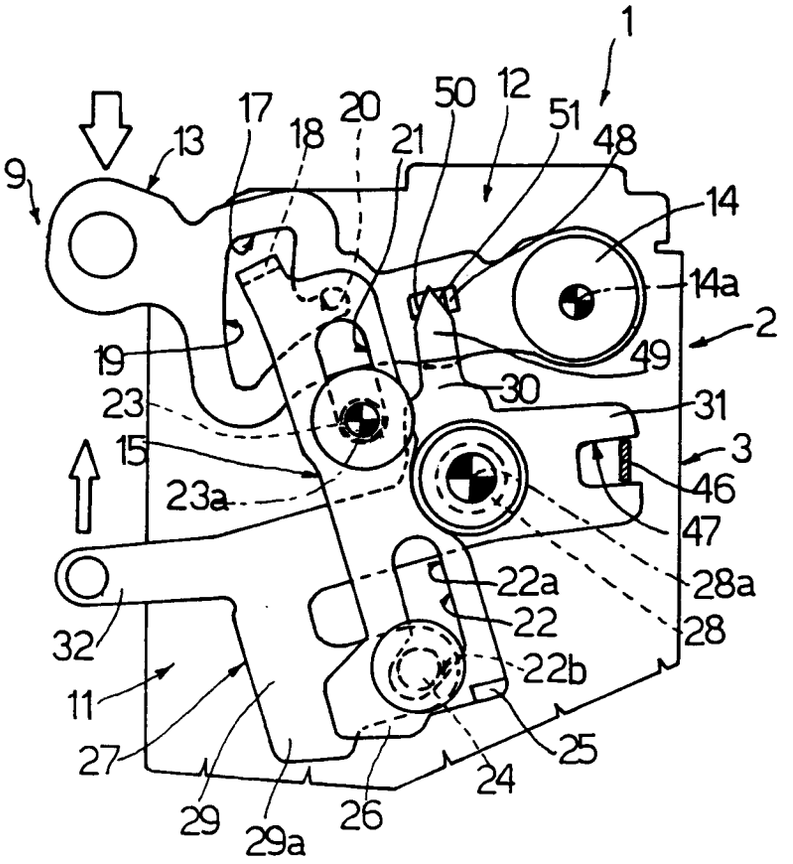
Fig.3

Fig.4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EUROPEAN SEARCH REPORT

Application Number
EP 98 10 5434

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 88 06 681 U (BOMORO BOCKLENBERG & MOTTE GMBH & CO KG) 14 July 1988 * the whole document *	1	E05B65/20
A	DE 44 34 167 C (KIEKERT AG) 21 March 1996 * the whole document *	1	
A	DE 295 07 642 U (KIEKERT AG) 13 July 1995 * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 July 1998	Westin, K

CATEGORY OF CITED DOCUMENTS

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