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(54) Lock for the hatch-back door of a vehicle

(57) Lock (1) for a hatch-back door (2) of a vehicle (3) presenting a boxed body (6) which is provided with an open housing (7) which may be engaged in a striker (4) which is integral with the vehicle (3), and defining a functional operating plane (P; a double snap fork (10) and a control lever being mobile on the operating plane (P) and being able to engage in relation to each other

in order to block the fork (10) in a snap operating closed position and/or in a snap operating safety position; an inhibiting device (30) being provided in order to inhibit, during opening, a return of the control lever (11) in such a way as to abut the fork (10) and presenting a mobile contrast element (31) across the operating plane (P) in order to engage the control lever (11) itself.

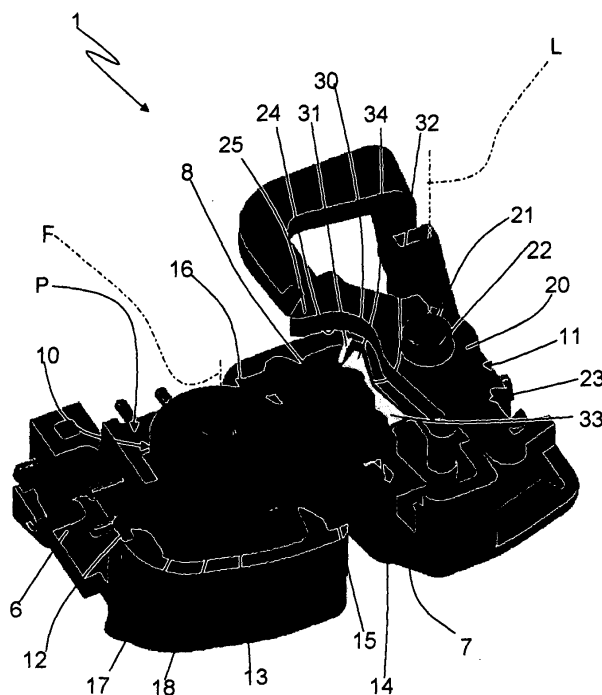


Fig. 1

Description

[0001] The present invention refers to a lock for the hatch-back hatch-back door of a vehicle.

[0002] In general, locks for the hatch-back hatch-back doors of vehicles comprise:

- a boxed body which is provided with an open housing and which may be engaged in a striker which is integral with the vehicle;
- a double snap fork, which is mobile, as a result of a pushing force of the striker and which is against the elastic action of a respective spring, towards a snap operating closed position and across a snap operating safety position, in correspondence to which the striker is blocked by the fork inside the open housing; and
- a control lever, which is maintained by a respective spring in a position of stable equilibrium which abuts the fork in order to block the fork itself in either the snap operating closed position or the snap operating safety position, and which is suitable for being selectively moved away from the fork to a position of instable equilibrium in order to permit the unblocking of the striker from the fork itself and, therefore, to permit the opening of the lock.

[0003] Locks of the kind which have just been described must guarantee the blocking of the hatch-back hatch-back door even in the case that the manoeuvre of moving the hatch-back hatch-back door close to the vehicle is not carried out completely, and for this reason the fork is provided with the safety operating snap, in correspondence to which the striker is blocked in the open housing of the boxed body, but the lock is not totally locked, a situation which occurs, instead, when the fork is arranged in the snap closed operating position.

[0004] During the manoeuvre of moving the hatch-back hatch-back door close to the vehicle, the fork enters into contact with the striker and is pushed, against the elastic action of its own spring, first towards the snap safety operating position and, subsequently and without any solution of continuity in the case that the manoeuvre of moving closer occurs completely, towards the snap closed operating position.

[0005] Instead, in the case in which the manoeuvre of moving the hatch-back hatch-back door close to the vehicle occurs in an incomplete manner, the fork is pushed by the striker into the snap safety operating position, and is blocked there by the control lever, the stable equilibrium position of which, as described above, abuts the fork itself.

[0006] Instead, during the manoeuvre of opening the lock, the control lever is disengaged from the fork and moves away from it, and the pull to which the lock is subjected by the hatch-back door determines the disengagement of the striker from the fork and the exit of the striker itself from the open housing.

[0007] However, due both to the fact that the control lever, once activated, returns to abut the fork due to the elastic effect of its own spring, as well as to the fact that the pull of the hatch-back door may be contrasted due to exogenous factors, it can happen that the fork becomes involuntarily blocked again in its snap safety operating position causing the lock not to open properly and determining, therefore, the failed disengagement of the striker from the open housing.

[0008] This situation constitutes, for the kinds of locks described above, a considerable operating disadvantage, in that it renders necessary a further activation of the control lever against a check, however, of the state of opening of the hatch-back door.

[0009] With the aim of avoiding such a disadvantage, as described, for example, in the Italian patent application No. TO2000A001188, locks for vehicle hatch-back doors also comprise an inhibiting device, which is suitable for inhibiting the immediate return of the control lever to its own stable equilibrium position, and which comprise in turn a switching tile which is mounted on the control lever, and which is mobile in automatic fashion from and towards an intercepting position, in which intercepts a positioning tooth which is arranged on the fork in order to prevent the engagement of the control lever with the fork itself.

[0010] The lock for vehicle hatch-back doors which is described in the above-mentioned Italian patent, while having been demonstrated to be reliable and of relatively easy construction, does however present a structure which is still not totally compact, and it is still not sufficiently cost-effective to manufacture.

[0011] The aim of the present invention is to produce a lock for the hatch-back door of a vehicle, which will present a particularly compact structure and which will also be cost-effective to produce.

[0012] According to the present invention, a lock for the hatch-back door of a vehicle will be produced, comprising:

- a boxed body which is provided with an open housing which may be engaged in a striker which is integral with the vehicle, and defining a functional operating plane;
- a double snap fork, which is mobile on the operating plane towards a snap operating closed position and across a snap operating safety position, in correspondence to which the striker is blocked by the fork inside the open housing;
- a control lever, which is maintained, by a respective spring, in a position of stable equilibrium abutting the fork in order to block the fork itself, and which is selectively mobile on the operating plane towards a disengagement position of the fork; and
- inhibiting means in order to inhibit, during opening, the return of the control lever to the position of stable equilibrium from the disengaged position;

the lock being characterised by the fact that the inhibiting means comprise a contrast element, which is mobile across the operating plane in order to engage the control lever in the position of instable equilibrium, and which can be activated by the control lever itself.

[0013] The present invention will now be described with reference too the attached drawings, which illustrate a non-limiting form of embodiment of the present invention, in which:

- FIGURE 1 is a perspective view, with some parts removed for reasons of clarity, of a first preferred form of embodiment of a lock for the hatch-back door of a vehicle produced according to the present invention;
- FIGURES 2, 3 and 4 illustrate, in plan view and on a reduced scale, the lock which is shown in FIGURE 1 in different operating positions; and
- FIGURE 5 is a perspective view, with some parts removed for reasons of clarity, of a second preferred form of embodiment of the lock which is illustrated in FIGURE 1.

[0014] With reference to FIGURES 1 and 2, the number indicates, in its entirety, a lock for the hatch-back door of a vehicle.

[0015] The lock 1 is mounted on the rear hatch-back door of a vehicle, both of which are schematically illustrated with broken lines and indicated, respectively, with the numbers 2 and 3, and is suitable for blocking the hatch-back door 2 to the vehicle 3 by acting on a striker 4, which is rendered integral with the vehicle 3 itself by means of the interposition of a striker plate 5.

[0016] The lock 1 comprises a boxed body 6, which defines a functional operating plane P for the lock 1 itself, and which is provided with an oblong open housing 7 which can be engaged by the striker 4, and with a housing 8 which is open towards the plane P itself, and which extends towards the inside of the boxed body 6.

[0017] The lock 1 also comprises a double snap fork 10 which is mobile on the plane P in order to rotate around an axis F which is transverse to the plane P itself, and a control lever 11, which is mobile on the plane P in order to rotate around an axis L which is transverse to the plane P itself, and which is arranged opposite the housing 8 in relation to the fork 10.

[0018] The fork 10 is arranged opposite the plane P in relation to the housing 8, and comprises a shaped flattened body 12, which is provided with a respective open housing 13, and with two positioning teeth 14 and 15.

[0019] In particular, the open housing 13 of the flattened body 12 and the housing 7 of the boxed body 6 are arranged opposite the plane P and are suitable for overlapping each other in order to engage and block the striker 4. Furthermore, the open housing 13 presents a substantially oblong shape and extends towards the axis F inside the flattened body 12 in a direction which de-

finer a substantial right angle in relation to a position of the teeth 14 and 15 in relation to the axis F itself and along a peripheral edge 16 of the flattened body 12. The two positioning teeth 14 and 15 are arranged in series in relation to each other and to the open housing 13 along the edge 16, and define, respectively, a snap operating closed position, which is illustrated in FIGURE 2, and a snap operating safety position, which is illustrated in FIGURE 3, for the fork 10 itself.

[0020] The flattened body 12 also presents a passing hole 17, which is co-axial to the axis F, and inside which is housed a torsion spring which is schematically illustrated and indicated by means of its own pin 18 which is inserted in the hole 17 itself.

[0021] The fork 10 is suitable for rotating on the plane P against the elastic action of the relative spring 18 for the insertion of the striker 4 into the open housing 7, and, at the same time, into the open housing 13, and is suitable for stopping itself as a result of the action of the control lever 11 on the teeth 14 and 15 in correspondence with the two snap operating positions.

[0022] Furthermore, the fork 10 is suitable for arranging itself in a release position, as illustrated in FIGURE 4 in which it completely disengages the striker 4 from its own open housing 13, and in which it is rotated around the axis F at an angle which is at least 90° in relation to the two snap operating positions.

[0023] The control lever 11 is arranged opposite the plane P in relation to the housing 8, and laterally to the fork 10, and it comprises a respective flattened body 20 of an elongated shape which can rotate around the axis L against the action of a respective torsion spring which is schematically illustrated and indicated by means of its own pin 21 which is co-axial to the axis L.

[0024] The flattened body 20 of the lever 11 presents a central passing hole 22 for housing the spring 21, and a peripheral edge 23 which extends around the axis L, and comprises a loop 24 and a catch 25 of a substantially triangular shape, which are arranged near to each other along the edge 23 of the wall of the edge 23 which is turned towards the fork 10.

[0025] The lever 11 is maintained by the relative spring 21 in a position of stable equilibrium abutting the fork 10 in order to engage the catch 25 with the tooth 14 or with the tooth 15 in such a way as to block the rotation of the fork 10 itself, and is selectively mobile on the plane P towards a position of disengagement of the fork 10, which is illustrated in FIGURE 4, and from which the lever 11 tends to return instantaneously due to the recall action which is exerted by the spring 21.

[0026] Furthermore, the lever 11, in its own position of stable equilibrium, is arranged in such a way as to completely close the housing 8, while in its own position of disengagement it is arranged with the loop 24 in correspondence with the housing 8 in such a way as to completely free the housing 8 itself.

[0027] Finally, the lock 1 comprises an inhibiting device 30, which is arranged substantially inside the hous-

ing 8, and which is suitable for inhibiting the return of the lever 11 to the position of stable equilibrium from the position of disengagement.

[0028] The device 30 comprises a contrast tile 31 which is mobile towards the plane P in order to engage the control lever 11 in a position of unstable equilibrium, and an elastic element 32, which is integral with the tile 31, and which is deformable under the selective action of the fork 10 or the control lever 11 in order to return to an un-deformed configuration with the tile 31 arranged across the plane P.

[0029] In particular, the element 32 is defined by an elastic strip, an end 33 of which is embedded in the boxed body 6, and an end 34 of which is opposite the end 33 and is free to oscillate inside the housing 8, and supports the tile 31. In the un-deformed configuration, the elastic strip 32 is partially arranged outside the housing 8 beyond the plane P and is suitable for being intercepted by the fork 10.

[0030] The device 30 is a totally passive device, the functional operating configuration of which depends on the position of the fork 10 and the control lever 11.

[0031] In particular, the device 30 is arranged completely inside the housing 8 when the control lever 11 is arranged in its position of stable equilibrium abutting the fork 10 and in such a way as to close the housing 8 itself, and it is actually maintained in such a position by the control lever 11. While the device 30 and, in particular, the tile 31, is arranged outside the housing 8 and inside the loop 24 when the control lever 11 is arranged in its position of disengagement.

[0032] Furthermore, the activation of the control lever 11 determines both the disengagement of the catch 25 from the tooth 14 or the tooth 15 and the rotation of the lever 11 itself around the axis L, as well as, therefore, the rotation of the fork 10 around the axis F, and the disengagement of the striker 4 from open housings 7 and 13 as far as the positioning of the fork 10 in the release position.

[0033] As soon as the control lever 11 is arranged in its own position of disengagement, the tile 31 completely exits the housing 8 under the elastic effect of the elastic strip 32, and is arranged inside the loop 24 and abutting the edge 23 in such a way as to block the return of the control lever 11 to its own position of stable equilibrium, or rather to prevent the control lever 11 from returning into contact with the fork 10 before the end of the manoeuvre of opening the hatch-back door is reached.

[0034] During the manoeuvre of moving the hatch-back door 2 closer, the striker 4 impacts against the fork 10 causing its rotation from the release position towards the snap safety operating position. Such rotation determines the engagement of the peripheral edge 16 of the fork 10 with the elastic strip 32 starting from the embedded end 33 and the consequent and progressive lowering of the elastic strip 32 itself, and, therefore, of the tile 31 below the plane P and inside the housing 8.

[0035] As soon as the tile 31 is disengaged from the

edge 23, the control lever 11 snaps into its position of stable equilibrium and the catch 25 engages the tooth 14 or the tooth 15 according to whether the manoeuvre of moving the hatch-back door closer occurs in complete or incomplete fashion, and blocks the fork 10 again.

[0036] It is clear from the above description that the implementation of the device 30 does not require any particular working or any complicated assembly operations, and is therefore in line with the aims of compactness, simplicity and cost-effective production.

[0037] The form of embodiment which is illustrated in FIGURE 5 refers to a lock 1' which is similar to the lock 1, from which the lock 1' differs due to the fact that the elastic element 32 is defined by two elastic arms 40, which are integral with the tile 31, and which are interposed between a base wall 41 of the housing 8 and the tile 31 itself.

[0038] In this case, the device 30 also comprises a support body 42, which is interposed between the tile 31 and the arms 40, and which is mounted in the housing 8 in sliding fashion parallel to the axis F and the axis L.

[0039] The two arms 40 are fixed in staggered fashion on the body 42 and present a substantially curved shape in such a way as to cross each other substantially in correspondence with their respectively linear ends 43.

[0040] The functioning principle of the lock 1' is substantially identical to the functioning principle of the above-described lock 1, and is easily understandable from the above description, it is however necessary to specify that the fork 10, in its rotation towards the snap operating positions, determines an elastic squashing of the arms 40 in the housing 8 and a sliding of the body 41 inside the housing 8 itself.

[0041] It is intended that the present invention should not be limited to the forms of embodiment herein described and illustrated, which are to be considered as examples of forms of embodiment of a lock for the hatch-back door of a vehicle, and which may instead be subject to further modifications relating to the shape and disposition of its parts, as well to details pertaining to construction and assembly.

Claims

1. Lock (1)(1') for a hatch-back door (2) of a vehicle (3) comprising:
 - a boxed body (6) which is provided with an open housing (7) which may be engaged in a striker (4) which is integral with the vehicle (3), and defining a functional operating plane (P);
 - a double snap fork (10), which is mobile on the operating plane (P) towards a snap operating closed position and across a snap operating safety position, in correspondence to which the striker (4) is blocked by the fork (10) inside the open housing (7);

- a control lever (11), which is maintained, by a respective spring, in a position of stable equilibrium abutting the fork (10) in order to block the fork (10) itself, and which is selectively mobile on the operating plane (P) towards a disengagement position of the fork (10); and
- inhibiting means (30) in order to inhibit, during opening, the return of the control lever (11) to the position of stable equilibrium from the disengaged position;

the lock (1)(1') being **characterised by** the fact that the inhibiting means (30) comprise a contrast element (31), which is mobile across the operating plane (P) in order to engage the control lever (11) in the position of instable equilibrium, and which can be activated by the control lever (11) itself.

2. Lock according to Claim 1, **characterised by** the fact that the said contrast element (31) can be deactivated by the fork (10) in order to permit the return of the control lever (11) to the its position of stable equilibrium.
3. Lock according to Claim 2, **characterised by** the fact that the contrast element (31) is arranged inside a housing (8) which is obtained in the boxed body (6) opposite the operating plane (P) in relation to the fork (10) and to the control lever (11), and which is open towards the fork (10) and the control lever (11) themselves.
4. Lock according to Claim 3, **characterised by** the fact that the said inhibiting means (30) comprise an elastic element (32), which is integral with the said contrast element (32), and which is deformable as a result of the selective action of the fork (10) or of the control lever (11) in order to return to an undeformed configuration with the contrast element (31) arranged across the operating plane (P).
5. Lock according to Claim 4, **characterised by** the fact that the contrast element (31) is defined by a tile (31) which is transverse to the operating plane (P).
6. Lock according to Claim 5, **characterised by** the fact that the said elastic element (32) is defined by an elastic strip (32) which is embedded in the boxed body (6) and which supports the said tile (31) at one of its own free ends (33).
7. Lock according to Claim 5, **characterised by** the fact that the said elastic element (32) is defined by at least an elastic arm (40) which is integral with the tile (31), and which is interposed between a base wall (41) of said housing (8) and the tile (31) itself.
8. Lock according to Claim 7, **characterised by** the fact that the said elastic element (32) is defined by two elastic arms (42) which are integral with the tile (31) and which are interposed between a base wall (41) of said housing (8) and the tile (31) itself.

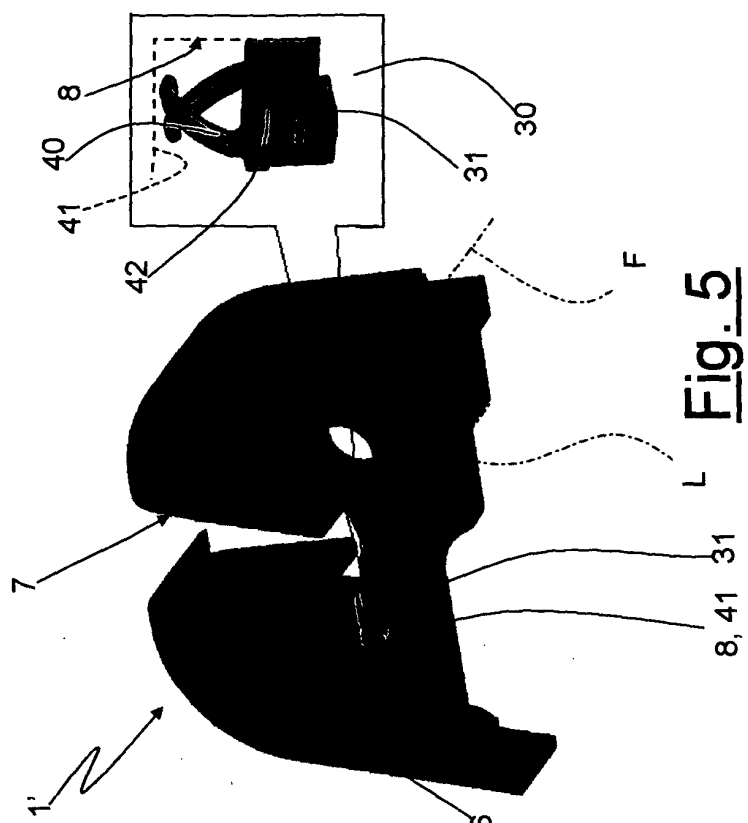


Fig. 5

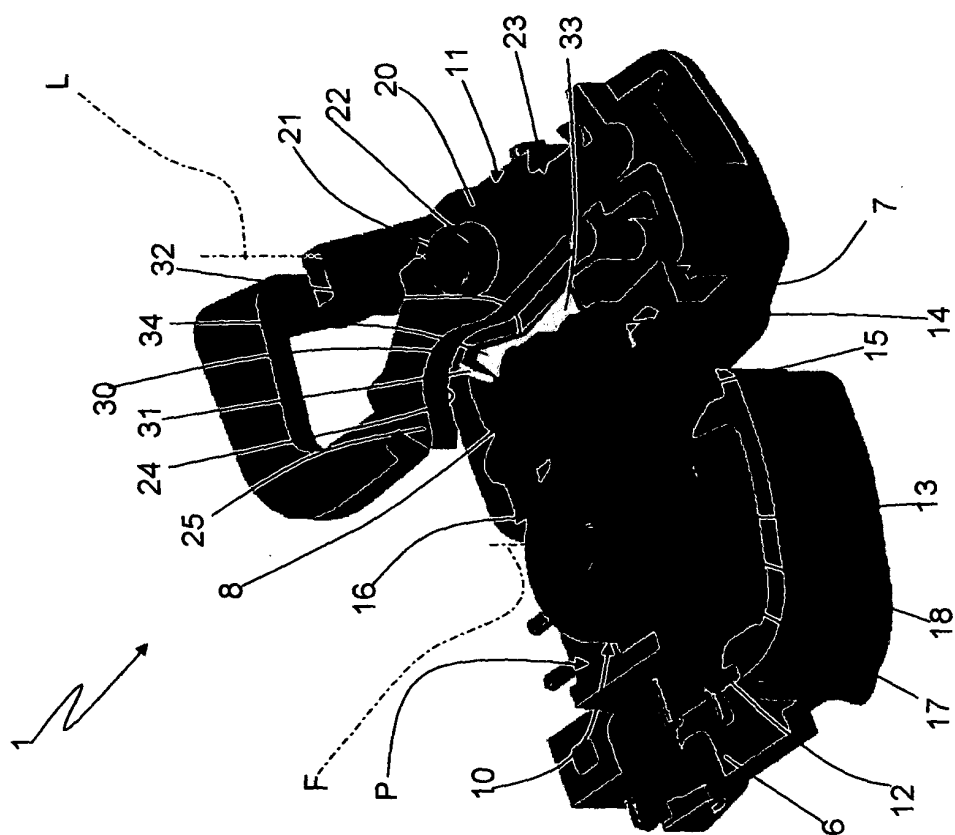


Fig. 1

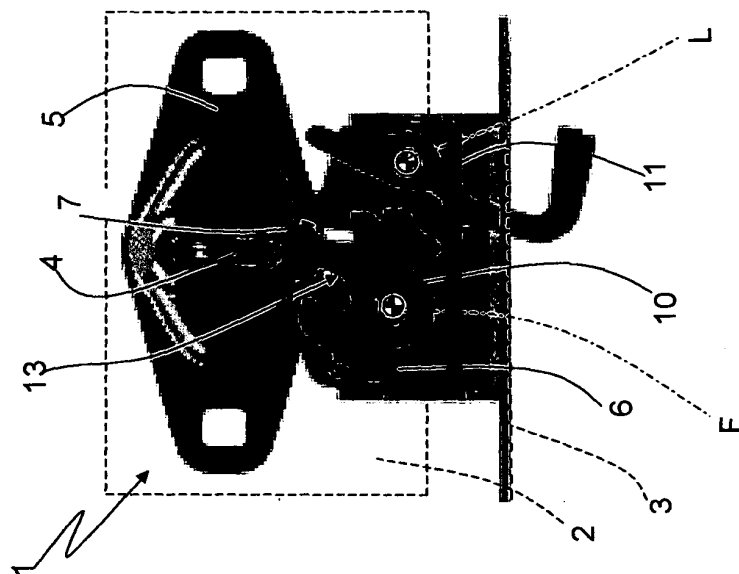


Fig. 2

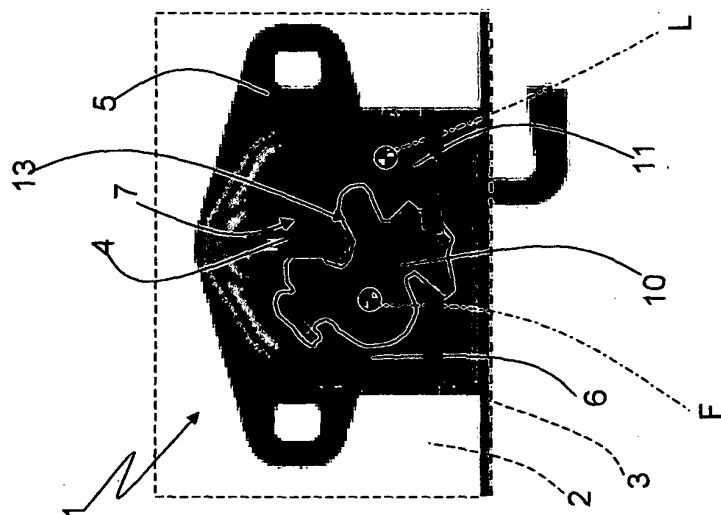


Fig. 3

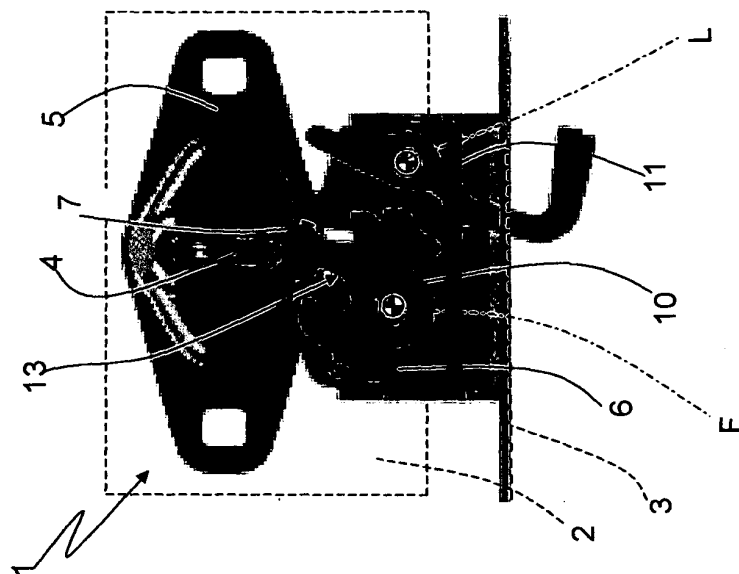


Fig. 4