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(54) **Lock for a door of a motor vehicle**

(57) Described herein is a lock (1) for a door of a motor vehicle provided with a closing mechanism (6) designed to couple in a releasable way with a lock striker (4) in a relative coupling direction (A) to define a closing position of the door, and with a supporting body (5) of the closing mechanism (6) provided with a seat (2) to receive the lock striker (4) delimited, on opposite sides of the relative coupling direction (A), by respective lat-

eral surfaces (23), and, in the transverse direction to the relative coupling direction (A), by a bottom surface (10) defining a final stop position of said lock striker (4); at least one of the lateral surfaces (23) is carried by a movable element (21) designed to intercept the lock striker (4) at the entrance of the seat (2) and movable with the lock striker (4) along a set trajectory to accompany it towards the bottom surface (10).

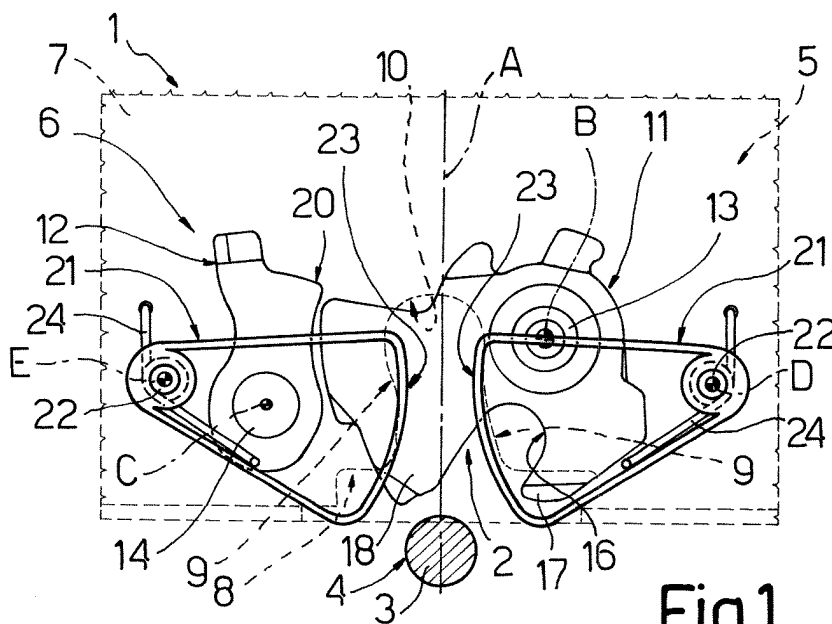


Fig.1

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Description

[0001] The present invention relates to a lock for a door of a motor vehicle.

[0002] It is specified that the term "door" is used in the present description and in the claims in its broadest sense, to indicate any element movable from an opening position to a closing position of an access opening to an internal compartment of a motor vehicle. Therefore, in addition to the side doors of motor vehicles, the aforesaid term, to which explicit reference will be made in the ensuing description without this entailing any loss of generality, will also include the bonnet or the boot or the hatchback.

[0003] As is known, locks for motor vehicles generally comprise a supporting body designed to be fixed to a door of a motor vehicle, and a closing mechanism carried by the supporting body and designed to couple with a lock striker integral with an upright of said door. There are also solutions, used much less frequently, wherein the supporting body of the lock is fixed to the upright and the lock striker is instead fixed to the door.

[0004] In both cases, the supporting body is provided with a C-shaped lateral seat, inside which the lock striker is designed to be inserted to be blocked by the closing mechanism.

[0005] In the most commonly known traditional form, the closing mechanism is constituted essentially by a fork and by a dog hinged to the supporting body around respective axes fixed parallel to each other.

[0006] The fork has an engagement seat for the lock striker superimposed on the lateral seat of the supporting body, and is elastically loaded towards an opening position, wherein the lock striker can be engaged and disengaged from its seat.

[0007] The fork is also available in a closing position, wherein it holds the lock striker both inside its seat and inside the lateral seat of the supporting body, preventing disengagement.

[0008] The dog is thrust by a spring to couple via snap-action, by means of an engagement edge thereof, with a retention shoulder of the fork to block the latter in a releasable way in the closing position.

[0009] In particular, after the door is slammed, the fork moves, under the thrust of the lock striker, from the opening position to an overtravel position disposed beyond the closing position; during the portion of travel between the closing position and the overtravel position, the fork moves, with its retention shoulder, beyond the dog, to enable the latter to snap, with its engagement edge into a position facing the aforesaid shoulder. During subsequent elastic return of the fork towards the opening position, the retention shoulder is positioned against the engagement edge of the dog, thus defining the closing position of the fork on the lock striker.

[0010] Due to the action of the weight of the door on the hinges that connect it to the frame of the motor vehicle or due to imperfect adjustment of the hinges, the

lock and the lock striker may not be perfectly centered for reciprocal coupling.

[0011] To enable correct closing of the door also in these conditions, the seat of the supporting body destined to receive the lock striker is delimited laterally, on opposite sides, by a pair of inclined guide walls, which converge towards a bottom wall defining the stop position of said lock striker.

[0012] In this way, in the case of optimal alignment between the lock and the lock striker, the latter comes into contact with the inclined walls of the seat of the supporting body only at the end of its closing travel. However, if they are misaligned, at the entrance to the seat of the supporting body the lock striker knocks against one of the two inclined walls and, sliding on it, is guided towards the final coupling position with the fork.

[0013] However, the effect of this sliding causes friction and scraping during closing of the door, which causes unwanted noise and a limited braking action on the movement of the lock striker.

[0014] In order to limit the negative effects of said scraping, the part of the supporting body defining the seat that receives the lock striker is currently produced in materials with a low friction coefficient, which however have relatively high costs.

[0015] The object of the present invention is to produce a lock for a door of a motor vehicle, which enables the problems related to known locks indicated hereinbefore to be solved in a simple and inexpensive way.

[0016] The aforesaid object is obtained by the present invention, as it relates to a lock for a door of a motor vehicle comprising a closing mechanism designed to couple in a releasable way with a lock striker in a relative coupling direction to define a closing position of said door, and a supporting body of said closing mechanism provided with a seat to receive said lock striker, delimited, on opposite sides of said relative coupling direction, by respective lateral surfaces, and, in a transverse direction to said relative coupling direction, by a bottom surface defining a final stop position of said lock striker, characterized in that at least one of said lateral surfaces is carried by a movable element designed to intercept said lock striker at the entrance of said seat and movable with said lock striker along a set trajectory to accompany it towards said bottom surface.

[0017] For better understanding of the present invention a preferred embodiment is described hereunder, purely as a non-limiting example and with reference to the accompanying drawings, in which:

Figure 1 is a partially sectional front view with parts removed for clarity, of a lock for a door of a motor vehicle, produced according to the present invention and disposed in an opening position;

Figure 2 is a partially sectional front view with parts removed for clarity, of the lock in Figure 1, disposed in a closing position; and

Figures 3 and 4 are partially sectional front views

with parts removed for clarity, of the lock in Figure 1 in two different transitory positions between the aforesaid opening and closing positions.

[0018] With reference to the attached figures, number 1 indicates as a whole a lock for a door of a motor vehicle (not shown).

[0019] The lock 1 has a seat 2 to receive a cylindrical portion 3 of a lock striker 4 (represented only in part), integral with a fixed upright (not shown) of the door of the motor vehicle, and is designed to block the portion 3 in a releasable way inside the seat 2 to define a closing condition of the aforesaid door.

[0020] In particular, the lock 1 essentially comprises a supporting body 5 designed to be connected rigidly to the door of the motor vehicle, and a closing mechanism 6 connected to the supporting body 5 and designed to be coupled in a releasable way, in a relative coupling direction A, with the portion 3 of the lock striker 4 to block it inside the seat 2.

[0021] The supporting body 5 comprises a plate 7 in turn provided with a C-shaped lateral opening 8 designed to enable the portion 3 of the lock striker 4 to enter the lock 1 when closing the door.

[0022] In particular, the opening 8 partly defines, as will be explained in detail hereunder, the seat 2 that receives the lock striker 4 inside the lock 1, and is delimited by a pair of lateral surfaces 9 extending on opposite sides of the direction A, and by a bottom surface 10 transverse to the direction A and defining a final stop position of the lock striker 4.

[0023] As can be seen in detail in the attached figures, the bottom surface 10 has a concave arc of circumference structure, while the lateral surfaces 9 have a curvilinear structure in the zone of connection to the bottom surface 10 and draw closer to each other at the opposite end to become rectilinear and parallel.

[0024] In practice, in proximity to the bottom surface 10, the opening 8 has an open circular structure with a larger diameter with respect to that of the portion 3 of the lock striker 4.

[0025] The closing mechanism 6 essentially comprises a fork 11 and a dog 12 hinged around respective pins 13, 14 fixed integral with the plate 7 and with respective axes B, C parallel to each other and orthogonal to said plate 3 and to the direction A.

[0026] The fork 11 is constituted by a shaped metal plate extending parallel to the plate 7 and with an intermediate portion hinged to said plate 7 by the pin 13.

[0027] The fork 11 is provided with a peripheral C-shaped seat 16, superimposed on the opening 8 of the plate 7, designed to receive the portion 3 of the lock striker 4 and delimited laterally by a pair of teeth 17, 18.

[0028] Advantageously, the fork 11 is coated externally by a shell made of plastic material, from which the free ends of the teeth 17 and 18 delimiting the seat 16 project.

[0029] The fork 11 is thrust in a known way, by a spring

(not shown) wound around the pin 13 and connected to said fork 11 and to the plate 7, towards an opening position (figure 1), wherein the seat 16 is facing the same part as the opening 8 of the plate 7 and therefore enables engagement and disengagement of the portion 3 of the lock striker 4; the fork 11 is also disengaged in a closing position (figure 4), wherein the portion 3 of the lock striker 4 is blocked inside the seat 16 and the tooth 17 intercepts the opening 8 to prevent its disengagement.

[0030] The dog 12 is composed of a shaped plate designed to couple via snap-action with the fork 11 to block it in a releasable way in the closing position.

[0031] In particular, the dog 12 extends on the same lying plane as the fork 11, is hinged to the pin 14 at the level of one of its ends and is designed to engage via snap-action, by means of an opposite L-shaped end edge 20 thereof, with the free end of the tooth 18 of the fork 11.

[0032] The dog 12 is thrust in a known way towards the fork 11 by a helical spring (not shown) wound around the pin 14 and connected to said dog 12 and to the plate 7.

[0033] In particular, after the door is slammed, the fork 11 is designed to move, under the thrust of the portion 3 of the lock striker 4, from the opening position to an overtravel position (not shown) disposed beyond the closing position; during the portion of travel between the closing position and the overtravel position, the fork 11 moves, with its tooth 18, beyond the dog 12, to enable the latter to snap, with its end edge 20, into a position facing the free end of said tooth 18. During subsequent elastic return of the fork 11 towards the opening position, the free end of the tooth 18 is positioned against the end edge 20 of the dog 12, thus defining the closing position of said fork 11 on the lock striker 4.

[0034] According to an important aspect of the present invention, the lock 1 also comprises a pair of movable elements 21 disposed symmetrically on opposite sides of the direction A to intercept the lock striker 4 in the phase in which it enters the supporting body 5, hinged to the plate 7 by means of respective pins 22 with axes D, E parallel to the axes B, C, and which can be moved separately from each other by means of the lock striker 4 to accompany it towards the bottom surface 10.

[0035] In particular, the movable elements 21 are designed to cooperate with the portion 3 of the lock striker 4 by means of respective interception surfaces 23 projecting in the direction A with respect to the relative lateral surfaces 9 of the opening 8.

[0036] The interception surfaces 23 of the movable elements 21 and the bottom surface 10 of the opening 8 thus delimit, as a whole, the seat 2 to receive the portion 3 of the lock striker 4 inside the supporting body 5.

[0037] As can be seen in the attached figures, the movable elements 21 have a symmetrical structure with respect to the direction A and are loaded by respective

helical springs 24 towards the zone in which the lock striker 4 enters the seat 2.

[0038] More specifically, each movable element 21 essentially has a triangular structure, is hinged to the plate 7 at the level of one of its vertices and defines, with the curvilinear opposite side, the relative interception surface 23.

[0039] More precisely, the interception surfaces 23 are arc of circumference in shape with facing convexities.

[0040] Each spring 24 is wound around the relative pin 22 and has opposite end portions connected respectively to the plate 7 and to the relative movable element 21 so as to thrust it in the opposite direction to the one in which the lock striker 4 enters the supporting body 5 and against a fixed stop (not shown) defined by said plate 7.

[0041] In use, closing of the lock 1, from outside or from inside the motor vehicle, takes place simply by slamming the door; in this way, the portion 3 of the lock striker 4 is made to knock against the tooth 18 of the fork 11, which rotates clockwise from the opening position in Figure 1 towards the closing position in Figure 2.

[0042] In particular, in the very frequent case in which the lock striker 4 is not perfectly aligned in the direction A with the seat 2 of the lock 1, when entering the supporting body 5, the portion 3 of said lock striker 4 also knocks against the interception surface 23 of one of the two movable elements 21 (in the case shown the one on the left) drawing it in rotation around its relative hinging pin 22 against the action of the spring 24.

[0043] In practice, the portion 3 of the lock striker 4 adheres to the interception surface 23 of the aforesaid movable element 21, which, through being hinged to the pin 22 is constrained to move along a set arc of circumference trajectory and thus accompanies the portion 3 towards the bottom surface 10 of the seat 2 without causing scraping or friction.

[0044] The other movable element 21 does not move and comes into contact with the portion 3 of the lock striker 4 exclusively at the end of the coupling travel of said lock striker 4 with the fork 11.

[0045] During rotation around the axis B, caused by thrust of the lock striker 4, the fork 11 initially slides with its peripheral edge on the end edge 20 of the dog 12; as soon as the tooth 18 moves beyond the end edge 20, the dog 12, under the thrust of its spring, snaps further towards the fork 11, which completes its travel and returns, through the effect of the elastic return force to which it is subject, towards the opening position. During this movement, the free end of the tooth 18 is intercepted by the end edge 20 of the dog 12, thus blocking the fork 11 in the closing position.

[0046] As can be seen in figure 4, in this position, the portion 3 of the lock striker 4 is blocked, in the direction A, between the tooth 17 of the fork 11 and the bottom surface 10 of the seat 2, and, in the direction orthogonal and coplanar to the direction A, between the movable

elements 21.

[0047] By examining the characteristics of the lock 1 produced according to the present invention the advantages that can be obtained are apparent.

[0048] In particular, when closing the door, the lock striker 4, not perfectly centered with respect to the seat 2 of the lock 1, is accompanied by the movable elements 21 towards the final stop position against the bottom surface 10 without scraping or friction and, therefore, without creating any unwanted noise or braking action on said lock striker 4.

[0049] It is therefore possible, with respect to known locks, to eliminate the converging guide surfaces delimiting the opening for the entry of the lock striker inside the supporting body of the lock. Therefore, in the solution described herein, these surfaces merely act as spacers (lateral surfaces 9 of the opening 8).

[0050] Finally, it is clear that modifications and variations may be made to the lock 1 without departing from the scope of protection of the present invention.

[0051] In particular, the lock 1 could be fixed to the upright of the door and could cooperate with a lock striker integral with the door.

[0052] Moreover, the lock 1 could have only one movable element facing a fixed guide wall of the lock striker 4.

Claims

1. Lock (1) for a door of a motor vehicle comprising a closing mechanism (6) designed to be coupled in a releasable way with a lock striker (4), along a relative coupling direction (A) to define a closing position of said door, and a supporting body (5) of said closing mechanism (6) provided with a seat (2) to receive said lock striker (4) delimited, on opposite sides of said relative coupling direction (A), by respective lateral surfaces (23), and, in a transverse direction to said relative coupling direction (A), by a bottom surface (10) defining a final stop position of said lock striker (4), **characterized in that** at least one of said lateral surfaces (23) is carried by a movable element (21) designed to intercept said lock striker (4) at the entrance of said seat (2) and movable with said lock striker (4) along a set trajectory to accompany it towards said bottom surface (10).
2. Lock as claimed in claim 1, **characterized in that** said movable element (21) is hinged to said supporting body (5) around an axis (D, E) transverse to said relative coupling direction (A) and is loaded by elastic means (24) towards the zone in which said lock striker (4) enters said seat (2).
3. Lock as claimed in claim 1 or 2, **characterized in that** both said lateral surfaces (23) are carried by said respective movable elements (21)).

4. Lock as claimed in claim 3, **characterized in that** said movable elements (21) have a symmetrical structure with respect to said relative coupling direction (A).

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5. Lock as claimed in claim 3 or 4, **characterized in that** said lateral surfaces (23) are arc of circumference in shape with facing convexities.

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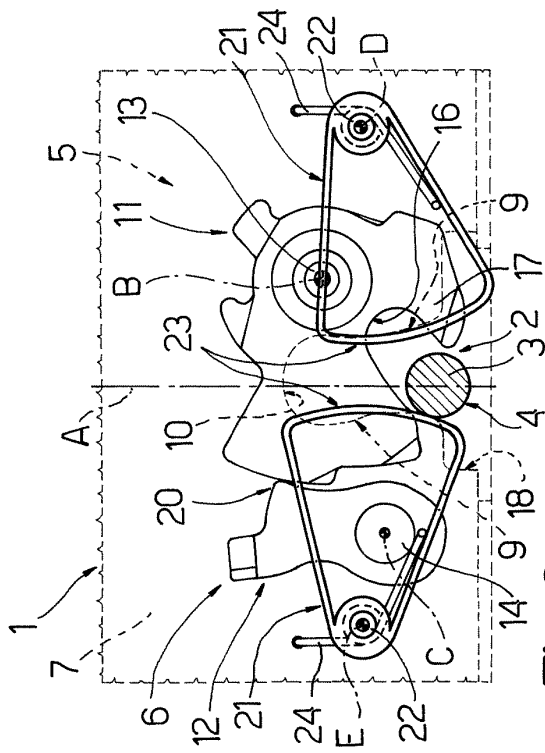


Fig.1

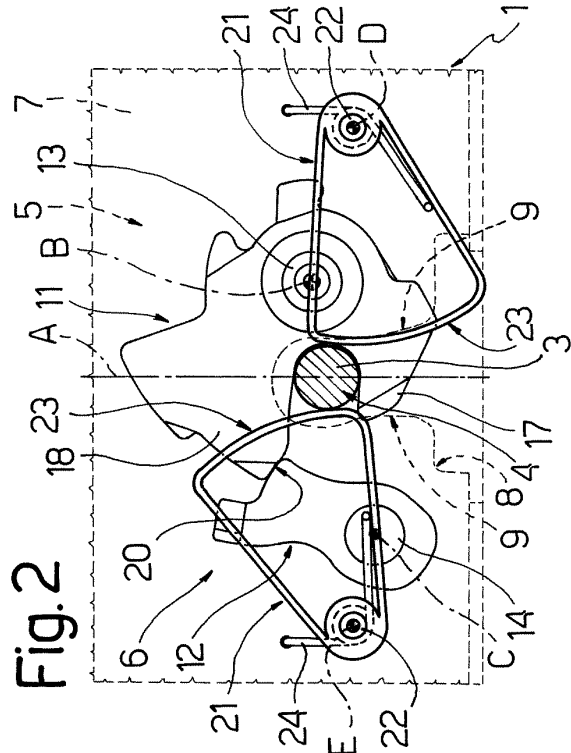


Fig.2

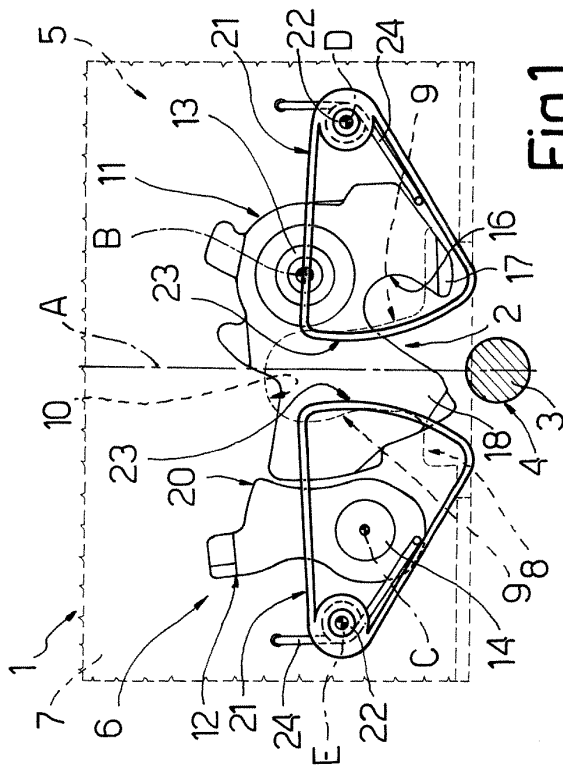


Fig.3

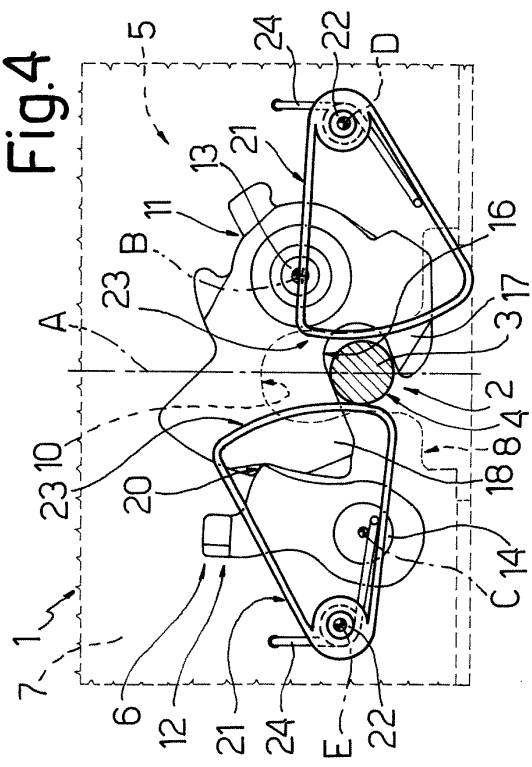


Fig.4



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Application Number
EP 04 10 4503

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		20 December 2004	Westin, K
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