(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 052 355 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.11.2000 Bulletin 2000/46

(51) Int. Cl.[7]: **E05B 65/20**, E05B 7/00, E05B 65/12

(21) Application number: **00109650.2**

(22) Date of filing: **05.05.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **07.05.1999 IT TO990380**

(71) Applicant:
Valeo Sicurezza Abitacolo S.p.A.
10026 Santena (IT)

(72) Inventors:
- **Agostini, Astorre**
  10091 Alpignano (IT)
- **Savant, Fiorenzo**
  10093 Collegno (IT)

(74) Representative:
Cerbaro, Elena, Dr. et al
STUDIO TORTA S.r.l.,
Via Viotti, 9
10121 Torino (IT)

(54) Vehicle door handle

(57) A handle (1) for a door of a vehicle has a supporting structure (2); a control lever (14) movable, with respect to the structure (2), between a rest position and a work position to activate a lock on the door; and a C-shaped body (56) for retaining the lever (14) in the rest position in the event of lateral impact on the vehicle; the body (56) is hinged about an axis (42), and has an inertial mass (64) located eccentrically with respect to the axis (42), and a hooked end portion (63) for locking onto the lever (14) in the event of lateral impact.

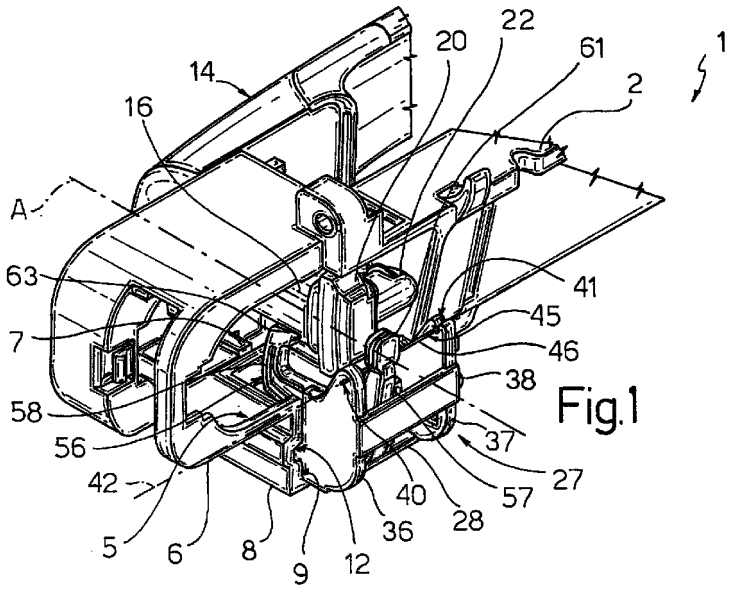


Fig.1

EP 1 052 355 A2

Description

[0001] The present invention relates to a vehicle door handle.

[0002] Handles are known comprising a user-activated control lever movable between a rest position maintained by a preloaded return spring, and a work position to open a lock on the door by means of a transmission lever interposed between the control lever and the lock. In some applications, the handles are provided with safety devices for preventing control of the lock, and so preventing the door from opening spontaneously, in the event of a side-on collision.

[0003] In particular, inertial safety devices are used comprising a mass or counterweight connected integrally to, and eccentric with respect to the axis of rotation of, the transmission lever to balance, in the event of impact, the inertial forces generated at least by the control lever and tending to rotate the transmission lever.

[0004] Known handles of the above type are far from satisfactory, owing to the inertial mass, movable integrally with the transmission lever, generating on the lever - when the control lever is activated - an inertial moment which is added to the moment exerted by the spring, thus increasing the opening force required, and - when the control lever is released - a force which, at the end of the travel of the control lever, generates a backward thrust and impact resulting in undesired noise.

[0005] Moreover, though the door involved in the collision is kept closed, known inertial devices do not always succeed in keeping the opposite door closed.

[0006] Inertial safety devices of the type described are also relatively slow to operate, by featuring a necessarily large mass to balance the inertial forces tending to open the door, and are only effective up to a given maximum impact intensity, beyond which, efficiency is gradually reduced. To increase efficiency, it is necessary to act on the mass, which is sized according to a predicted impact intensity. Beyond a given limit, however, the mass would be excessively large and incompatible with the space available.

[0007] It is an object of the present invention to provide a vehicle door handle designed to provide a straightforward, low-cost solution to the above problems.

[0008] According to the present invention, there is provided a handle for a door of a vehicle, the handle comprising a supporting structure; a control member movable, with respect to said structure, between a rest position and a work position to activate a lock on said door; and retaining means for retaining the control member in said rest position in the event of lateral impact on the vehicle, and comprising an inertial mass rotating about an axis and located eccentrically with respect to said axis; characterized in that said retaining means also comprise locking means integral with said inertial mass and for locking onto said control member in the event of lateral impact.

[0009] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a partial view in perspective of a preferred embodiment of the handle according to the present invention;

Figure 2 shows a side view, with parts removed for clarity, of the Figure 1 handle;

Figure 3 shows an exploded view in perspective of a detail in Figure 2;

Figure 4 shows a section along line IV-IV in Figure 2.

[0010] Number 1 in Figure 1 indicates a handle (shown partly) for controlling a lock on a side door (not shown) of a vehicle.

[0011] Handle 1 comprises a supporting structure 2, which is connected integrally, in known manner not described in detail, to the side door of the vehicle. When fitted to the respective door, structure 2 extends in a longitudinal direction, and comprises a through cavity 5 extending in a direction A crosswise to the longitudinal direction and to the door, and defined by a longitudinal lateral wall 6.

[0012] As shown in Figure 1, lateral wall 6 carries a stop 7 extending inside cavity 5, and comprises a U-shaped portion 8, which extends adjacent to stop 7 and outwards of structure 2 to define a seat 9, and has a lateral groove 12 inside seat 9 and parallel to direction A.

[0013] As shown in Figures 1, 2 and 4, handle 1 also comprises a control lever 14 hinged in known manner (not shown) to structure 2 to rotate between a rest position (Figure 4) and a work position to open the respective lock (not shown) by means of a known transmission lever (not shown) connected to structure 2 and interposed between lever 14 and the lock.

[0014] Lever 14 carries an end arm 16, which extends through cavity 5 in a direction substantially parallel to direction A, is defined by a recessed surface 19 facing portion 8, and carries a longitudinal end appendix 22, which mates with the transmission lever in known manner not shown. Arm 16 also carries an end portion 20, which has a tooth 24 (Figure 4) extending facing surface 19 to define, with surface 19, a substantially V-shaped retaining seat 25.

[0015] Handle 1 also comprises an inertial safety assembly 27 for preventing the lock from being activated, and the door from opening spontaneously, in the event of lateral impact on the vehicle.

[0016] As shown in the accompanying drawings, assembly 27 comprises a connecting body 28 having a U-shaped cross section, and which engages seat 9 and is carried by structure 2 and connected integrally to portion 8 by a releasable connecting device 30 integral with body 28. More specifically, device 30 comprises a straight lateral rib 32 (Figure 3) connected to groove 12;

and an elastic tab 33 (Figure 4) which clicks onto a seat (not shown) on portion 8.

[0017] Body 28 carries, in one piece, two projecting lateral plates 36 and 37, which extend parallel to each other on opposite sides of end portion 20, and are connected to each other by a supporting plate 38 extending longitudinally and facing end portion 20. At respective ends, lateral plates 36 and 37 have a through hole 40 and a through groove 41 respectively; and hole 40 and groove 41 are coaxial with each other along a longitudinal axis 42 extending on the opposite side of end portion 20 with respect to tooth 24, and are connected to a wire spring 45.

[0018] With particular reference to Figure 3, spring 45 comprises a hinge portion 46 having an omega-shaped intermediate portion 48, and two opposite straight portions 49 and 50 engaging hole 40 and groove 41 respectively. Spring 45 also comprises a connecting arm 53, which is connected to portion 50, extends on the opposite side of plate 37 with respect to plate 36, and has a free end 54 connected to a seat 55 (Figure 4) on plate 37.

[0019] Assembly 27 also comprises a C-shaped inertial body 56 formed in one piece and carried by, and housed inside, body 28.

[0020] As shown, particularly in Figures 3 and 4, body 56 extends in a plane perpendicular to axis 42, and comprises two end arms 57 and 58, which are substantially parallel to each other and respectively located between lateral plates 36 and 37 and adjacent to stop 7. More specifically, arm 57 comprises a parallelepiped-shaped end connecting portion 61 facing end portion 20, and onto which omega-shaped portion 48 is forced to enable body 56 to rotate, about axis 42, between an angular standby position (shown by the continuous line in Figure 4), in which arm 57 rests against supporting plate 38, and an angular retaining position (shown by the dash line in Figure 4) into which body 56 is moved by inertia in the event of lateral impact on the vehicle. Arm 58, on the other hand, comprises a hooked end portion 63, which extends towards tooth 24, is separated transversely from tooth 24 when body 56 is in the standby position, and, in the event of lateral impact, positively engages seat 25 to retain lever 14 in the rest position.

[0021] Body 56 comprises an inertial mass 64 located eccentrically with respect to axis 42 and between lateral plates 36 and 37.

[0022] In actual use, in the absence of lateral impact on the vehicle, spring 45 exerts an elastic force on body 56 to keep body 56 in the standby position, while arm 16 of lever 14 is free to move in a direction substantially parallel to direction A and independently of assembly 27.

[0023] Conversely, in the event of lateral impact, lever 14 of handle 1 on the distressed door undergoes an inertial reaction which tends to rotate it from the rest to the work position and so open the respective lock. At the same time, inertial mass 64 generates an inertial force, which rotates body 56, clockwise in Figure 4, about axis 42 with respect to lever 14 and in opposition to the elastic force of spring 45.

[0024] In particular, the distance between tooth 24 and hooked portion 63, the rigidity of spring 45, and the position of inertial mass 64 with respect to axis 42, are so determined that, in the event of lateral impact, the intervention time of assembly 27 is less than the response time of lever 14.

[0025] Consequently, when body 56 rotates inertially, in advance with respect to the movement of lever 14, hooked portion 63 moves up to surface 19, i.e. seat 25. At which point, as soon as lever 14 tends to move, seat 25 mates with hooked portion 63, and arm 16 exerts thrust on body 56, so that spring 45 is deformed and arm 58 rests on stop 7 to prevent any movement of lever 14, which therefore remains substantially in the rest position.

[0026] Handle 1 as described and illustrated therefore comprises a safety assembly 27, which, in the absence of lateral impact, has no effect on the operation of control lever 14 or the transmission lever, so that, in normal operating conditions, the noise level and the force required to operate handle 1 are the same as those of a handle with no safety assembly.

[0027] Conversely, in the event of lateral impact, the fast response time of assembly 27 provides for an extremely high degree of efficiency. That is, the body 28-body 56 connection is subject to very little friction by virtue of spring 45, which acts both as a hinge pin and as an elastic retaining element; and, by not being called upon to directly balance the inertial forces acting on the transmission and control levers, inertial mass 64 is smaller than in known solutions, and, for the same reason, need not be sized, unlike known solutions, according to a given predicted impact on the door.

[0028] Moreover, unlike known solutions, in the event of impact, assembly 27 provides for keeping the distressed door closed, while having no release effect on the opposite door lock.

[0029] Moreover, assembly 27 comprises a relatively small number of parts, and is extremely easy to assemble by simply forcing portion 48 of spring 45 onto portion 61, inserting portion 49 inside hole 40, clicking portion 50 inside groove 41, and elastically deforming arm 53 to insert end 54 inside respective seat 55. Safety assembly 27 is also fitted or replaced quickly, by body 28 sliding, parallel to direction A, inside seat 9 and clicking onto portion 8 by means of device 30.

[0030] Using a flexible wire spring 45 as a hinge means enables body 56 to spring back automatically into the standby position following impact. That is, the forces acting on lever 14 upon impact are transmitted to structure 2 by arm 58 resting on stop 7, as opposed to via spring 45, which, even after impact, continues to operate elastically to reset body 56 and permit normal control of the lock.

[0031] Clearly, changes may be made to handle 1 as described herein without, however, departing from the scope of the present invention.

[0032] In particular, assembly 27 may differ from and be located differently from the one described and illustrated herein by way of example.

[0033] Assembly 27 may be connected differently to structure 2, e.g. without stop 7 or connecting body 28, and with body 56 hinged directly to structure 2, so as to further reduce the number of component parts of assembly 27; and/or spring 45 may be replaced with a different elastic element, e.g. integral with body 56.

Claims

1. A handle (1) for a door of a vehicle, the handle comprising a supporting structure (2); a control member (14) movable, with respect to said structure (2), between a rest position and a work position to activate a lock on said door; and retaining means (27) for retaining the control member (14) in said rest position in the event of lateral impact on the vehicle, and comprising an inertial mass (64) rotating about an axis (42) and located eccentrically with respect to said axis (42); characterized in that said retaining means (27) also comprise locking means (63) integral with said inertial mass (64) and for locking onto said control member (14) in the event of lateral impact.

2. A handle as claimed in Claim 1, characterized in that said inertial mass (64) is carried by said structure (2).

3. A handle as claimed in Claim 1 or 2, characterized by also comprising elastic means (45) for elastically retaining said inertial mass (64) in an angular standby position.

4. A handle as claimed in Claim 3, characterized by comprising hinge means (45) permitting rotation of said inertial mass (64) about said axis (42); said elastic means (45) and said hinge means (45) being defined by a single elastically deformable element (45).

5. A handle as claimed in Claim 4, characterized in that said elastically deformable element (45) is a wire element.

6. A handle as claimed in Claim 5, characterized in that said wire element (45) comprises a hinge portion (46) in turn comprising an intermediate portion (48) connected to a connecting portion (61) of said inertial mass (64), and two end portions (49)(50) carried by said structure (2).

7. A handle as claimed in Claim 6, characterized in that said intermediate portion (48) is forced onto said connecting portion (61).

8. A handle as claimed in any one of the foregoing Claims, characterized in that said structure (2) comprises a stop portion (7); said inertial mass (64) resting against said stop portion (7) when said control member (14) is locked.

9. A handle as claimed in any one of the foregoing Claims, characterized in that said control member (14) comprises a seat (25); said locking means (63) comprising a hooked portion (63) for positively engaging said seat (25).

10. A handle as claimed in Claim 9, characterized in that said inertial mass (64) and said hooked portion (63) form part of a single member (56) formed in one piece.

11. A handle as claimed in any one of the foregoing Claims, characterized by also comprising a connecting body (28) to which said inertial mass (64) is hinged; releasable connecting means (30) being provided to connect said connecting body (28) to said structure (2).

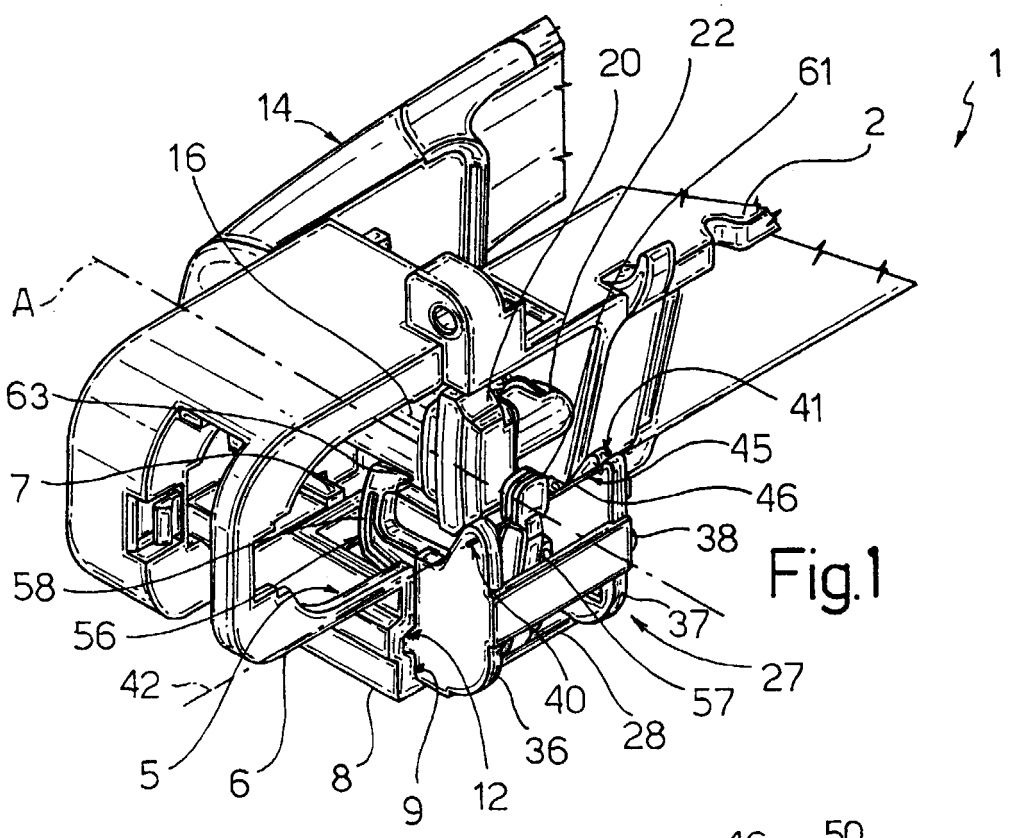
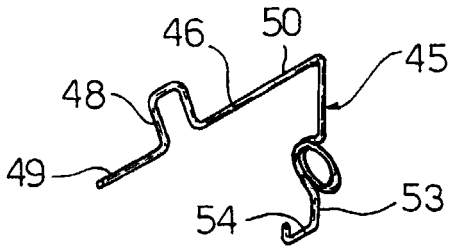

1
2
61
22
20
14
16
A
63
7
58
56
42
5
6
8
9
12
36
40
28
57
27
37
38
46
45
41

Fig.1


46
50
45
48
49
54
53

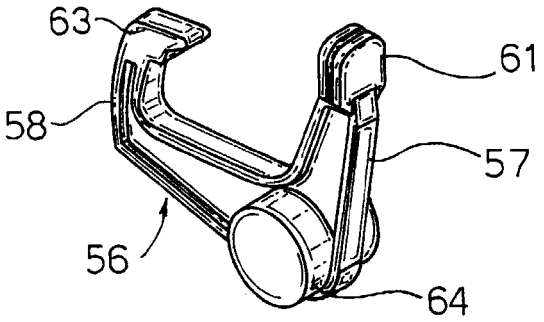
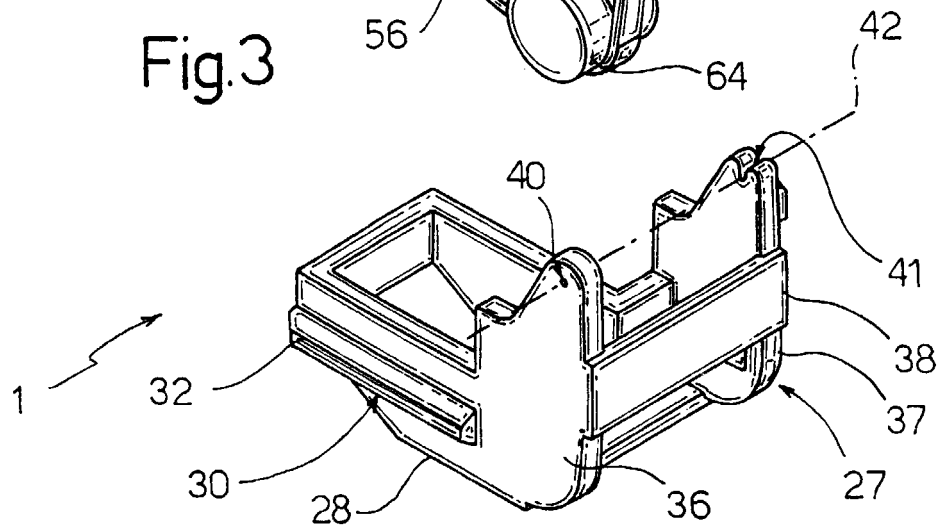

63
61
58
57
56
64

Fig.3


42
40
41
38
37
27
1
32
30
28
36

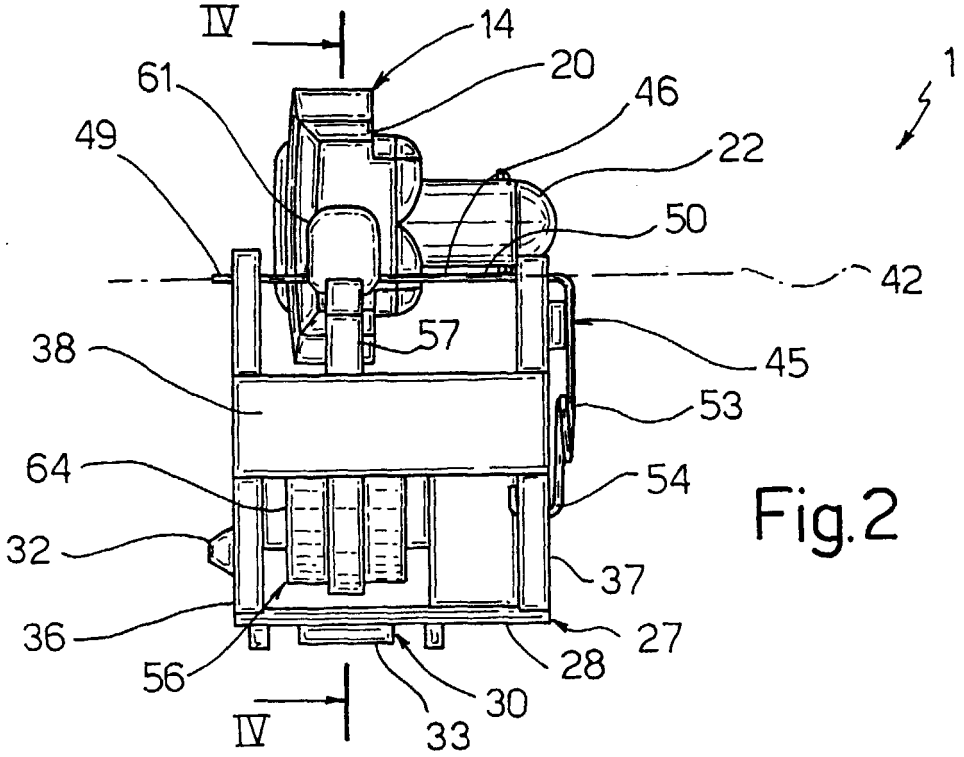

IV
14
20
46
61
49
22
1
50
42
57
38
45
53
64
54
32
37
36
27
56
28
30
33
IV

Fig.2

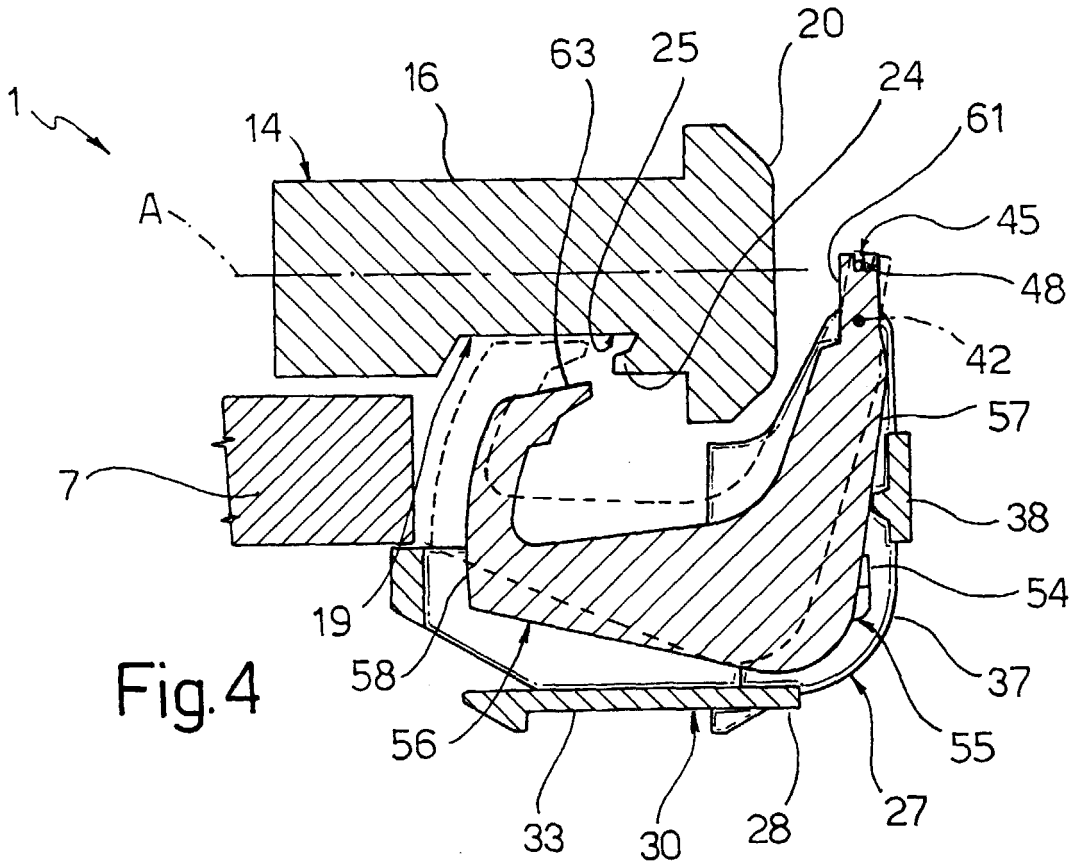

1
14
16
63
25
20
24
61
A
45
48
42
57
7
38
54
19
58
37
56
55
33
30
28
27

Fig.4