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Mechanikai csillapító rendszer aktív motorháztető-csuklóhoz

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

MECHANICAL ABSORBING SYSTEMS FOR ACTIVE HOOD HINGES.

The technical field of the invention is that of the devices used in the field of automotive safety to protect a pedestrian in the event of a frontal impact between the said pedestrian and a motor vehicle.

When a pedestrian is struck by the front end of a motor vehicle, the pedestrian's head often comes into direct contact with the bonnet of the vehicle. The impact of the head on the bonnet causes the bonnet to deform. This deformation often occurs to such a point that the bonnet comes into contact with the engine block and any rigid parts such as suspension leg turrets, windscreen wiper mechanisms, etc. The movement of the pedestrian's head is then abruptly halted by the bonnet coming into contact with the engine block and therefore experiences a violent deceleration which may cause the pedestrian serious injury.

The prior art already knows devices which, in the event of an impact between a pedestrian and a motor vehicle, allow the vehicle bonnet to be raised by a certain amount so as to prevent the pedestrian's limbs and especially his head from being stopped, in the impact against the bonnet, by the engine block situated just under the bonnet. In the devices of the prior art, the raising of the bonnet is performed at the rear end of the bonnet, that is to say at the windscreen end, which is the opposite end to the end used for opening or closing the bonnet in normal operation, the bonnet remaining fixed at the front end of the motor vehicle.

Patent FR 2 848 947 relates to a safety device for raising the bonnet of a motor vehicle in the event of a collision, this device being situated under the said bonnet and comprising a mechanism for raising the said bonnet and an actuator, the said bonnet comprising a structure which, in normal operation, allows it to be opened or closed about an axis known as the pivot axis.

The main characteristic of this device is that the raising mechanism first of all undergoes an unlocking phase by performing a first, translational, movement.

The main characteristic of this device is that it undergoes an unlocking phase through a translational movement, followed by a deployment phase in a rotational movement. The safety device also foresees a later, shock-absorbing, phase allowing the bonnet to move with the struck pedestrian so as to lessen the effect of the said impact. It is specifically disclosed a bracking device with balls initially located in the piston for carrying out said later shock-absorbing phase.

The safety device according to the invention exhibits a shock-absorbing device the qualities of which are tailored to the requirements associated with the tight confines of motor vehicles and their low cost, namely, small size, simplicity of design and great reliability. Simplicity of design means that the shock-absorbing device has not to require the addition of parts that need complex and costly machining.

The subject of the present invention is a safety device for raising the bonnet of a motor vehicle in the event of a collision with a pedestrian, comprising a pyrotechnic actuator provided with a thrust piston -- said pyrotechnic actuator possessing a hollow cylindrical body containing said piston - secured to a mechanism for raising the bonnet and able to deploy the said mechanism which is itself secured to the said bonnet, a blocking device intended to block the said actuator in a given position and a shock-absorbing device, located within the said pyrotechnic actuator, employed when a pedestrian hits the bonnet which has been raised, so that the assembly consisting of the bonnet, the raising mechanism and the piston can move under the effect of the impact while at the same time being retarded. More specifically, since the raising mechanism is blocked in a given position corresponding to a certain raising of the bonnet, the assembly consisting of the bonnet, the said mechanism

and the piston can be assimilated to a single rigid component. The shock-absorbing device has to allow the said assembly to move under the effect of a pedestrian impact, in the opposite direction to the direction in which the bonnet is raised, so as to allow the bonnet to move with the said pedestrian in order to absorb the shock of the impact. For an understanding of the invention and, in particular, of claim 1, the raising mechanism comprises a link rod and a raising lug.

The pyrotechnic actuator thus possesses a hollow cylindrical body containing the piston.

The shock-absorbing device is thus located inside the pyrotechnic actuator. This embodiment encourages the shock-absorbing device to be of minimum bulk.

Characteristically, the shock-absorbing device consists structurally of the blocking device (see after). In other words, the safety devices according to the invention have just one mechanical device which, depending on the applied stresses, may either block the raising mechanism or absorb the shock of the "bonnet + raising mechanism + piston" assembly.

Characteristically, the hollow body exhibits a small-diameter upstream part and a larger-diameter downstream part which parts are connected to one another by a divergent passage, and the piston comprises a peripheral groove partially delimited by the internal wall of the said upstream part; the said groove housing a pre-stressed member bearing against the said internal wall. Thus, the piston is positioned in the hollow body in such a way that the groove lies in the upstream part of the said body, the said piston being able to slide in the said upstream part.

As a preference, the groove has a U-shaped cross section so that it exhibits two side walls facing one another and parallel to each other.

A prestressed member is thus housed in the groove, bearing against the internal wall of the upstream part.

In this way, withdrawal from the internal wall of the upstream part could cause the said member to relax.

As a preference, the prestressed member consists of a snap ring which is an annular component having the shape of a ring provided with an opening. Thus, a radial pressure uniformly distributed over the said component allows the latter to deform elastically in such a way as to move the two ends that delimit the said opening closer together.

According to an alternative form of the embodiment of the invention, the snap ring has a circular cross section.

Advantageously, initiation of the actuator causes the piston to slide until the groove reaches the downstream part of the body, thus causing the snap ring to relax.

In the absence of any particular stress, the snap ring, which is relaxed, prevents the piston from moving in the opposite direction.

As a preference, the material of the upstream part of the body is deformable so as to allow the piston, following a pedestrian impact, to move in the opposite direction, carrying with it the snap ring which forcibly enters the said upstream part of the body which deforms. The length travelled by the snap ring in the upstream part corresponds to the shock-absorbing distance.

The safety device according to the invention has the advantage of having a well-controlled shock-absorbing function thanks to mechanical devices that are simple, perfectly suited to the small volumes available, conceded by motor vehicles. In addition, this shock-absorbing function can be tailored to a given configuration through a simple structural modification of the materials involved or simply by changing the material since the said materials are in commonplace use and have perfectly known mechanical properties.

A detailed description of an embodiment of a safety device according to the invention is given hereinafter with reference to Figures 1 to 4.

Figure 1 is a view in longitudinal section of a safety device according to the invention equipped with a shock-absorbing device involving a snap ring and which has not yet functioned.

Figure 2 depicts the device of Figure 1 once the shock-absorbing device has functioned.

Figure 3 is an enlarged view in longitudinal axial section of a shock-absorbing device involving a snap ring.

Figure 4 is an enlarged view in longitudinal axial section of the device of Figure 3, following a pedestrian impact with the bonnet.

With reference to Figures 1 and 2, an embodiment of a safety device 1 according to the invention comprises a pyrotechnic actuator 2, a link rod 3, a raising lug 4 and a locking hook 5. The link rod 3 has the shape of an elongate part with a variable U-shaped cross section so that it has two mutually parallel faces. The said link rod 3 has an upstream part 6 able to pivot about a pivot pin 7 passing through its two parallel faces, and a downstream part 8 able to be raised when the upstream part 6 pivots about its pin 7.

The said downstream part 8 comprises, on each of these faces, an elongate opening 9, each opening having, passing through it, a pivot pin 10 secured to the raising lug 4, the said lug 4 itself being secured to the bonnet 11. The link rod 3 has, on one of its faces, a fixed protrusion 12 equipped with a flat 13. The pyrotechnic actuator 2 comprises a cranked rear part 14 in which a pyrotechnic charge 15 is housed and a front part in the form of a straight hollow cylindrical body 16 in which a piston 17 is housed. The said straight hollow body 16 has a small-diameter upstream part 18 and a larger-diameter downstream part 19 which parts are connected to one another by a divergent passage 20, the said upstream part 18 being in contact with the cranked rear part 14. The piston 17 is made up of a widened body 21 extended by a cylindrical rod 22 comprising a shoulder 25. In this way, the rod 22 exhibits a widened part in contact with the widened body 21 of the piston 17 and a smaller-diameter part. The said widened body 21 of the piston 17 has a peripheral groove 23 and exhibits an outside diameter slightly smaller than the inside diameter of the upstream part 18 of the hollow cylindrical

body 16 of the actuator 2. The piston 17 is placed in the actuator 2 in such a way that its widened body 21 is housed in the upstream part 18 of the straight hollow body 16 and can slide therein hermetically. Thus, the peripheral groove 23 is partially delimited by the internal wall of the said upstream part 18 of the hollow body 16. The actuator 2 is able to pivot at the same time as the link rod 3 about a pivot pin not depicted in the figures and which is parallel to the pivot pin 7 of the said link rod 3. With reference to Figures 3 and 4, the groove 23 has a shoulder 26 to distinguish a smaller-diameter part 27 corresponding to the deepest part of the said groove 23 from a larger-diameter part 28. A prestressed snap ring 24, of circular cross section, bearing against the internal wall of the upstream part 18 of the hollow cylindrical body 16 is housed in the said groove 23 at its deepest part. An electro-pyrotechnic initiation system is positioned near the pyrotechnic charge 15 to initiate its combustion. The hook 5 is mounted to pivot on the vehicle and can effect a rotary movement about a pivot pin 29.

The way in which this safety device 1 according to the invention works is as follows.

An electrical impulse device sets off the electro-pyrotechnic ignition system which initiates the combustion of the pyrotechnic charge 15.

The gases delivered move the piston 17 which, in a first phase, unlocks the safety device 1 by exerting thrust on the hook 5 and which, in a second phase, comes to bear against the flat 13 of the protrusion 12 of the link rod 3 via the shoulder 25 of its rod 22, so as to cause the said link rod 3 to rotate about its pin 7. The rotation of the said link rod 3 leads to the raising of the bonnet 11 by virtue of the raising lug 4, the pivot pin 10 of which can move in the elongate openings 9 of the downstream part 8 of the link rod 3. Thus, the piston 17 slides in the straight hollow cylindrical body 16 until the peripheral groove 23 reaches the divergent passage 20 and the snap ring 24 relaxes to occupy the shallower part 28 of the said groove 23. In this final position which corresponds to the one depicted in Figures 1 and 3, the snap ring 24 prevents any movement of the piston 17 in the opposite direction, unless external stress is exerted. Thus, the assembly represented by the bonnet 11, the raising lug 4, the link rod 3 and the piston 17 constitutes a rigid component. All of this first phase corresponds to a phase of arming the safety device 1.

With reference to Figure 4, in the event of a pedestrian impact with the bonnet 11 in the direction shown by the arrow in Figure 1, the impact thus generated is transmitted to the piston 17, and its intensity is such that the said piston 17 will begin to move in the opposite direction, carrying with it the snap ring 24 which is relaxed. During this movement in the opposite direction, the said snap ring 24 forcibly enters the small-diameter upstream part 18 of the hollow cylindrical body 16 which deforms. This phase of deforming the hollow cylindrical body 16 corresponds to a phase of absorbing the shock of the bonnet 11 because the said bonnet 11 can move under the effect of the pedestrian impact while at the same time being retarded. With reference to Figure 4, the movement of the bonnet 11 halts when the safety device 1 returns to the re-engagement position. In this embodiment, the snap ring 24 has had the dual function of acting as a blocking device and of acting as a shock-absorbing device.

MECHANIKAI CSILLAPÍTÓ RENDSZER AKTÍV MOTORHÁZTETŐ-CSUKLÓKHOZ

Szabadalmi igénypontok

1. Biztonsági szerkezet (1) egy gépjármű motorháztetőjének (11) megemelésére egy gyalogossal való ütközéskor, amely szerkezet egy pirotechnikai működtetőhengert (2) tartalmaz, amely egy hengeres üreges testtel (16) rendelkezik, amelyben egy tolódugattyú (17) van elhelyezve, amely szilárdan össze van kötve a motorháztető (11) egy emelőmechanizmusával, és alkalmas arra, hogy ezt a mechanizmust nyitott helyzetbe állítsa, amely mechanizmus maga is szilárdan össze van kötve a motorháztetővel (11), a szerkezet tartalmaz továbbá egy megakasztó szerkezetet, amely arra szolgál, hogy a működtetőhengert (2) egy megadott helyzetben rögzítse, valamint tartalmaz egy csillapító szerkezetet, amely a pirotechnikai működtetőhengerben (2) található, amely a gyalogosnak a megemelkedett motorháztetőn (11) való felütközésekor oly módon lép működésbe, hogy a motorháztetőből (11), az emelőmechanizmusból és a dugattyúból (17) álló egység el tud mozdulni az ütközés behatására egyidejű fékeződés mellett, *azzal jellemezve*, hogy az üreges test (16) egy kisebb átmérőjű szűkítés előtti résszel (18) és egy nagyobb átmérőjű szűkítés utáni résszel (19) rendelkezik, amelyek egymással egy szétartó csatornán (20) keresztül vannak összekötve, és hogy a dugattyú (17) egy kerület menti horonnyal (23) van ellátva, amely részben a szűkítés előtti rész (18) belső fala által van határolva, ahol a horony (23) egy előfeszített szervet fogad be, amely felfekszik a belső falon.
2. Az 1. igénypont szerinti szerkezet, *azzal jellemezve*, hogy az előfeszített szerv (24) egy gyűrűből áll.
3. A 2. igénypont szerinti szerkezet, *azzal jellemezve*, hogy a működtetőhenger (2) kioldása addig csúsztatja el a dugattyút (17), amíg a horony (23) meg nem érintkezik az üreges test (16) szűkítés utáni részébe (19), és ott a gyűrű kilazulását eredményezi.
4. A 3. igénypont szerinti szerkezet, *azzal jellemezve*, hogy az üreges test (16) szűkítés előtti részének (18) anyaga deformálható, hogy a dugattyú (17) képes legyen egy gyalogos motorháztetőnek való nekicsapódását követően az ellenkező irányba elmozdulni, amikor is a dugattyú (17) magával viszi a gyűrűt (24), amely erőhatásra behatol az üreges test (16) deformálódó szűkítés előtti részébe (18).
5. A 2. igénypont szerinti szerkezet, *azzal jellemezve*, hogy a gyűrű (24) kör keresztmetszetű.

FIG. 1

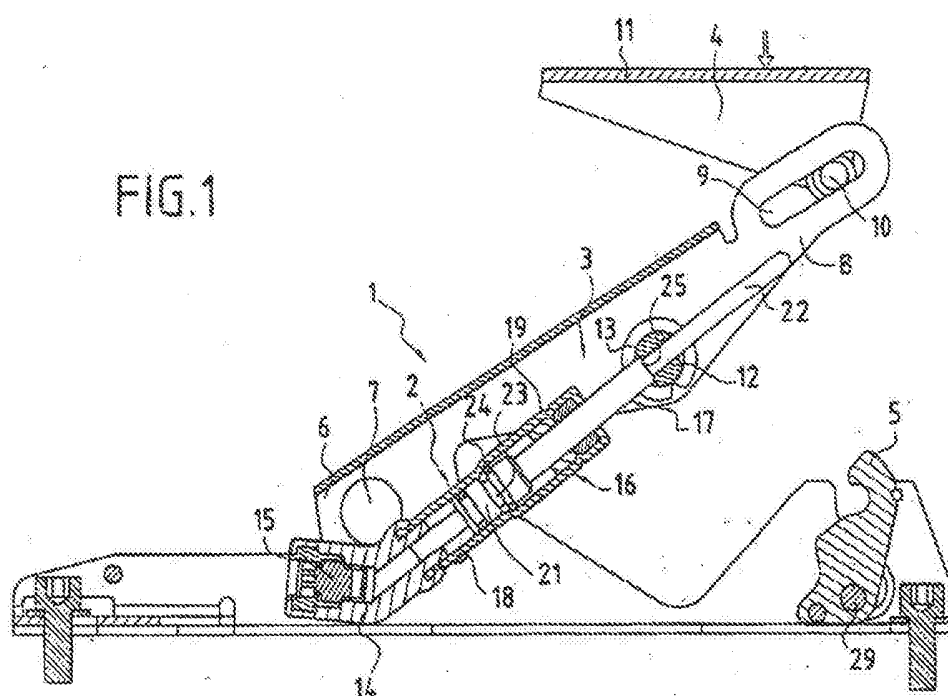


FIG. 2

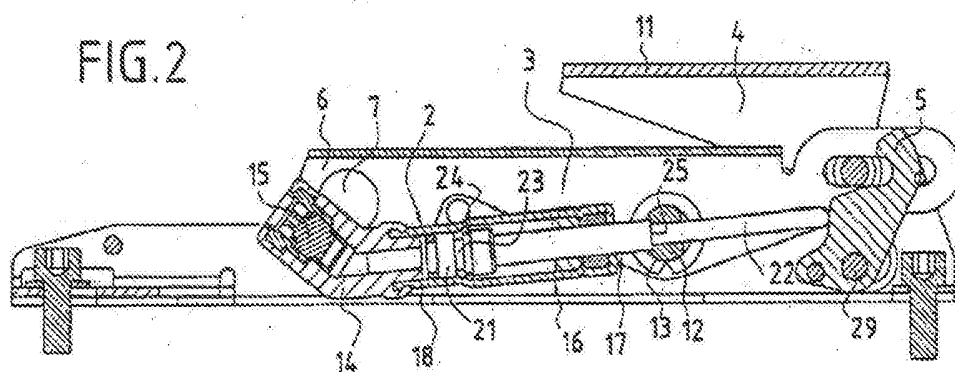


FIG. 3

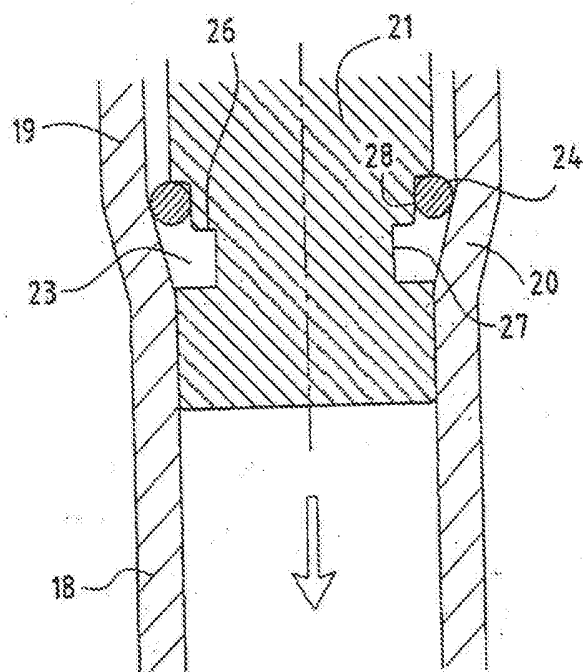


FIG. 4

