United States Patent

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[33] **France**
[31] **146,650**

[54] **DOOR LOCK**
5 Claims, 12 Drawing Figs.

[52] **U.S. Cl.** **292/226**
[51] **Int. Cl.** **E05c 3/22**
[50] **Field of Search** 292/341.13, 198, 216, 52, 46, 92, 200, 226

[56] **References Cited**
UNITED STATES PATENTS

2,314,613	3/1943	Evdter	292/213
2,409,794	10/1946	Quigley et al.	292/52
3,331,624	7/1967	Pugh	292/216
3,416,826	12/1968	Putsch et al.	292/198

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ABSTRACT: A door lock having a self-cocking mechanism in which the catching of the bolt in the locked position is obtained by the previous rocking of the bolt combined with the simultaneous rocking, but in a reverse direction, of a tightening element interacting together by a common spring whose tension increases proportionally with the closing of the door.

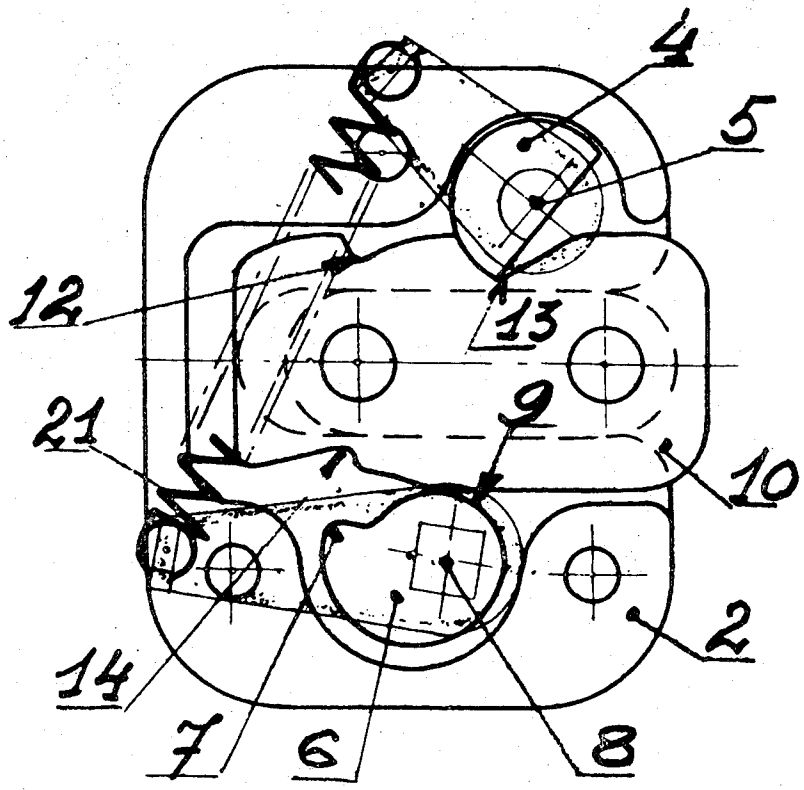

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Fig. 1

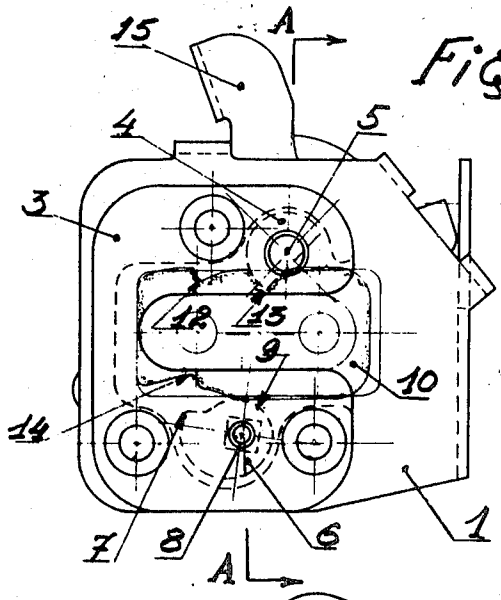

Fig. 2

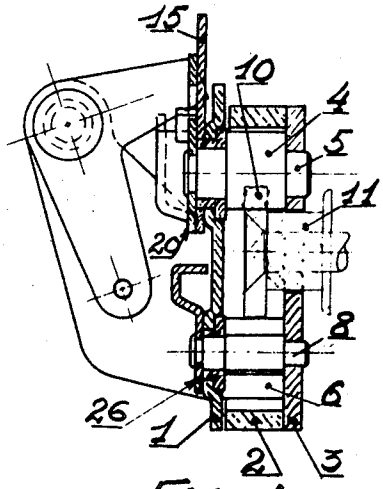

Fig. 3

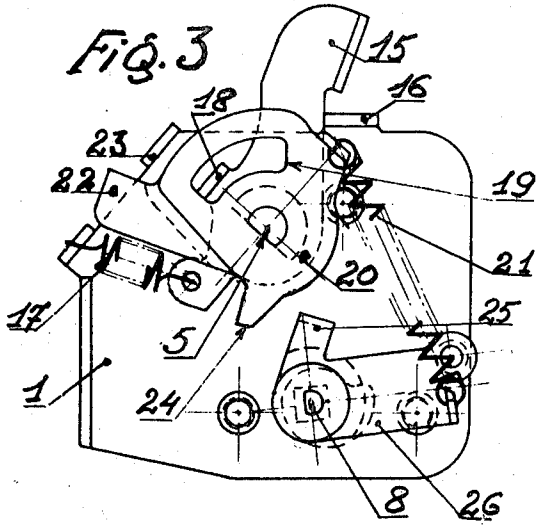

Fig. 4

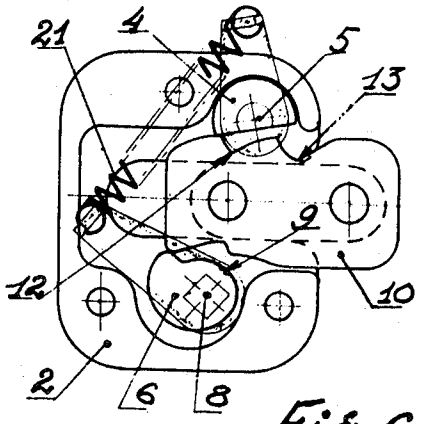

Fig. 5

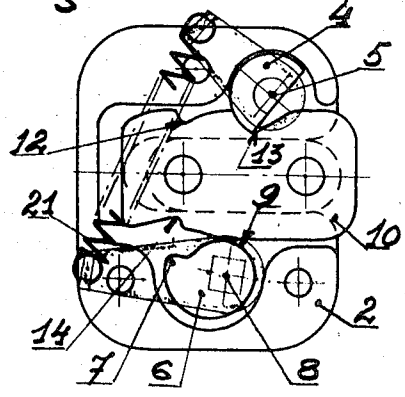

Fig. 6

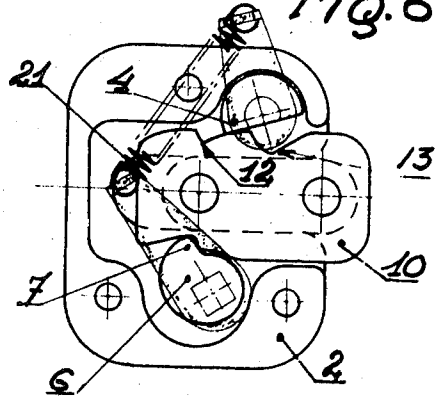

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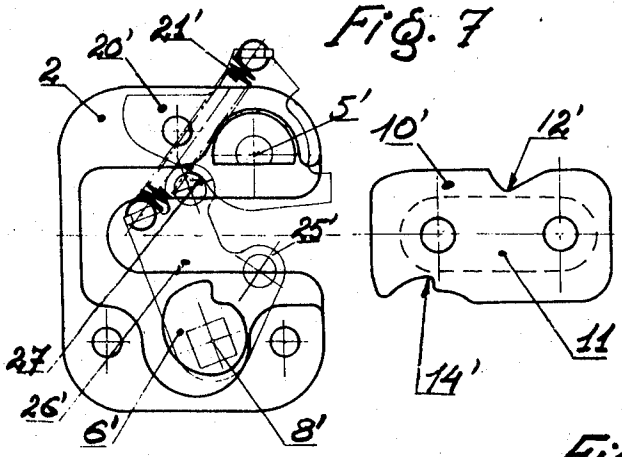
FIG. 7



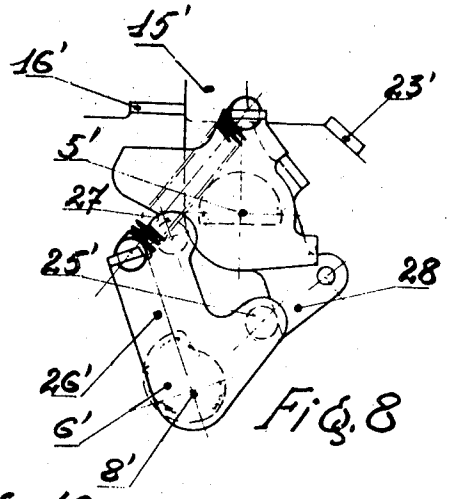


FIG. 8

FIG. 9

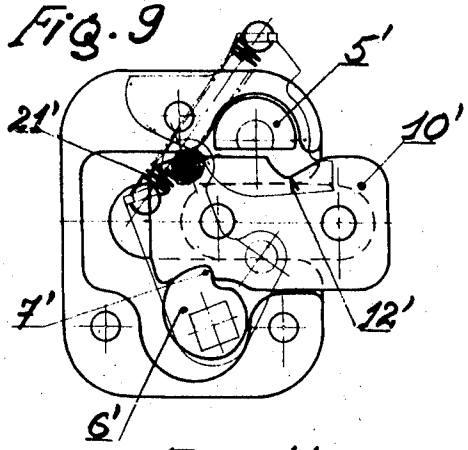


FIG. 10

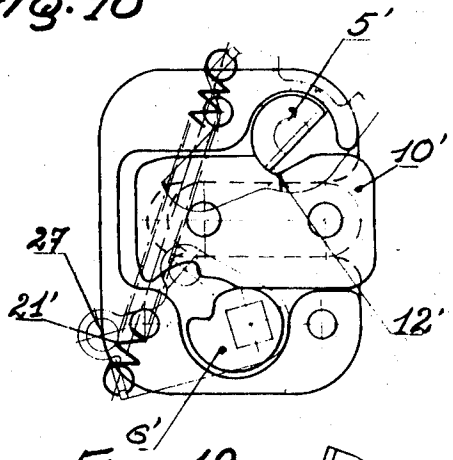
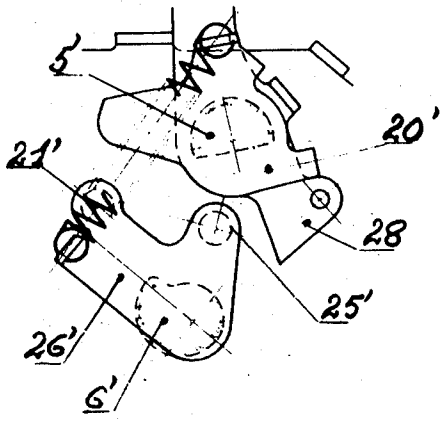
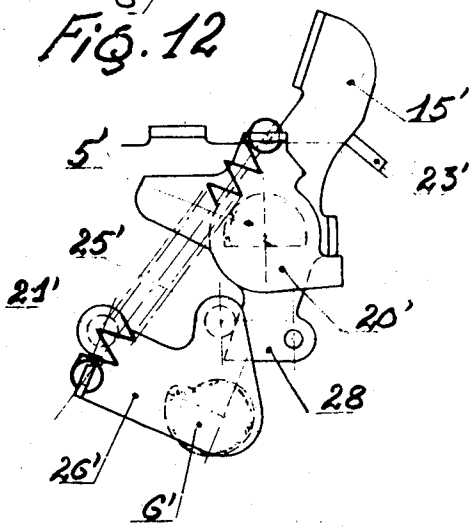


FIG. 11

FIG. 12





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DOOR LOCK

The present application relates to an improvement for locks and more particularly for vehicle door locks.

The new lock is characterized by a self-cocking mechanism which is obtained by a new combination of a rocking bolt and a rocking tightening element, interacting between each other by a spring common to both the block and the tightening element and whose tension increases in relation with the closing movement of the door. This guarantees a more silent closure combined with an increased locking security because it is reached with the maximum tension of the spring.

Another advantage of the new lock consists of its compact arrangement.

The above-mentioned advantages and others would be better understood in the following description of the invention with the annexed drawings in which two embodiments are disclosed and in which:

FIG. 1 is an elevation view of the assembly of the lock mechanism and its keeper for a car door according to the invention;

FIG. 2 is a sectional view along line A–A of FIG. 1;

FIG. 3 is a rear view of the mechanism shown in FIG. 1;

FIG. 4 is a schematic view of the case of the lock according to FIG. 1 in which the holding plate is withdrawn while the keeper is shown, at the beginning of the closing movement of the door;

FIG. 5 is a similar view as in FIG. 4 in which the keeper is in its final closing position;

FIG. 6 is a similar view as in FIG. 4, but shows the keeper in its intermediate position known as the security position;

FIG. 7 shows a similar view as in FIG. 4 according to a different embodiment but wherein the keeper is shown outside the rock mechanism;

FIG. 8 is a schematic view of some members of the mechanism illustrated in FIG. 7 and located behind the lock plate;

FIG. 9 is a schematic view similar to FIG. 7 but in which the keeper is in its intermediate position, that is, the security position;

FIG. 10 is a schematic view similar to FIG. 9 in which the keeper is in its final closing position;

FIG. 11 is a schematic view of the mechanism members according to FIG. 10 which are located behind the lock plate at the beginning of the opening movement; and

FIG. 12 is a schematic view according to FIG. 11 illustrating the end of the opening movement.

In the embodiment according to FIGS. 1—3, the lock mechanism for car doors according to the present invention consists of a usual bent plate 1, on which is mounted a raised case 2 an a U-shaped holding plate 3, allowing to house and support the bolt 4 of the lock which has the shape of a semicylindrical catch which is adapted to rock around its axis 5 as well as a tightening element 6 having the shape of a cam and having a hooking nose 7 adapted to rock around its axis 8 which appears eccentric due to the fact that its outer contour has the shape of spiral 9.

The internal outline of the holding plate 3 is reduced relative to the case 2 to allow the lateral holding of the broad head 10 of the keeper, which inversely is raised by a crosspiece 11 and whose two upper notches 12 and 13 are adapted to successively grip the rocking bolt 4 while the lower notch 14 may grip the nose 7 of the cam 6.

In addition, behind the plate 1, the usual actuating lever 15 is mounted for operating the bolt 4 which is free to rock around its axis 5 while it is brought back against the bent abutment 16 of the plate 1 by a tension spring 17.

The actuating lever 15 comprises a bent leg 18 which while extending through the elongated aperture 19, of a rocking sector 20, rigidly secured to the axis 5 of the bolt 4 constitute a resting abutment opposing the effect of the tension spring 21 which has a biasing effect on the leg 22 against the fixed abutment 23, while the counterclockwise rocking of the sector 20 according to FIG. 3 is obtained through a substantially well predetermined angle by the elongated aperture 19 and that another leg 24 can come to grip with leg 25 of a lever 26 having an angular shape, the said lever 26 being rigidly secured in rotation to the axis 8 of the cam 6 and which is also brought in a position of rest by the tension spring 21, the latter being connected at its other end on the sector 20.

It should be obvious to understand that due to the mutual interaction of the above-described elements, if their relative position is considered for the final and the complete closure of the door, according to FIGS. 1 to 3, it would be sufficient to apply a pressure on the upper leg of the lever 15, for example by a button (not shown), to obtain the opening of the door.

In fact, the rocking of the lever 15 in a counterclockwise direction, as seen in FIG. 3, simultaneously causes, due to its bent leg 18, the same rocking of the sector 20 and therefore of the axis 5 and of the semicylindrical bolt 4, which leads to the progressive release from the notch 13 of the head 10 of the keeper while simultaneously driving the hooking nose 7 of the cam 6 beyond the hooking position in the lower notch 14 of the head of the bolt 10, in such a way as to allow the unhooking due to the leg 24 of the rocking sector 20 which tends to rock in the clockwise direction the leg 25 of the angular lever 26 while causing a similar rocking of the axis 8 and of the cam 6 which is solidly secured thereto in spite of the tension exerted by the spring 21.

It is according to the usual operation of the door that, as soon as the latter is open, the cessation of the thrust on the leg of the lever 15 brings back all the mechanism in the position of rest and then, as illustrated schematically in FIG. 4, any subsequent movement of the closure of the door, brings the upper projection on the head of the block 10 in contact with the lower ramp of the rocking block 4 and simultaneously, the lower left projection of the head of the block 10 in contact with the hooking nose 7 of the cam 6 while exerting a rocking pressure upon these members respectively in opposite direction around their axes 5 and 8, which causes an increasing tension known as the self-cocking of their common return spring 21.

If the closing movement of the door is further continued, it is easy to understand that the block 4 which becomes cocked, will first catch the notch 12 of the head of the keeper 10 in the partial closing position known as the security position (not shown).

Following up the closing movement of the door, as illustrated in FIG. 6, there is a new hooking position which is a partial closing, wherein it is the hooking nose 7 of the cam 6 which while catching the lower notch 14 of the head of the keeper 10 prevents in the same way all risk of unexpected opening of the door.

If the closing movement of the door is still further completed, the complete closure is obtained, as shown in FIG. 5, by repeating the same arrangement of the elements as shown in FIG. 1, that is, with the maximum tension, the spring 21 causes the catching of the rocking block 4 in the notch 13 of the head of the keeper 10. Again, the said maximum tension of the spring 21 results from the previous rocking of the cam 6 up to its position where it is effectively illustrated, while in this position, its profile in the shape of a spiral prevents all risk of vertical vibration while being used as a tightening element.

It should be further specified, that in this complete closing position of the door, it will not open even under the effect of a lateral displacement, such as in the case of an accident, due to the effect of the lateral holding of the broad head 10 of the keeper by the plate 3, as it is clearly illustrated in FIG. 2.

As it has been shown above, there are in this first embodiment, two successive intermediate closing positions known as security positions, but according to a different embodiment shown in FIGS. 7—12, one of the two security positions has been deleted while maintaining only one upper notch 12' in the broad head 10' of the keeper.

In the new embodiment shown in FIGS. 7—12, the rocking sector 20 becomes 20', the actuating lever 15 becomes 15', the angular lever 26 becomes 26' and the cam 6 becomes cam 6'.

According to this new embodiment, FIG. 8 shows, for the position of the elements corresponding to FIG. 7, the orientation of the rock sector fixed on the axis 5' in that it coacts with the angular lever 26' fixed on the axis 8' to obtain a mutual balance, by the effect of the abutment 27 coming in contact with the rocking sector and with a minimum tension of their common spring 21'.

It is pointed out that in this position of rest, the ramp of the bolt has moved aside due to its horizontal orientation and its axis 5' and therefore the beginning of its closing movement will be made smoother.

After this first fraction of the closing path or movement as mentioned above, the left lower end of the head 10' of the keeper will come in contact with the hooking nose 7' of the cam 6' and will similarly cause the rocking of the angular lever 26' in a counterclockwise direction, as shown in FIG. 8, in stretching the spring 21', while the continuation of the movement, while allowing the unhooking of the nose 7', and its return, by a clockwise rocking movement up to the lower notch 14' of the lower part of the head of the keeper 10', will allow a first hooking in the closing position known as the security position illustrated by FIG. 9.

While continuing the closing movement of the door from the security position according to FIG. 9, which causes only a slight rocking movement of the hooking nose 7' of the cam 6' and a corresponding orientation of the other elements, according to FIG. 11, the movement will remain relatively smooth, but increasingly tighter while allowing a greater clockwise rocking movement of the cam 6' up to the position shown in FIG. 10 in which, after the maximum self-cocking of the spring 21' then obtained, it will release by maintaining the rocking of the bolt around the axis 5' so as to locate it in the notch 12' of the head of the keeper 10'.

In this final closing position of the door, as well as in the first embodiment, the tension of the spring 21', combined with the spiral shape of the outer outline of the cam 6', provides the tightening effect and eliminates any risk of vertical bouncing due to road bumps.

Finally, FIG. 12 shows the opening step, which is obtained by pushing on lever 15', so as to make it rock in a clockwise direction. This provides a similar rocking movement of the sector 20' and of the axis 5' of the rocking bolt solidly mounted on the said axis, until it unhooks from the notch 12' of the head of the keeper 10' where its ramp reaches its horizontal position, while simultaneously, the unhooking of the hooking nose of the cam 6' is obtained by the counterclockwise rocking movement of the angular lever 26' to which it is secured, by the effect of the leg 28 of the lever 15' coming in contact with the corresponding abutment 25' of the aforementioned lever 26'.

Although it may be advantageous to use a plastic material and in particular a superpolyamide for making the cam 6 or 6', the invention is not restricted to such material. Similarly for all the parts, the invention is not restricted to the combination of means or process steps specifically mentioned, described or illustrated herein. It should be considered within the embodiment of this invention to operate such a lock by remote control or by means of a key. Although the door lock described herein has been contemplated for car doors, it may be used for the trunk of a car or any other industrial use wherein the self-cocking of the lock would be advantageous.

I claim:

1. A door lock comprising: BOLT MEANS HAVING SUBSTANTIALLY THE SHAPE OF A SEMICYLINDER AND CONSTITUTING A SEMICYLINDRICAL CATCH ADAPTED TO ROCK IN THE HOUSING,

2. A door lock as recited in claim 1, wherein the bolt means and the keeper means are provided with a catching arrangement for stopping the rocking movement of the bolt means.

3. A lock as recited in claim 1, wherein the tightening means and the keeper means are provided with a catching arrangement for stopping the rocking movement of the bolt means.

4. A lock as recited in claim 1, wherein the bolt means is solidly secured to a rocking sector and the tightening means is solidly secured to an angular lever, and an operating lever is provided for interconnecting the said sector and said square lever.

5. A lock as recited in claim 1, wherein the keeper means comprises a plate having a broad head and a cross piece fixed on said plate, the said broad head being adapted to be laterally maintained within the said housing.