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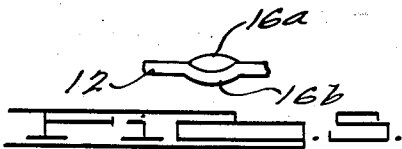
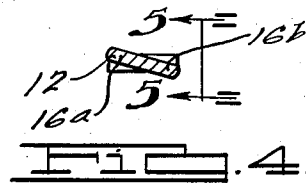
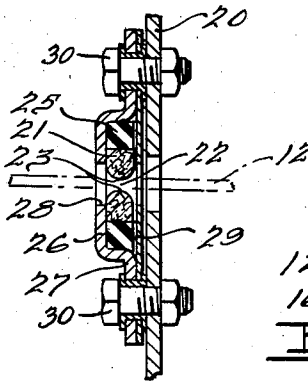
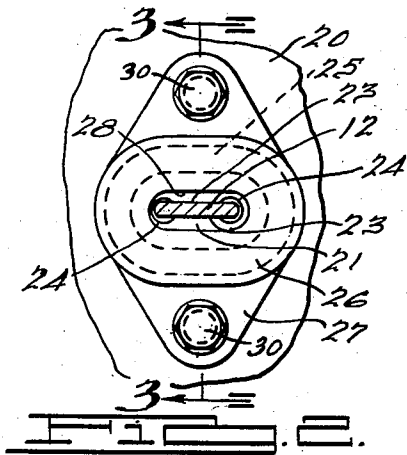
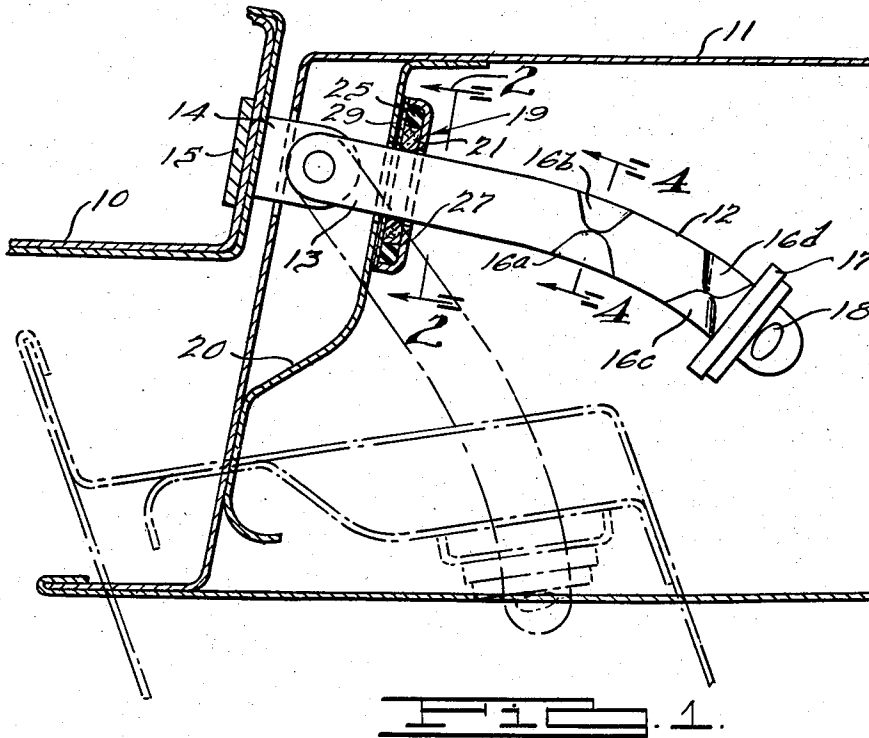
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DOOR CHECKING AND RETAINING MEANS

Filed March 12, 1956

2 Sheets-Sheet 1



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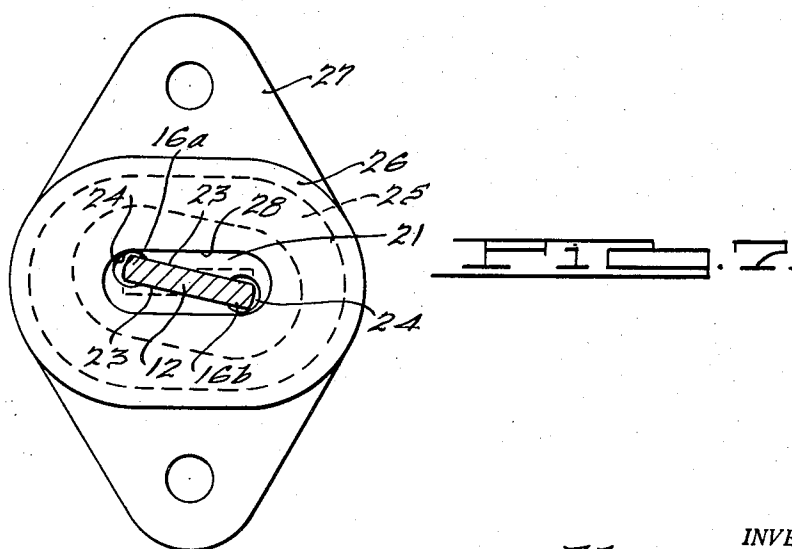
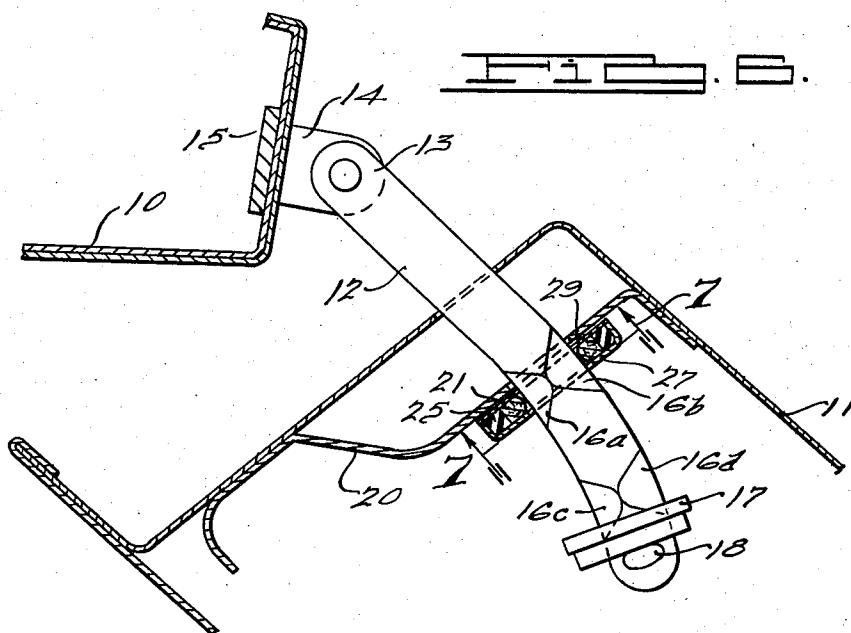
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DOOR CHECKING AND RETAINING MEANS

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2 Claims. (Cl. 16—86)

This invention relates to a mechanism for checking the opening movement of a swinging structure and also for releasably holding the swinging structure in an open position, the invention being particularly applicable to the doors of automobile or other vehicle bodies.

The present application embodies certain improvements over my co-pending applications Serial No. 456,842, filed September 17, 1954, and now abandoned, and Serial No. 479,603, filed January 3, 1955, and now abandoned. As described in these earlier applications, a mechanism for checking the movement of a swinging structure, particularly the doors of automobiles or the like, has been developed wherein an arm member pivotally hinged on a body structure, such as a body pillar, projects through a slotted member on the swingable structure, said arm, or a portion thereof, and the slot of the slotted member being tilted in relation to each other in the horizontal plane of the arm. As the swingable structure is swung from a closed to an open position, the arm is engaged by the slot edges in such a manner that the arm is twisted about its longitudinal axis, the resistance to the twist resulting in a frictional drag of the arm relative to the edge surfaces of the slot in the slotted member. The frictional drag is proportional to the twist resistance of the arm, one of the controlling factors thereof being the kind and quality of steel used in manufacture of said arm.

It is an object of the present invention to further the development of this mechanism to eliminate the necessity of having to use high quality spring steel in the fabrication of the arm member, such as was required by the earlier development of the invention. Utilization of a lower grade steel will facilitate the manufacture of the door checking and retaining means embodying the present invention and will reduce its cost of manufacture. Whereas in the prior development the arm member was twisted to provide the checking effect, the present development provides for the slotted member to be subject to a twisting action to provide the necessary frictional drag in a simple and easily adjustable way. The slot containing member is preferably made of a resilient wear and tear resisting material. Thus, the slot edges are resilient and will resistably yield to the twisted or deformed surfaces of the arm passing therebetween. The use of a resilient slotted member permits the utilization of a rigid or non-resilient arm member. By means of a simple stamping operation the arm member may be provided with a permanent twist of desired size so that the coaction between the arm member and the resilient slot edges will provide a desired degree of checking power. Further control of the checking action may be obtained by judicious selection of the material of the slot carrying member, since the degree of resiliency and the frictional coefficient will both affect the checking action.

In the illustrated embodiment of the present invention, the slotted member is supported in an elastic lining plate mounted in the frame of the swingable structure. The slotted member and lining plate are simply

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and easily attached to the frame of the swingable structure by a mounting plate having a cup portion, the cup portion being provided with a broad slot, said slotted member and lining plate being held within said cup portion with the edges of the slot of the slotted member protruding above the edges of the cup slot.

Other objects, advantages and the features of construction embodying the present invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a fragmentary horizontal section taken through a door and body frame member illustrating a door checking and holding device constructed in accordance with the principle of the present invention, the door being shown in its closed position in solid lines and in its open position in dot and dash lines.

Fig. 2 is a view in part sectional taken substantially through line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a sectional view taken substantially through line 3—3 of Fig. 2 looking in the direction of the arrows.

Fig. 4 is a sectional view taken substantially through line 4—4 of Fig. 1 looking in the direction of the arrows.

Fig. 5 is a fragmentary side elevation of the arm member taken in the direction of the arrows 5—5 in Fig. 4.

Fig. 6 is a view in part similar to Fig. 1 illustrating the members in an intermediate position.

Fig. 7 is an enlarged view in part sectional taken substantially through line 7—7 of Fig. 6 looking in the direction of the arrows.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings there is illustrated, by way of example, a certain embodiment of the present invention as applied to the door and frame structures of an automobile body. Illustrated in Fig. 1, is a portion of an automobile body pillar 10 having hinged thereto a door 11. The door checking and retaining device embodying the present invention comprises a relatively flat and longitudinally curved metal arm or link 12 of substantially uniform width having its one end 13 pivotally connected to a flanged lug 14 welded to the body pillar 10. As shown, the base 15 of the lug 14 is fastened to the inner side of the pillar 10 with the flanged portion projecting through an aperture in the pillar into a suitable aperture in the outer wall of the door when the latter is shut. The arm 12 is provided with pairs of nodes, one pair of said nodes being located intermediate the ends of the arm 12 and the other pair being located near the free end thereof. It will be noted that the nodes 16a and 16c extend upwardly from the upper surface of the arm 12 and are on the same side thereof. The nodes 16b and 16d extend downwardly and also are on a common side of the arm 12. The appearance of the nodes in cross section and in side elevation is to be seen in Figs. 4 and 5. The free end of the arm 12 is provided with a rubber bumper 17 held by a fastening peg 18.

Within the door a resilient checking means, generally designated 19, is mounted on a reinforcing rib or support member 20 forming part of the door. The checking means comprises a plate member 21 made of a material having high resistance to wear and tear but also

having some degree of resilience. Such a material would be a plastic material of the polyamide group, such as the material commercially known as "nylon." The plate member 21 is provided with a centrally positioned slot 22, the transverse axis of the slot paralleling the cross sectional transverse axis of the arm 12, as shown in Fig. 2. The slot edges 23 are rounded as is to be seen in Fig. 3. At each end the slot 22 is provided with a circular enlargement 24 to provide clearance for the extreme outer edges of the nodes; but the fit between the straight edges 23 of the slot 22 and the upper and lower surfaces of the arm 12 is a close or snug fit. The slotted plate member 21, which may be substantially oval in shape, is resiliently supported by a surrounding elastic or rubber plate 25 within a cup 26 of an anchor plate or mounting escutcheon 27. The mounting escutcheon front face is provided with a slot 28 of larger size than the slot 23 and aligned with a similar slot in rib 20. However, the slot 28 overlaps a substantial portion of the plate member 21. The anchor plate or mounting escutcheon 27 may be provided with an inner covering plate 29 provided with an aperture similar to the aperture or slot 28. The anchor plate or mounting escutcheon 27 is suitably secured to the reinforcing rib or support member 20 by bolts 30.

The foregoing described structure operates as follows: As the vehicle door 11 is swung from its closed position, shown in Fig. 1, to its intermediate position shown in Fig. 5, the slotted member 21 moves relative to the arm 12 with a minimum of resistance. The slot edges 23 merely slide along the upper and lower surfaces of the arm 12. Upon the intermediate position being attained, that is, the location of the nodes 16a and 16b being reached, a checking effect will be exerted as the slot edges 23 attempt to pass the nodes 16a and 16b. Two things will happen to the plate member 21 at this stage. Its slot edges 23 will be deformed to permit their passage over the nodes and the plate member as a whole will be twisted in its mounting plate 25, as shown in Fig. 7. The resistance of the slot edges 23 and the resistance of the mounting plate 25 to the twisting of the plate member 21 provide the desired retarding effect on the opening movement of the door 11. When the plate member 21 is forced and has passed beyond the nodes 16a and 16b the door 11 will be restrained against any unintentional closing, the rear sides of the nodes being as effective to retain the door in open position as the lead or front sides of the nodes were to retard the opening movement. Manual pressure exerted on the door 11 makes it possible to close the door again.

The pair of nodes 16c and 16d in front of the rubber buffer or bumper 17 act in the same manner as the nodes 16a and 16b. They act to further check the swinging movement of the door 11 in an opening direction and provide a means for retaining the door in a completely open position. The bumper 17 serves as a final or positive stop means to limit the extent to which the vehicle door 11 may be swung open.

It will be understood that the arm 12 might be hinged to the door 11 and the checking assembly 19 mounted

within the body pillar 10 without departing from the principle of the present invention.

I claim:

1. A device for retarding the swinging movement of a swingable structure hinged on a supporting structure, said device comprising an arm member and slotted member coacting therewith, said arm member being pivotally mounted at one end thereof on one of said structures, the free end of said arm member projecting through said slotted member, means mounting said slotted member on the other of said structures, said mounting means including an escutcheon secured to said other structure and a rubber member contained within said escutcheon, said slotted member being fitted within said rubber member and formed of a material of relatively less resilience than said rubber member, said arm member comprising a flat member having a deformed section angularly related to the plane of said flat member, said deformed section being engageable by said slotted member as the free end of the arm member moves relatively to the slotted member upon swinging movement of the swingable structure relative to the supporting structure whereby the slot edges are deformed as they pass over said deformed section and said slotted member is twisted within said rubber member, the resistance of said slot edges to such deformation and the resistance of said rubber member to twisting of said slotted member retarding the swinging movement of the swingable structure.

2. A device for retarding the swinging movement of a swingable structure hinged on a supporting structure, said device comprising an arm member and a flat slotted member coacting therewith, said arm member being pivotally mounted at one end thereof on one of said structures with the free end thereof projecting through said slotted member, means mounting said slotted member on the other of said structures, said mounting means including an escutcheon secured to said other structure and a flat rubber member contained within said escutcheon, said slotted member being fitted within said rubber member and consisting of a material comprising a synthetic polyamide plastic, said arm member comprising a flat member having a deformed section angularly related to the plane of said flat member, said deformed section being engageable by said slotted member as the free end of the arm member moves relatively to the slotted member upon swinging movement of the swingable structure relative to the supporting structure whereby the slot edges are deformed as they pass over said deformed section and said slot member is twisted within said rubber member, the resistance of said slot edges to such deformation and the resistance of said rubber member to twisting of said slotted member retarding the swinging movement of the swingable structure.

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