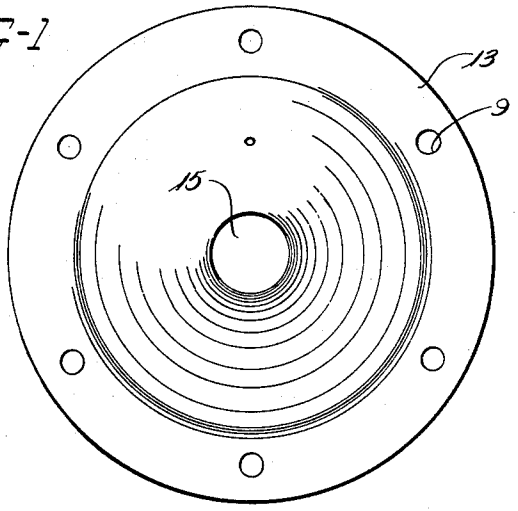
Jan. 1, 1957 W. E. THIBODEAU 2,776,156

CLOSURE CHECK

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FIG-1



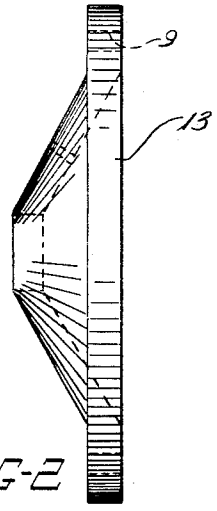


FIG-2

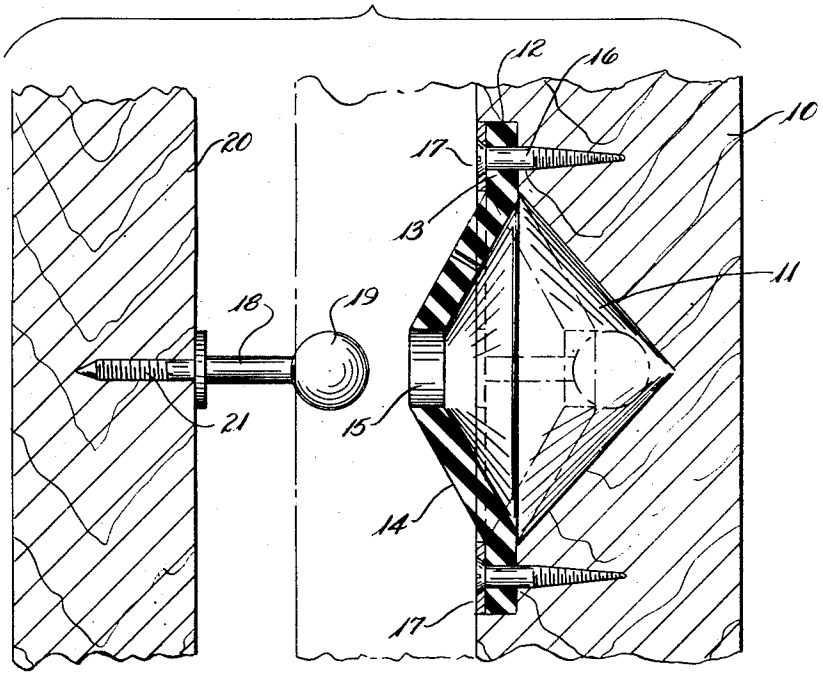


FIG-3

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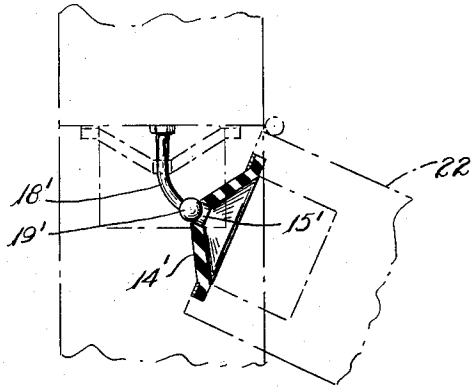
Wilfred E. Thibodeau

Jan. 1, 1957 W. E. THIBODEAU 2,776,156

CLOSURE CHECK

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FIG-4



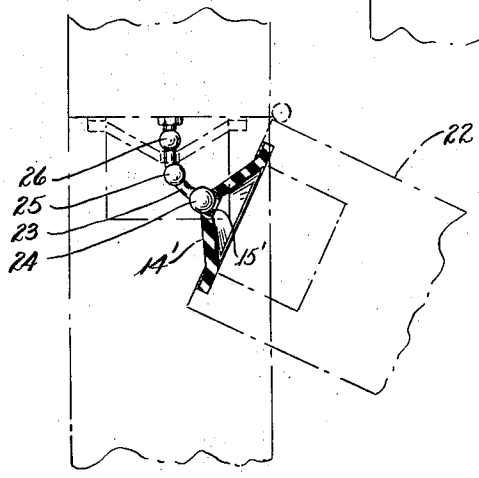
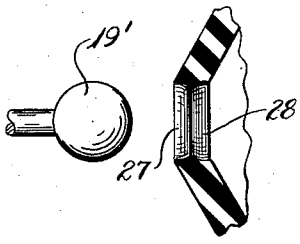


FIG-5

FIG-6



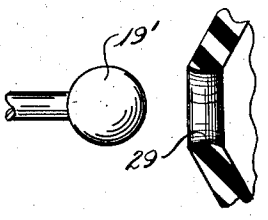


FIG-7

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Wilfred E. Thibodeau

United States Patent Office 2,776,156 Patented Jan. 1, 1957

2,776,156

CLOSURE CHECK

Wilfred E. Thibodeau, Franklin Township, Summit County, Ohio

Application May 14, 1952, Serial No. 287,679

10 Claims. (Cl. 292—70)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described in the specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a checking and holding device for closures, such as doors, and in particular to a device which combines the functions of a door check and a door latch.

In a preferred embodiment of the invention a single sheetlike element of resilient material such as rubber, or the like, generally designated "rubbery," in the form of a frustum of a hollow cone with an axial, through opening, cooperates with a stud having a size slightly larger than the said opening, whereby the kinetic energy of the closing door is largely absorbed in deforming said element in a collapsing action, followed by an inversion of the cone frustum and ultimate penetration of the opening by the stud, in which position, withdrawal is resisted.

It is, therefore, a principal object of the invention to provide an improved closure check. A further object is to provide a device which functions both as a closure check and a latch. Yet another object is to provide a closure check which is simple in structure, and therefore easy and economical in manufacture, yet certain in operation.

These and other objects are attained by the present invention, certain preferred embodiments of which are described in the specification to follow, and illustrated in the drawings, in which:

Fig. 1 is a plan view of a rubber door check,

Fig. 2 is a side elevational view of the device of Fig. 1,

Fig. 3 is an axial sectional view of the check mounted on a door jamb, and in association with a door having a stud.

Fig. 4 is an axial sectional view of the door check and plunger mounted on a car door,

Fig. 5 is a view similar to Fig. 4, showing a modification, and

Figs. 6 and 7 are enlarged fragmentary views of the door check opening showing modifications of the form thereof.

Referring to the drawings by characters of reference, there is shown in Fig. 3 an arrangement comprising a door jamb **10** having a recess **11**. A counter recess **12**, surrounding recess **11** accommodates the flange **13** of a hollow frusto-conical element **14** of rubber or other rubbery material having an axial through opening **15**. Preferably the wall of element **14** is of uniform thickness although some latitude is permissible in this regard, consistent with the purposes and functions of the device hereinafter set forth. The flange **13** has openings **9** and is secured to the jamb or other framework as by screws **16** equipped with washers **17**, or an annular metal retainer.

A stud **18**, which may have a spherical head **19**, is secured to the door **20** or other closure element as by means of screw threads **21**, and is so arranged as to

be axially aligned with ring **14** when the door is closed. In this position, stud head **19** lies within recess **11**, as seen in dotted lines in Fig. 3.

With the parts positioned as shown in full lines in Fig. 3, assuming that the door is being urged to closed position as by means of the usual tension spring, it will be seen that stud head **19** will seat in opening **15** with some force. Since this opening is smaller than head **19** there will be no immediate penetration, but instead the slanted walls of the ring **14** will provide a toggle action and a resultant resistance with absorption of energy along the walls which materially reduces the velocity of swing of the door, and any movement of opening **15** axially of the ring will reduce the size of opening **15**. However, after the initial shock the walls of the hollow frustum **14** will buckle, and this yielding permits stud head **19** to carry the neck or opening **15** into recess **11**, inverting the body **14** (that is, turning it inside out) in the process. After such inversion, the remaining kinetic energy in the swinging door operates to carry the stud head through neck **15**, there being considerably less resistance to such passage outwardly from within the frustum than in the approach from without. With the stud so engaged, the toggle action resistance to passage of the plunger head is reversed, and the device therefore functions as a latch. However, the latched connection is easily overcome by manual pressure to open the door, the frustum **14** being then re-inverted to normal form and thus positioned in readiness to again check slamming of the door. Preferably, the body **14** is in its normal, uninverted state and unstressed condition when occupying the recess **11**, since it will be in such position for the greater part of the time. However, in this regard it is to be noted that the dotted line showing of the inverted frustum in Figure 3 is more or less idealized. Since, when inverted, one side of the wall will be in tension and the other in compression, there will not be a sharp corner at the flange in the inverted form; instead there will be a rounding. In this abnormal position the resistance to collapse will obviously be less than in the normal form, and the choice as to which form will be employed for shock absorbing and which for latching will be guided by such consideration.

In Fig. 4 the device is shown in an arrangement for holding a car door open. As shown, the body **14'** is fastened to a car door **22**. In this case the plunger **18'** is arcuate to accommodate the neck **15'** during closing of the door. It will be seen that the toggle action of body **14'** against stud head **19'** takes place with the door in open position to resist closing of the door. However, the resistance is overcome by suitable manual pressure. In this case the latching function is of relatively small importance.

In Fig. 5 is shown a car door check similar to that shown in Fig. 4. In this form, the stud **23** has a series of heads, **24**, **25** and **26** to provide a plurality of holding stages suitable to occasions when full opening of the door is not required. Preferably, these heads will be of decreasing size from the outer one inward, compatible with the corresponding degrees of energy involved in slamming the door from the different positions.

The exact form of the opening **15** is subject to modification. For instance, in Fig. 6 it is shown as having frusto-spherical seats **27**, **28** to receive the stud head, and in Fig. 7 it has a rounded contour **29**.

While the rubber part has been shown on a door jamb it could equally well be carried by the door, and the stud placed on the jam. Likewise, the parts could be reversed from the position shown in the car door example. Also, whereas the frustum has been illustrated as having a particular degree of slant this may be varied considerably to suit particular conditions. A good tire

tread stock is preferable for the rubber part to provide toughness and long life in repeated use. However, the particular material used is in no wise limiting and various elastomers, including synthetic rubbers and plastics may be employed.

Generally speaking, the invention is not limited to the particular embodiments illustrated and described, since numerous modifications will suggest themselves to those skilled in the art. Therefore, the invention is not to be considered as limited except as shall appear from the spirit or scope of the appended claims.

What is claimed is:

1. In a checking and holding device for a closure of the type having a stationary member and a member movable with respect thereto, an element of rubbery material of generally sheet-like form, the periphery of which forms a flange for attachment to one of said members, the portion of the element inwardly of the flange having a through opening in its center, and said portion extending, in its normal, stress-free state, laterally of the plane of said flange, into substantially frusto-conical form, thereby providing a hollow interior offset from the plane of said flange, said element adapted to be contacted at said opening by a stud carried by the other of said members, which stud is slightly larger than said opening, whereby motion of the stud is first impeded by contact with said element at said opening, followed by collapse and inversion of said element and final penetration of said opening by said stud.

2. A checking and holding device for a closure of the type having a stationary member and a member movable with respect thereto, comprising an element of rubbery material of generally sheet-like form, the periphery of which forms a flange for attachment to one of said members, the portion of the element inwardly of the flange having a through opening in its center, and said portion extending, in its normal, stress-free state, laterally of the plane of said flange, into substantially frusto-conical form, thereby providing a hollow interior offset from the plane of said flange, and a stud adapted to be attached to the other of said members, said stud being slightly larger than said opening, whereby motion of the stud is first impeded by contact with said element at said opening, followed by collapse and inversion of said element and final penetration of said opening by said stud.

3. A device as in claim 2, said stud comprising an enlargement for contact with said element at said opening.

4. A device as in claim 2, said stud comprising an enlargement on its distal end for contact with said element at said opening.

5. A device as in claim 2, said stud comprising a pair of enlargements for contact with said element at said opening, and said enlargements separated by a constricted portion.

6. In a checking and holding device for a closure of the type having a stationary member and a member movable with respect thereto, an element of rubbery material of generally sheet-like form, the periphery of which forms a flange for attachment to one of said members, the portion of the element inwardly of the flange having a through opening in its center, and said portion extending, in its normal, stress-free state, laterally of the plane of said flange, into substantially frusto-conical form, with substantially uniform wall thickness, thereby providing a hollow interior offset from the plane of said flange, said element adapted to be contacted at said opening by a stud carried by the other of said members, which stud is slightly larger than said opening, whereby motion of the stud is first impeded by contact with said element at said opening, followed by collapse and inversion of said element and final penetration of said opening by said stud.

7. A checking and holding device for a closure of the type having a stationary member and a member movable with respect thereto, comprising an element of rubbery material of generally sheet-like form, the periphery of which forms a flange for attachment to one of said members, the portion of the element inwardly of the flange having a through opening in its center, and said portion extending, in its normal, stress-free state, laterally of the plane of said flange, into substantially frusto-conical form, with substantially uniform wall thickness, thereby providing a hollow interior offset from the plane of said flange, and a stud adapted to be attached to the other of said members, said stud being slightly larger than said opening, whereby motion of the stud is first impeded by contact with said element at said opening, followed by collapse and inversion of said element and final penetration of said opening by said stud.

8. A device as in claim 7, said stud comprising an enlargement for contact with said element at said opening.

9. A device as in claim 7, said stud comprising an enlargement on its distal end for contact with said element at said opening.

10. A device as in claim 7, said stud comprising a pair of enlargements for contact with said element at said opening, and said enlargements separated by a constricted portion.

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