Nov. 28, 1961 P. WIDMER 3,010,143

DOOR HINGE WITH HOLD-OPEN DEVICE

Filed Nov. 13, 1958 2 Sheets-Sheet 1

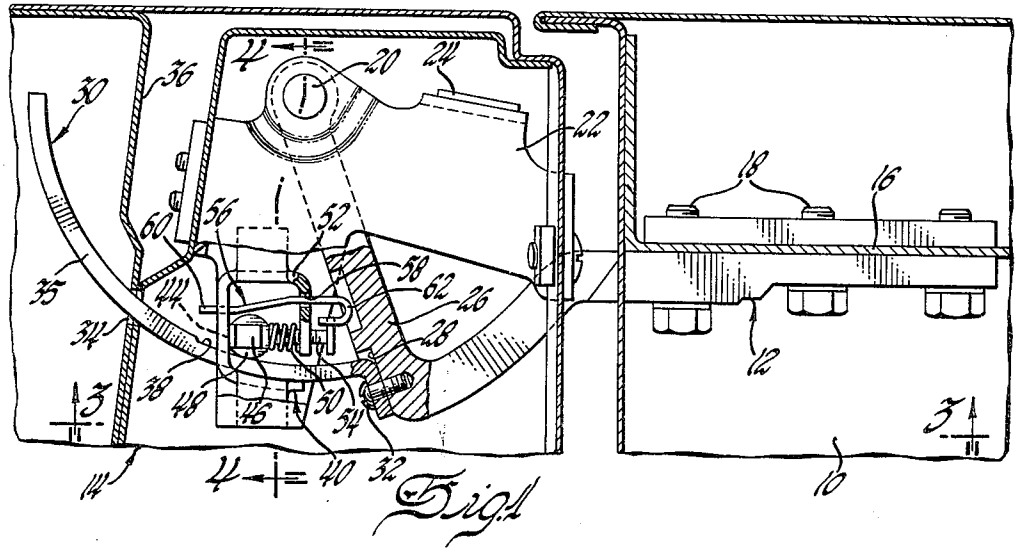


Fig. 1

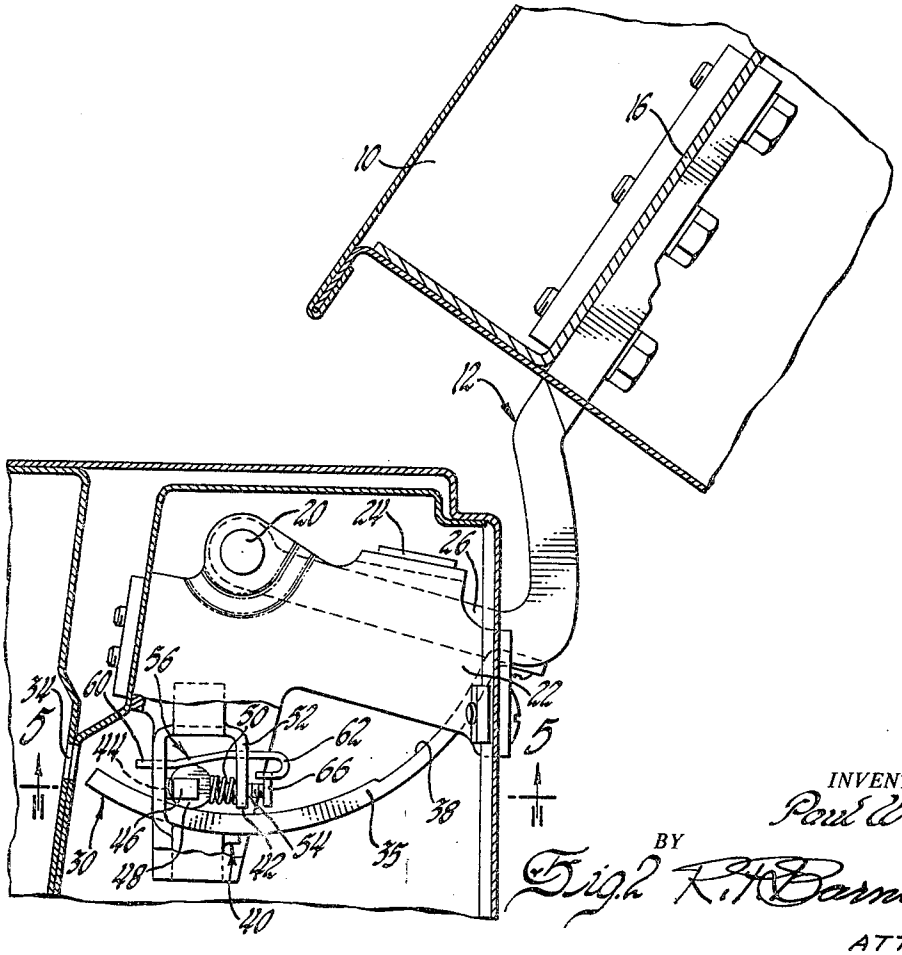


Fig. 2

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DOOR HINGE WITH HOLD-OPEN DEVICE

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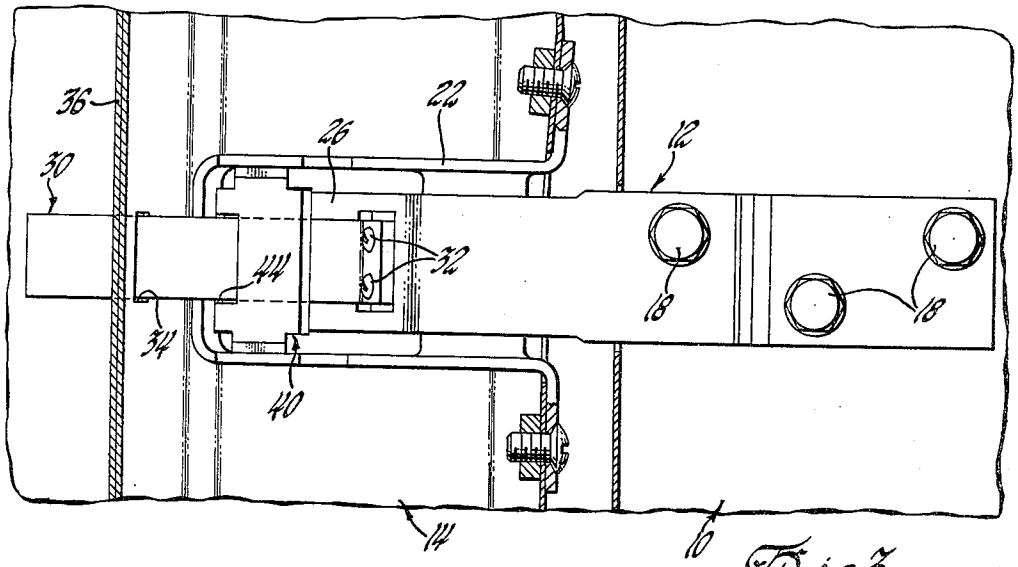


Fig. 3

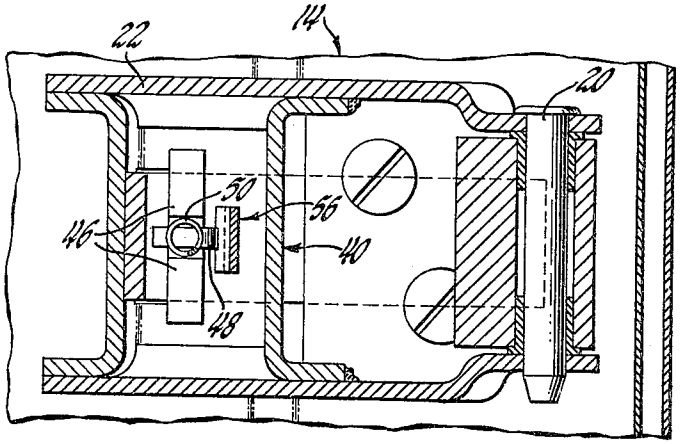


Fig. 4

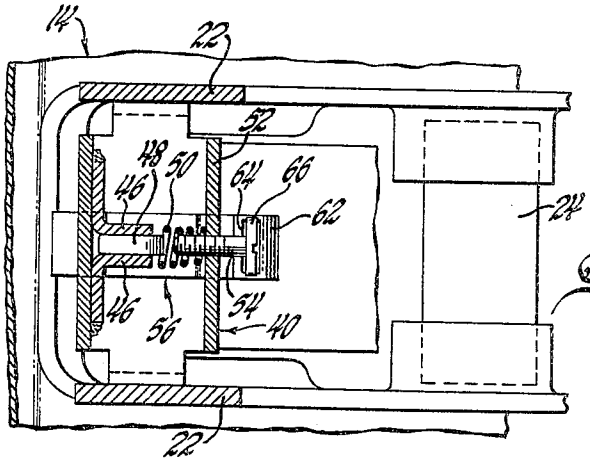


Fig. 5

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DOOR HINGE WITH HOLD-OPEN DEVICE

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9 Claims. (Cl. 16—140)

The present invention relates to an improved door hinge construction of the type utilizing a hold-open mechanism. In the present invention the door associated with the hinge mechanism is adapted to be freely moved in an opening direction until the door is fully opened, however, additional means is provided for yieldably resisting the initial closing movement of the door until such time as the latter reaches a predetermined position after which the door may be freely closed.

While many types of door hold-open devices have been developed, they have frequently been complicated in design and subject to locking the door in a fully open position to an extent requiring the application of excessive door closing forces to overcome the hold-open mechanism. The subject door hold-open mechanism represents a distinct improvement in that the door may be fully opened without having to overcome the considerable resistance necessary to activate previous type hold-open devices. It has been generally necessary with these previous devices to frequently utilize some type of over-center mechanism which the final few degrees of door opening movement activated but which requires considerable extra effort on the part of the person opening the door. This objection is obviated in the present invention which permits the door to be moved from fully closed to fully opened with only that force required to overcome the mass of the door itself.

Additionally, previous types of door hold-open devices have generally been operative to hold the door in but one open position. The present deviec is so constructed that the door may be retained in a range of open positions.

The present invention provides a relatively simple hold-open mechanism in which an arcuate sector member fixed on or integral with the door hinge strap is adapted to coact with a roller member and a spring element in such a way that during opening movement the roller is moved out of operative relationship between the spring and sector but during the initial closing movement of the door the roller is resiliently wedged between the sector and the spring member so as to resist the door closing movement until such time as the roller drops into a relieved portion of the sector freeing the door for easy closing movement.

The details as well as other objects and advantages of the present invention will be apparent from a perusal of the detailed description which follows.

In the drawings:

FIGURE 1 is a partially sectioned view through a door hinge mechanism embodying in the subject invention;

FIGURE 2 is substantially the same as FIGURE 1 with the door approaching a fully opened position;

FIGURE 3 is a view along line 3—3 of FIGURE 1;

FIGURE 4 is a view along line 4—4 of FIGURE 1; and

FIGURE 5 is a view along line 5—5 of FIGURE 2.

Referring to the drawings, a door is shown generally at 10 and is suitably pivotally supported through a gooseneck hinge strap 12 to a door frame structure 14. Hinge strap 12 is suitably fastened to a supporting plate 16 on the door 10 through studs 18. The other end of strap 12 is pivotally mounted on a pintle member 20 which is in turn supported within a hinge box 22.

Hinge box 22 includes check flanges 24 adapted to be engaged by arm 26 of strap 12 to provide a positive door opening stop for the strap and hence for door 10.

Arm 26 of strap 12 includes a relieved portion 28 within which an arcuate extension sector 30 is adapted to be secured through a screw member 32. An opening 34 is formed in door frame wall 36 and through which opening arcuate sector 30 is adapted to project. As best seen in FIGURES 1 and 2 sector 30 includes a relatively thick portion 35 and a thinner or relieved portion 38, the latter being disposed proximate arm 26 of strap 12.

In the illustrated embodiment of the invention, sector 30 is shown as a separate member attached to strap 12, however, it is to be understood that the sector may be incorporated as an integral part of the strap if desired.

A support bracket 40 is mounted on hinge box 22 and extends outwardly therefrom in the direction of sector 30. Support bracket 40 is open at 42 and 4 so as to permit arcuate sector 30 to extend therethrough. Thus as door 10 opens and closes sector 30 will move in an arcuate direction about pintle 20 relative to support bracket 40.

Support bracket 40 includes a pair of L-shaped members 46 fixed thereto and spaced from each other to support a roller member 48 therebetween. Roller member 48 is biased within members 46 by a spring element 50 one end of which seats against the roller and the other end of which seats upon an arm 52 of bracket 40. A screw member 54 is adjustably mounted within bracket arm 52 and provides an axial support for spring 50.

An offset spring member 56 is supported within an opening 58 formed within bracket arm 52. End 60 of spring 56 is offset in the direction of arcuate sector 30 and is adapted to extend through opening 44 formed in bracket 40. The other end of spring 56 includes a hooked portion 62 having an opening or slot 64 formed therein and within which slot the head 66 of screw 54 is adapted to project. For reasons to be subsequently considered in greater detail, as the screw member 54 is threaded in relation to bracket arm 52, it will be seen that the spring member will be correspondingly moved whereby end 60 moves closer to or farther from arcuate sector 30. It is also to be noted that spring 56 is adapted to engage the periphery of roller 48.

The operation of the subject hold-open device may best be understood by referring to FIGURES 1 and 2. With door 10 closed, roller 48 is disposed within relieved portion 38 of arcuate sector 30. As door 10 opens, the thick portion 35 of sector 30 moves beneath and urges roller 48 toward the wider end of the generally tapered space defined by the sector and spring 56. Thus the roller is maintained out of engagement or only lightly engages with spring 56 and compresses spring 50. In this manner door 10 may move relatively freely in an opening direction until arm 26 of strap 12 engages check flange 24 on hinge box 22. As door 10 is moved in a closing direction, the movement of sector 30 will cause roller 48 to be moved to the narrower end of the tapered space between the sector and spring 56 where the roller will be wedged between the spring and sector to create a drag resistance to the door closing movement. Thus the wedging action of roller 48 between spring 56 and sector 30 provides a yieldable hold-open force.

Application of sufficient closing pressure on door 10 will deflect spring 56 permitting door closure under equally maintained yieldable hold-open force until roller 48 rides down into the recess portion 38 of sector 30 as the door approaches its closed position. After roller 48 is within sector recess 38, the door is easily closed.

The degree of closing movement through which the door hold-open action is in effect is determined by the length of recess portion 38 of sector 30. As the recess 38 is moved closer to strap arm 26 the longer becomes thicker sector portion 37 and correspondingly the longer the hold-open action is available.

The upward deflection of spring 56 under the closing

movement of door **10** causes the spring to abut against the upper side of opening **58** in bracket arm **52**. By adjusting screw **54** to the left, as viewed in FIGURE 1, the effective length of spring **56** is increased and the resilience of the spring is decreased. As a consequence of such adjustment the force required to overcome the hold-open action is decreased. Correspondingly as screw **54** is adjusted to move spring **56** to the right, the stiffness of the spring is increased as is the door hold-open force.

It is apparent that various structural modifications of the present device are possible within the scope of the invention as set forth in the hereinafter appended claims.

I claim:

1. A door hold-open mechanism comprising a support member, a hinge strap pivotally supported upon said member, said hinge strap also being secured to said door, said strap member including a sector formed thereon and arcuately disposed with respect to the pivot point of said strap on said member, said sector including a recessed portion, a bracket mounted upon said support member and disposed proximate said sector, a roller member supported within said bracket and adapted to engage with said sector, a spring member mounted upon said bracket, said spring member coacting with said sector to define a generally tapered space within which said roller is disposed, said roller being mounted within said bracket and being movable in the direction of strap movement, a stop formed on said support member, the opening movement of said door causing the sector to move said roller toward the wider end of said tapered space permitting unresisted opening of said door until said hinge strap engages the stop member, the closing movement of said door causing said sector to move said roller toward the narrower end of said tapered space whereby said roller is wedged between said sector and said spring member to yieldably resist the closing movement of said door, said roller resisting the closing movement of said door until the recessed portion of said sector is disposed adjacent said roller to interrupt said wedging action and permitting unresisted closing movement of said door, said recessed portion of the sector being of such length that the roller member remains therein until the door has moved from its closed to an appreciably open position.

2. A door hold-open mechanism comprising a support member, a hinge strap pivotally supported upon said member, said hinge strap also being secured to said door, said strap member including a sector formed thereon and arcuately disposed with respect to the pivot point of said strap on said member, said sector including a recessed portion, a bracket mounted upon said support member and disposed proximate said sector, a roller member supported within said bracket and adapted to engage with said sector, a spring member mounted upon said bracket, said spring member coacting with said sector to define a generally tapered space within which said roller is disposed, said roller being mounted within said bracket and being movable in the direction of strap movement, a stop formed on said support member, the opening movement of said door causing the sector to move said roller toward the wider end of said tapered space permitting unresisted opening of said door until said hinge strap engages the stop member, the closing movement of said door causing said sector to move said roller toward the narrower end of said tapered space whereby said roller is wedged between said sector and said spring member to yieldably resist the closing movement of said door, said roller resisting the closing movement of said door until the recessed portion of said sector is disposed adjacent said roller to interrupt said wedging action and permitting unresisted closing movement of said door, and means for adjusting the rate of the spring member to vary the door hold-open force, said recessed portion of the sector being of such length that the roller member remains therein until the door has moved from its closed to an appreciably open position.

3. A door hold-open mechanism as set forth in claim 2 in which the spring rate adjusting means comprises a screw member adjustably supported upon said bracket, said spring member being operatively connected to said screw whereby screw movement will translate the spring relative to the bracket.

4. A door hold-open mechanism as set forth in claim 3 in which said bracket includes an opening within which said spring member is supported, movement of said screw changing the effective length of the spring member through which the roller member is engaged.

5. A door hold-open mechanism as set forth in claim 4 in which said spring member is generally flat and includes an offset portion terminating adjacent the roller member.

6. A door hold-open mechanism as set forth in claim 1 in which said bracket includes a pocket within which said roller member is disposed, and a spring element biasing the roller member within said pocket.

7. A door hold-open mechanism as set forth in claim 6 in which the spring rate adjusting means comprises a screw member adjustably supported upon said bracket, said screw member being adapted to support said spring element in alignment with the roller member.

8. A door hold-open mechanism as set forth in claim 1 in which the recessed portion of the sector is disposed subadjacent said roller when the door is closed.

9. A door hold-open mechanism comprising a support member, a hinge strap pivotally supported upon said member, said hinge strap also being secured to said door, said strap member including a sector formed thereon and arcuately disposed with respect to the pivot point of said strap on said member, said sector including a plurality of offset surfaces, at least one of said surfaces being radially more remote from said strap pivot point than another and contiguous of said surfaces, a bracket mounted upon said support member and disposed proximate said sector, a roller member supported within said bracket and adapted to sequentially engage with said sector surfaces, a spring member mounted upon said bracket, said spring member coacting with said sector to define a generally tapered space within which said roller is disposed, a stop formed on said support member, the opening movement of said door causing the sector to move said roller toward the wider end of said conical space permitting unresisted opening of said door until said hinge strap engages the stop member, the closing movement of said door causing said sector to move said roller toward the narrower end of said tapered space whereby said roller is wedged between said sector and said spring member to yieldably resist the closing movement of said door, said roller resisting the closing movement of said door until said more radially remote sector surface is disposed adjacent said roller to interrupt said wedging action and permitting unresisted closing movement of said door.

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