May 2, 1961 C. A. E. NAYES ET AL 2,981,970

DOUBLE ACTING SPRING HINGE

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Fig. 1

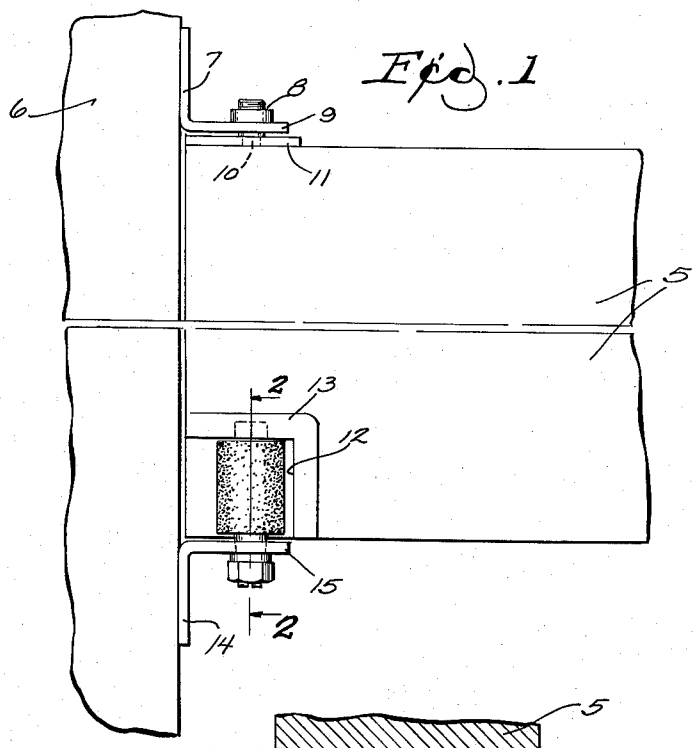
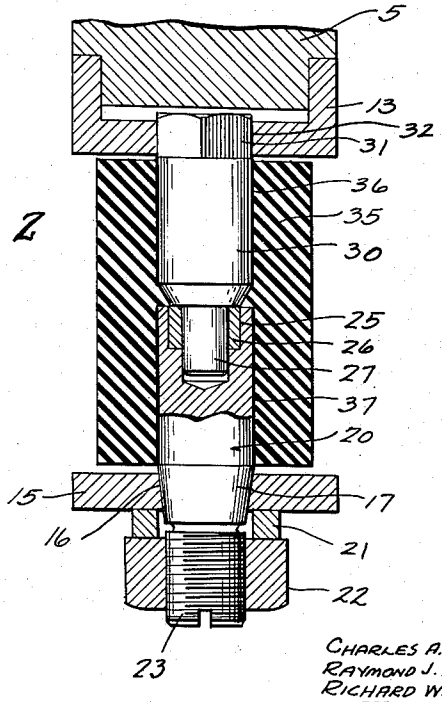


Fig. 2



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Fig. 3

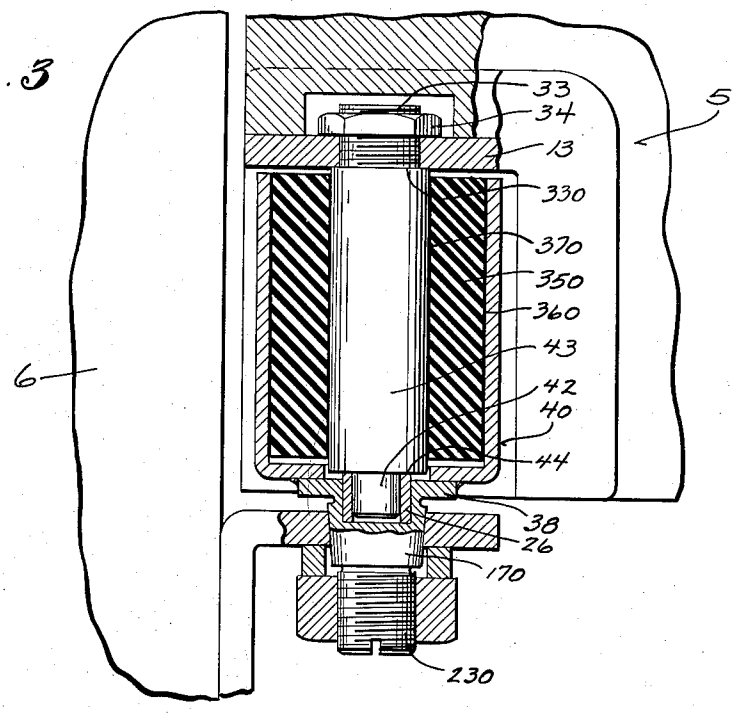
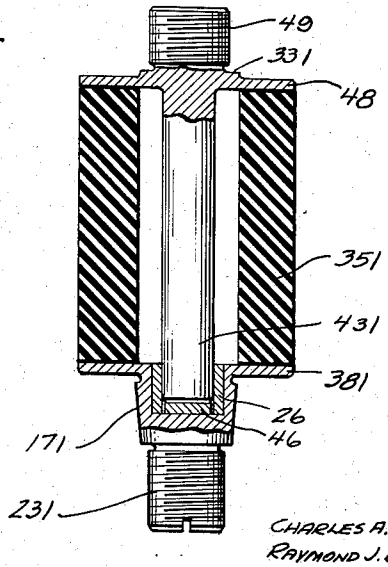


Fig. 4



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DOUBLE ACTING SPRING HINGE

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13 Claims. (Cl. 16—182)

This invention relates to a double acting spring hinge.

The hinge disclosed is particularly designed for application to the doors of toilet stalls, shower stalls and the like in which the door is not required to completely fill the opening in which it is mounted. However, the hinge does have other applications. It features a mechanism in which all parts of the spring hinge may be, and usually are, assembled as a unit in a notch in the lower corner of the door for adjustable mounting on a bracket affixed to the jamb. The hinge comprises a lower socket member adjustable in said bracket for determination of the position to which the door returns when swung in either direction. Piloted on this member is a pintle bar connected to a complementary bracket fixed to the door. This member sustains the weight of the door and guides its oscillation, the spring means for returning the door to its normal closed position, comprising an elastomeric sleeve connected to the respective members. A simple pin and bracket pivot the upper end of the door.

In the preferred construction, the elastomeric sleeve is vulcanized or otherwise bonded to members respectively connected with the leaf brackets of the door and jamb and in piloted bearing engagement with each other intermediate the length of the sleeve.

In an alternative construction, the member connected with the jamb bracket is a cup, the other member being piloted in or near the bottom of the cup and the elastomeric spring comprising a tube bonded to the respective members on its inner and outer peripheries.

In another alternative construction, the member fixed to the jamb bracket is bonded to the end of the elastomeric sleeve, while the member fixed to the door bracket comprises a plate bonded to the opposite end of the rubber sleeve. One of these members has pintle or stem which extends substantially all the way through the sleeve to a piloted connection with the other member, the stem or pintle being wholly free of contact with the inner periphery of the sleeve.

In all of these installations, the door and the spring hinge unit near its bottom corner, are readily disengaged from the lower jamb bracket by relative upward movement of the door, without disconnecting the jamb bracket from the jamb, and without releasing the hinge unit from the door. It is because this relative bodily upward displacement of the door and the attached spring unit is feasible for stall type doors that the invention is particularly suitable for such installations.

In the drawings:

Fig. 1 is a view largely in side elevation, fragmentarily illustrating portions of a door equipped with hinges embodying the invention.

Fig. 2 is a view taken in section on the line 2—2 of Fig. 1.

Fig. 3 is a view in section showing a modified embodiment of the invention.

Fig. 4 is a view in section showing a further modified embodiment of the invention.

In order to mount the door 5 for swinging movement in both directions from a predetermined central position respecting the jamb, six separate hinges are provided for the upper and lower corners of the door. The upper hinge includes a bracket 7 having a shoulder bolt 8 connected to its arm 9, its reduced extension 10 being engaged in a hole in the plate 11, which is secured to the upper end of the door adjacent its corner.

The lower margin of the door has a corner notched at 12 framed by a hinge leaf or bracket 13 of channel-shaped cross section. The other hinge leaf or bracket 14 is screwed to the jamb and has an arm 15 projecting immediately beneath the notched corner of the door. A tapered opening at 16 in the bracket arm 15 adjustably receives the tapered end 17 of pintle member 20 which is fixed in adjusted position by lock washer 21 and nut 22 threaded to its lower end portion 23.

The upper end of pintle member 20 has a socket 25 and is counterbored to receive the bushing 26. Piloted in the bushing and extending into the socket is the reduced lower extremity 27 of upper pintle member 30 which is fixed to rotate with the door. The shoulder 28 of member 30 may, and desirably does, have bearing support on the upper end of bushing 26. The manner in which the member 30 is engaged with leaf bracket 13 is immaterial to the invention. It may have a squared portion 31 engaged in a corresponding opening 32 of the bracket as shown in Fig. 2, or it may have a reduced threaded portion 33 extending through the bracket and provided with a nut 34 which is used to tighten the shoulder 330 against the bracket in the manner suggested in Fig. 3. In other words, the mounting means suggested in Figs. 2 and 3 may be employed interchangeably.

In the preferred construction shown in Figs. 1 and 2, the piloted connection between the upper and lower pintle members 30 and 20 is intermediate the door bracket 13 and the jamb bracket arm 15. The upper and lower pintle members are encircled by an elastomeric tubular spring 35, the inner periphery of which is bonded to the outer peripheries of both members, either by vulcanizing or adhesive connection or otherwise. The bond is diagrammatically engaged in the drawings by the heavy lines at 36 and 37. The piloted connection is within the elastomeric spring in this construction.

Any oscillation of the door in either direction from its normally centered position will subject the heavy sleeve 35 of rubber or the like to torsion, its upper end being twisted with respect to the lower end. Upon release of presure on the door, the hinge will restore the door to its original position. For setting the door in a desired position, the tapered portion 17 of lower pintle member 20 is released from its socket in leaf arm 15; the door can then be positioned while free of pressure; and the tapered portion 17 is then wedged into the socket by tightening nut 22.

In the construction shown in Fig. 3, the tapered shank 170 with its screwthreaded extremity 230 corresponds to the tapered portion 17 and screwthreaded end 23 of pintle member 20. In this instance, the tapered shank 170 supports a cup 40. In practice the shank may terminate in a flange or head 38 which is welded to the lower side of cup 40. The cup and shank unit is socketed at 41 to receive the bushing 26 in which the reduced end portion 42 of pintle 43 is piloted. The shoulder 44 of pintle 43 may rest on the bushing.

At its upper end, the shoulder 330 abuts the door bracket 13 and is anchored by nut 34 as already described.

The rubber spring 350 comprises a sleeve having its external periphery bonded to the cup 40 at 360 and its internal periphery 370 bonded to the pintle 43 by vulcanization or the use of adhesive or otherwise.

In the construction shown in Fig. 4, the conically tapered mounting member **171** and its screwthreaded reduced end **231** and its head **381** correspond closely to parts **170**, **230** and **38** in Fig. 3. Shank **171** is socketed to receive the bushing **26** into which the pintle **431** extends. Instead of having a shoulder abutting the top of the bushing **26**, the pintle **431** seats against a bearing disk **46** within the bushing.

At its upper end, the pintle **431** has a flange **48** above which it is shouldered at **331**. It may be mounted to the door bracket in any desired manner, as by means of threads at **49**.

In this instance, the rubber spring **351** has a central opening **50** which is of greater radius than the pintle pin **431**, being desirably completely out of contact with the pin. The bond **361** with flange **381** is at the lower end of the rubber sleeve **351** while its upper end is bonded at **371** to the flange **48** of the pintle pin fixed to the door.

From the foregoing description, it will be apparent that the operation of the device shown in Figs. 3 and 4 is similar to that shown in Fig. 1 except as to the manner in which torsion is applied to the rubber spring. In the Fig. 3 construction, the torsion is developed between the inner and outer periphery whereas in the Fig. 4 construction the torsion is developed between the respective ends of the rubber sleeve.

In all three constructions, the door will have an upper bearing providing pivotal guidance for its upper corner and, desirably, it will have a bearing at its lower corner fixing with reasonable accuracy the axis upon which the door swings. In any event, there should be no appreciable yielding of either corner of the door from its predetermined axis of oscillation, since any displacement of the axis would permit the free margin of the door to strike the side of its jamb instead of swinging properly.

We claim:

1. In a hinge, the combination with members respectively adapted for door and jamb connection and provided with non-yieldable bearing pintle and socket parts in piloted bearing engagement, of a spring comprising an elastomeric body having spaced portions connected with the respective members and opposing their relative displacement from a predetermined position.

2. In a device of the character described, the combination with relatively pivotally movable leaf members, of pintle means for positively positioning the members for relative pivotal movement upon a fixed axis, and an elastomeric spring sleeve through which the pintle means extends, spaced portions of the said spring having connection with respective members, the pintle means comprising axially aligned sections one of which has a piloted bearing in the other, the respective sections being connected with said elastomeric sleeve portions.

3. The device of claim 2 in which the piloted bearing is intermediate the ends of the elastomeric sleeve, said sleeve having inner peripheral portions fixed to respective sections at opposite sides of the piloted bearing.

4. The device of claim 2 in which the section of the pintle means at one side of the piloted bearing is provided with a cup encircling the elastomeric sleeve and connected to the outer periphery thereof, the elastomeric sleeve having its internal periphery connected to the other section of the pintle means.

5. The device of claim 2 in which the elastomeric sleeve has terminal portions in fixed connection with flanges with which the respective sections of the pintle means are provided.

6. A hinge for mounting in the notched corner of a free swinging door, said hinge comprising a jamb bracket leaf, a door bracket leaf, pintle sections connected with the respective leaves and an elastomeric tubular spring embracing both of said pintle sections and having different lengths of its inner periphery respectively connected therewith, the said pintle sections having a pilot bearing intermediate the ends of said spring, one section being socketed and the other having a reduced extremity extending into the socket to provide said bearing.

7. A spring hinge for a double swinging door, said hinge comprising a jamb bracket leaf, a door bracket leaf, a pintle bearing section adjustably connected with the jamb bracket leaf, a pintle bearing section connected with the door bracket leaf, one of said sections being socketed and the other provided with a bearing stud extending into the socket, the said sections having radial and axial bearing surfaces affording support for the door bracket leaf and positively fixing its axis of oscillation, and an elastomeric tubular spring through which the axis of oscillation extends and which has spaced portions in fixed connection with the respective pintle bearing sections.

8. The device of claim 7 in which the pintle bearing sections comprise bar portions and the spring comprises a tube having different lengths of its inner periphery bonded to said portions.

9. The device of claim 7 in which one of said sections comprises a cup through which the other section extends, the spring comprising a tube having its external periphery bonded to the cup and its internal periphery bonded to the other pintle bearing section.

10. The device of claim 7 in which both of said sections are provided with radial flanges spaced axially of the axis of oscillation, the spring comprising a sleeve having its ends bonded to the respective flanges.

11. The device of claim 7 in which the pintle bearing sections comprise bar portions and the spring comprises a tube having different lengths of its inner periphery respectively bonded to the said portions, said tube constituting a housing within which said bar portions are enclosed.

12. The device of claim 7 in which the spring comprises a tube, at least one of said pintle bearing sections being axially disposed within the tube, the other pintle bearing section comprising the said socketed section and being disposed outside of the tube.

13. The device of claim 7 in which the pintle bearing section adjustably connected with the jamb bracket leaf and pintle bearing section connected with the door bracket leaf are of substantially identical cross section and have external peripheral portions in bonded connection with the interior of the elastomeric tubular spring, said spring constituting a housing for said sections and extending substantially continuously between said leaves.

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