

May 15, 1951

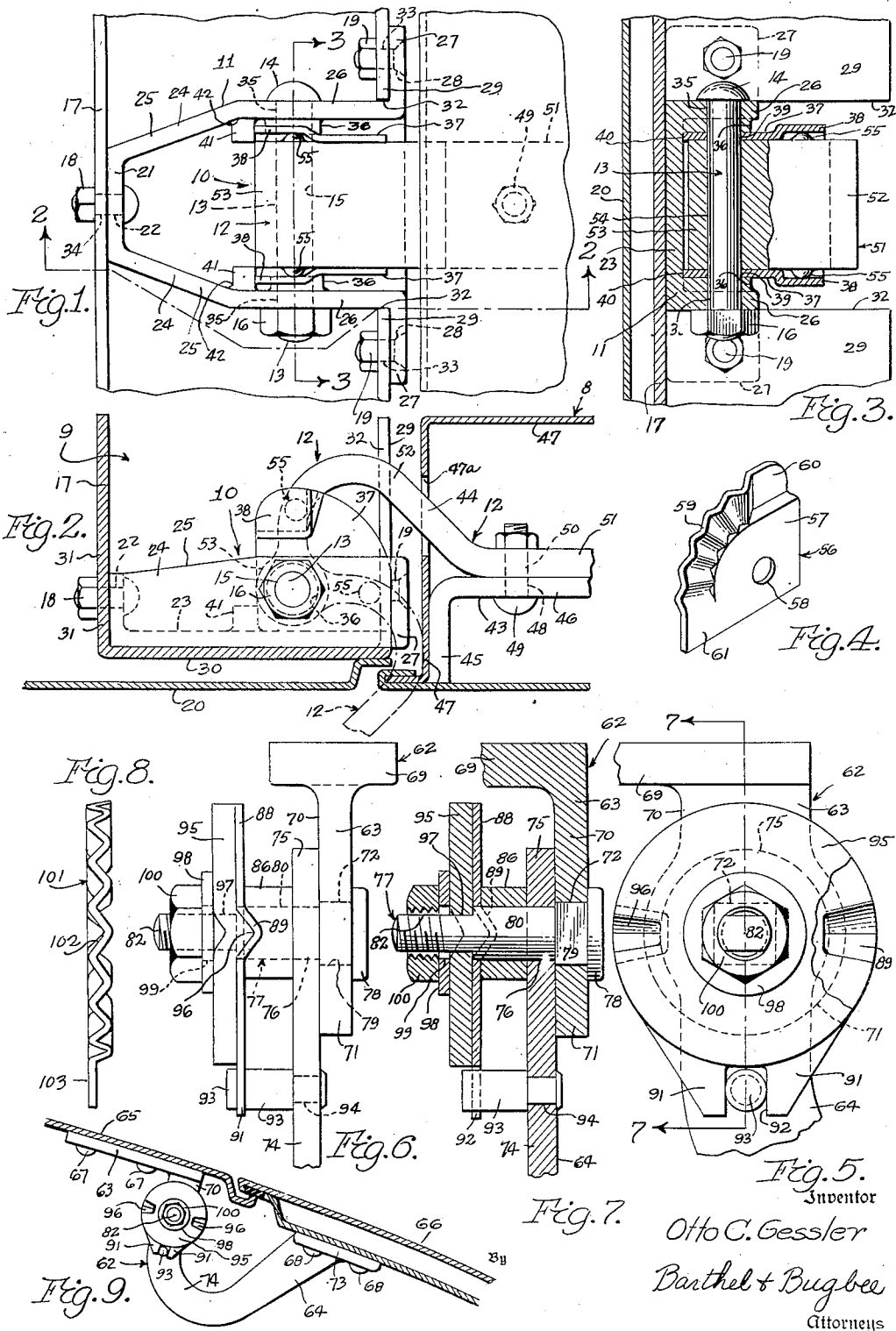
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2,553,185

FRICTIONALLY-HELD HINGE

Filed Aug. 14, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 10.

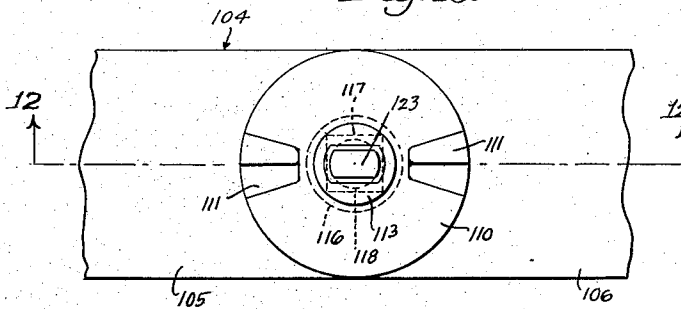
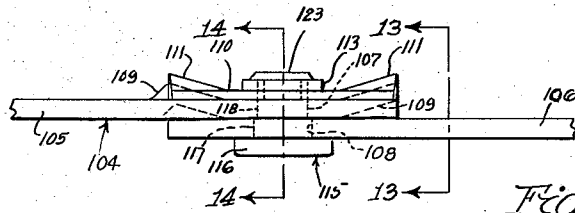


Fig. 11.

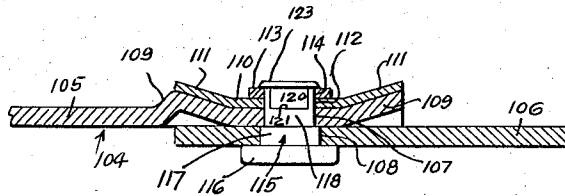


Fig. 12.

Fig. 13.

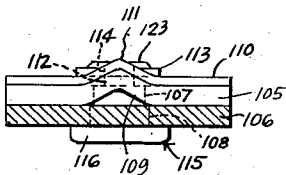


Fig. 14.

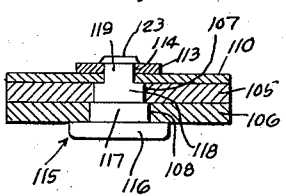
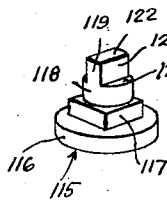


Fig. 15.

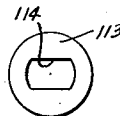


Fig. 16.

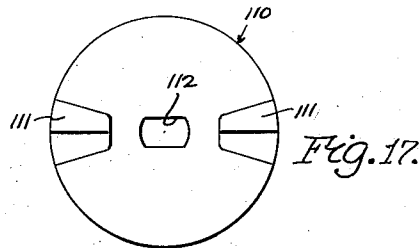


Fig. 17.

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## UNITED STATES PATENT OFFICE

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## FRICTIONALLY-HELD HINGE

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1 Claim. (Cl. 16—142)

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This invention relates to hinges and, in particular, to yieldably held hinges.

One object of this invention is to provide a hinge which can be adjusted to any one of a number of predetermined positions and yieldably held in those positions.

Another object is to provide a hinge having a yieldable holder associated with the hinge brackets and so arranged as to yieldably retain the hinge brackets at a given angle to one another until a sufficiently strong force is applied to overcome the resistance of the holder and swing the bracket to a different angle.

In the drawings:

Figure 1 is a side elevation of a hinge constructed in accordance with a preferred form of the invention, as adapted for use on automobile doors;

Figure 2 is a horizontal section looking upward from below, taken along the line 2—2 in Figure 1;

Figure 3 is a vertical section taken along the line 3—3 in Figure 1;

Figure 4 is a perspective view of a modified form of the friction plate shown in Figure 1, having an undulating corrugated peripheral surface;

Figure 5 is a front elevation of a modification of frictional hinge in a form adapted for use in closures of a lid type for receptacles;

Figure 6 is a side elevation of the hinge shown in Figure 5;

Figure 7 is a vertical section taken along the line 7—7 in Figure 5;

Figure 8 is an edge view of a modified form of the friction hinge shown in Figure 5, having a series of peripheral corrugations;

Figure 9 is a side elevation, partly in section, of an application of the invention employed with an automobile trunk compartment lid or lid of another receptacle;

Figure 10 is a top plan view of a further modification of the hinge shown in Figure 5;

Figure 11 is a side elevation of the invention as shown in Figure 10;

Figure 12 is a vertical section taken along the line 12—12 in Figure 10;

Figure 13 is a vertical section taken along the line 13—13 in Figure 11;

Figure 14 is a vertical section taken along the line 14—14 in Figure 11;

Figure 15 is a perspective view of the pivot member shown in Figure 12;

Figure 16 is a top plan view of the washer shown in Figure 10; and

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Figure 17 is a top plan view of the spring disc member shown in Figure 10.

Referring to the drawings in detail, Figures 1, 2 and 3 show an automotive structure consisting generally of a door 8 movably connected to a stationary portion 9 by means of a frictional hinge, generally designated 10. The hinge 10 consists generally of brackets 11 and 12 which are held in association by a fastener 13 composed of a head 14 and a shank 15 and secured in position by a nut 16 (Figure 2).

The bracket 11 is secured by means of fasteners 18 and 19 to the structural member 17 which is affixed to and concealed by the cover plate 20.

The bracket 11 consists generally of a head 21 provided with a hole 22 for the insertion of the fastener 13, and a back support 23 provided with perpendicular flanges 24 connected also with the head 21 and having oblique sections 25, attachment sections 26 and feet 27, which extend outwardly perpendicular to the sections 26 and are provided with countersunk holes 28 for the insertion of the fasteners 19.

The structural member 17 has three sides 29, 30 and 31 (Figure 2), side 29 being provided with a large rectangular aperture 32 for the insertion of the bracket 11 and to allow room for the hinge to swing. The portions of the side 29 flanking the hole 32 are provided with circular holes 33 for the insertion of the fasteners 19 to secure the feet 27 of bracket 11 to the member 17. The side 30 lies adjacent and parallel to the back support 23 of the bracket 11, and the side 31, to which the head 21 of the bracket 11 is secured, is provided with a hole 34 for the insertion of the fastener 18.

Figures 1 and 3 show the two flanges 24 pierced by the fastener 13, the sections 26 being furnished with holes 35 for that purpose. Extending from the inner sides of the sections 26 toward each other are two bosses 36, the holes 35 passing through them as well as through the sections 26.

Adjacent the bosses 36 are two resilient friction plates 37 having struck-up portions 38 provided with holes 39 for the insertion of the fastener 13. The edges 40 of said friction plates are held parallel to and in contact with the side 30 of the structural member 17, thus preventing rotation of the friction plates around the axis of the fastener 13 when the hinge is swung. To facilitate alignment of the holes 39 of the friction plates 37 with the holes 35 in the bosses 36 in the process of assembly, the flanges 24 are provided with lugs 41 extending inward from the junctures 42 of the sections 25 and 26 of said flanges. The lugs 41,

being in contact with the edges of the friction plates 37, help to anchor the friction plates 37 and prevent rotation thereof.

The bracket 12 (Figure 2) consists of a right-angle member 43 and a hinge arm 44, the former being composed of two mutually perpendicular sections 45 and 46. The section 45 is secured to the inner surface of the member 47 of the door 8 (Figure 2) by welding, riveting or any suitable means. The section 46 is provided with a hole 48 for the insertion of a fastener 49 by means of which the right-angle member 43 is secured to the hinge arm 44, said hinge arm also being provided with a hole 50 for the same purpose.

The hinge arm 44 consists of a straight section 51 extending parallel with and secured to the section 46 of the right-angle member 43 and containing the hole 50, a curved portion 52 which is the hinge arm proper, and a terminal cylindrical portion 53 provided with a hole 54 axially bored to admit the fastener 13. The curved portion 52 passes out of the door 9 through the aperture 47a in the member 47. Extending from the edges of the curved portion 52 near the terminal cylindrical portion 53 are two protuberances 55 which are maintained in frictional contact with the resilient friction plates 37 of the bracket 11 as a result of the bending of said plates by the protuberances 55.

Figure 4 shows a modification of the friction plate 37 consisting of a friction plate 56 having a struck-up portion 57 provided with a circular hole 58 and also having an undulating corrugated peripheral flange 59 flanked by straight flange portions 60 and 61, the latter being flush with the struck-up portion 57.

Figures 5, 6, 7 and 9 show a modification 62 of the frictional hinge 10 of Figure 1, consisting of brackets 63 and 64 mounted on an auto frame structure 65 and closure lid frame 66 respectively by means of fasteners 67 and 68 (Figure 9). The bracket 63 consists of a base 69 and a perpendicular arm 70 having a circular terminal head 71 provided with a square hole 72. The bracket 64 consists of a base 73 and a curved arm 74 having a circular terminal head 75 provided with a circular hole 76.

The two circular terminal heads 71 and 75 are held adjacent and in movable association with each other by a fastener member 77 consisting of a head 78, a square shank 79 and a circular shank 80. The shank 80 has a flat-sided extension 82. The square shank 79 passes through the square hole 72 of the bracket 63, while the circular shank 80 of the fastener 77 passes through the circular hole 76, so that the circular terminal head 75 is movable with said fastener.

Adjacent the circular terminal head 75 is a spacing washer 86 of small diameter having a circular center hole for the insertion of the circular shank 80 of the fastener 77. Adjacent said washer on the side opposite the circular terminal head 75 is a resilient spring washer 88 provided with two peripheral indentations 89 located on opposite sides of said washer and two arms 91 projecting radially from the circumference having between them a notch 92. Extending into the notch 92 from the arm 74 of the bracket 64 is a stop pin 93 anchored in a hole 94 in the arm 74. As a result, the spring washer 88, washer 86 and bracket 64, all mounted upon the circular shank 80 of the fastener 77 are able to rotate with respect to said fastener, but the stop pin 93 causes the bracket 64 and the spring washer 88 to be fixed with respect to each other.

Adjacent and in frictional association with the resilient spring washer 88 is a rigid backing washer 95 provided with two peripheral protuberances 96 located oppositely as in the spring washer 88 and with a flat-sided center hole 97, said backing washer 95 being fixedly mounted upon the shank portion 80 of the flat-sided extension 82 of the fastener 77. Likewise fixedly mounted upon the same shank portion adjacent said backing washer is a smaller washer 98 having a flat-sided hole 99 for the insertion of said shank portion.

Holding the assembly together is a nut 100 mounted upon the threaded portion of the flat-sided extension 82.

Figure 8 shows a modified resilient spring washer 101 having an undulating edge 102 and radially extending arms 103 for the reception of the stop pin 93 (Figure 6).

Figures 10 to 14 inclusive show a modified frictional hinge generally designated 104 including two arms 105 and 106 with rounded ends, arm 105 being provided with a circular hole 107 in its terminal portion and arm 106 having a square hole 108. The terminal ends of the two arms are in an overlapping position. Arm 105 is also furnished with two upwardly protruding indentations 109.

In frictional association with the terminal portion of the arm 105 is an adjacent resilient spring washer 110 provided with two peripheral indentations 111 corresponding to the indentations 109 in the arm 105 and with a flat-sided center hole 112. Located next to the spring washer 110 on the side opposite the arm 105 is a small retaining washer 113 having a semi-rectangular center hole 114 similar to the center hole 112 in the spring washer 110.

Holding the entire assembly together is a pivot member 115 having a circular head 116, a square shank 117 and a circular shank 118 of which the upper end portion 119 is cut away to provide flat sides. In the process of assembly, the upper end 122 is enlarged in rivet fashion to form a retaining head 123. (Figure 14.) The square shank 117 is inserted in the square hole 108 of the arm 106. The circular shank 118 fits into the circular hole 107 in the arm 105, while the flat-sided end portion 119 fits into the flat-sided center holes 112 of the spring washer 110 and hole 114 of retaining washer 113. Thus washers 110 and 113 and arm 106 are rigidly held with relation to each other and to the pivot member 115. Arm 105, although frictionally held by the spring washer 110 is able to rotate with respect to all other parts in the assembly.

In the operation of the frictional hinge shown in Figure 1, when the door 9 is in its closed position (Figure 2), the protuberances 55 of the hinge arm 44 lie within the spaces enclosed by the struck-up portions 39 of the friction plates 37, hence substantially no frictional grip is exerted between the said protuberances and friction plates. When the door 9 is swung open, the hinge arm swings into the position indicated by the broken lines in Figure 2. In so doing, the hinge arm 44 pulls the protuberances 55 up the inclined shoulders bordering the struck-up portions 39 of the friction plates 37, spreading the latter apart. This causes the friction plates 37 to frictionally grip the protuberances 55, thus yieldingly holding the door.

If the modified friction plates 56 are employed (Figure 4), the protuberances 55 are held posi-

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tively but releasably in the recesses provided by the undulating flange portion 59.

In the operation of the modified hinge shown in Figures 5, 6, 7 and 9, when the closure 63 is in its closed position shown in Figure 9, the protuberances 96 of the washer 95 fit into the peripheral recesses 89 of the spring washer 88 and yieldingly hold the closure shut. If a sufficient pressure is applied to lift the closure 66, however, the spring washer 88 is swung and its recess portions 89 pushed axially to permit the protuberances 96 to move out of them and frictionally engage the straight peripheral portions of the washer 88.

The operation of the modification shown in Figures 10 to 17 inclusive is similar to that of the form shown in Figures 5, 6, 7 and 9. When the arms 105 and 106 are moved out of alignment with one another, the protuberances 109 move out of the peripheral recesses 111 of the indented washer 110 and frictionally engage the remaining portions of the washer.

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What I claim is:

A hinge structure comprising a hinge bracket, a pivot member mounted on said bracket, a hinge arm pivotally mounted on said pivot member, a detent member mounted on said pivot member and secured to said hinge bracket, said detent member having a multiplicity of fluted portions therein, and a protuberance connected to said hinge arm and engageable with said fluted portions.

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