

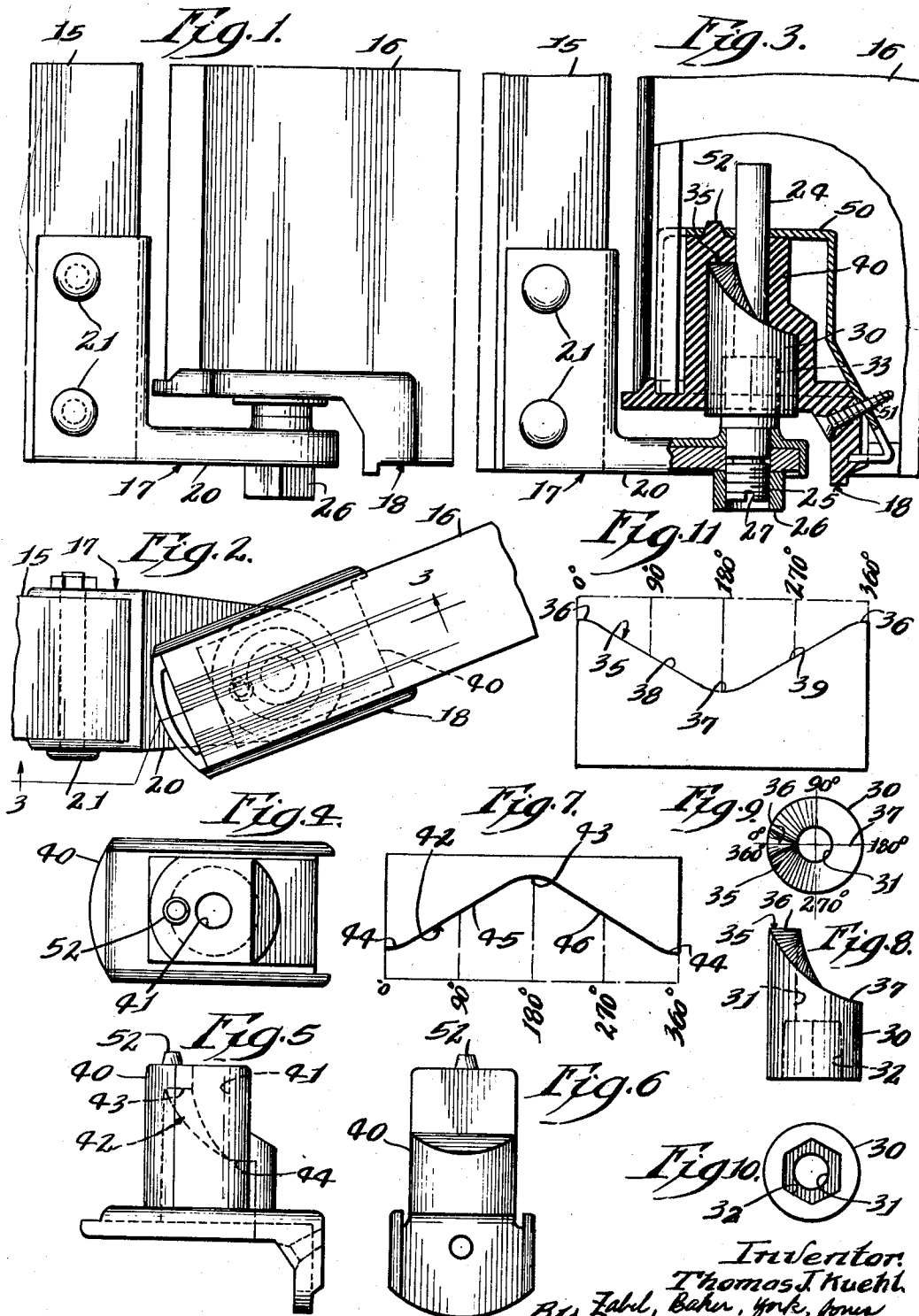
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GRAVITY HINGE

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GRAVITY HINGE

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This invention relates to a gravity hinge, and more particularly to a gravity hinge designed for use on doors leading into toilet and dressing compartments or the like.

A gravity hinge, as is well known, has the characteristic of utilizing the force of gravity to return a door with which the hinge is associated to a predetermined rest position. It is customary to use a slightly open rest position to signify that the compartment served by the door is unoccupied.

Numerous gravity hinges have been developed and are in use. Most of them have an inclined cam surface on one hinge part and a cam follower or roller on the other hinge part. This construction is such that where good quality machine design practice is followed, the size of the hinge is objectionably large.

Prior efforts to reduce the size of the hinge have required a compromise with good machine design practice and the smaller hinges are subject to excessive wear and consequent short life. Small hinge size is desirable, however, for aesthetic reasons and because many installations require that the hinge be substantially concealed within the door.

One object of the invention, therefore, is to provide a gravity hinge of such small size that the portion thereof secured to the door may be mounted substantially within the bounding planes of the door.

Another object of the invention is to provide a gravity hinge which can be made in small size but which involves no compromise with good machine design practice.

Still another object of the invention is to provide a gravity hinge which wholly eliminates the use of a cam follower roller, an element which involves considerable expense and imposes the requirement of large size on a hinge if good machine design practice is to be observed.

Another object of the invention is to provide a gravity hinge which can be manufactured at a cost of about 25% that of present satisfactory gravity hinges.

Still another object of the invention is to provide a low cost gravity hinge which will have a long, useful life because the working elements thereof have a minimum sensitivity to destructive forces to which they are exposed.

In brief, the present invention utilizes a pair of bearing elements each of which has an annular cam track portion. The cam track portions have substantially identical contours so that they nest together with substantially full bearing when the two bearing elements are at rest position.

The bearing elements preferably are formed of molded plastic material which has superior wearing, anti-friction and resistance to cold flow characteristics. Such a plastic, for example, is polymeric amide known as nylon.

Each cam track portion has high and low points with inclined lengths between them, and there is sliding action between the engaged inclined lengths during hinge operation. The lengths utilize the force of gravity to

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return the hinge to predetermined rest position, and the high and low points cooperate to locate the rest position.

As previously mentioned, the cam track portions have substantially identical contours to provide substantially full bearing when at rest position. This feature distributes the load uniformly and prevents objectionable cold flow or change in shape of the material used in the bearing elements.

Other objects, advantages and details of the invention will be apparent as the description proceeds, reference being had to the accompanying drawing wherein one form of the invention is shown. It is to be understood that the description and drawing are illustrative only and that the scope of the invention is to be measured by the appended claims.

In the drawing:

Fig. 1 is an elevational view of fragmentary parts of door and frame members which carry a hinge embodying the invention;

Fig. 2 is a top view of the structure shown in Fig. 1;

Fig. 3 is an elevational view partly in section of the structure shown in Fig. 1, the section being taken on line 3—3 of Fig. 2;

Fig. 4 is a top view of a hinge part which in Figs. 2 and 3 is mounted on the door member;

Fig. 5 is a side elevational view of the hinge part shown in Fig. 4;

Fig. 6 is a front elevational view of the hinge part shown in Fig. 4;

Fig. 7 shows in developed form the contour of the cam track portion used in the hinge part shown in Fig. 4;

Fig. 8 is a side elevational view of a hinge part mounted on the frame member;

Fig. 9 is a top view of the hinge part shown in Fig. 8; Fig. 10 is a bottom view of the hinge part shown in Fig. 8, and

Fig. 11 shows in developed form the contour of the cam track portion used in the hinge part shown in Fig. 8.

Referring now to the drawing, the illustrated gravity hinge embodying the invention is shown mounted between a frame member 15 and a door member 16. As previously mentioned, door member 16 may provide access to a toilet or dressing compartment.

The hinge comprises a stationary hinge part 17 mounted on frame member 15 and a movable hinge part 18 mounted on door member 16.

Stationary hinge part 17 includes a bracket 20 secured to frame member 15 by any suitable means such as bolts 21. It includes a hinge pintle 24 (Fig. 3) secured to bracket 20, the lower end of pintle 24 being threaded as shown at 25. A nut 26 is effective to clamp pintle 24 in predetermined angular relation with respect to bracket 20.

The lower end of pintle 24 may have a groove 27 to receive a screw driver for the purpose of altering the angular relation between pintle 24 and bracket 20. Such alteration, as will be seen, changes the rest position angulation between the two hinge parts.

Stationary hinge part 17 also includes a bearing element 30, the element being shown in detail in Figs. 8—10. Bearing element 30 is generally cylindrical in shape. It has an axial bore 31 (Figs. 8—10) through which pintle 24 extends (Fig. 3). The lower portion of element 30 has a countersunk bore 32 which is non-circular and receives a non-circular enlargement or collar 33 (Fig. 3) on pintle 24. Bore 32 and collar 33 provide a spline arrangement which prevents relative rotation between bearing member 30 and pintle 24.

The upper surface of bearing member 30 constitutes an annular cam track portion 35. The developed form

of cam track portion 35 is shown in Fig. 11, and the angles indicated thereon also are indicated on Fig. 9. Cam track portion 35 has a high point 36 and a low point 37, these points being shown in Figs. 8, 9 and 11. The high and low points 36 and 37 are spaced by 180 degrees and hence are diametrically opposite on annular cam track portion 35. Between high and low points 36 and 37 are inclined lengths 38 and 39 of cam track portion 35, as best shown in Fig. 11.

Cam track portion 35 encircles pintle 24, as shown in Fig. 3, and transverse surface lines of portion 35 are extensions of radii of pintle 24, that is, the surface lines are at right angles to the axis of pintle 24.

Movable hinge part 18 includes a bearing element 40 which is shown in detail in Figs. 4-6. Bearing element 40, as shown in Figs. 2 and 3, is secured to door member 16, preferably within the bounding planes of the door member.

Bearing element 40 has a hollow interior including an aperture 41 through which passes the upper end of pintle 24, as shown in Fig. 3. The interior of bearing element 40 has downwardly facing annular cam track portion 42 which when pintle 24 is in place encircles the pintle and is in opposing relation to cam track portion 35 of bearing element 30. Fig. 7 shows cam track portion 42 in developed form.

Cam track portion 42 has substantially the same shape as cam track portion 35 so that the two portions nest together with substantially full bearing when the two hinge parts are at rest position. Thus, cam track portion 42 has a high point 43 and a low point 44, as best shown in Fig. 7 with inclined lengths 45 and 46 between them. When at rest position, high point 36 of cam track portion 35 registers with high point 43 of cam track portion 42 and low point 37 of track portion 35 registers with low point 44 of track portion 42.

As the hinge parts are turned away from rest position, there is sliding action between a pair of engaged inclined lengths of the two cam track portions. Thus, when movable hinge part 18 swings in one direction there is sliding action between inclined lengths 39 and 45, and when the part swings in the opposite direction there is sliding action between inclined lengths 38 and 46. This action, of course, raises movable hinge part 18 with respect to stationary hinge part 17 and this rise is accommodated by relative movement between pintle 24 and bearing element 40. When door member 16 is released gravity is effective to provide reverse sliding action between engaged inclined lengths so that movable hinge part 18 returns to rest position.

Bearing element 40 is mounted on a bracket 50 (Fig. 3) by suitable means such as screw 51. A boss 52 on bearing element 40 extends through an aperture in bracket 50 to provide an additional connection between the element and the bracket.

Bracket 50 and associated bearing element 40 are mounted in door member 16 as shown in Figs. 1-3. It will be noted that movable hinge part 18 (comprising bracket 50 and bearing element 40) is disposed substantially within the bounding planes of the door member, thus presenting a neat appearance.

From the above description it is thought that the construction and advantages of my invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A gravity hinge for mounting a door member on

a frame member comprising a stationary hinge part and a movable hinge part, said stationary hinge part including a bracket adapted to be secured to said frame member, a hinge pintle on said bracket and a bearing element having an annular cam track portion encircling said pintle, said movable hinge part including a bearing element secured to said door member, said last bearing element having an aperture for said pintle and an annular cam track portion, the said cam track portions comprised of polymeric amide type material and having substantially identical contours whereby said track portions nest together with substantially full bearing when said door member is at rest position, said cam track portions each having diametrically opposite high and low points with symmetrical inclined lengths between said points, all transverse surface lines of said cam track portions having a right angular relationship with said pintle, there being sliding action with full transverse and helical bearing relationship between engaged inclined lengths during relative angular movement of said stationary and movable hinge parts.

2. A gravity hinge for mounting a door member on a frame member comprising a stationary hinge part and a movable hinge part, said stationary hinge part including a bracket adapted to be secured to said frame member, a bearing element carried by said bracket and having an annular cam track portion, said movable hinge part including a bearing element secured to said door member, said last bearing element having an annular cam track portion, a hinge pintle interconnecting said bearing elements and maintaining said cam track portions in axial alignment while permitting relative axial movement between said two bearing elements, said cam track portions each comprised of polymeric amide type material and having diametrically opposite high and low points with symmetrical inclined lengths between said points, all transverse surface lines of said cam track portions having a right angular relationship with said pintle, there being sliding action with full transverse and helical bearing relationship between engaged inclined lengths during relative angular movement of said stationary and movable hinge parts.

3. A return type hinge comprising a first hinge part and a second hinge part, said first hinge part including a bearing element having an annular cam track portion, said second hinge part including a bearing element having an annular cam track portion, both cam track portions comprised of polymeric amide type material, means maintaining said cam track portions in axial alignment while permitting relative axial movement therebetween, said cam track portions each having diametrically opposite high and low points with symmetrical inclined lengths between said points, all transverse surface lines of said cam track portions having a right angular relationship with the axes of said annular cam track portions, there being sliding action with full transverse and helical bearing relationship between engaged inclined lengths during relative angular movement of said first and second hinge parts.

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