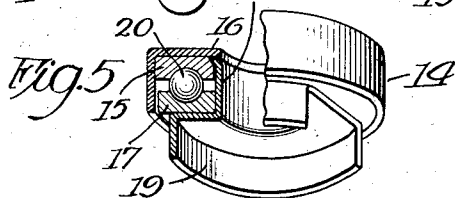
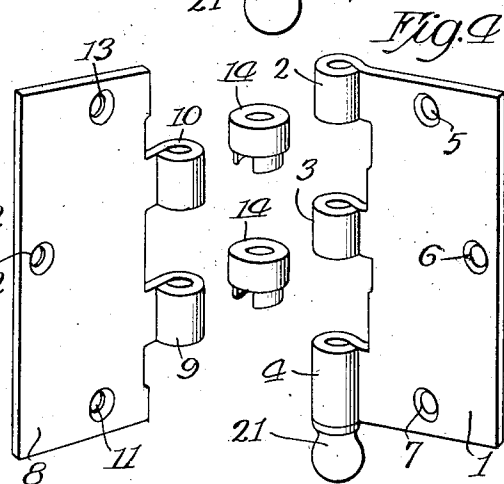
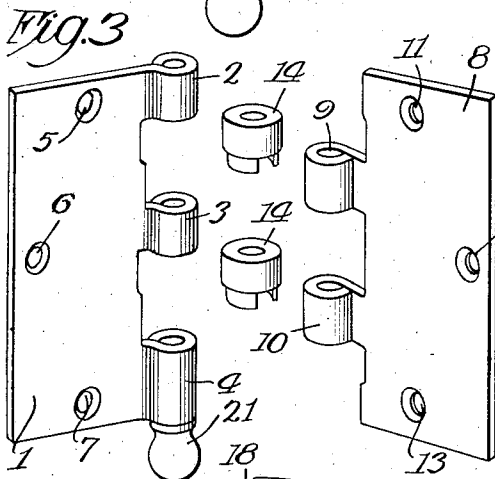
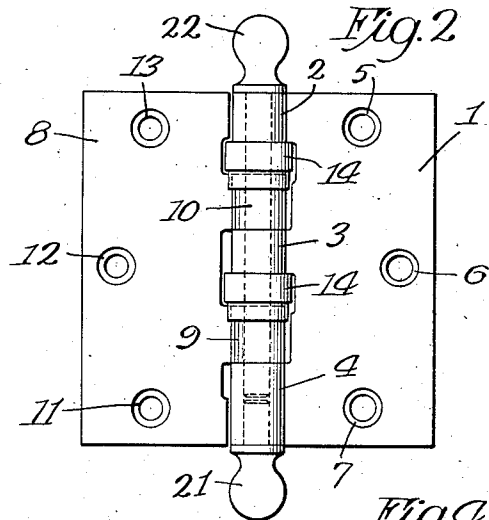
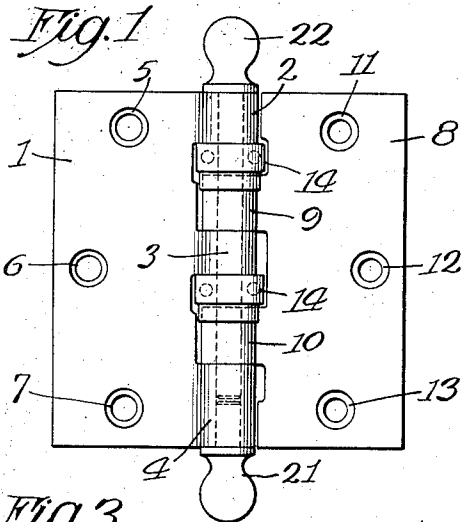
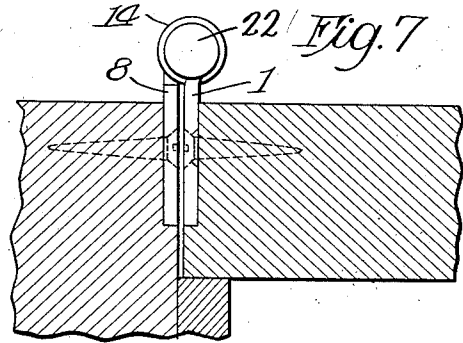
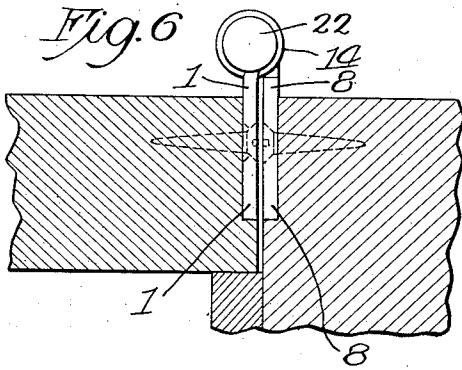


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BALL BEARING HINGE
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BALL BEARING HINGE

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5 Claims. (Cl. 16—136)

This invention relates to hinges, and more particularly to door hinges having ball bearings.

Generally stated, the object of the invention is to provide a novel and improved construction whereby a plurality of ball bearings, one above another, are insured for the hinge, regardless of whether the hinge is used on a right or left door.

It is also an object to provide certain details and features of construction tending to increase the efficiency and desirability of a ball bearing hinge of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawing, in which—

Fig. 1 is a front elevation of a hinge embodying the principle of the invention, showing the same in condition for a so-called left-hand door.

Fig. 2 is a similar view showing the hinge in condition for use on a right-hand door.

Fig. 3 is a perspective showing the parts of the hinge separated, and ready to be assembled together in the manner shown in Fig. 1.

Fig. 4 is a similar perspective view showing the parts for assembly as shown in Fig. 2.

Fig. 5 is an enlarged perspective view of one of the ball bearings, one of the so-called units, with certain portions thereof in section.

Fig. 6 is a horizontal section or diagram showing the operation of the hinge on a left-hand door.

Fig. 7 is a similar diagrammatic view showing the hinge on a right-hand door.

As thus illustrated, the invention comprises a hinge leaf 1 having three knuckles 2, 3 and 4, and having three screw holes 5, 6 and 7 which are countersunk on both sides of the plate, so that either side may be secured to the edge of a door, depending upon whether the latter is a right or a left-hand door.

The leaf 8 has two knuckles 9 and 10 and has screw holes 11, 12 and 13 which need to be countersunk on one side only, as this leaf is always received by the door frame. This leaf 8 is turned one way, as shown in Fig. 1 and Fig. 3, for the left-hand door shown in Fig. 6, and is then turned upside down, as shown in Fig. 2 and Fig. 4, for the right-hand door shown in Fig. 7. The ball units 14 and 14 are duplicates, and are each constructed as shown in Fig. 5. The upper ball race 15 is rigid with the sheet metal cap 16, and the lower ball race 17 is rigid with a sheet metal member that has a portion 18 that extends into swivel or loose engagement with the race 15, and

which has a larger portion 19 that fits over one of the knuckles 9, as shown. The balls 20 are disposed between the two races. The units 14 are then shaped or formed to engage either end of a knuckle 9, depending upon which end of the leaf 8 is uppermost. Thus the ball units 14 are removable and replaceable, and the hinge always affords two ball bearings to sustain the weight of the door. The weight is always on the caps 16, and hence there are always a plurality of ball units, one above another, to support the weight of the door. The leaf 1 is always right side up, with the knob 21 at the bottom, but the leaf 8 is one way or the other, depending upon whether the door is a right or left.

The pivotal or hinge pin 22 is adapted to extend down through the knuckles and ball bearings in either condition of the hinge. The door 23 in Fig. 6 is called a left because it opens or swings out to the left, while the door 24 in Fig. 7 is called a right because it opens to the right.

From the foregoing, it will be seen that the two ball units 14 are always right side up, with their notched flanges 19 at the bottom. Also, it will be seen that in either condition of the hinge, for a right or a left door, these ball units are each on one of the knuckles 9 and 10, whereby each of these two units is transferable to one or the other of these two knuckles, when the hinge is changed from a right to a left door. Again, it will be seen that the two knuckles 3 and 9, or 3 and 10, depending upon the condition of the hinge, are always between the two ball units, so that the latter are always separated by two knuckles on different leaves of the hinge.

Also, from the foregoing, it will be seen that the construction involves leaves having inter-fitting knuckles, with the leaf 8 having its upper and lower ends reversible for right and left doors but keeping the same surface outward, and the other leaf 1 having its surfaces reversible but always keeping the same end downward, whereby the ball bearing units are always each carried by a different knuckle and are each always on the same knuckle for right and left doors but on different ends of the same knuckle.

It will be seen that the knuckles 2, 3, and 4 are on-center, with relation to their leaf 1, while the knuckles 9 and 10 are off-center, relatively to their leaf 8, whereby the latter is adapted to close tightly against either side of the leaf 1, as shown in Figs. 6 and 7 of the drawing.

Thus one leaf of the hinge has two off-center knuckles, 9 and 10, while the other leaf has three on-center knuckles, 2, 3 and 4, the on-center leaf

having one surface engageable with a right door, and the other surface with a left door, tending not only to simplify and render the installation of hinges of this kind more satisfactory in actual use, but also to solve the problem of manufacture more satisfactorily.

What I claim as my invention is:

1. A door hinge comprising leaves having inter-fitting knuckles, with one leaf having its upper and lower ends reversible for right and left doors, and a plurality of ball units for said knuckles, together with a pintle extending through the knuckles and units, the latter being engageable with either end of each knuckle of said reversible leaf, so that the weight of the door is on a plurality of ball bearings for either a right or a left door, one said ball unit comprising upper and lower ball races, with balls between them, a sheet metal cap rigid with the upper race, said cap having a horizontal wall extending between the upper ball race and the knuckle, and having a cylindrical flange extending downwardly around the lower ball race as well as the upper ball race, and a sheet metal member rigid with the lower race and having means connecting the latter with the upper race, said member having a portion to fit over the knuckle of the reversible leaf.

2. A door hinge comprising leaves having inter-fitting knuckles, with one leaf having its upper and lower ends reversible for right and left doors, but keeping the same surface outward, and the other leaf having its two surfaces reversible but always keeping the same end downward, and a plurality of ball units for said knuckles, together with a pintle extending through the knuckles and units, the latter being engageable with and disengageable from either end of each knuckle of said end for end reversible leaf, so that the weight of the door is on a plurality of ball bearings for either a right or a left door, means for fastening said leaf having reversible surfaces to the door, and means for fastening the leaf having reversible ends to the doorway.

3. A structure as specified in claim 2, said end for end reversible leaf having screw holes that

are countersunk on one side only of the leaf, so that the other side may always engage the door frame, each leaf having a knuckle that is between the two ball units, in either condition of the hinge, whereby there are always two knuckles between the units, the other leaf having screw holes that are countersunk on both sides of the leaf, whereby either side of this other leaf may be secured to the door, and the knuckles and units all fitting tightly together, in either right or left use of the hinge, so that the door can be removed only by withdrawing said pintle, which latter is insertable in either end of said reversible leaf.

4. A structure as specified in claim 2, one said ball unit comprising upper and lower ball races, with balls between them, a sheet metal cap rigid with the upper race, said cap having a horizontal wall extending between the upper ball race and the knuckle, and having a cylindrical flange extending downwardly around the lower ball race as well as the upper ball race, and a sheet metal member rigid with the lower race and having means connecting the latter with the upper race, said member having a portion to fit over the knuckle of the reversible leaf.

5. A door hinge comprising leaves having inter-fitting knuckles, adjustable in different relations for right and left doors, there being two off-center knuckles on one leaf and three on-center knuckles on the other, ball units on the top of each of the two knuckles, with the middle and upper knuckles of the other leaf resting on said units, whereby the similar units are carried by as many different knuckles and each unit is always on the same knuckle, for right and left doors, the on-center leaf having one surface engageable with a right door and the other surface with a left door, said ball units having sockets that are engageable with and detachable from their respective knuckles, the sockets always facing downward, and the leaf of the latter being reversible end for end, for right or left doors, whereby the weight of the door is always on a plurality of ball units.

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