June 8, 1937. S. BRANTINGSON 2,083,140

HINGE CONSTRUCTION

Filed May 31, 1935

Fig. 1.

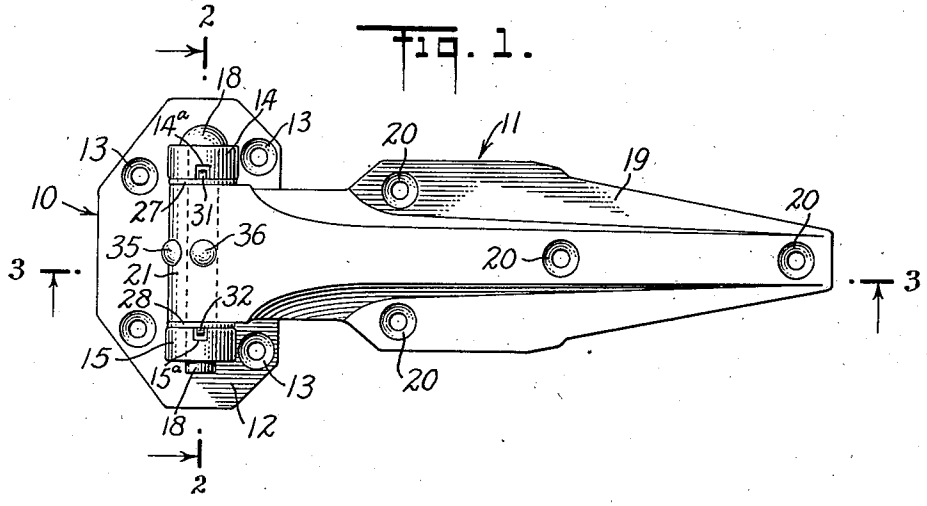


Fig. 3.

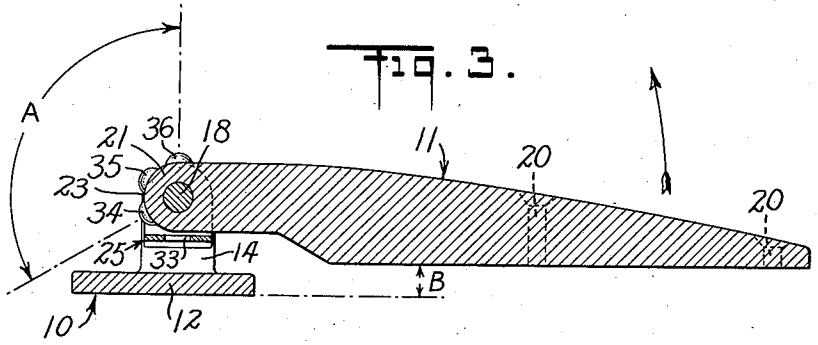


Fig. 2.

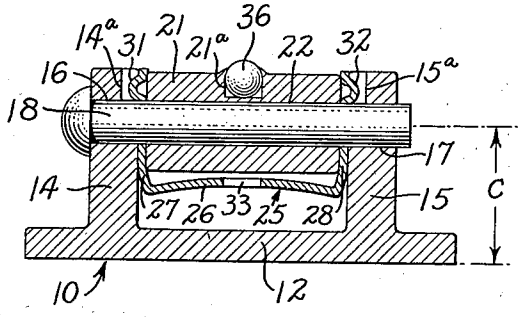
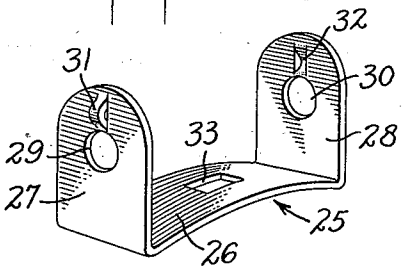


Fig. 4.



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HINGE CONSTRUCTION

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6 Claims. (Cl. 16—140)

This invention relates to hinge construction. One of the objects of this invention is to provide a simple, practical and inexpensive hinge construction which will dependably and safely decelerate the swinging movement of one of the parts to which it is connected, such as a door, when swung in opening direction, and safely guard against such over-swinging as tends, in heretofore known constructions, to loosen, injure, or destroy the connection of the relatively fixed portion of the hinge to the other or non-swinging part. Another object is to provide a hinge construction of the above-mentioned character which will be compact in construction and arrangement, neat in appearance, and of thoroughly dependable action. Another object is to provide a practical and inexpensive construction for dependably limiting the relative swinging movement between the two parts of the hinge. Another object is to provide a hinge construction of the above-mentioned character whose individual parts are of inexpensive construction and manufacture and which parts may be speedily and inexpensively assembled. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown a preferred embodiment of my invention,

Figure 1 is a plan view of the assembled hinge construction;

Figure 2 is a vertical sectional view as seen along the line 2—2 of Figure 1;

Figure 3 is a longitudinal central sectional view as seen along the line 3—3 of Figure 1, and

Figure 4 is a perspective view on an enlarged scale of one of the parts of the hinge construction.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring to the drawing, and more particularly to Figures 1, 2 and 3, there are generally indicated at 10 and 11 the two parts of the hinge that are to be secured respectively to a fixed member, such as the doorframe, and the swinging or movable member, such as a door. The part 10 comprises a flat base plate 12 provided with suitable holes 13 for the reception of screws, bolts, or other suitable means for securing the part 10 to the fixed member or doorframe, and upstanding therefrom and suitably spaced from each other are two posts 14 and 15, preferably integrally formed with the base plate 12 and provided with alined holes 16—17 for the reception of a hinge pin or pintle 18.

The part 11 of the hinge has a plate-like portion 19 provided with suitable holes 20 whereby it may be secured as by screws, bolts, or other suitable fastening means, to the swinging member or door. The hinge part 11, at its left-hand end, as viewed in Figures 1 and 3, is shaped to provide a portion 21 of a width approximating the spacing between the upstanding posts 14—15, to be received therebetween, and portion 21 is provided with a hole 22 for the reception of the hinge pin 18, whereby the parts 10 and 11 are pivotally connected.

The portion 21, as is better shown in Figure 3, is, in cross-section, preferably of substantial thickness and is curved as at 23 throughout an arc, whose center is at the axis of the hinge pin 18, of suitable extent, illustratively as is indicated in Figure 3 to subtend an angle on the order of that indicated at A.

The member 11 is preferably a casting and it may be given any suitable or desired attractive or decorative configuration, such as that shown in the drawing, whereby the part 21 merges into the plate-like part 19 thereof.

In Figures 1, 2 and 3, the hinge parts are shown in the relative positions they occupy when the door and hence the hinge are in "closed" position, and usually the hinge construction has to provide for a certain offset, indicated at B in Figure 3, between the planes or faces of the parts 12 and 19 that are to be secured to the doorframe and door respectively to compensate for the offset that exists between the planes of the latter parts themselves. The extent or degree of offset between the faces of doorframes and doors varies widely and accordingly, to meet these varying conditions, it is usual to provide a number of parts 10, corresponding to the number of different offsets to be coped with, these parts 10 having posts 14—15 of different heights so that the dimension C (Figure 2) is different for each part 10 and so that, when the said member 11 is related to these differently dimensioned parts, the offset B (Figure 3) is different for each resultant hinge. Or other provision for changing the dimension C may be made to meet the condition for a different offset B (Figure 3).

Now according to my invention, I provide a dependable and highly convenient means for

achieving deceleration of the swinging door, or the like, or for achieving a limiting of the extreme opening movement of the door, capable of functioning properly and appropriately no matter what change is made in the dimension C (Figure 2) to cope with changes in the offset B (Figure 3), and thereby I am enabled to achieve important and substantial advantages in the manufacture of hinges of this character or type.

Accordingly, and bearing in mind the above described shape or configuration of the portion 21 of the hinge part 11 as is better shown in Figure 3, I provide a device generally indicated at 25 shaped as is better shown in Figure 4. Device 25 is substantially U-shaped; it has a base portion 26 with upstanding side arms 27 and 28, the latter being spaced apart so as to be snugly received between the upstanding posts 14—15 (see Figures 1 and 2). Moreover, side arm portions 27—28 are apertured as at 29 and 30, respectively (Figure 4), these apertures being dimensioned so as snugly to receive the pintle 18 and being spaced downwardly from the upper ends of the side arms 27 and 28 by the same distance that the holes 16 and 17 (Figure 2) are spaced downwardly from the upper ends of the posts 14 and 15, respectively. Moreover, the parts 27 and 28 are curved or shaped so that, when they become alined with and alongside of the posts 14 and 15, respectively, the former mate exteriorly with the latter and appear as a result unobtrusive and virtually as a part of the latter.

The member 25 (Figure 4) is made of a relatively heavy sheet metal, preferably of a springy material, such as spring steel, spring bronze, or the like, of suitable hardness. Preferably, I employ spring steel which, with its temper drawn, may be relatively easily worked to give the member 25 the configuration and shape shown in Figure 4, after which it may be appropriately heated, heat-treated, or the like, to restore or to give it the desired resiliency.

Immediately above the apertures 29 and 30 (Figure 4) in the upstanding arms 27 and 28, the metal of the latter is stamped or pressed outwardly, as at 31 and 32, respectively, thereby forming substantial integral and strong lugs on the outer faces of the members 27 and 28. Now the upstanding posts 14 and 15 of the hinge part 10 (see Figures 1 and 2) are provided, on their inside faces and above the holes 16 and 17, with vertically extending slots 14a and 15a, respectively; these slots 14a and 15a are dimensioned to receive the projecting lugs 31 and 32 of the device 25 when the latter, prior to assembly of the hinge part 11 and pintle 18 to the hinge part 10, is interposed between the posts 14 and 15 by sliding it downwardly, as viewed in Figures 2 and 3, in between the upstanding posts 14 and 15.

The end portion 21 of the hinge part 11, furthermore, is given a width, as viewed in Figure 2, and hence a dimension along the axis of the hole 22 therein, such that it is snugly received in between the upstanding arm portions 27 and 28 of the device 25, and if the holes 16, 29, 22, 30 and 17 are now alined and the hinge pin 18 thrust therethrough, the parts 10, 25 and 11 become reliably assembled. Hinge part 11 may freely pivot about the axis of the pintle 18 and hence relative to the hinge part 10, but the interfitting of the lugs 31 and 32 with the slots 14a and 15a, respectively, coupled with the fact that the hinge pintle 18 passes through both parts 10 and 25, insures that the latter part 25 cannot pivot about the axis of the pintle 18 and becomes very securely anchored immovably to the part 10. The device 25 may thus be interfitted with hinge construction even though the hinge parts 10 thereof, particularly as to the dimension C of Figure 2, are different.

Now the horizontal base portion 26 (Figures 2 and 4) of the device 25 will be seen to be bowed upwardly to a suitable degree and, being inherently resilient or yielding, tends always to return to this upwardly bowed position or shape as shown in Figures 2 and 4. Substantially centrally thereof, the base portion 26 is provided with a recess conveniently taking the form of an aperture 33, for coaction with other parts about to be described.

At a suitable number, illustratively (but not by way of limitation) three, of points in the arcuate part 23 of the portion 21 (see Figure 3) and midway of the portion 21 (see Figures 1 and 2) are projections which preferably take the form of hardened steel balls 34, 35 and 36. The latter are secured to the portion 21 of the hinge part 11 in any suitable manner, illustratively and preferably as shown in Figure 2, where the mounting of ball 36 is clearly shown. It will be noted that ball 36 is seated in a hole 21a formed or drilled radially into the portion 21 to a depth slightly greater than the radius of the ball 36, leaving a substantial portion less than half of the ball 36 projecting from the member 21. The metal about the outer end of the hole 21a is then forced, in any suitable manner, inwardly against and about the ball 36 whereby the latter is held against coming out of the recess or hole.

Now the plane of the highest portion of the bowed base portion 26 of the member 25 (see Figures 2, 3 and 4) is spaced from the axis of the pintle 18 by a distance which is slightly greater than the radius of curvature of the arcuate surface 23 (Figure 3) of the hinge portion 21 but less than the radius drawn from the axis of the pintle 18 to the outermost part of any one of the balls 34, 35, etc., the balls being, of course, as is now clear, positioned in an arc of a circle whose center is the axis of the pintle 18.

Accordingly, and viewing more particularly Figure 3, as the door is swung in opening direction and hence to swing the hinge part 11 in counterclockwise direction, as viewed in Figure 3, relative freedom of swinging takes place throughout an angle approximating 90 degrees, by which time ball 34 bears against the upwardly bowed base portion 26 and has to distort the latter toward a straight line or unbowed relation; since the device 25 is relatively powerful, a certain amount of energy of the swing of the door is consumed, in tending to unbow the member 25. But the reactions resulting from this unbowing of the portion 26 are taken up in or by the pintle 18 itself or in or by the hinge construction per se, being transmitted thereto by the side arm portions 27, 28.

The door continues to swing and the ball 34 snaps into the recess 33 and, if the energy of swing of the door has been dissipated, the door is held in that position.

If, however, the deceleration of the door has not proceeded sufficiently far in this first step, the door will continue to swing, snapping the ball 34 out of the recess 33, thereby again tending to unbow the device 25 but as the ball 34 continues to move about the axis of the pintle 34 and hence to move away from the base portion 26 of the device 25, the next ball, namely ball 35, is brought

into engagement with the device **25** whose stiff resiliency it has to overcome, thus further dissipating the energy of swing of the door and thus achieving the next stage of deceleration.

By the time ball **35** is juxtaposed to the recess **33**, the base portion **26** snaps upwardly and ball **35** finds its seat in the recess **33**, thus holding the door in that position if by that time the energy of swing of the door has been completely dissipated. If not, ball **35** is moved out of the recess **33**, just as was ball **34** as above described, and ball **36** comes into coaction with the part **26**, just as had ball **35** as just described.

Also, the side arm portions **27** and **28** (Figures 1, 2 and 4) of the device **25**, being preferably made integrally with the base portion **26** and hence being preferably made of the same metal as the latter, are thus of excellent wear-resisting qualities and, being non-rotatively related to the hinge part **10**, they dependably protect the posts **14** and **15** of the latter against wear due to the swinging relative thereto of the hinge part **11**.

Furthermore, it will be seen that the construction lends itself to rapid disassembly for replacement or repair of any part.

It will thus be seen that there has been provided in this invention a hinge construction in which the various objects hereinbefore noted, together with numerous practical advantages, are successfully achieved, and that the construction is well adapted to meet the varying conditions of hard practical use.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In hinge construction, in combination, a hinge part having a base plate adapted to be secured to a wall or the like and having upstanding therefrom two spaced apertured posts for the reception of a pintle, each of said posts having a slot on its inside face, a U-shaped member having apertured side arm portions joined by a yielding base portion, said side arm portions being spaced so as to be received each adjacent one of said upstanding posts with the yielding base portion extending substantially parallel to said base plate, said side arm portions having lateral projections each received in one of said slots, a companion hinge member having an apertured portion receivable between said side arm portions, and a pintle extending through the apertures in said upstanding posts, said side arm portions, and said portion of said companion hinge member, and said last-mentioned portion having projecting means which engage said base portion and stress the latter as said companion hinge members swings relative to said hinge part.

2. A hinge construction as claimed in claim 1 in which said yielding base portion is provided with a recess with which said projecting means coacts as said companion hinge member swings.

3. In a hinge construction, in combination, two hinge parts pivotally connected by an axis pin, one of said parts having a recess and the other part having a protrusion, and a device having a part that is apertured to receive said axis pin therethrough and having also a projecting part receivable into said recess, said projecting part coacting with the walls of said recess to hold said device against rotation about the axis of said axis pin, said device having a third part that is resilient and that is positioned in the path of movement of said protrusion.

4. In hinge construction, in combination, a hinge member comprising a base plate adapted to be secured to a wall or the like and having upstanding therefrom two spaced apertured posts for the reception therethrough of a pintle, a U-shaped sheet metal member having its side arms apertured and received between said upstanding posts with its base portion extending between said posts, a companion hinge member having an apertured portion that is received between said side arms, a pintle passing through the apertures in said two hinge parts and in said side arms, said companion hinge member having means brought into engagement with said base portion of said sheet metal member as said companion hinge member swings, and means holding said sheet metal member against rotation with respect to said first-mentioned hinge part.

5. A hinge construction as claimed in claim 4 in which the means for holding the sheet metal member against rotation relative to the first-mentioned hinge part comprises interfitting portions of said sheet metal member and said first-mentioned hinge part.

6. In hinge construction, in combination, a hinge part adapted to be secured to a wall or the like and supporting a hinge pin, a companion hinge member swingable about said hinge pin and having a protrusion which moves about the axis of the hinge pin as said companion hinge member swings thereabout, a non-rotatable part positioned in the path of movement of said protrusion, means forming a non-rotatable and detachable connection between said non-rotating part and said hinge part whereby the former is prevented from rotating relative to the latter, and means supporting said non-rotatable part from said hinge pin whereby the latter takes up the stresses caused by the engagement of said protrusion with said part and for holding said connection-forming means against detachment.

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