July 2, 1968 R. E. FOLTZ 3,390,420

HINGE KNUCKLE AND PINTLE ARRANGEMENT FOR A DOOR HINGE

Filed Nov. 5, 1965

Fig. 1.

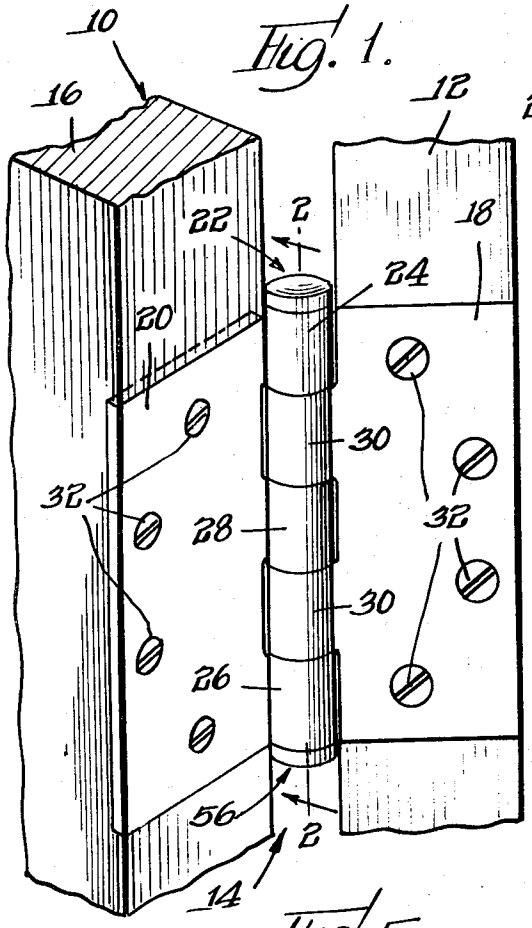


Fig. 2.

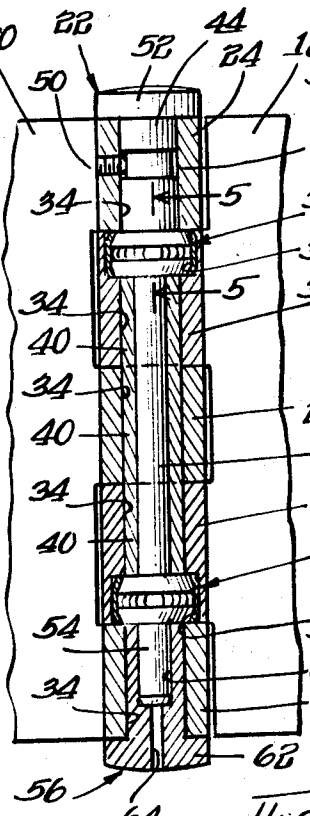


Fig. 3.

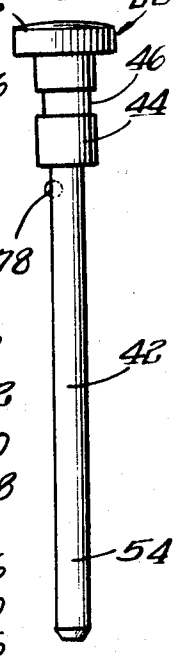


Fig. 4

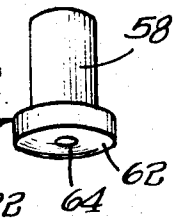


Fig. 5.

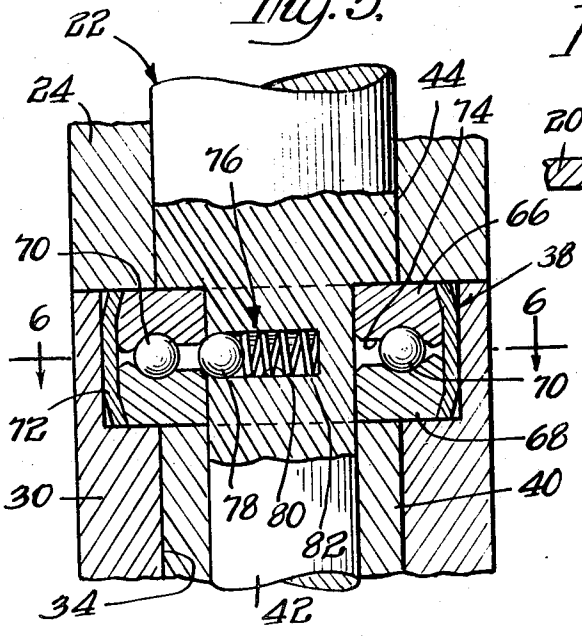
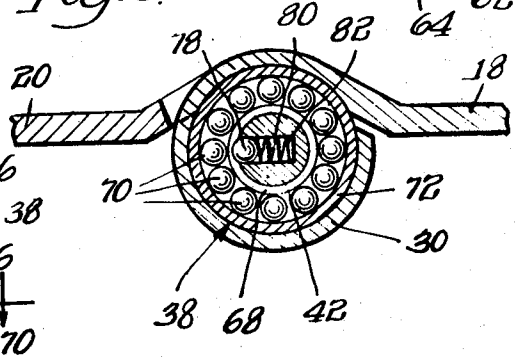


Fig. 6.



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HINGE KNUCKLE AND PINTLE ARRANGEMENT FOR A DOOR HINGE

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ABSTRACT OF THE DISCLOSURE

A butt hinge having sleeve bearings in the medial knuckles and having pintle means and an end element of radially enlarged dimension to fill substantially the bores in the corresponding end knuckles. Additionally, ball bearing units are situated at the opposite ends of the sleeve bearing assemblage, one of the ball bearing units having an inwardly opening groove and the pintle means having a radial detent for coacting lockably with the groove.

This invention relates generally to door hardware and more particularly to butt hinges of the lubricated bearing type.

Heretofore, butt hinges for supporting doors subjected to frequent operation have been equipped with ball bearings; and frequently, oil-impregnated sintered bronze sleeve bearings have also been incorporated in such hinges.

A general object of the invention is to provide a new and improved butt hinge of the lubricated bearing type.

Another general object of the invention is to provide a butt hinge of the lubricated bearing type which is economical to manufacture and dependable to use.

These and other objects and features of the invention will become more apparent from a consideration of the following descriptions.

A butt hinge in accord with the invention includes cooperating hinge leaves having interfitting end and medial knuckles, all of which have bores of substantially the same diameter. Certain of the medial knuckles are recessed to receive ball bearing units whereas sleeve bearings are disposed in the medial knuckles between the ball bearing units. A hinge pintle and an end element are assembled to the leaves, and each of these latter elements is fashioned with a portion which is sized substantially to fill the bore of one of the end knuckles.

In order that the principles of the invention may be readily understood, a single embodiment thereof, but to which the application is not to be restricted, is shown in the accompanying drawing wherein:

FIG. 1 is a perspective view of a door installation incorporating a butt hinge constructed in compliance with the invention;

FIG. 2 is an enlarged view taken substantially along the section 2—2 of FIG. 1;

FIG. 3 is an elevational view of the pintle used in the hinge of FIGS. 1 and 2;

FIG. 4 is a perspective view of the end element used in conjunction with the pintle of FIG. 3;

FIG. 5 is an enlarged, sectional view taken substantially along the line 5—5 of FIG. 2 to show the pintle retention means; and

FIG. 6 is a reduced scale view taken substantially along the line 6—6 of FIG. 5.

Referring now in detail to the drawing, specifically to FIG. 1, a door installation indicated generally by the numeral 10 includes a side jamb 12 and a butt hinge 14 which is used in mounting a door 16 to the jamb. The butt hinge 14 is of the inserted bearing type and, in accordance with conventional practice, comprises a pair of hinge leaves 18 and 20 which are swingably interconnected by means of a hinge pintle 22. Leaf 20 is provided with an upper end knuckle 24, a lower end knuckle 26 and a medial hinge knuckle 28. These knuckles are spaced apart axially, and leaf 18 is fashioned with a pair of medial hinge knuckles 30 which are received in the spaces between the knuckles 24, 26 and 28. All of the knuckles in hinge 14 have aligned bores of substantially the same diameter whereby to permit fabrication of the hinge leaves and their integral knuckles by conventional processes. The leaves 18 and 20 are perforated with fastener-passing apertures whereby to permit mounting of the leaves to the jamb 12 and the door 16 using flat headed wood screws 32 or other suitable fasteners. While the hinge 14 is shown as incorporating five knuckles, other numbers of knuckles may be employed.

Turning now to a consideration of FIG. 2, the knuckles 24, 26, 28 and 30 are shown to be provided with bores 34 which have substantially the same diameter; and upon interfitting assembly of the several hinge knuckles, the respective bores 34 define a cylindrical channel. In addition, the medial knuckles 30 are fashioned with recesses 36 which are shaped to receive ball bearing units 38. The recesses 36 axially confront the end knuckles 24 and 26 respectively so as to space the ball bearing units 38 and develop maximum thrust support. The ball bearing units may be located in the end knuckles if desired. Furthermore, the receiving knuckles may be arranged to expose the ball bearing units externally. In order to provide additional bearing action and in order to establish a reservoir for lubricant, porous sleeve bearings 40 are situated in the medial knuckles 28 and 30 between the ball bearing units 38. Advantageously, these sleeve bearings are impregnated with lubricating oil and are conveniently fabricated from sintered bronze, although other bearing materials, such as for example graphited nylon, may be used.

The hinge pintle 22 is assembled to the leaves 18 and 20 at the aligned bores 34; and the hinge pintle includes an elongate stem 42 which is slidably and rotatably received in the ball bearing units 38 and in the sleeve bearings 40. In addition, the hinge pintle 22 comprises a plug portion 44 which is connected to the stem 42 and which is sized substantially to fill the bore 34 in end knuckle 24, thus eliminating the need for a sleeve bearing in that knuckle while concomitantly avoiding the need for any special fabrication of the end knuckle. The plug portion 44 may be provided with an annular, peripheral groove 46 to cooperate with a set screw 50 where it is desired to have maximum security in the positioning of the hinge pintle with respect to the hinge knuckles. At its upper end, the hinge pintle is provided with a conventional button or headed tip 52, and the stem 42 of the pintle includes an inner end portion 54 which is adapted to extend partially into the bore of lower end knuckle 26.

An end element 56 is also assembled with the leaves 18 and 20 and the hinge 22. Structurally, the end element 56 includes an abbreviated stem 58 which is sized substantially to fill the bore 34 of lower end knuckle 26, and the abbreviated stem 58 is itself fashioned with a bore 60 that slidably receives the inner end portion 54 of stem 42. Accordingly, end element 56 eliminates both the need for special fabrication of lower end knuckle 26 and the need for a sleeve bearing in that unit. Moreover, the interfitting relationship between the inner end portion of the hinge pintle and the abbreviated stem of the end element provides alignment for the stem of the hinge pintle, tending thereby to balance thrust loads imposed on the butt hinge by the swing operation of door 16. The end element 56, is, in addition, formed to include a button or headed tip 62 which matches the button 52. A bore 64 is provided in the end element 56 opening through the button 62 and into the bore 60. Bore 64 therefore is capable of admitting a punch or nail into forcible engagement with the lower end of the stem 42 in order to permit forcible

extraction of the hinge pintle from the aligned hinge knuckles.

Turning now to a consideration of FIGS. 5 and 6, a ball bearing unit **38** is shown to comprise an upper race **66** and a lower race **68** which are fabricated from suitably hardened steel. Alloy steel balls **70** are situated between the races **66** and **68**, and an annular shell **72** surrounds the two races, holding them in position relative to each other. In addition, the races **66** and **68** are spaced apart axially to define an annular, inwardly opening groove **74**; and this groove is arranged to cooperate with a detent unit **76**. The detent unit **76** specifically comprises a ball **78** that is received in a radial bore **80** formed in the stem **42** of the hinge pintle. The lip of this bore is somewhat constricted to retain the ball generally within the confines of the pintle stem while a compression spring **82** is situated inwardly of the ball **78** to urge the ball generally outwardly so that its exposed portion fits lockably in the groove **74**. Thus, the spring-biased ball **78** tends to hold the pintle **22** in axial position relative to the hinge knuckles while the resiliency of the spring **82** permits the ball **78** to be pushed inwardly for facility in extraction of the pintle. The aforesaid arrangement of the ball bearing unit and the detent unit is of particular advantage where an easily grooved sleeve bearing is absent, such as is the case with end knuckles **24** and **26**.

Operation of the butt hinge **14** will be apparent from the foregoing descriptions.

The specific example herein shown and described is to be considered as being primarily illustrative. Various changes in structure will, no doubt, occur to those skilled in the art; and such changes are to be understood as

forming a part of this invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A butt hinge including a pair of cooperating hinge leaves having interfitting end and medial knuckle structures, said knuckle structures having aligned bores, hinge pintle means including an elongate headed stem telescopically associated with said knuckle structures, an extremity of the medial knuckle structure having a bearing accommodating recess, and anti-friction thrust bearing means fitted within said recess, said thrust bearing including a plurality of balls within retainer means providing a peripheral annular groove, a spring actuated element associated with said stem and coactible with the groove of said anti-friction bearing means to prevent unauthorized removal of the pintle stem.

2. A butt hinge as set forth in claim **1** wherein the opposite axial extremities of the medial knuckle structure are recessed and anti-friction bearing means is fitted within each of said recesses.

References Cited

UNITED STATES PATENTS

2,742,663	4/1956	Meadows	16—46
2,772,441	12/1956	Riser	16—169
2,997,734	8/1961	Dyer	16—169
1,618,244	2/1927	McKinney	16—168

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