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S. B. COOK ET AL

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HINGE

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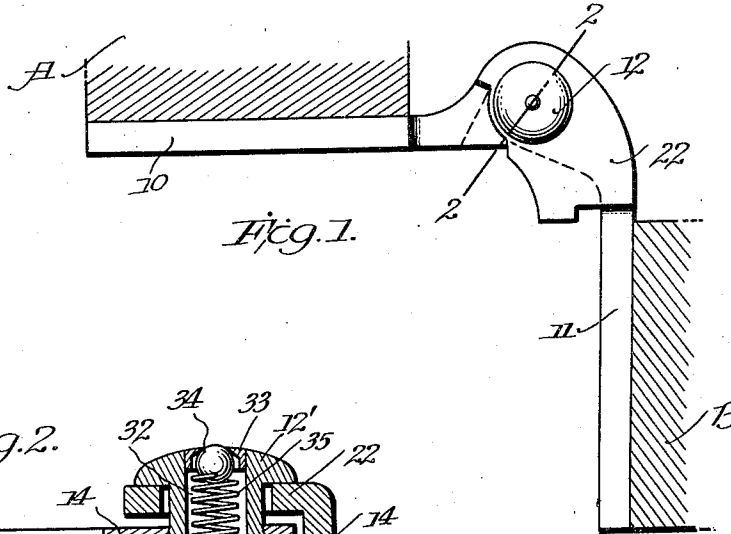


Fig. 1.

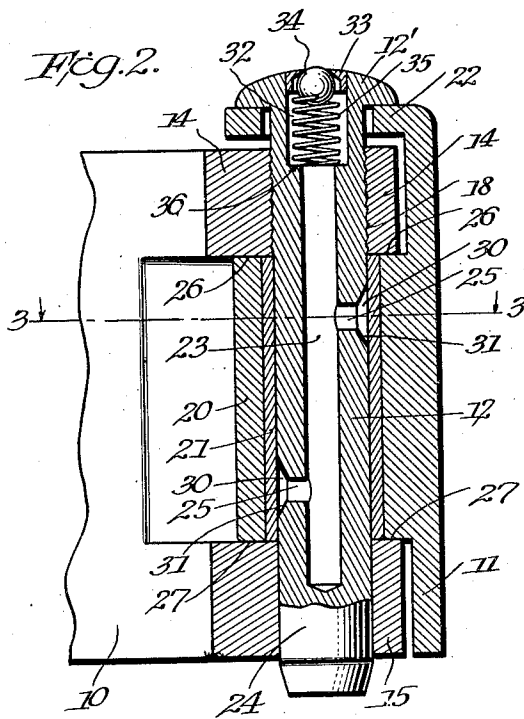


Fig. 2.

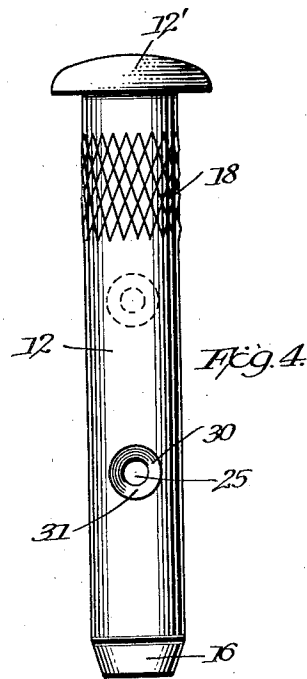


Fig. 4.

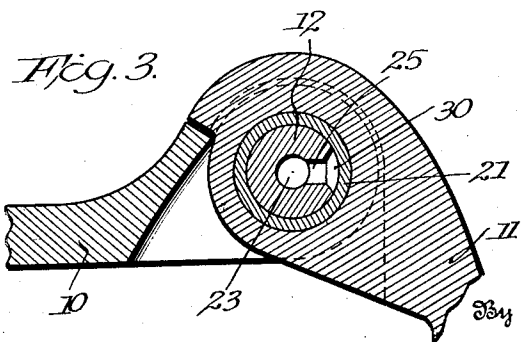


Fig. 3.

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UNITED STATES PATENT OFFICE

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HINGE

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Application April 30, 1934, Serial No. 723,266

1 Claim. (Cl. 16—161)

This application is a continuation in part of application, Serial No. 653,234, filed January 24, 1933.

The present invention relates to hinges of the type in which a pair of hinge plates are pivoted for movement with respect to one another by means of a pintle. An object of the invention is to provide a hinge of this character which is self-lubricating.

10 Another object of the invention is to provide a hinge which may be provided internally with lubricant, thus eliminating the necessity for lubricating the hinge from the outside.

15 A further object of the invention is to provide a self-lubricating hinge in which the lubricated areas are isolated from the outside of the hinge, in order to preclude the possibility of leakage of lubricant from the inside to the outside of the hinge.

20 Another object of the invention is to provide a hinge which will not gather dust and dirt, and in which means are provided to prevent dust and dirt from coming into contact with the lubricant.

In the drawing, which is illustrative of one form of the invention, and in which like numerals refer to like parts throughout the several views:

25 Figure 1 is a top plan view of the hinge, showing the same attached to a frame member and a door member;

30 Figure 2 is a vertical sectional view along the line 2—2 of Figure 1, showing the construction of the pintle and its disposition with respect to the hinge plates;

35 Figure 3 is a horizontal sectional view of the hinge plates and pintle taken along the line 3—3 of Figure 2; and

Figure 4 is a view of the pintle.

In Figure 1, the hinge is shown as comprising a frame plate 10, a door plate 11, and a pintle 12. The plate 10 is secured in any suitable manner, as by screws, to the frame A of the structure, and plate 11 is likewise secured to the movable member, such as a door B of the structure. The pintle 12 serves as a pivot for the ends of the hinge plates, in order that the door may be moved from closed to open position or vice versa. The door is shown in the open position in Figure 1.

In Figure 2, the hinge plate is disclosed provided with a pair of spaced knuckles 14 and 15, the interior cylindrical surface of said knuckles being of proper diameter to retain the pintle 12. That is, the inside diameters of the apertures of the knuckles 14 and 15 may be slightly less than the outside diameter of the cooperating parts of

the pintle 12, so that the latter will be securely held within the knuckles.

The pintle 12 is of substantially cylindrical shape, and is provided with a relatively flat shallow retaining head 12' at its upper end, and with a tapered portion 16 at its lower end. The tapered end portion facilitates the insertion of the pintle into the knuckles. The outer wall of the pintle comprises a plurality of areas, the areas where the pintle passes through the knuckles 14 and 15 serving to retain the pintle fixed with respect to plate 10, while the smooth area of the pintle between the inner ends of the knuckles 14 and 15 constitutes a journal area, as will be hereinafter described. In Figures 2 and 4, the outer wall of the pintle 12 is shown provided with a knurled cylindrical area or band 18, this knurled area or band being adjacent to but spaced a short distance below the head 12', so as to coincide with the knuckle 14. By knurled, I intend to include any roughened portion, or screw threaded portion, which will insure that the pintle will remain fixed with respect to the frame plate 10. While I have shown the knurled area as being on the outer wall of the pintle, obviously, a like result might be obtained by having the knurled area upon the inside cylindrical surface of the knuckle 14, and furthermore, the knurled area might be disposed at the lower end of the hinge either on the cylindrical area of the aperture in the knuckle 15, or on the outer wall of the pintle at the lower end thereof.

The door plate 11 has integral therewith a knuckle comprising a bearing sleeve 20 which is adapted to be placed in alignment with and between the spaced knuckles 14 and 15. The door plate is further provided with an apertured top plate 22 which extends over the top of the knuckle 14 and is engaged by the head 12' of the pintle 12 when the latter is inserted into the hinge. The sleeve 20 embraces the smooth area of pintle 12 when the same is inserted in position, and where the sleeve embraces the pintle, the former is provided with a bushing 21 of suitable material to reduce friction. The bushing 21 is of such diameter that although it closely embraces the pintle 12, yet, there is sufficient space between the pintle and the bushing to permit the formation of a lubricating oil film. It will be noted that the sleeve 20 is of greater length than the combined lengths of the knuckles 14 and 15, and thus it presents a greater internal cylindrical area where it embraces the pintle 12 than do the knuckles 14 and 15. Therefore, the pintle would tend to

move with sleeve 20 were it not fixed to the knuckles 14 and 15.

Extending longitudinally through the center of the pintle 12 is a bore 23 which constitutes a main lubricant receiving chamber. The bore 23 does not extend to the lower end of the pintle, but the pintle is solid for a substantial distance from its lower end as at 24 where it is retained by the knuckle 15. This construction is advantageous in that the pintle is not weakened at its lower end where it is held by the knuckle 15.

Extending radially and outwardly from the bore of the pintle to the outer wall thereof at spaced points are a number of feed openings 25 which serve as outlet passages to convey the lubricant from the bore 23 to the journal and bearing surfaces of the pintle and bearing sleeve, respectively. In Figure 2, a pair of these openings are shown at diametrically opposite sides of the pintle, and it will be noted that these openings are spaced apart longitudinally of the pintle rather than being diametrically aligned, in order to prevent material weakening of the pintle.

The feed openings are both within the bearing sleeve of the door plate, and one feed opening is shown placed near the upper end of the bearing sleeve, while the other feed opening is disposed adjacent the lower end of the bearing sleeve. By this arrangement, the lubricant is conveyed to the circular areas 26 and 27 between the outer ends of the bearing sleeve and the inner ends of the knuckles 14 and 15.

In order to assist the free flow of the lubricant from the bore 23 to the bearing surface, the outer ends of the feed openings 25 may be flared as at 30, said flared portions also serving as secondary lubricant receiving chambers, as will hereinafter be described. By reason of the flared ends of the feed openings, the lower surface of each opening has a downwardly extending portion 31 which will trap a quantity of lubricant and maintain the same at the bearing surface as will be hereinafter described. While we have shown only a pair of feed openings 25 with flared ends, obviously, any greater number of such openings could be utilized to maintain a greater quantity of lubricant at the bearing surfaces, or to increase the capacity of the main chamber 23.

At the upper end of the pintle, a counter-bore 32 is provided, said bore being concentric with the bore 23 but of slightly greater diameter. The upper end of the counter-bore 32 is closed by a retaining ring 33 which is centrally apertured to provide a valve seat for a ball valve 34. The ball valve is normally held upon its seat by the pressure of a spring 35, said spring being within the counter-bore 32 and supported at its lower end on the shoulder 36 where the counter-bore 32 merges into bore 23.

In use, the lubricant receiving chamber 23 of the pintle may be filled by inserting the end of an oil can into the aperture of the retaining ring 33 against the spring-pressed ball valve 34. If sufficient lubricant is permitted to enter, it will fill the chamber 23, and also the feed openings 25 and the secondary chambers provided by the flared ends 30 thereof. When the door member is moved, the bearing sleeve 20 with its bushing 21 will be rotated back and forth around the pintle 12, and this movement will draw the lubricant from the feed openings 25 and distribute the same over the bearing surfaces. It will thus be seen that the retaining of the pintle 12 fixed with respect to the knuckles 14 and 15 is extreme important, in that the bushing 21 will move past the

lubricant chambers 30 to draw lubricant from the same and distribute it over the bearing surfaces. In this connection, it will be noted that by reason of the position of the feed openings 25 adjacent the ends of the bearing sleeve 20, that the movement of the bearing sleeve will by capillary action draw the lubricant in between the horizontal surfaces 26 and 27 where the ends of the bearing sleeve abut the inner ends of the knuckles 14 and 15. However, by reason of the fact that the feed openings 25 are covered by the bearing sleeve and bushing, and not in alignment with the horizontal surfaces 26 and 27, there will be no tendency for the lubricant to leak to the outside of the hinge. In addition, because the pintle fits tightly within the knuckles 14 and 15, it will not be possible for any lubricant to flow between these knuckles and the pintle, and thus the lubricant is retained within the hinge. The importance of having the pintle fixed with respect to the knuckles 14 and 15 will be apparent in this connection, in that if movement were permitted between the pintle and these knuckles, lubricant would be drawn between them and to the outside of the hinge. This would be undesirable, in that lubricant would be wasted, necessitating more frequent filling of the chamber 23, and the hinge would attract dust and dirt and soil objects which came in contact with it.

After the hinge has been in use for some time and the level of the lubricant within the bore 23 falls below one or both of the feed openings 25, it will be evident that some of the lubricant will be retained within the secondary chambers formed by the flared ends 30 of the feed opening. Furthermore, as the lubricant within the secondary chambers is drawn into the bearing surfaces, it will be replenished by shocks and jars to the frame splashing lubricant from the chamber 23 up into the secondary chambers 30. This will occur particularly when the hinge is used, for instance, on the door of a vehicle.

When the level of the lubricant has fallen below one or both of the feed openings 25 and only a limited quantity of lubricant is fed through the valve 34, some of this lubricant running down the sides of the bore 23 will pass into the feed openings 25, and because the lower surfaces of said feed openings slant downwardly as by reason of being flared as at 30, a quantity of this lubricant will be retained in the secondary chambers 30 to lubricate the bearing. Thus, by providing the secondary lubricant receiving chambers, the hinge will function efficiently even when only a limited quantity of lubricant is fed into the bore 23, and when the level of the lubricant is below one or both of the feed passages 23.

Such departure from the construction here disclosed as amounts only to mechanical skill may be made without departing from the range of the invention.

We claim:—

In a hinge, a frame plate and a door plate, a pair of spaced aligned knuckles carried by said frame plate, a bearing sleeve having a lining of antifriction material carried by said door plate between and in alignment with said knuckles, the ends of said sleeve having moving engagement with the inner ends of said knuckles, and a pintle passing through said knuckles and said sleeve providing a pivot for said plates, said pintle having a knurled area to maintain it fixed with respect to said knuckles and said frame plate, and with a smooth area to serve as a journal for said bearing sleeve, a longitudinal lubricant receiving

bore extending throughout the major length of said pintle providing a main lubricant reservoir, and a plurality of axially spaced relatively small feed passages extending from said bore to the
5 outer wall of the pintle at said smooth area and between said knuckles to convey lubricant from said bore to the bearing surfaces, said feed passages being flared at their outer ends to provide auxiliary lubricant reservoirs at the journal sur-

face of said pintle, certain of said passages being adjacent the ends of said bearing sleeve, said pintle being provided with an integral head and an enlarged counter-bore at the outer end of said bore, and a normally closed valve in said counter-bore adapted to be opened by a lubricant dispensing device to supply lubricant to said bore.

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