QUICK DISCONNECT AND CONNECT HINGE

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This invention relates generally to hinges and, more specifically, to hinges that facilitate quick and simple connection and disconnection of the hinged portions.

In many applications, particularly in chassis arrangements for complex electronic equipment, it is necessary to provide precision hinges that are simple to manufacture in large quantities and which, at the same time, facilitate quick connection and removal. For example, in complex communications equipment, it is often desirable to use a hinged chassis for providing access to certain components on or behind the chassis and, in addition, it is often necessary to have means for quickly replacing the entire chassis with a new unit. The hinge we have devised meets all the requirements of simplicity and performs the desired functions in a precision, fool-proof manner.

It is an object of this invention to provide a separable hinge which may be readily locked in assembled relation.

Another object of this invention is to provide a hinge, the portions of which are easily separated by manipulation of the parts, which are not subject to inadvertent separation.

Still another object of this invention is to provide a separable hinge which is easy to mount and operate, self-aligning, self-contained, fool-proof, and which requires no maintenance.

For further objects and for a more complete understanding of the nature of this invention, reference is now made to the following detailed description of our invention and to the accompanying drawing, in which:

Fig. 1 illustrates a preferred form of our invention in a fully assembled condition;

Fig. 2 illustrates the embodiment of Fig. 1 with the hinge portion separated;

Fig. 3 illustrates the hinge which is used in accordance with this invention in a totally disassembled condition; Fig. 4 is a cross-sectional view taken through the line 4—4 in Fig. 2;

Fig. 5 illustrates a modification of the embodiment of Figs. 1—4, and

Fig. 6 illustrates a second modification.

Referring now to Figs. 1—4 of the drawing, there is shown a hinge assembly including a jamb leaf 10, a door leaf 11 and a slideable pintle 12. The jamb leaf 10 comprises a plate 13 provided with countersunk holes 14 for securing the jamb leaf 10 to a support for the chassis (not shown). Integral with the plate 13 and extending therefrom are spaced projections 15, 16 and 17 defining recesses 18 and 19 therebetween for receiving corresponding projections of the door leaf 11. The projections 15, 16 and 17 are each provided with aligned bores 15’, 16’ and 17’, respectively, for slideably receiving a pintle 12 which has an outside diameter slightly less than that of the bores. A longitudinally disposed slot 20 extending through to the bore 16’ is provided in the projection 16. To prevent rotation of the pintle, while permitting limited longitudinal motion, a pin 21 having a diameter equal to or slightly less than the width of the slot is press-dainted into a hole 22 in the pintle 12. For a purpose hereinafter to be described, and as best seen in Fig. 3, the pintle 12 is cylindrical in shape except for two milled-flat portions 23 and 24.

The door leaf 11 comprises a plate 25 provided with suitable holes 26 for securing the leaf to a hinge chassis (not shown). Integral therewith and extending therefrom are projections 27 and 28 which are milled-flat, respectively, with aligned bores 27’ and 28’ of the same diameter as the bores 15’, 16’ and 17’ in the jamb leaf 10. In addition, the projections 27 and 28 are provided with longitudinally extending slots 29 and 30 having widths equal to or just slightly larger than the width of the milled-flat portions 23 and 24 of the pintle 12, but substantially smaller than the diameter of the cylindrical portion. The projections 27 and 28 on the door leaf 11 are complementary to the projections 15, 16 and 17 on the jamb leaf 10, i.e., the projections 27 and 28 are equal in length to the recesses 18 and 19, respectively, and as shown in Fig. 1, these projections are aligned in said recesses when the hinged parts are assembled.

When the pintle 12 is slideably inserted into the bores 15’, 16’ and 17’ of the jamb leaf 10 and the pin 21 is secured thereon through the slot 20, the pintle cannot rotate, but is manually movable longitudinally between the limits defined by the length of the slot 20. The pintle 12 is designed so that at its upper limit of travel, the milled-flat portions 23 and 24 are longitudinally aligned with the recesses 18 and 19, while at its lower limit of travel the cylindrical portions are so aligned. Since the slots 29 and 30 in the door leaf 11 are equal to, or just slightly larger than, the width of the milled-flat portions 23 and 24, the slots 29 and 30 may be angularly aligned therewith, and the projections 27 and 28 of the door leaf 11 may then be slipped onto the pintle 12 and sandwiched between the projections 15, 16 and 17 of the jamb leaf. At this time, the pintle 12 may then be manually moved to its lower limit of travel, as shown in Fig. 1, thereby aligning the cylindrical portions of the pintle 12 with the slots 29 and 30, thus preventing removal of the door leaf from the pintle.

In order to lock the pintle 12 at either its upper or lower limit of travel, we provide on the pintle 12 a pair of longitudinally spaced detents 31 and 32 arranged to cooperate with a ball 33, which is spring-loaded by a detent spring 34 and held in position within a transverse bore 35 by means of a set screw 36. Thus, when the pintle 12 is moved to its upper limit, the detent 32 is engaged by the ball 33 to fix the pintle in its "unlock" position, that is, in the position where the milled-flat portions 23 and 24 are longitudinally aligned with the recesses 18 and 19. By angularly aligning the slots 29 and 30 with the milled-flat portions, the door leaf 11 may then be connected or disconnected. On the other hand, when the pintle 12 is moved to its lower limit of travel the detent 31 is engaged by the ball 33 and is seated in its "lock" position; that is, the cylindrical portions of the pintle are longitudinally aligned with the recesses 18 and 19, and thus the door leaf 11 cannot be connected or disconnected. It is seen, therefore, that we have provided a hinge requiring two conditions for connect or disconnect; namely, the pintle 12 must be longitudinally aligned in its "lock" or "unlock" positions, and slots 29 and 30 must be angularly aligned with the milled-flat portions 23 and 24.

Fig. 5 illustrates a modification of our invention whereby the angular position of the slots 29 and 30 is immaterial. In this embodiment we use a pintle having a reduced diameter at the positions 23a and 24a corresponding to the positions 23 and 24 of the pintle 12. If the reduced portions 23a and 24a have diameters which are slightly less than the width of the slots 29 and 30, respectively, then the door leaf 11 may be removed from
the pintle 12a whenever it is in its "unlock" position, i.e., at its upper limit of travel. Thus, with the identical operation as in the first embodiment, the door leaf 11 will be locked onto the pintle 12a when the pintle is moved to its lower limit of travel and will be unlocked when the pintle is moved to its upper limit of travel. However, unlike the first embodiment, the door leaf may be removed from the pintle 12a at any angular position.

The embodiment shown in Fig. 6 illustrates an arrangement wherein a pintle 12b is longitudinally displaceable in a jamb leaf 10a and, in addition, is rotatable 90° for permitting separation of the hinged parts. The pintle 12b is identical to the pintle 12 but, for a reason to be seen, the milled-flat portions 23 and 24 are displaced 90°, and a thumb knob 37 is fixed at the top thereof. Moreover, the jamb leaf 10a is identical to the jamb leaf 10 except that the upper portion of the longitudinal slot 20 in the projection 16 is extended radially at 20a a distance of 90° to permit rotation of the pintle 12b.

As in the previous embodiments, the hinge will be in its "lock" condition when the pintle 12b is in the lower position and the pin 21 is at the bottom of the slot 20, since in this position the cylindrical portion of the pintle 12b is always presented to the slots 29 and 30 in the door leaf 11. With the leaves in the position shown in Fig. 1, separation is not possible until such time as the pintle 12b is moved to the upper position and until after the pin 21 is rotated into the extended slot 20a. At that time, the milled-flat portions 23 and 24 will be presented to the slots 29 and 30 and aligned therewith, thus permitting separation of the parts without the necessity of further angular alignment of the leaves.

Although not shown, a detent similar to detent 32 is added and positioned 90° therefrom to provide a lock for the pintle in this position.

From the foregoing it is seen that we have produced a hinge, the portions of which may be rapidly and easily separated, but which are not subject to accidental separation. While only three embodiments have been illustrated and described, various modifications and adaptations will become apparent to one skilled in the art. Moreover, the illustrated embodiments may have many other uses besides those indicated herein. For example, the hinges shown may be used with cabinet doors, screen doors, etc., or may be used in connection with many and various types of quick-release mechanisms. The embodiment illustrated in Fig. 6, for example, can be used in mooring aircraft, a quick release being provided by longitudinally displacing the pintle and then rotating it. Furthermore, the steps of displacement and rotation may be reversed, and the pintle may first be rotated from the "secured" position and then displaced longitudinally to permit separation of the parts. It is our intention, therefore, that the embodiments described be merely illustrative and that our invention be limited only by the scope of the appended claim as construed in the light of the prior art.

What we claim is:

A hinge comprising: first and second leaves and a cylindrical pintle, said first leaf including a support having spaced projections, each of said spaced projections being provided with longitudinally aligned cylindrical bores having a diameter sufficient to contain said cylindrical pintle; means for selectively positioning said pintle in said bores at a first or at a second longitudinal position, said means comprising a longitudinally extending slot in one of said projections extending through said projections to said bore and a pin extended through said slot and secured to said pintle, first and second longitudinally disposed detents in said pintle, the distance between said detents being equal to the distance between said projections, a transverse bore through one of said projections, a detent ball in said transverse bore spring-loaded toward said longitudinal bore, said detent ball cooperating with said detents to positively position said pintle in said first or second position; said pintle having reduced portions at positions registering with the spaces between said projections when said pintle is in said first position and registering with said projections when said pintle is in said second position, said reduced portions comprising milled-flat parallel faces on said pintle; said second leaf comprising a support having spaced projections registering with the spaces of said first leaf, said projections being sized to be received within said spaces, the projections of said second leaf being provided with longitudinally aligned bores having a diameter sufficient to contain said cylindrical pintle, said projections having longitudinally aligned slots of a size slightly larger than the distance between said milled-flat parallel faces on said cylindrical pintle to receive said reduced portion of said pintle.

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