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QUICK DISCONNECT AND CONNECT HINGE

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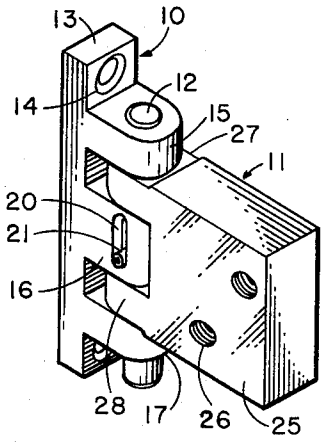


Fig 1

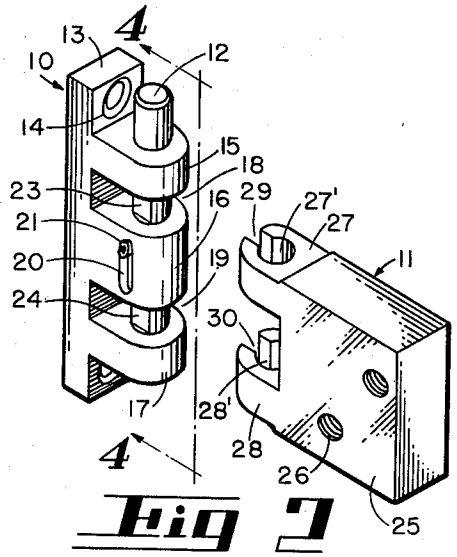


Fig 2

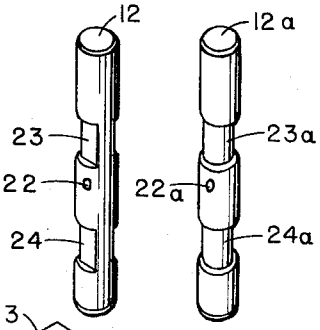


Fig 5

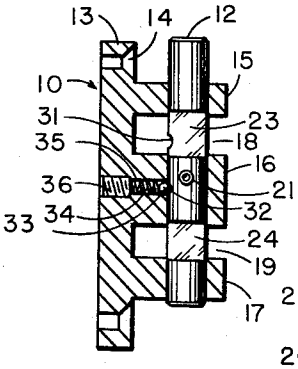


Fig 4

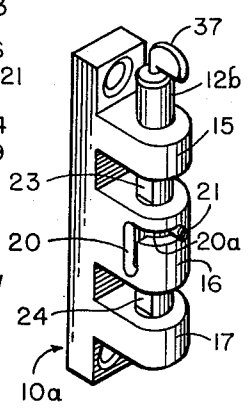


Fig 6

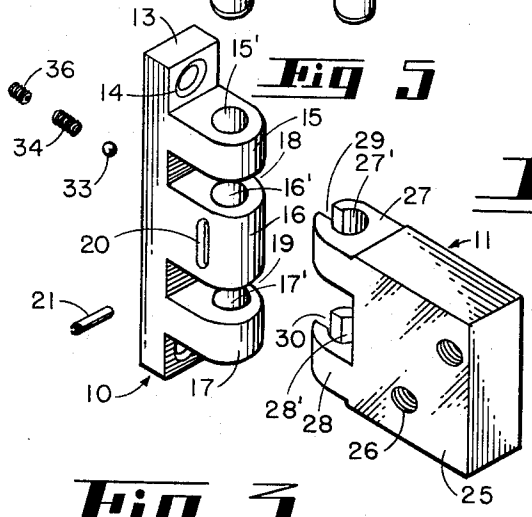


Fig 3

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QUICK DISCONNECT AND CONNECT HINGE

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1 Claim. (Cl. 16—176)

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, but 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 portions 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 first to Figs. 1–4 of the drawing, there is shown a hinge assembly including a jamb leaf **10**, a door leaf **11** and a slidable 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 slidably 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-fitted 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 provided, 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 seen in Fig. 1, these projections are positioned in said recesses when the hinged parts are assembled.

When the pintle **12** is slidably 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 fixed 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 **12***a* having a reduced diameter at the positions **23***a* and **24***a* corresponding to the positions **23** and **24** of the pintle **12**. If the reduced portions **23***a* and **24***a* 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 12*a* 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 12*a* 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 12*a* at any angular position.

The embodiment shown in Fig. 6 illustrates an arrangement wherein a pintle 12*b* is longitudinally displaceable in a jamb leaf 10*a* and, in addition, is rotatable 90° for permitting separation of the hinged parts. The pintle 12*b* 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 10*a* 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 20*a* a distance of 90° to permit rotation of the pintle 12*b*. As in the previous embodiments, the hinge will be in its "lock" condition when the pintle 12*b* 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 12*b* 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 12*b* is moved to the upper position and until after the pin 21 is rotated into the extended slot 20*a*. 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 projection 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.

References Cited in the file of this patent

FOREIGN PATENTS

31,330 Netherlands ---------- Nov. 15, 1933