Oct. 20, 1953 J. F. SUMMERSGILL 2,655,686

HINGE

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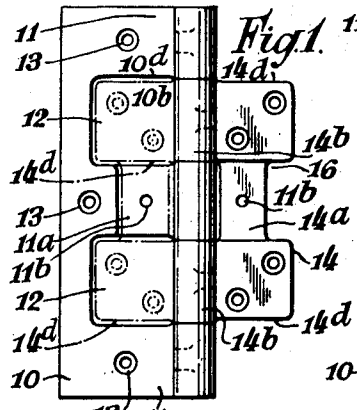


Fig. 1.

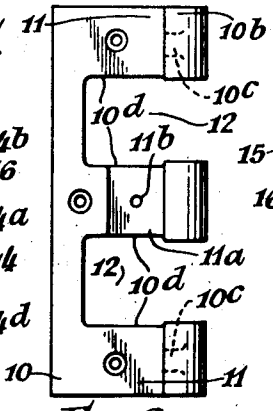


Fig. 3a.

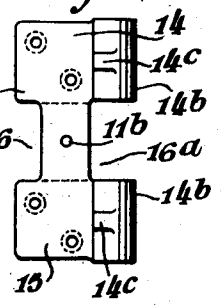


Fig. 3b.

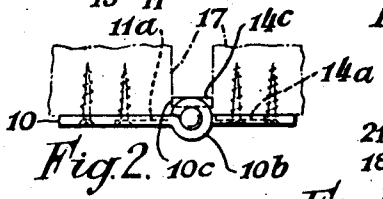


Fig. 2.

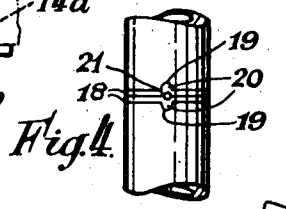


Fig. 4.

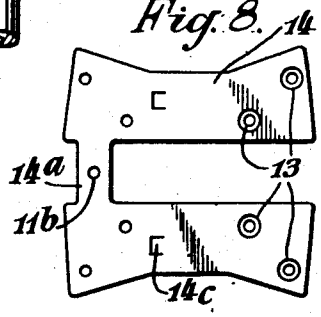


Fig. 8.

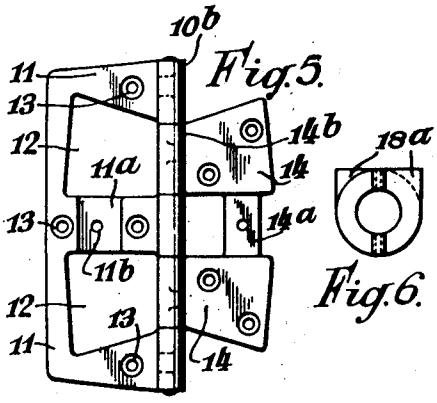


Fig. 5.

Fig. 6.

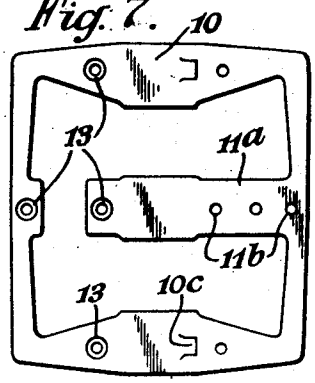


Fig. 7.

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HINGE

Joseph Frederick Summersgill, Maughold, Isle of Man

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This invention relates to improvements in hinges and relates in particular to leaf or butt hinges wherein the leaves are hinged to a common pivot pintle or pin and are formed so that when folded the leaves lie co-planar.

An object of the present invention is to provide a construction of hinge which is strong and rigid in normal conditions of use. Another object is to provide a hinge which can be made simply and cheaply and in which locking or binding in the folded position due to wear on the contacting surfaces at the rolls is prevented.

A further object of the invention is to provide a construction having means for locating same on plane (i. e. unrecessed) surfaces prior to their positive fixing thereto.

With the above and other objects which will be apparent from the following specification in view, reference will now be made to the accompanying drawings in which preferred embodiments of the present invention are illustrated by way of example. In the drawings,

Figure 1 is a front view of one form of hinge;

Figure 2 is a plan view thereof;

Figure 3*a* is a front view of the one leaf used in forming the hinge shown in Figures 1 and 2;

Figure 3*b* is a front view of the other leaf;

Figure 4 is a fragmentary view to an enlarged scale of a detail showing an alternative way of providing the leaf clearance;

Figure 5 is a front view of another form of hinge;

Figure 6 is a plan view of an alternative form of the spacing washer shown in Figure 4;

Figure 7 is a front view of the blank used in forming the hinge shown in Figure 6, and

Figure 8 is a view similar to Figure 7 of the other blank.

Referring firstly to Figs. 1 to 3*b*, one plate 10 is of E-form, having the outer horizontal limbs 11 and center horizontal limb 11*a* all said limbs being of equal length and parallel thereby leaving two recesses 12. The centre limb 11*a* is of approximately one half the thickness of the other two limbs, the cut away part being in from the front face as shown and terminating short of the common root line of the three limbs. A small pin hole 11*b* is made through the centre limb, whilst countersunk screw receiving holes 13 are made through the other limbs and the common upright.

The other plate 14 is of general rectangular form, and has two limbs 15 projecting from one face one at each end to leave a space 16 therebetween. The median part 14*a* of the said plate

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14 between the limbs 15 and from the face adjacent the plate 10 is of reduced thickness, approximately one half the thickness of the outer portions, and a rectangular cut away or recess 16*a* is made in from the edge opposite the limbs.

The ends of the limbs of the one or E-plate are rolled as are the lugs of the rectangular plate, to form the rolls 10*b*, 14*b* in customary manner the rolls of each plate being co-axial so that the plates can be joined as shown in Figure 1. Prior to rolling, tongues 10*c*, 14*c* are cut and bent from said parts preferably at their ends so that after rolling these tongues serve as locating projections as later described. It will be seen that the rolled part of each of the horizontal limbs of the E-plate is of a greater vertical dimension than its main flat part, and it will be clear from the drawings that when folded, a working clearance is provided between adjacent edges of the co-planar parts. As shown the flat plate parts at adjacent edges are both cut away at 10*d*, 14*d*, and also a sufficient clearance is made between vertical adjacent edges. It will be clear however, that only either the one or the other of the plates may be cut away sufficient to give the desired clearance.

When assembled, the two parts 10, 14, can fold substantially co-planar so that the median part 14*a* of the plate 14 lies on the part 11*a* of the centre limb of the E-plate 10, and each part outside the median part is received in a recess 12 between an outer limb and the centre limb of the E-plate, the space 16 of the median part receiving the projecting non-reduced root part of the centre limb sufficient clearance being allowed. The tongues 10*c*, 14*c* are arranged so that their ends can butt against the edge of the surface of the member, the plane of which member is at a right angle to the surface to which the part is secured. Thus as shown if either one plate is placed on the end surface of the member 17 to which it is to be fixed, its tongues will engage the right angle adjacent edge of the member, and said plate can be fixed temporarily by means of a pin or tack driven home through a pin hole 11*b*. It will be understood that each set of rolls can be offset from the plane of its plate, and suitable tongues will also be provided with this arrangement. With this construction, said tongues may be cut from the leaf on a line at or near to the commencement of the roll.

Referring to the arrangement illustrated in Fig. 4, a pair of washers 18, 18, of hardened steel are arranged between the rolls. The edges of the roll have one or more recesses such as a

recess 19 in each roll, whilst the washers are provided with projecting nibs 20 each to be received in a recess 19. A small hole 21 for oiling may also be provided. As shown in Figure 6, the washers may be shaped so that when two are oppositely superimposed, they are of D shape in plan, that is, each washer is of circular form with a protuberant right angled part, thereby providing locating lugs 18a. In using this form of locating means, it is the vertical edges shown in the drawing which serve as the locating edges. Said edges butt the edges of the members 17 in the same manner that the ends of the members 17 butt said members as shown in Figure 2.

In the arrangement shown in Fig. 5, non-rectangular spaces 12 are left between the limbs 11 and the fitting parts of the plate 14 are of similar shape. In this construction, it is preferred to construct both parts from a blank which is folded over on itself, the roll being formed at the fold so that all or the greater part of the plates are of double thickness. Thus, the leaves or plates 10, 14 may be stamped out from one piece of metal to the shape shown in Figs. 7 and 8, and are then bent so that each leaf is of double thickness, the plates being bent on the line forming the hinge rolls 10b, 14b respectively. This construction provides complementary parts of single thickness 11a, 14a. The construction could however, be made with each leaf solid by casting or other suitable way.

In all arrangements the parts may be manufactured by stamping and pressing operations, by moulding, die casting or other suitable means. For die casting, the two leaves with the pin holes cored, with solid locating lugs and nail and screw holes with countersinking, can be made in one complete operation, the half thickness areas if provided, giving the strength and rigidity necessary in a one plane hinge.

It will be understood that the term "E-plate" is used herein in a broad sense and as will be clear from the embodiment illustrated in Figs. 5, 7, and 8, is not to be construed as limited to a form in which the horizontal limbs are parallel or have parallel sides. The end rolls must of course be co-axial but the shape of the cut out portions between the said limbs and the similar shape of the second leaf parts fitting therein may be of a different contour from that described and illustrated to give a greater area to either leaf as desired.

The necessary clearance required to allow for the wear at adjacent roll ends will depend mainly upon the size of the hinge and the purpose to which it is to be put. Thus, for small hinges which do not carry a large weight a clearance of about $\frac{1}{32}$ part of an inch will be sufficient although it is preferred to make the clearance somewhat greater.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. Co-planar hinge consisting of two plates, one comprising an E-shaped plate, co-axial pintle pin receiving rolls formed at the ends of the horizontal limbs, a part of the central limb being of reduced thickness from one face and for the complete vertical dimension of said central limb, the other said plate having lugs each to be received in a space between an outer horizontal limb of the E-shaped plate and the center limb, said lugs having co-axial rolls along one vertical end for uniting the two plates by the pintle pin,

and a part of reduced thickness between said lugs and complementary with the part of reduced thickness of the said central limb, for the folding up of the leaves in substantially co-planar relation with the reduced thickness parts juxtaposed.

2. Co-planar hinge consisting of two leaves, one comprising an E-shaped plate, co-axial pin-receiving rolls formed at the ends of the limbs, a part of the central limb being of reduced thickness from one face of the said plate, and a second leaf comprising a plate consisting of two similar lugs united by a median bridge part, said similar lugs having co-axial pin-receiving rolls formed at their one ends for uniting the two leaves by a pintle pin, said bridge part being of reduced thickness from its one face, the said leaves, when folded, lying co-planar, with each roll-carrying lug located in one of the gaps between the center and one end limb of the E-plate, the bridge part lying with its part of reduced thickness on the part of the central limb of the E-plate of reduced thickness.

3. Co-planar hinge consisting of two leaves, one comprising a vertical uniting part for three co-planar laterally projecting limbs, co-axial rolls on the ends of said limbs for the pintle pin, a part of reduced thickness on the central limb and from one face thereof and for the width thereof, the other said leaf comprising co-axial lugs having co-axial rolls at one vertical end for uniting to the first leaf by the pintle pin, and a part bridging and co-planar with the lugs and of reduced thickness and complementary with the part of reduced thickness of the center limb of the first leaf.

4. A co-planar hinge as claimed in claim 3, wherein a hole is provided through the parts of reduced thickness to permit of the temporary fixing of the parts.

5. A co-planar hinge as claimed in claim 3, the one leaf having two gaps with the adjacent or inner edges being parallel and at a right angle to the hinge pin, with the outer edge of each gap sloping away from its inner edge from its end nearest the pin to produce a wedge like gap, the solid portion between the gaps having a part of reduced thickness through which a pin hole for temporary location of the one leaf is made, the other leaf being formed as two lugs each to fit into a gap, said lugs being bridged by a solid part of reduced thickness having a pin hole therethrough, which solid part, when the leaves are folded, lies on the part of reduced thickness between the gaps of the first leaf.

6. A co-planar hinge as claimed in claim 3, wherein the leaves are of double thickness and include a fold line of the desired shape, the parts of reduced thickness being constituted by single thickness.

7. Co-planar hinge as claimed in claim 3, wherein the edges of the lateral limbs adjacent the edges of the lugs are cut away to provide working clearances between the lugs and limbs when the leaves are in coplanar position.

8. Co-planar hinge as claimed in claim 3, wherein means are provided to form a gap between adjacent edges of the lateral limbs of the one leaf and the edges of the lugs of the other leaf.

9. Co-planar hinge as claimed in claim 3, wherein spacing washers are provided between adjacent roll edges.

10. Co-planar hinge as claimed in claim 3, wherein tangential tongues are provided at the

rolls, said tongues being located at the sides of the rolls adjacent the securing faces of the leaves and serving as means for locating each leaf against an edge of the member to which the leaf is to be secured.

11. A co-planar hinge as claimed in claim 10, in which the tongues extend outwardly from the edge of the plate forming the roll and parallel with the pin, the outer edges of said tongues being in alignment and parallel with the axis of the roll, and serving to butt against the edge or face of the member at a right angle to the edge or face to which the plate is to be fixed.

12. Co-planar hinge as claimed in claim 9, in which the washers and adjacent roll edges are provided with locating means each fixed to a washer and engaging an adjacent roll edge.

13. Co-planar hinge as claimed in claim 12, in which oiling grooves are provided in the washers.

14. Co-planar hinge consisting of two leaves, each comprising co-planar limbs and having rolls for the uniting of the leaves by the pintle pin, the limbs of the one leaf fitting into the spaces between the limbs of the other leaf in folded condition except for one limb of each leaf which said one limb lies contiguous in folded condition, said contiguous limbs having parts of reduced thickness which are juxtaposed in folded condition.

JOSEPH FREDERICK SUMMERSGILL.

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