

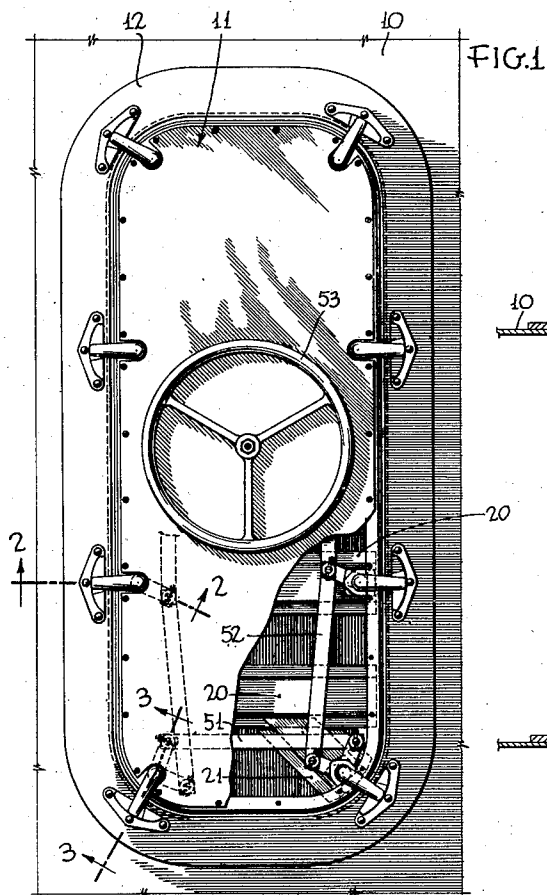
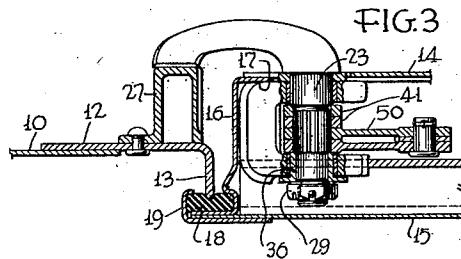
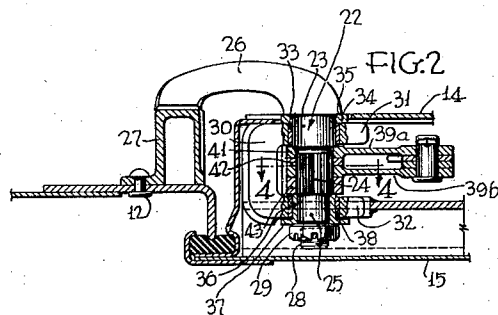
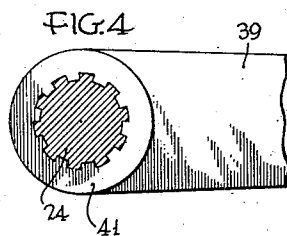
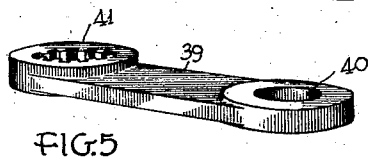
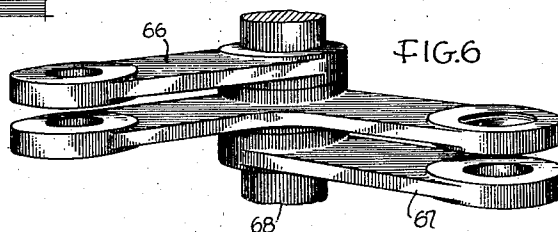
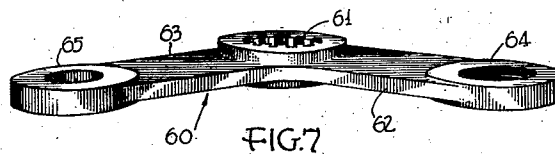
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2,383,435

CLAMPING DEVICE

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2,383,435

CLAMPING DEVICE

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7 Claims. (Cl. 292—48)

This invention relates to improvements in clamping devices, particularly as applied to the closing of doors of the type employed in bulkheads which are adapted for sealing under pressure.

Among the objects of the invention are contemplated the following provisions: To provide clamping mechanism employing parts of simplified structure; to provide a mechanism requiring a minimum number of parts; to provide a clamping unit which is self-binding on parts which are removable and replaceable; to provide a clamping structure which is readily adaptable to varied forms of connection and attachment. Various other objects relating to details of construction will be apparent on consideration of the following description of the invention, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a plan view of a bulkhead door with a section of the wing panel removed for inspection of the linkage;

Figure 2 is a detail of one of the side dog units taken along line 2—2 of Figure 1;

Figure 3 is a detail section of a dog unit positioned at the corner of the door taken along line 3—3 of Figure 1;

Figure 4 is a detail showing the spline connection of the pivot arm and pivot pin of one of the dog units;

Figure 5 is a perspective of one of the pivot arms;

Figure 6 is an assembly of a four-plate section of a corner dog unit illustrating a modified form of pivot plate; and

Figure 7 is a perspective of the modified pivot plate of Figure 6.

In my Patent No. 2,216,012, dated September 24, 1940, there is described a door construction similar in many respects to the disclosure of Figure 1 of this application but differing in the important respect that the dog unit employed in the mechanism for locking the door in closed position includes a casting which is exceptionally difficult to manufacture and which, after manufacture, is subject to distortions and warping which may lessen the effectiveness of the closing mechanism and in some cases cause break-down.

In accordance with my present invention, I contemplate the elimination of this difficult casting unit and the employment of a plurality of simplified castings assembled in such a manner that the parts are retained together as if formed of a single casting.

Referring to Figure 1, I have shown by way of

example a support 10 which may be a frame in the bulkhead and to which an edge of a door opening in this support is hingedly secured, the door being generally indicated by the numeral

11. A reinforcing edge frame member 12 borders the periphery of the door opening, having a right angle edge flange 13, as shown in Figures 2 and 3, adapted to contact with a yieldable portion of the door 11 to form a sealed contact therewith as will be more fully described hereinafter. The door structure includes an inner panel 14, an outer panel 15 and an edge attaching member 16. The member 16 is turned at its inner edge to form a flange 17, whereby attachment may be made by spot welding or other means to the inner panel 14. The outer edge of the edge member 16 is flanged outwardly in a form roughly S-shaped so that the panel formed thereby is adapted to receive the yieldable material 18. This material is also supported in position by the angle plate 19 attached to the edge of door panel 15 and inwardly turned so as to enclose an edge of the yieldable material 18. In closed position the flange 13 of the door frame embeds itself in the yieldable material 18.

Interposed between the outer and inner panels 14 and 15 are a plurality of transverse panelled ribs 20 adapted for reinforcement of the door structure and for support of the various dog units for clamping the door in closed position. Also at the ends of the door, diagonal ribs 21 are employed for the support of the corner dog units.

Referring to Figure 2 of the drawing, there is illustrated a dog unit such as is employed on the side of the door. This unit includes a pivot pin 22 formed in three sections, an upper section 23 cylindrical in form, a central section 24 axially splined, and a third section 25 cylindrical in shape, the upper section 23 having a larger diameter than the splined section 24. At its upper end, the pivot pin is extended in a transverse dog member 26, the end of which is cam-shaped for the purpose of engagement with a cam element 27 shown in section in Figures 2 and 3 and secured by riveting or otherwise to the door frame 12. The other end of the pivot pin terminates in a screw threaded section 28 upon which a nut 29 is movable to secure the separable elements of the unit together.

The pivot pin 22 is supported within the door frame between the outer and inner panel plates 15 and 14 by means of a U-shaped yoke 30 of sufficient breadth at its top and bottom in the yoke arms 31 and 32 to permit formation of openings in which the pivot pin may have movement.

The pivot pin bridges the arms of this yoke as shown in the drawing, the upper section 23 of the pivot pin lying within the opening of arm 31 and supported therein by the bearing ring 33. The washer 34 is inserted between the upper edge of the ring 33 and the upper surface of the upper yoke arm 31 and an enlargement 35 on the dog 26 formed by a radial extension of the pivot cylinder 23.

The lower section 25 of the pivot pin is supported in the lower arm 32 of the yoke by a bearing ring 36 having its outer edge 37 outwardly turned to form a bearing surface for engagement by the nut 29. Surrounding the bearing ring 36 is a second ring 38 forming a liner in the opening of the lower yoke arm 32.

The splined section 24 is intended to receive the pivot arms 39 and such spacer elements as may be necessary. As shown in Figure 2, I employ two link arms of the type shown in perspective in Figure 5, each of these arms being made of a casting or forging or other fabrication of any desired metal, such as steel, which is enlarged to form heads 40 and 41 machined as shown to have a cylindrical aperture at one end and a splined aperture at the other end. These pivot arms are attached in the unit by placing the splined ends of the arms over the splined section 24 of the pivot pin. For the said dog units only two of these arms are necessary and they are placed adjacent the top of the splined section 24 with an intervening washer 42 and a second washer 43 positioned below the lower arm and in contact with the inner edge of the bearing ring 36. Thus it will be seen that when assembled, pressure is transmitted from cylindrical pivot pin section 23 to the nut 29 through the head of arm 39a, washer 42, head of arm 39b, washer 43 and sleeve 36 to the nut 29. This pressure relationship insures a compact and rigid assembly of the assembled parts without imparting a binding pressure between the dog and door panel or yoke 30. It also readily permits disassembly on release of the nut 29. The yoke supporting the pivot pin 22 is fixed in position within the door structure by arc welding preferably to the edge of an opening formed in the end of the rib 20 and the lower yoke arm 32.

End dog units as shown in Figure 3 of the drawing are, in general, dissimilar to the side dog units, differing in the employment of four pivot arms 50 instead of the two pivot arms of the side units with the spacing washers. In the end units no washers are employed, the splined heads of the arms being in contact with one another and forming together a unit under compression between the section 23 and the bearing ring 36, the nut 29 serving to bind the four pivot arms 50 into a unitary structure.

The pivot arms 39 of the side dog units and the arms 50 of the end units are connected by linkage, there being indicated in Figure 1 the end links 51 and the side links 52. By appropriate gear mechanism, not shown, power is applied to these links and the connected dog units from the hand wheel 53 so as to move the various dogs 26 onto or from the cam elements 27 on the door frame, thereby securing a locking closing of the door when desired.

The modification of the invention as illustrated in Figures 6 and 7 is adaptable for use as an end dog unit. This modification consists essentially in the employment of a member 60 combining as an integral member two of the pivot arms in one plane. As shown, the combined pivot arm is cast

or forged or otherwise fabricated as an angle plate, the peak of the angle containing the splined aperture 61 from which the two arms 62 and 63 extend angularly to the pivot heads 64 and 65, in which the cylindrical pivot apertures are placed. When assembled as shown in Figure 6, the combined unit 60 is interposed between the pivot arms 66 and 67 on the splined section of the pivot shaft or pin 68. The splined head areas of the various arms are enlarged laterally in the direction of the axis of the pivot shaft so as to form the equivalent of an interposed spacer or washer so that the proper separation of the pivot arms is secured.

The outstanding feature of the clamping device as hereinabove described resides in its utilization of separable plates or pivot arms which may be made separate and then assembled into a rigid unit, which is the full equivalent of a casting with which these individual parts are integrally associated. Heretofore in the manufacture of clamping devices of this type it has been necessary to employ bronze, or some similar substance, which is suitable for casting where the integral sections of the casting are of thin metal and closely spaced as is the case with the dog unit as used in the bulkhead door described. In this casting operation because of the thinness of the spacing, the pattern elements are fragile and, therefore, easily broken, and also because of the thinness of the pivot arms and the nature of the material used, warping and bending of the arms frequently resulted, making the whole door mechanism inoperative. By casting or forging or otherwise fabricating each arm separately, it is now possible to utilize an alloy steel having a much improved tensile strength over bronze, and further by utilizing my improved means of clamping the heads of the pivot arms in position, I insure a complete absence of warpage or binding and the assembly operates as a unit and has the full advantage of a single casting. It is apparent also that in the case of breakage or undue wear, it is possible readily to break down the dog unit and remove one or more pivot arms for any desired replacement. It should be understood also that while I have shown in Figures 6 and 7 a modification using a simplified and combined arm member, such modification is not usually employed, preference being given in the assembly of end units to the use of four separate pivot arms, as shown in Figure 5 of the drawing. Thus use may be made of single pivot arms for either the side or the end dog units.

It is apparent that details of structure may be modified in accordance with the particular requirements of the door structure and, further, that the clamping device may be utilized for the closing of separable elements other than bulkhead doors, and, therefore, the invention should not be limited to the process and disclosure except insofar as required by the claims hereto appended.

What is claimed is:

1. A clamping device comprising a clamping member, a pivot pin connected to one end of said clamping member, means for supporting said pivot pin, a plurality of pivot arms positioned separably in spaced planes in angular relation to said pin, and means for fixedly securing said pivot arms to said pivot pin.

2. A clamping device adapted to be employed in conjunction with separable members for maintenance of the members in closed position which comprises a clamping member, a pivot pin con-

nected to one end of the clamping member, said pivot pin including a splined section and a section adjoining the splined section, a plurality of separable pivot arms detachably mounted in spaced planes in angular relation to said pin on the splined section of said pin, means for clamping the ends of the pivot arms against the adjoining section of the pivot pin, and means for supporting the pivot pin on one of said separable members.

3. A clamping device comprising a clamping member, a pivot pin secured to said member, said pin including an end bearing section and an intermediate connector section, separate pivot arms detachably mounted upon said connector section, said connector section having a diameter less than that of the bearing section, means for fixing said arms in mutually displaced planes along said connector section and means for forcing said pivot arms into engagement with said end bearing section.

4. In a clamping unit a frame, a U-shaped yoke supported by said frame, a pivot pin extending between and through the arms of said yoke forming protruding ends, a clamping unit attached to one of said ends, a locking means attached to the other of said ends, and a plurality of separable pivot arms mounted in displaced planes along said pivot pin intermediate the arms of said yoke,

the heads of said arms at the point of attachment to the pivot pin being clamped against a section of said pin by said locking means.

5. A bell crank structure adapted for use with clamping mechanism comprising a pivot pin, a V-shaped bell crank having apex attachment means for the pivot pin, separable single arms secured to said pivot pin on either side of said V-shaped bell crank and in parallel relation to the arms thereof.

6. A bell crank structure adapted for use with clamping mechanism comprising a pivot pin, a V-shaped bell crank having apex attachment means for the pivot pin, separable single arms secured to said pivot pin on either side of said V-shaped bell crank and in parallel relation to the arms thereof, and means for clamping together said single arms and V-shaped bell crank.

7. A clamping device comprising a clamping member, a pivot pin connected to one end of said clamping member, means for supporting said pivot pin, a plurality of pivot arms positioned separably in spaced planes angularly related to said pin and means for fixedly securing said pivot arms to said pivot pin, said pivot arms extending from the pivot pin in angular relationship to each other.

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