

12

EUROPEAN PATENT APPLICATION

21 Application number: **86303849.3**

51 Int. Cl.⁴: **E 05 D 11/04**

22 Date of filing: **21.05.86**

30 Priority: **21.05.85 GB 8512769**

43 Date of publication of application:
26.11.86 Bulletin 86/48

84 Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

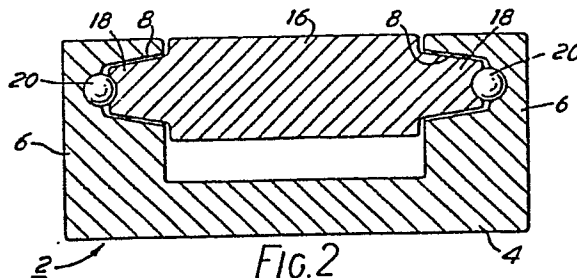
71 Applicant: **George Blair P.L.C.**
Newcastle Alloy Steelwork Pottery Lane
Forth Newcastle Upon Tyne NE1 3RB(GB)

72 Inventor: **Reynard, Kenneth**
The Den 13D Croft Heads
Thirsk North Yorkshire(GB)

74 Representative: **Gura, Henry Alan et al,**
MEWBURN ELLIS & CO. 2/3 Cursitor Street
London EC4A 1BQ(GB)

54 **Hinge assemblies.**

57 Hinge assemblies, primarily for the doors of freight containers, each comprise a bracket member (2) for attachment to a door frame (3), the bracket (2) including opposed flange portions (6), and a hinge member (10) for securing to the door (14), the hinge member (10) including a pivot portion (16) for location between the flange portions (6). The flange portions (6) and the adjacent end regions of the pivot portion (16) have formed thereon corresponding, substantially conical or frusto-conical recesses (8,8') and projections (18,18'), the projections (18,18') on one member (2,10) being received within the recesses (8,8') in the other member (10,2) whereby the two members (2,10) are pivotally mounted relative to one another.



- 1 -

HINGE ASSEMBLIES

This invention relates to hinge assemblies and has particular though not exclusive application to hinge assemblies for the doors of freight containers.

5 The doors of dry cargo containers are commonly mounted to the body of the container by three, four or five-aligned, vertically-spaced hinge assemblies depending upon the size of the container, Each hinge assembly typically comprises separate members, usually of cast or forged steel, welded or bolted to the body and to the
10 associated door of the container, said members of an assembly being interconnected by a pivot pin about which the door pivots.

More particularly, established hinge assemblies each comprise a bracket member secured to the body of the
15 container and including a pair of vertically-spaced, outwardly-projecting flange portions each provided with co-axial apertures therethrough, and a hinge member including a plate portion secured to the surface of the door, one end of said plate portion being adapted for
20 location between the flange portions of the bracket member and having a cylindrical bore formed therethrough for co-axial alignment with the apertures in the flange portions.

The hinge assembly is completed by a pivot pin,
25 usually of stainless steel, located through the apertures in the flange portions of the bracket member and through

- 2 -

the bore in the plate portion of the hinge member, the ends of the pivot pin being secured to the flange portions of the bracket member, for example by welding. Thus the hinge members, and therefore the door, pivot
5 about the fixed pivot pins.

It is common practice to incorporate nylon or non-ferrous metal bushes within the cylindrical bore in the hinge member to surround the pivot pin of the assembly to reduce friction between the two members of the
10 assembly.

However the above-described assembly still suffers from a number of disadvantages not the least of which are that the bushes can become distorted such that a clamping pressure is applied to the pivot pin through
15 the bush whereby pivoting movement is restricted, while any damage to the door can cause misalignment of the pivot pins of the various assemblies, again resulting in difficulty in opening and closing the door. Further, the use of stainless steel pivot pins adds considerably
20 to the cost of the assembly.

It would be desirable to be able to provide a hinge assembly eliminating the above-mentioned disadvantages and which is cheaper to produce than heretofore.

According to the present invention there is provided
25 a hinge assembly comprising a bracket member for securing to one of two components to be pivoted relative to one

- 3 -

another, said bracket member including a pair of spaced flange portions, and a hinge member for securing to the other of said components, said hinge member including a pivot portion for location between, and co-operation with, 5 the flange portions of the bracket member, the flange portions of the bracket member and the adjacent regions of the pivot portion of the hinge member having formed thereon corresponding, substantially conical or frusto-conical recesses and projections, the projections on 10 one member being received within the recesses in the other member to provide a pivotal mounting of the two members relative to one another.

The hinge assembly may include a bearing element reacting between at least one projection and its associated 15 recess. The or each bearing element may be a bearing ball, for example of nylon or non-ferrous metal, in which case the end face of its projection and the adjacent end face of the associated recess are conveniently shaped to provide seatings therein for said bearing 20 ball.

In one embodiment of the invention, the frusto-conical projections are formed on, to extend outwardly from each end region of, the pivot portion of the hinge member, while the corresponding recesses are formed in 25 the opposed inner faces of the flange portions of the bracket member.

In an alternative embodiment of the invention, the frusto-conical projections are formed on, to extend

- 4 -

inwardly of, the opposed inner faces of the flange portions of the bracket member, while the corresponding recesses are formed in the opposed end regions of the pivot portion of the hinge member.

5 By way of examples only, embodiments of the invention will now be described in greater detail with reference to the accompanying drawings of which:

Fig. 1 shows a first hinge assembly according to the invention;

10 Fig. 2 is a transverse section through the bracket member and pivot portion of the hinge member of the assembly of Fig. 1;

Fig. 3 shows a further hinge assembly according to the invention, and

15 Fig. 4 is a transverse section through the bracket member and pivot portion of the hinge member of the assembly of Fig. 3.

Referring to Figs. 1 and 2, the illustrated hinge assembly comprises a bracket member indicated generally at 2 of forged or cast steel, adapted to be secured to an upright frame portion 3 of a container, for example by welding. The bracket member 2 includes a base plate 4 for abutment against said frame portion 3, and a pair of spaced flange portions 6 projecting outwardly from, at right angles to, the base plate 4.

25 Formed in the flange portions 6 of the bracket member 2 are opposed frusto-conical recesses 8, the innermost

- 5 -

end faces of which recesses 8 are each of concave, part-spherical shape to provide seatings therein for reasons which will become apparent.

The hinge assembly further comprises a hinge member
5 of forged or cast steel indicated generally at 10 and including a body portion 12 having a flat undersurface adapted to lie against and be secured to the outer surface of a door 14 of the container. Conveniently the body portion 12 of the hinge member 10 is welded to the
10 door substantially as detailed in our co-pending European patent application no. 84.304618.6.

The hinge member 10 further includes, at one end thereof, an increased-thickness pivot portion 16 of generally cylindrical shape. Integrally formed on the
15 cylindrical pivot portion 16 are opposed, co-axial, frusto-conical projections 18 extending outwardly one from each end of the pivot portion 16 and corresponding in shape with the recesses 8 in the bracket member 2. The outer end face of each projection 18 has formed there-
20 in a concave, part spherical recess providing a seating for co-operation with that in the associated recess 8.

Referring more particularly to Fig. 2, the bracket member 2 and hinge member 10 are assembled with the projections 18 of the hinge member 10 received within the
25 recesses 8 in the bracket member 2, a pair of nylon balls 20 each reacting between the adjacent seatings formed in

- 6 -

the recesses 8 and projections 18 to locate the members 2,10 relative to one another and to provide bearings for the pivotal movement of the members 2,10 relative to one another. A substantial clearance, which may be up to of the order of one millimetre, exists between the faces of the recesses 8 and the associated projections 18 with the members 2,10 in their normal positions relative to one another, thus permitting substantial relative movement and/or distortion of the hinge assembly before face-to-face contact of the two component members occurs.

In practice, and as with known hinge assemblies to be used on freight containers, three or more of the above-described assemblies are spaced one above the other on the container with the bracket members 2 welded or otherwise secured to the body of the container and the hinge members 10 welded or otherwise secured to the door of the container with the pivot portions 16 of the spaced assemblies axially aligned. The frusto-conical recesses and projections 8,18, in combination with the bearing balls 20, ensure smooth, unimpeded pivoting movement of the door relative to the container body without any substantial friction between the members 2 and 10, while the clearance between the recesses 8 and projections 18 and the conical configuration thereof accommodate any distortion of the container

- 7 -

that may occur due to lateral forces or torques that may be applied thereto.

Thus it will be appreciated that the described assembly, which, apart from the balls 20, can be of ferrous material throughout, is cheap to manufacture, particularly compared with the prior art assemblies that include stainless steel pivot pins, while the balls 20 themselves will only cost of the order of one pence per assembly.

10 The elimination of the cylindrical pivot pins and the substitution of frusto-conical pivotal mountings overcomes the problem of mis-alignment of the pivot pins, while the absence of cylindrical bushes around the pivot pins eliminates the problem of clamping pressures restricting pivoting movement of the door.

15 Although it is preferred that the described assembly incorporates bearing elements such as the balls 20, which may be of nylon or non-ferrous metal, such elements may be eliminated. However, the resultant assembly may be subjected to unacceptable wear rates.

20 Figs. 3 and 4 show an alternative embodiment of hinge assembly in which components equivalent to those of the embodiment of Figs. 1 and 2 are similarly referenced. The recesses 8 and projections 18 of the assembly of Figs. 1 and 2 have been transposed in the assembly of Figs. 3 and 4, in that the

- 8 -

projections, referenced 18', are integrally formed with the flange portions 6 of the bracket member 2, which flange portions 6 are somewhat narrower than those of the assembly of Figs. 1 and 2, while the pivot
5 portion 16 of the hinge member 10 has an axial bore 22 extending therethrough, the end regions of said bore being shaped to provide the inwardly extending frusto-conical recesses referenced 8'. These two recesses are interconnected by the central regions of the axial
10 bore 22, the inner end faces of the recesses 8', at their junction with said central portion of the bore 22, each being shaped to provide a part-spherical seating therein. Again, nylon or non-ferrous metal balls 20 are provided between the end faces of the projections
15 18' and recesses 8' to provide bearings on relative pivotal movement of the two members 2,10.

Other modifications and variations from the illustrated arrangements will be apparent to those skilled in the art, while the assemblies clearly may be used on
20 other than freight containers.

- 9 -

CLAIMS

1. A hinge assembly comprising a bracket member (2) for securing to one of two components (3,14) to be pivoted relative to one another, said bracket (2) including a pair of spaced flange portions (6), and a
5 hinge member (10) for securing to the other of said components (3,14), said hinge member (10) including a pivot portion (16) for location between, and co-operation with, the flange portions (6) of the bracket member (2), characterised in that the flange portions (6) of the
10 bracket member (2) and the adjacent regions of the pivot portion (16) of the hinge member (10) have formed thereon corresponding, substantially conical or frusto-conical recesses (8,8') and projections (18,18'), the projections (18,18') on one member (2,10) being received within the
15 recesses (8,8') in the other member (10,2) to provide a pivotal mounting of the two members (2,10) relative to one another.

2. A hinge assembly as claimed in claim 1 and including a bearing element (20) reacting between at
20 least one projection (18,18') and its associated recess (8,8').

3. A hinge assembly as claimed in claim 2 in which said at least one bearing element is a bearing ball (20), the end face of its projection (18,18') and the adjacent
25 end face of the associated recess (8,8') being shaped

- 10 -

to provide seatings therein for said bearing ball (20).

4. A hinge assembly as claimed in any one of claims 1 to 3 in which the frusto-conical projections (18) are formed on, to extend outwardly from each end region of, the pivot portion (16) on the hinge member (10), the corresponding recesses (8) being formed in the opposed inner faces of the flange portions (6) of the bracket member (2).

5. A hinge assembly as claimed in any one of claims 1 to 3 in which the frusto-conical projections (18') are formed on, to extend inwardly of, the opposed inner faces of the flange portions (6) of the bracket member (2), the corresponding recesses (8) being formed in the opposed end regions of the pivot portion (16) of the hinge member (10).

