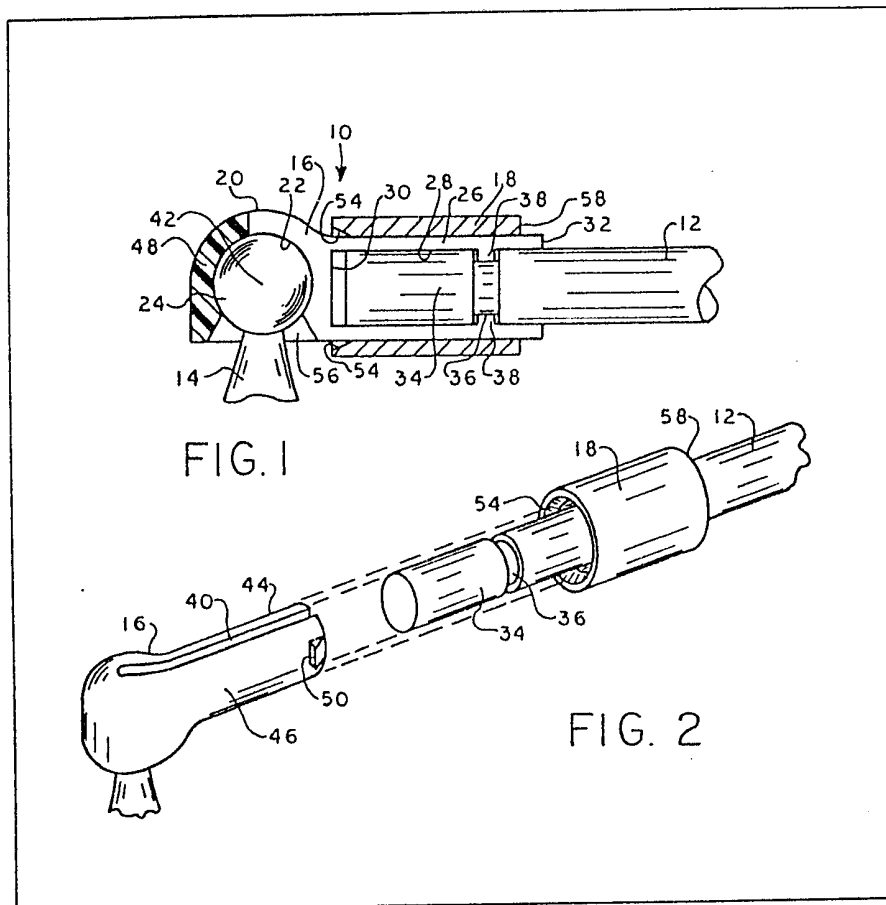


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(54) Swivel connectors

(57) A swivel connector assembly for connecting a member 12 to be pivoted to a pivot 14, 24. The assembly includes just two components which may be readily assembled, a socket 16 and a retaining sleeve 18. The socket has a forward portion 20 including a bearing seat 22 and a rearward portion 26 having an aperture 28. A slot 40 which extends from a point forward of

the bearing seat centre 42 to and through the rearward portion 26 forms bifurcated opposed socket portions 44, 46 which may be separated to enlarge the bearing seat 22 and aperture 28 to permit ready assembly of the same to the pivot ball 24 and an end portion 34 of the member to be pivoted. The sleeve 18 is arranged to be axially slid over the socket rearward portion 26 to thereby maintain the assembly in assembled relation.



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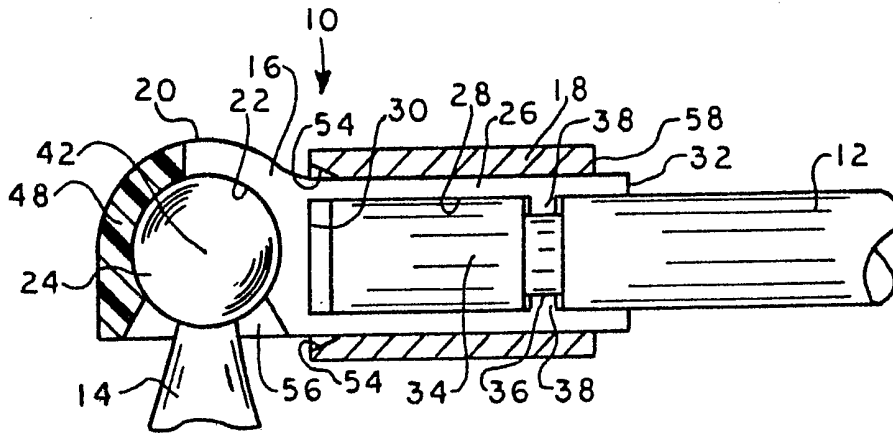


FIG. 1

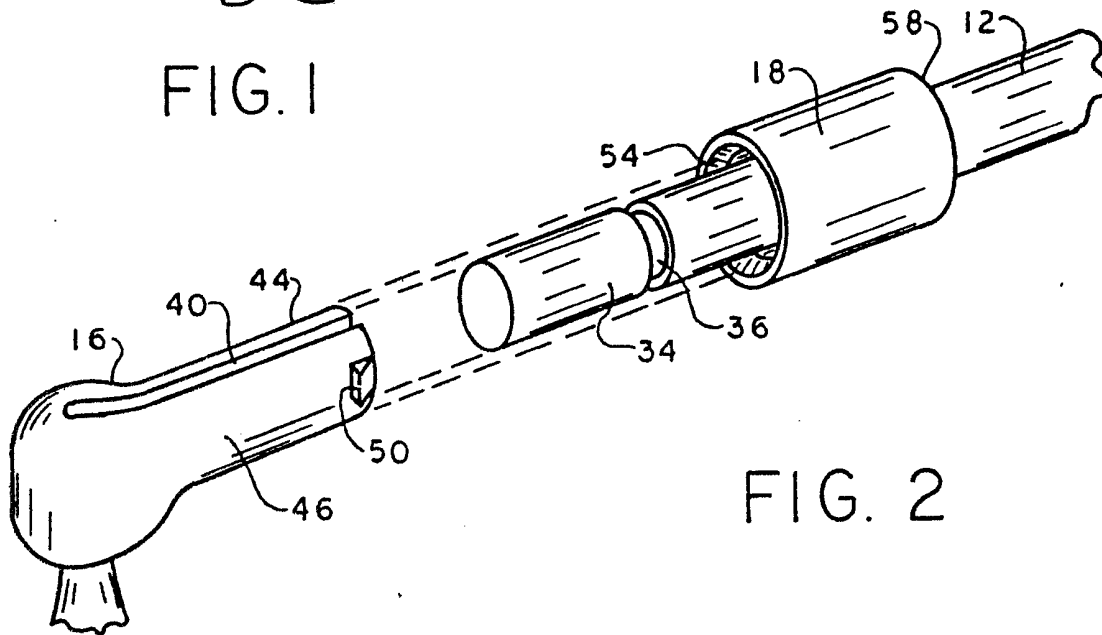


FIG. 2

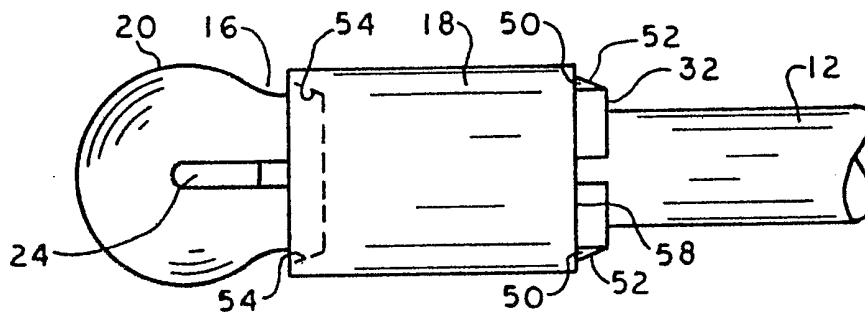


FIG. 3

SPECIFICATION

Swivel connectors

The present invention is generally directed to new and improved swivel connectors and more particularly to swivel connector assemblies for establishing an interconnection between a member to be pivoted and a pivot with little effort.

There are many situations where a member must be mounted for pivotal movement. In such situations, connectors are often utilised for enabling pivotal movement of the member by interconnecting the member to a pivot, such as a pivot ball.

Connectors for these applications generally include a bearing seat or circular recess, which receives and confines the pivot ball while allowing relative pivotal movement between the seat and the ball, and means for capturing and supporting the member to be pivoted. As a result, the member is rendered free to pivot about the pivot ball.

Because connectors of this variety find considerable use in manufacturing applications, it is necessary for the connectors to allow the required pivot connection to be established in a close and cramped environment with little effort by an operator, so as to minimize assembly time and manufacturing cost. However, the connector must also provide a joint connection of extreme integrity to ensure that the joint will be reliable and will not fail during operation.

From the foregoing, it can be appreciated that a swivel connector must be adapted for assembly to the pivot and to the member with little force. However, the connector must require a high force to cause the connection to come apart.

It is therefore an object of the present invention to provide new and improved swivel connectors.

It is a more specific object of the present invention to provide swivel connectors which may be easily assembled to a pivot and to a member to be pivoted, while thereafter maintaining a reliable joint connection.

Although in the majority of uses, a swivel connector requires to permit universal movement, so that the pivot is a ball, this invention can also be embodied in connector assemblies in which the pivotal movement is about one axis only, in which case the pivot is a cylinder or an oblate spheroid.

A swivel connector assembly according to the present invention, for connecting a member to be pivoted to a pivot, comprises: socket means having a bearing seat for confining a pivot therein and an aperture means for receiving and capturing an end portion of the member to be pivoted, said socket means including slot means permitting enlargement of said aperture means and of said bearing seat to enable insertion of the member end portion into said aperture means and insertion of the pivot into said bearing seat; and sleeve means capable of being received over said socket means for clamping said socket means to the member to be pivoted and for confining the pivot within said bearing seat.

The assembly preferably includes socket means having a forward end portion including a generally spherical bearing seat for confining a ball pivot therein and a generally cylindrical rearward end portion having a generally cylindrical inner aperture for receiving one end of a member to be pivoted which includes an annular groove. The aperture includes a lug means for lockingly engaging the annular groove in the member. The socket further includes a slot extending, from a point forward of the centre of the bearing seat, rearwardly, through the rearward end portion, to form a pair of opposed bifurcated socket portions joined by a joining portion, to permit the opposed portions to be radially separated about the joining portion to enlarge the bearing seat and the aperture, for insertion of the pivot ball and one end of the member respectively therein. The assembly further includes a hollow, generally cylindrical sleeve member arranged to be axially slid over the socket rearward end portion, and having an inner diameter substantially equal in dimension to the outer dimension of the socket rearward portion when the member end portion is lockingly received therein, for confining the ball pivot within the bearing seat and clamping the member end portion within the aperture. The socket rearward end portion includes retention means for axially restraining the sleeve on the socket.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by making reference to the following description taken in conjunction with the accompanying drawings, in the several figures of which like reference numerals identify identical elements, and wherein:

Figure 1 is a cross-sectional side view of a swivel connector assembly embodying the present invention, illustrated in assembled relation to a pivot ball and one end of a member to be pivoted;

Figure 2 is an exploded perspective view of the assembly of Figure 1;

Figure 3 is a top plan view of the assembly of Figure 1.

Referring now to Figure 1, a swivel connector 10 is there illustrated in a fully assembled condition, interconnecting and establishing a reliable swivel joint connection between a member 12 to be pivoted and a pivot 14. The connector 10 includes a socket or body 16, and a sleeve 18 capable of being received over a portion of the socket 16.

The socket includes a forward portion 20 having a spherical recess or bearing seat 22 therein. The bearing seat 22 is capable of receiving and confining a correspondingly shaped pivot ball 24 of pivot 14.

The socket 16 further includes a rearward portion 26 which is generally cylindrical in configuration. Within the rearward portion 26 of the socket 16 there is an aperture 28 of generally cylindrical configuration. The aperture 28 extends from a forward wall 30 adjacent the forward

portion 20 to the rearward end 32 of the socket 16.

It may be noted in Figure 1 that the member 12 has one end portion 34 which is capable of being received within the aperture 28. The member 12 includes an annular groove or recess 36 which lockingly engages lugs 38 within the aperture 28. The lugs 38 may comprise an annular ring formation within the aperture 28 or one or more discrete ribs or the like projecting into the aperture from the aperture inner surface. With the lug means 38 lockingly engaging the annular groove 36 of the member 12, the member 12 is restrained against axial movement within the socket 16.

As may be noted in Figure 2, the socket 16 further includes a slot means in the form of a slot 40 which extends through the socket 16 along the longitudinal axis thereof from a point forward of the centre 42 of the bearing seat 22, completely through the aperture 28 and rearward portion 26, and to the rearward end 32 of the socket 16. As a result, the slot 40 forms a pair of opposed bifurcated socket portions 44 and 46.

The socket 16 and sleeve 18 are preferably formed from a plastics material to thereby render the socket and sleeve deformable. By virtue of the slot 40 as above described, the opposed socket portions 44 and 46 are separable radially of the axis of the aperture 28, about joining portion 48, to enable enlargement of the bearing seat 20 and the aperture 28 to allow the pivot ball 24 to be received within the bearing seat 22 and the member end 34 within the aperture 28.

The sleeve 18 is also generally cylindrical in configuration and is hollowed out along its axial length to define an inner diameter dimension. As will be noted in Figure 1, the inner diameter dimension of the sleeve 18 is substantially equal in dimension to the outer dimension of the socket rearward portion 26 when the socket and the member end portion 34 are in assembled relation. The sleeve 18 is received over the rearward portion 26 of the socket 16, and when so received by the socket, it maintains the assembled relation of the assembly. More particularly, when the sleeve 18 is axially slid over the rearward portion 26 of the socket 16, the pivot ball 24 is clamped within the bearing seat 22 for confinement therein, and the end portion 34 of member 12 is securely confined within the aperture 28.

Referring now to Figure 3, it can there be noted that, when the sleeve 18 is received over the socket 16, the sleeve 18 is restrained from axial movement thereon by a retention means which takes the form of a pair of lugs 50. The lugs 50 are at the rearward end 32 of the socket 16 and project radially outwards therefrom. The lugs 50 have a tapered guide surface 52 forming an acute angle with the socket in a forward direction from the rearward end 32. These guide surfaces guide the axial movement of the sleeve 18 over the socket.

In order to ensure smooth operation during the assembly of the connector assembly, the sleeve

18 further includes a tapered or chamfered internal leading surface 54 at its front end. The tapered surface 54 is substantially parallel to the guide surfaces 52 of the lugs 50. As a result, the sleeve 18 will be smoothly guided over the lugs 50 upon its axial displacement to its retained position over the rearward portion 26 of the socket 16 and to its fully assembled condition as illustrated in Figures 1 and 3.

From the foregoing, it can be seen that a swivel connector embodying the present invention is easily assembled to a pivot and to a member to be pivoted, for establishing a reliable pivotal connection therebetween. In assembling the swivel connector, the opposed socket portions 44 and 46 are radially spread apart about the joining portion 48 to enlarge the bearing seat 22. The pivot ball 42 is then inserted through a tapered opening 56 and into the enlarged bearing seat 22. Thereafter, the sleeve 18 is slid onto the member 12 and the opposed socket portions 44 and 46 are once again radially separated about the joining portion 48 to enlarge the aperture 28. After this has been accomplished, the end 34 of the member 12 may be readily received by the aperture 28 with the lugs 38 lockingly engaging the annular groove 36 of the member 12. Finally, the sleeve 18 is slid axially over the rearward portion 26 of the socket 16, with the tapered surface 54 of the sleeve first engaging the guide surfaces 52 of the lugs 50. Axial displacement of the sleeve 18 towards the forward portion 20 of the socket 16 is continued until the rearward edge 58 of the sleeve 18 clears the lugs 52. When this occurs, the lugs 52 will snap into their positions as shown in Figure 3, and the sleeve 18 will be restrained from reverse axial movement upon the socket 16.

By virtue of the inner diameter of the sleeve 18 being substantially equal in dimension to the outer dimension of the rearward portion 26 of the socket 16 when in the assembled condition, as shown in Figures 1 and 3, the member 12 will be securely confined within the aperture 28 and the pivot ball 24 will likewise be confined within the bearing seat 22 but allowed to pivotally move thereon. As a result, assembly of the connector is completed with little effort and in a very short period of time.

115 CLAIMS

1. A swivel connector assembly for connecting a member to be pivoted to a pivot comprising: socket means having a bearing seat for confining a pivot therein and an aperture means for receiving and capturing an end portion of the member to be pivoted, said socket means including slot means permitting enlargement of said aperture means and of said bearing seat to enable insertion of the member end portion into said aperture means and insertion of the pivot into said bearing seat; and sleeve means capable of being received over said socket means for clamping said socket means to the member to be pivoted and for confining the pivot within said bearing seat.

2. An assembly as defined in claim 1, wherein said socket means includes a forward end portion including said bearing seat and a rearward end portion including said aperture means, wherein
 5 said aperture means is straight and extends from adjacent said bearing seat to said rearward end, and wherein said slot means comprises a slot extending through said socket means along the longitudinal axis of said aperture means from a
 10 point forward of the centre of said bearing seat, completely through said aperture means to said rearward end, thus forming opposed bifurcated socket portions joined by a joining portion, said socket portions being separable by movement
 15 about said joining portion in directions radially of said axis to permit said enlargement of said bearing seat and said aperture means.

3. An assembly as defined in claim 2, wherein said rearward end portion of said socket means
 20 includes retention means for axially confining said sleeve means upon said socket.

4. An assembly as defined in claim 3, wherein said retention means comprises lug means projecting radially outwards from said socket
 25 means, said lug means having a tapered guide surface forming an acute angle with the exterior of said socket means in a forward direction from said rearward end, for guiding the axial movement of said sleeve means over said socket.

30 5. An assembly as defined in claim 4, wherein said sleeve means includes a front end having a leading tapered internal surface which is

substantially parallel to said guide surface.

6. An assembly as defined in any of claims 1 to
 35 5, wherein said bearing seat is part-spherical.

7. An assembly as defined in any of claims 1 to 6, wherein said sleeve means is capable of sliding axially of said sleeve, over said socket means.

8. An assembly as defined in any of claims 2 to
 40 6, and a member to be pivoted, wherein said sleeve means has an inner shape and size substantially corresponding to the external shape and size of said rearward end portion, when said member end portion is received and confined
 45 within said aperture means.

9. An assembly and member as defined in claim 8, wherein the exterior of said socket means around said aperture means is cylindrical in shape, wherein the end portion of the member to be
 50 pivoted is generally cylindrical in shape, wherein said sleeve means comprises a hollow cylindrical member, and wherein the inner diameter of said sleeve means is substantially equal in dimension to the outer diameter of said socket when said
 55 member end portion is received and confined within said aperture means.

10. An assembly as defined in claim 9, wherein said member end portion includes an annular groove, and wherein said aperture includes lug
 60 means for lockingly engaging said member groove.

11. An assembly as defined in claim 1, substantially as described with reference to the accompanying drawings.