Sept. 28, 1971 W. LINK 3,608,096

HIP JOINT SOCKET FOR ARTIFICIAL HIPS

Filed Jan. 23, 1970

Fig. 1

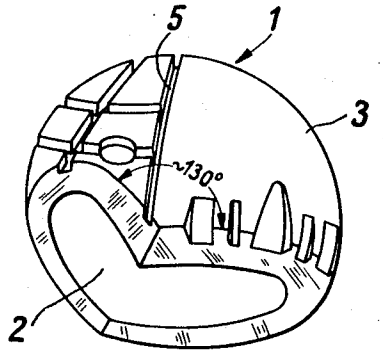
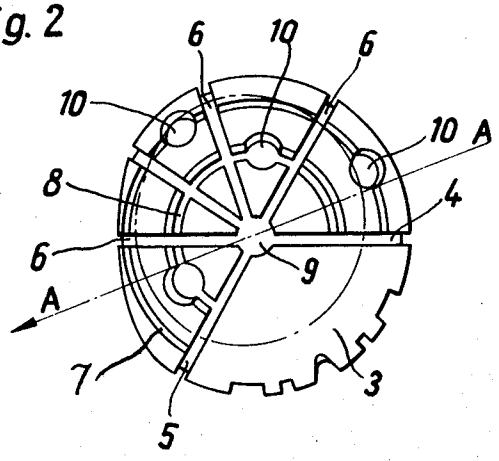


Fig. 2



Inventor:
WALDEMAR LINK
Lowry, Rinehart, Markva & Smith

United States Patent Office 3,608,096 Patented Sept. 28, 1971

3,608,096

HIP JOINT SOCKET FOR ARTIFICIAL HIPS

Waldemar Link, Hamburg, Germany, assignor to Waldemar Link, Hamburg, Germany

Filed Jan. 23, 1970, Ser. No. 5,177
Int. Cl. A61f 1/24, 5/04
U.S. Cl. 3—1 5 Claims

ABSTRACT OF THE DISCLOSURE

A hip joint socket for artificial hips comprises a substantially hemispherical plastic shell in which a likewise substantially hemispherical cavity is provided. The cavity is situated eccentrically in respect to the shell and adapted to accommodate the spherical upper end of an artificial thigh. The free edge of the hip joint socket, owing to an oblique cut made in a portion of the shell, is situated in two planes forming an obtuse angle with each other.

BACKGROUND OF THE INVENTION

This invention relates to a hip joint socket for artificial hips, consisting of a substantially hemispherical plastic shell in which a substantially hemispherical cavity, designed to accommodate the spherical upper end of an artificial thigh, is situated eccentrically in relation to the substantially hemispherical surface of the hip joint socket.

The known hip joint sockets have a hemispherical surface and a hemispherical cavity. They involve the disadvantage of reduced freedom of movement of the leg, by comparison with that available for the thigh of a healthy person. This is due to the fact that when the leg is moved forwards the neck of the artificial thigh is able to make impact with the lower edge of the front side of the hip joint socket cemented into the pelvic bone. In addition, the wearer of the artificial hip joint socket frequently suffers pain.

Attempts have been made to remedy this drawback by making the hip joint socket comparatively small, so that the "head" with the "neck" of the artificial thigh can be rotated further forward until it comes to rest against the edge of the hip joint socket. Such attempts, however, have proved inadequate, since a reduction in the size of the hip joint socket increases the danger of dislocation of the thigh or of the upper end of the prosthesis, the reduced area of the cap resulting in a higher pressure per unit of area on the pelvic bone.

SUMMARY OF THE INVENTION

It is the object of the present invention to provide a hip joint socket for artificial hips which avoids the above-mentioned disadvantage and which affords greater freedom of movement without the danger of dislocation and which will not be so small that the specific pressure on the pelvic bone will exceed an acceptable level.

To attain this object the present invention provides a hip joint socket of the type referred to in which the free edge of the hip joint socket, owing to an oblique cut in a portion of the shell, is situated in two planes forming an obtuse angle with each other.

An obtuse angle of this kind is produced when a lower portion of the edge of a hemispherical shell is subdivided by a cut in a plane of intersection taking an oblique course in respect of the vertical axis of the hemispherical shell. It is true that by the omission of a corresponding sector or edge portion of the hemispherical shell the spherical head of the prosthesis is not embraced on all sides to the same extent. It has been found, however, that if the shell is cemented into a position in which its lateral opening is situated in front, i.e. in the direction in which the wearer walks, there is no risk of dislocation of the aforementioned spherical head, as the latter is mainly moved up and down while the user is walking, greater freedom of movement being nevertheless afforded to the leg. In addition, soft tissues and particularly nerve centers cannot be pressed in or forced against the edge of the shell, in the zone of the emitted sector, during the said walking movement, as occurs, with the resulting pain, in the case of the hip joint socket known hitherto.

This advantageous effect is obtained in particular when the angle between the planes of the free edge of the hemispherical shell is within the range of about 120 to140°. It is true that in principle a smaller angle could be adopted. In this case, however, there is a danger of dislocation. If, on the other hand, the angle is greater then the drawbacks discussed in the foregoing will not be overcome to a sufficient extent.

As experience shows that the hip cap is cemented into the pelvic bone in an inclined position, thte maximum pressure being transmitted from the prosthesis to the upper side of the hip cap, where the thickness of the wall of the cap is at its maximum, owing to the eccentric position of the cavity in relation to the surface, it is of advantage for the edge of the obliquely cut portion to extend from the zone where the wall is thickest into the thin walled zone on the lower side of the shell.

The outside of the cap, i.e. the side which transmits the major portion of the pressure is preferably given a smooth surface. On the other hand, it is desirable for grooves or blind holes to be worked into the outer wall of the cap, as they result in increased firmness when cement is used for securing the cap.

A further version of the invention therefore provides that about one quarter of the outside of the shell has a smooth surface, this portion being situated in the zone of maximum wall thickness.

The provision of blind holes on the outside of the hip joint socket is in itself already known. The known method of providing blind holes, however, has proved unsatisfactory, since when the shell is pressed into the cavity of the pelvic bone, this cavity being coated with cement which is still in a plastic state, air occlusions are left in the blind holes and detract from the adhesive firmness of the cap. The invention enables air occlusions of this kind to be avoided as a result of the fact that the outermost side of the shell is provided, outside the smooth portion of the surface, with grooves preferably arranged in the manner of meridians and parallels of latitude, and also with blind holes which are intersected by a groove.

BRIEF DESCRIPTION OF THE DRAWING

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawing in which:

FIG. 1 is a side view of a hip joint socket according to the invention, and

FIG. 2 is a plan view thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawing shows a hip joint socket which consists of a substantially hemispherical shell **1** the hemispherical surface of which is situated eccentrically in respect of its likewise substantially hemispherical internal cavity **2**, so that the portion of the shell **1** to the right in the front part of the drawing has a greater wall thickness than the portion to the left in the rear part of the drawing.

FIG. 1 shows particularly clearly that the lower free edge of the shell **1**, owing to an oblique cut made in the left-hand portion of the said shell **1**, is situated in two planes which enclose an obtuse angle of about 130°.

The edge of the obliquely cut portion extends from the front zone, of greater wall thickness, into the rear zone, of reduced wall thickness.

Of the outside of the shell **1** the sector **3**, situated to the right and in the front, has a smooth surface. This sector **3** is delimited by two grooves **4** and **5** which, together with further groves **6**, take their course over the shell **1**, in the manner of parallels of longitude, or meridians, and intersect two parallels of latitude **7** and **8**. The parallels of latitude **7** and **8** or these annular grooves are concentric in respect of a blind hole **9** situated in the zenith of the shell **1**. In addition to this blind hole **9**, further blind holes **10** are provided on the surface, each of them being intersected by an annular groove **7** or **8**.

This hip joint socket shown in the drawing is intended for an artificial hip for a left leg. If this artificial hip is inserted in the human body, this is done in such a way that the sector **3** comes to rest with its smooth surface facing upwards, owing to the fact that the shell **1** is tilted about the axis A—A, which more or less corresponds to the direction in which the wearer walks, the cut out sector on the outside of the shell thus assuming the front position according to the said direction.

This enables the thigh of the left leg to be rotated further forward without any danger of compression or impaction of soft tissues or nerve centers on the front edge of the hip cap.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive.

What is claimed is:

1. A hip joint socket for artificial hips, comprising a substantially hemispherical shell having an internal substantially hemispherical open cavity bounded by a free edge, said cavity being situated eccentrically in respect of the substantially hemispherical shell and adapted to accommodate the spherical upper end of an artificial thigh, a portion of said free edge being defined by an oblique cut made in a portion of the shell subdividing said free edge into two parts located in separate planes forming an obtuse angle with each other.

2. A hip joint socket as claimed in claim **1**, wherein the obtuse angle between the planes of the free edge of the hip joint socket is within the range of about 120 to 140°.

3. A hip joint socket as claimed in claim **1**, wherein the free edge of the obliquely cut portion of the shell extends from a zone of maximum wall thickness into a zone of reduced wall thickness.

4. A hip joint socket as claimed in claim **3**, wherein about a quarter of the outside of the shell is provided with a smooth surface, this quarter being situated in the zone of maximum wall thickness.

5. A hip joint socket as claimed in claim **4**, wherein the exterior of the shell remote from said smooth surface is provided with grooves arranged in the manner of meridians, and with parallels of latitude, and also with spaced blind holes which are intersected by said grooves.

References Cited

UNITED STATES PATENTS

2,668,531	2/1954	Haboush	128—92CA
3,528,109	9/1970	Scales	128—92CX

FOREIGN PATENTS

124,585	1/1960	U.S.S.R.

OTHER REFERENCES

"Replacement of Arthritic Hips by the McKee-Farrar Prosthesis" by G. K. McKee, Journal of Bone and Joint Surgery, Vol. 48B, No. 2, May 1966, pp. 245–259.

RICHARD A. GAUDET, Primary Examiner

R. L. FRINKS, Assistant Examiner

U.S. Cl. X.R.

128—92C