The object of the invention is to provide means for obtaining a functional hip which would otherwise be non-functional when the head of the thigh bone was destroyed, impaired, or injured beyond repair, or where injury or disease has destroyed the hip joint and stiffened the latter so that motion is greatly limited, if not impossible; to provide a femoral head prosthesis which, when in position in the neck of the femur, will be retained in position without danger of loosening except under such conditions as would fracture a strong or healthy bone; and to provide an appliance of the kind indicated which is of simple form and therefore, simple of application with ordinary skill on the part of the surgeon.

With this object in view, the invention consists of a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing wherein:

Figure 1 is a side elevational view of the upper part of a femur in which the head or proximal fragment has been removed and replaced with the improved femoral head, the dotted lines indicating the initial position of the parts in placement.

Figure 2 is a view similar to Figure 1 but shows the femoral head finally positioned, the dotted lines indicating the relative positions of the parts;

Figure 3 is an axial sectional view of the improved femoral prosthesis, the keys being shown in extended position;

Figure 4 is a sectional view similar to Figure 3 but with the locking keys in retracted position;

Figure 5 is an elevational view of the key actuator screw;

Figure 6 is an elevational view of the lock screw; and

Figure 7 is an elevational view of one of the locking keys, detached from the device.

In the use of the invention where the head of the femur is pathologically impaired beyond the point where normality can be restored, it is removed and in old injury or disease the socket of the attendant acetabulum is reamed out for the reception of the prosthetic head which is applied into the neck of the femur to replace the head removed therefrom.

The operation of applying the prosthetic head consists of boring the neck of the femur along its axis beyond a straight line passing through the great and lesser trochanters. The bore having been prepared, there is then applied the prosthetic head 10 which is of plastic and stainless steel insert and which is formed with a shank 11, which enters the bore, the lower end of the shank tapering as indicated at 12. The bore, of course, is made with a suitable reamer (or with a drill followed with a reamer), so that there will be a snug fit between the shank 11 and the wall of the bore, the latter, of course, being in the medulla.

But the head must be securely anchored to the femur and to this end the shank 11 is moulded around and has incorporated with it a core 13 which is formed with a longitudinal bore 14, this bore being of a diameter corresponding to and registering with the bore 15 in the lower end of the shank 11.

The shank 11 is formed with lateral slots 16 and the core with lateral slots 17 and adjacent these slots 17, the core carries the locking keys 18 which are pivotally mounted, as indicated at 20. By reason of this arrangement, the key may be swung downwardly to nested positions within the periphery of the core 13, or they may be swung outwardly to engage the medullary cortex, the former position being shown in Figure 4 and the latter in Figure 3.

But the keys must be actuated to extended position and to this end there is provided a screw 19 formed with a pilot 20, the latter engaging the heel ends of the keys when the screw is advanced, the screw threadingly engaging the bore of the core and the pilot moving axially therealong.

A prosthesis is applied, after the preparation of the receiving bore in the neck of the femur, by gently driving on the head with a copped mallet until the shank is fully seated. When this has been accomplished, the screw 19 is advanced and the pilot then engaging the shoulders 21 on the locking keys, will raise the latter, causing them to penetrate or engage the medullary cortex and thus lock the shank and with it the head in the desired position on the femur.

The screw 19 is actuated with an ordinary screw driver of which the bit is inserted in the kerf of the head 22 of the screw.

When the locking keys have been fully advanced, the position of the actuating screw 19 is retained through the instrumentality of a lock screw 23 threadingly engaged with the upper end of the bore of the post.

It will be noted that the core is terminated just short of the dome of the head, thus forming a shoulder on which the head of the set screw 28 may set, with the head of the screw below the femoral head. Thus there is no projecting metallic part. It will also be noted that the operation of setting the locking keys results in their
being raised from a pendant position from their axes to positions normal to the axis of the shank. Thus the slots which they cut in the femur are below them, and the upper edges have firm bearings throughout their lengths within the neck of the femur, thereby providing a firm anchorage to keep the prosthetic head in place.

With the socket of the attendant acetabulum reamed out with a standard cupped reamer or adapted otherwise, the acetabulum is then in condition to receive the new head with the result that a new hip joint is formed. Because of the inertness of the material used in the prosthesis, further bony growth, which would defeat its purpose, is avoided, thus giving an otherwise crippled individual a painless weight-bearing functioning hip.

The invention having been described, what is claimed as new and useful is:

1. Femoral head simulating the natural head of the femur, the same having a shank insertable in a reamed hole formed in the neck of the femur, a plurality of locking members carried in the shank, and shank-enclosed means for advancing said locking members into engagement with the surrounding bone of the femur.

2. A femoral head prosthesis comprising a plastic head simulating the natural head of the femur, the same having a shank insertable in a reamed hole formed in the neck of the femur, the head and shank being formed with an axial bore, a metallic core enclosed by the shank, locking keys having respectively diametrically opposed pivotal mountings, and adjusting means for actuating said keys through slots in the shank in the binding engagement with the medullary cortex of the femur, said adjusting means being accessible through the plastic head but unexposed at any point of the surface thereof.

3. A femoral head prosthesis comprising a plastic head simulating the natural head of the femur, the same having a shank insertable in a reamed hole formed in the neck of the femur, the head and shank being formed with an axial bore, a metallic core enclosed by the shank, locking keys having respectively diametrically opposed pivotal mountings, and normally depending with their free terminals away from the head, an adjusting screw threadingly engaged with the heel ends of the keys to engage them into positions substantially normal to the axis of the shank and core being provided with clearance slots for said keys, and the adjusting screw being wholly within the core so that no portion thereof projects beyond the surface of the head, the screw being actuable through the head.

4. A femoral head prosthesis comprising a head portion simulating the natural head of the femur, the same having a shank insertable in a reamed hole formed in the neck of the femur, a plurality of locking keys mounted within the shank, one part engaging in slots in the neck being engaged with the heel ends of the keys to elevate them through clearance slots in the shank into positions substantially normal with the axis of the shank so as to enter and be anchored in the medullary cortex of the femur, the adjusting screw being wholly contained within the shank so that no part projects beyond the surface of the head through which said screw is accessible.

5. A femoral head prosthesis comprising a head portion simulating the natural head of the femur, the same having a shank insertable in a reamed hole formed in the neck of the femur, a plurality of locking keys mounted within the shank, the keys hanging normally in pendant positions away from the head, an adjusting screw threadingly engaged with an axial bore formed in the shank and having a pilot engageable with the heel ends of the keys to elevate them through clearance slots in the shank into positions substantially normal with the axis of the shank so as to enter and be anchored in the medullary cortex of the femur, the adjusting screw being wholly contained within the shank so that no part projects beyond the surface of the head through which said screw is accessible, the head having a core coaxially incident with the axis of the adjusting screw, and a lock-screw threaded in said bore and having its head bearing on a shoulder therein, the lock-screw when seated being below the surface of said head.

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