

H. A. DOTY.
ARTIFICIAL LIMB.
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1,265,308.

Patented May 7, 1918.

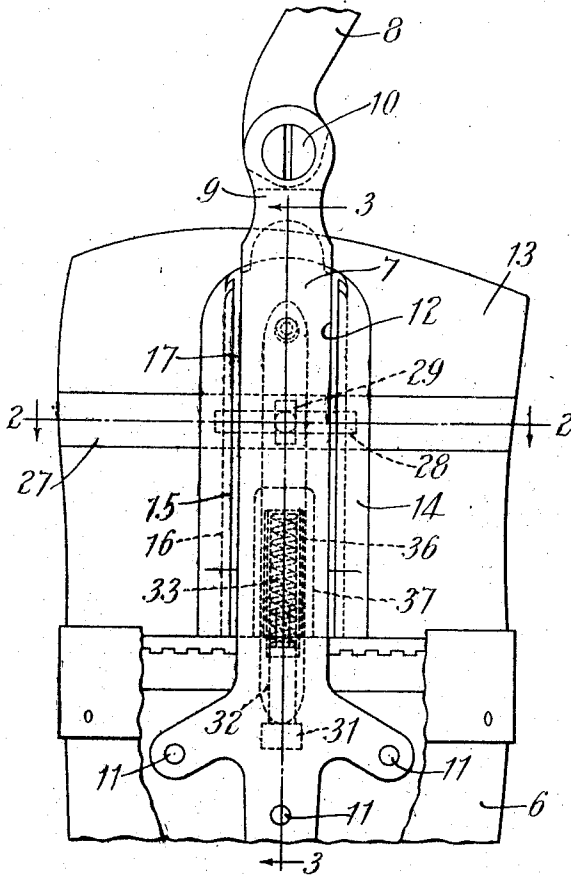


Fig. 1.

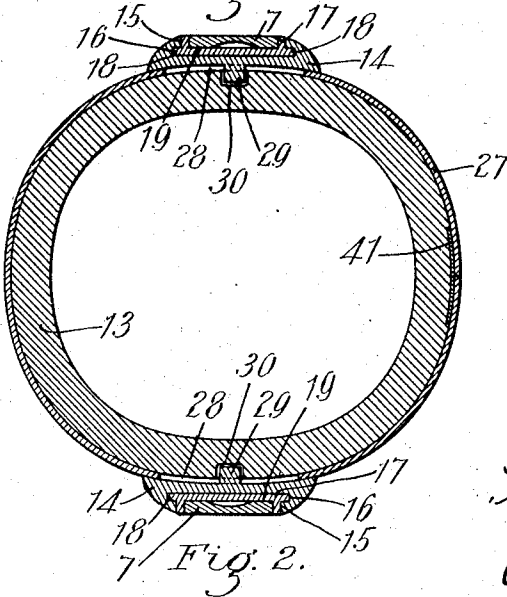


Fig. 2.

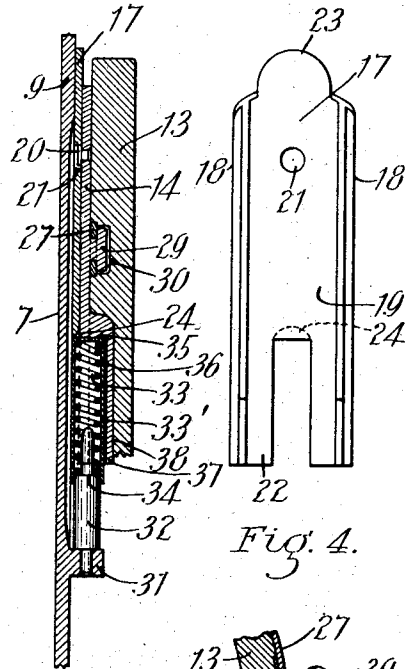


Fig. 3.

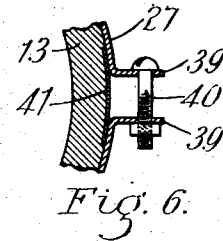


Fig. 4.

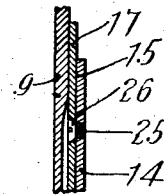


Fig. 5.

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UNITED STATES PATENT OFFICE.

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ARTIFICIAL LIMB.

1,265,308.

Specification of Letters Patent.

Patented May 7, 1918.

Application filed November 9, 1916. Serial No. 130,338.

To all whom it may concern:

Be it known that I, HUBERT A. DOTY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Artificial Limbs, of which the following is a specification.

This invention relates to improvements in artificial limbs and more particularly to the type of limb known as the slip socket limb, and is an improvement over the limb disclosed in the Patent No. 1,134,185, granted to me April 6, 1915.

The object of the invention is principally to provide a very strong limb in which the slip socket will be firmly guided during its slipping movement and at the same time be absolutely noiseless in its operation.

Another object of the invention is to provide means for detachably securing the linings for the socket in place in such a manner that when worn these members may be easily removed and replaced by others.

The invention consists in the combinations and arrangement of parts set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings:

Figure 1 is a side elevation of the slip socket portion of an artificial limb, portions thereof being broken away to save space in the drawing.

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1.

Fig. 4 is a detail side elevation of the lining or bearing member for the stump or slip socket.

Fig. 5 is a vertical section, illustrating another method of detachably securing the lining or bearing members to the plate of the slip socket.

Fig. 6 is a section taken substantially on the line 2—2 of Fig. 1, illustrating the preferred method of fastening the band to the socket.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 6 is the lower member of the limb and has attached to opposite sides thereof hinge members 7. The hinge members referred to each embodies in its construction an upper member 8 and a lower member 9 pivotally connected together at

10. The upper hinge member 8 is attached to the upper portion of the limb or what is known as the thigh portion, not shown. The lower section 9 of the hinge member 7 is secured directly to the lower member 6 of the limb, preferably by rivets 11, 11.

Between the pivot 10 and the portion of the member 9 which is attached to the lower member 6 is a relatively straight portion 12. A stump socket, or what has been referred to as a slip socket 13, is arranged between the straight portions 12 or the hinge members 7, projecting into the lower member 6 but slidable vertically relatively thereto.

In order to provide a limb which will produce the greatest comfort to the wearer, it is essential that the stump socket 13 be positively guided during its slipping or vertical movements, in such a manner that no cramping of the same will result and there must not be any noise between the moving parts thereof.

To accomplish this result I employ plates 14, preferably formed of metal, such, for instance, as aluminum, which is very light and tough, and similar to the plate employed in the limb embodied in the patent above referred to. One of the plates 14 is attached to each side of the stump socket 13 and adjacent to the straight portions 12 of the hinge members 7.

A groove 15 is provided in the outer face of each plate 14 adjacent to the member 7, said groove being substantially larger than the member 7 and having longitudinal recesses 16 along opposite sides thereof. A lining 17 constructed of suitable material is arranged within the groove 15, said lining having tongues 18, 18 adapted to occupy the recesses 16. This lining is preferably formed of paper fiber and has a groove 19 in its outer face adapted to substantially receive the straight portion 12 of the hinge member adjacent thereto, permitting a longitudinal relative movement between said hinge member and said lining.

The groove 15 has open ends, permitting the lining to be inserted at either end of the plate 14. Said lining furthermore is arranged, due to the groove 19, to engage three sides of the hinge member 7 so that when the plate 14 is in position against the hinge member with said hinge member lying in the groove 19 of said lining, it would be

impossible for said plate to move transversely of said hinge member but will be permitted to move longitudinally thereof.

The lining 17 is preferably detachably secured within the plate 14 by means of a stud 20 arranged at the bottom of the groove 15 and central relatively thereto. This stud is adapted to project into a recess 21 formed in the lining 19 and being less in height than the thickness of said lining at the point where the recess is positioned, said lining will be permitted to wear away until the utility thereof is impaired without interfering with the stud.

The portion of the lining containing the recess 21 is comparatively thin and slightly resilient, permitting the central portion of said lining to be deflected a distance sufficient to clear the projecting portion of the stud 20 when it is desired to remove the lining from the plate 14.

To insert the lining in said plate all that is necessary is to insert the end 22 of said lining in the groove 15 first and by applying pressure to the end 23 thereof a slight bevel 24 on the under side of said lining will automatically deflect the same when it strikes the stud 20 and said stud will hold said lining deflected until the recess 21 in said lining aligns with said stud, whereupon said lining will spring back into place and the stud referred to will hold the same in such a position.

Another method of securing the lining in place within the plate 14 is illustrated in Fig. 5. This form embodies a screw 25 having a countersunk head 26 which rests in a corresponding hole 27 in the lining 17. The screw 25 has screw threaded engagement with the plate 14. In this form when it is desired to remove the lining 17 from the plate the screw 25 must first be removed after which said lining may be withdrawn from the end of the groove 15.

Another feature of this invention embodies means for securing the plates 14 to the stump socket 13 and for reinforcing the socket to prevent splitting, this consists of a metal band 27 disposed circumferentially of the stump socket 13 and preferably embedded within said socket. Said band has two circumferentially disposed slots 28, 28 disposed on opposite sides of said stump socket adjacent to the positions to be occupied by the plates 14.

Upon the inner face of each plate 14 is a stud 29 preferably T-shaped, which is in width equal to the width of the slot 28. The length of the head of the stud 29 is, however, much longer than the slot 28 is wide so that when said stud is inserted within the slot, the narrow dimension of the head coincides with the width of said slot. The stud 29 together with said plate, after the stud has been inserted, is turned at right angles, whereupon said stud

will interlock with said band and be prevented from being withdrawn from said band.

The slots 28 are long enough to permit a limited circumferential movement of said band during the tightening and securing of said band upon said socket. A recess 30 is provided at each side of the socket 13 at the rear of the slot 28 to receive the head of the stud 29.

Upon the face of each of the hinge members 7, which is directed against the stump socket 13, is a lug 31 having a pin 32 attached thereto, which pin constitutes a support for a helical spring 33. One end of said spring seats against a shoulder 34 formed on said pin; the other end of said spring engages the closed end of a sleeve 33' which incloses said spring and also engages a shoulder 35 on the plate 14.

A recess 36 is formed in the plate to receive said sleeve, and in order to form said recess a portion of the back of said plate is offset at 37. To permit the plate 14 to rest closely against the side of the stump socket 13 a depression must be provided to receive the enlarged or offset portion 37 and this depression, which is shown in Fig. 3 at 38, assists in positioning the plate relatively to said stump socket.

The band 27 must be attached to the plates 14 before the plates are attached to the stump socket for the reason that the offset or projecting portions 37 of said plates must enter their depressions and thereby be prevented from being turned. After this has been done the ends of said band may be drawn together and secured in any suitable manner, such as by soldering or the like.

The preferred method, however, of accomplishing this result consists in bending the ends of the band 27 outwardly, as at 39, 39, see Fig. 6, then in drilling through said ends and inserting a bolt 40 through the holes so drilled. A short strip of metal 41, similar to the metal constituting the band 27, is placed beneath the ends of said band across the gap between said ends.

The bolt 40 is then rotated so as to draw the portions 39, 39 together or at least until the band fits the socket tightly. After this has been done, the ends of the band are soldered to the strip 41 and the portions 39, 39 severed from the strip.

The construction hereinbefore specifically described is such that the stump socket 13 may be permitted to slide up and down on the straight portions 12 of the hinge members 7 each time the members 8 and 9 are moved relatively to each other, such movement occurring when the knee of the person wearing the limb is bent.

The springs 33 which are arranged upon opposite sides of the socket 13 yieldingly retain the socket in contact with the stump at all times. To remove the detachable linings

from the plates 14 the stump is removed from the stump socket and the stump socket moved upwardly relatively to the hinge members 7 until entirely free from said members. The back of the lining 17 may then be deflected to move the same from the stud 20, after which said lining may be withdrawn from the plate and a new lining inserted in place thereof.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. An artificial limb having, in combination, a lower member, hinge members connected with said lower member, a stump socket arranged to slide between said hinge members, metal plates secured to said stump socket adjacent to each of said hinge members, said plates having oppositely disposed grooves formed in the outer faces thereof, a lining formed of fiber having tongues constructed and arranged to fit the grooves in said plates each of said linings having a groove adapted to receive the hinge member adjacent thereto, and means for detachably securing said linings in their respective plates.

2. An artificial limb having, in combination, a lower member, hinge members connected with said lower member, a stump socket mounted upon said lower member between said hinge members, guide plates constructed and arranged to slide on said hinge members, a band surrounding said stump socket, said band having circumferentially disposed slots therein adjacent to each of said hinge members, and means on said plates constructed and arranged to interlock with said band within said slots and secure said plates to said stump socket.

3. In an artificial limb a hinge member, a

stump socket movable longitudinally of said hinge member, a plate attached to said stump socket, said plate having a recess adapted to receive a portion of said hinge member, opposite edges of said recess being grooved, a lining arranged in said recess between said hinge member and said plate, tongues disposed along opposite edges of said lining, adapted to fit the grooves in said plate and prevent a lateral movement of said lining relatively to said plate, and means for detachably securing said lining in said plate, whereby a longitudinal relative movement between said lining and said plate will be prevented.

4. In an artificial limb a hinge member, a stump socket movable longitudinally of said hinge member and said plate, tongues dis-socket, said plate having a recess adapted to receive a portion of said hinge member, opposite edges of said recess being grooved, a lining arranged in said recess between said hinge member and said plate, tongues disposed along opposite edges of said lining, adapted to fit the grooves in said plate and prevent a lateral movement of said lining relatively to said plate, the portion of said lining between the bottom of said recess and the adjacent portion of said hinge member being resilient and provided with a hole therein, and a projection on said plate adapted to enter said hole upon the insertion of said lining in said plate and to detachably secure said lining to said plate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HUBERT A. DOTY.

Witnesses:

SYDNEY E. TAFT,

HATTIE E. STRATTON.