

W. H. MANNING.
ARTIFICIAL LIMB.

APPLICATION FILED MAR. 18, 1908. RENEWED MAR. 11, 1911.

1,005,254.

Patented Oct. 10, 1911.

2 SHEETS-SHEET 1.

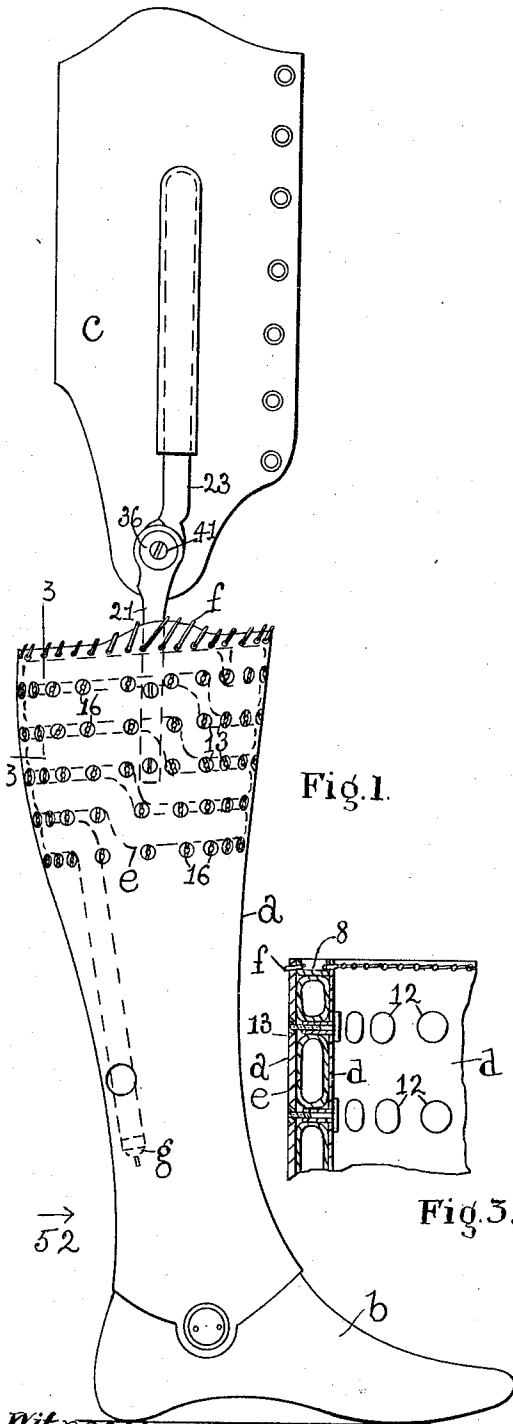


Fig. 1.

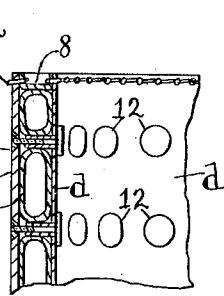


Fig. 3.

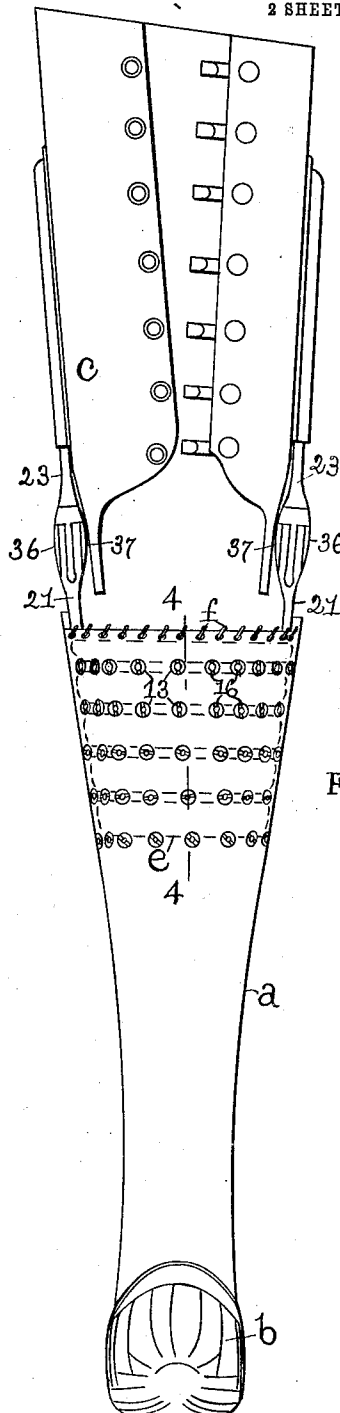


Fig. 2.

Witnesses:
C. B. Gannett,
J. Murphy

Inventor:
William H. Manning
by Jas. H. Churchill
att.

W. H. MANNING.
ARTIFICIAL LIMB.

APPLICATION FILED MAR. 18, 1908. RENEWED MAR. 11, 1911.

1,005,254.

Patented Oct. 10, 1911.

2 SHEETS—SHEET 2.

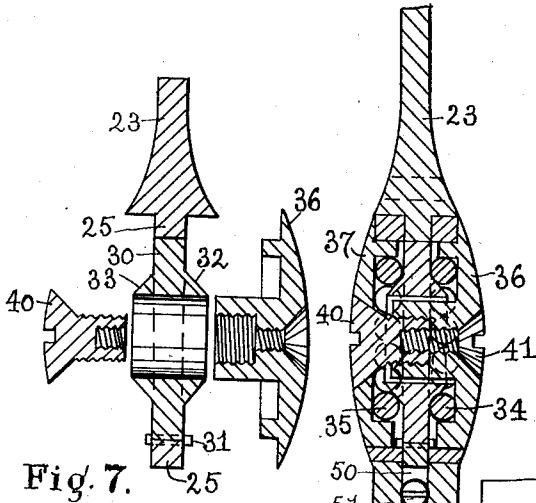


Fig. 7.

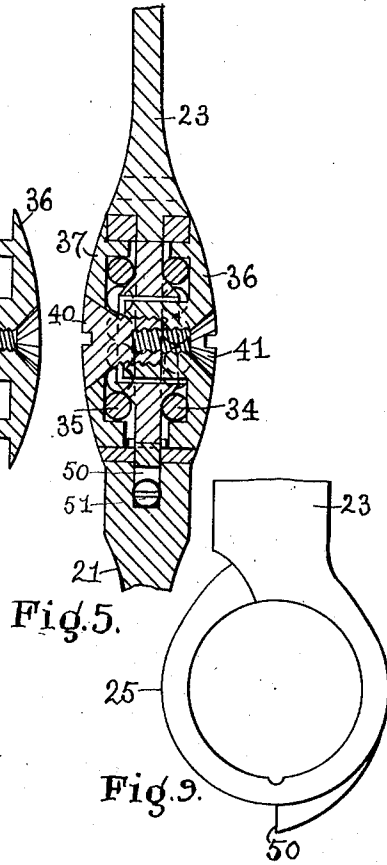


Fig. 5.

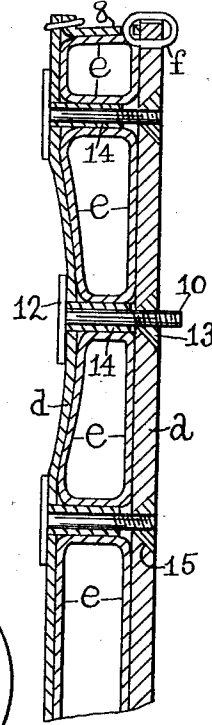


Fig. 4.

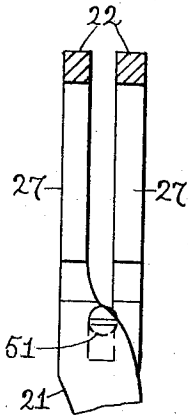


Fig. 8.

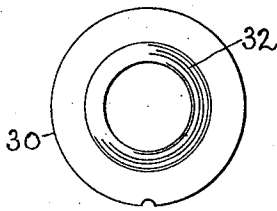


Fig. 11.

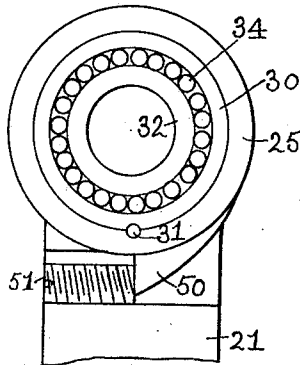


Fig. 10.

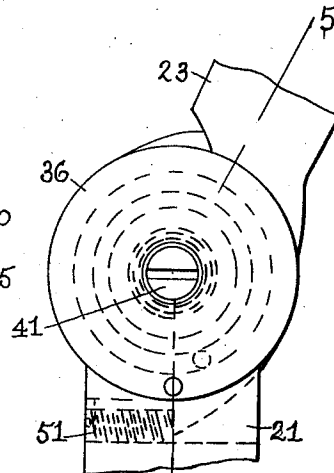


Fig. 6.

Witnesses.
C. H. Gannett
J. Murphy

Inventor.
William H. Manning
By Jas. H. Churchill
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM H. MANNING, OF MALDEN, MASSACHUSETTS.

ARTIFICIAL LIMB.

1,005,254.

Specification of Letters Patent.

Patented Oct. 10, 1911.

Application filed March 18, 1908, Serial No. 421,892. Renewed March 11, 1911. Serial No. 613,849.

To all whom it may concern:

Be it known that I, WILLIAM H. MANNING, a citizen of the United States, residing in Malden, county of Middlesex, and State of Massachusetts, have invented an Improvement in Artificial Limbs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to artificial limbs of that class in which a pneumatic cushion for the stump of the amputated limb is provided, and has for its object to provide means for adjusting the pneumatic or other fluid cushion at individual points, so that the stump may be relieved of pressure at a sensitive point, without interfering with or diminishing the cushioning effect upon the remaining or more sensitive parts of the limb.

The invention further has for its object to provide for effecting the regulation of the pressure from outside the artificial limb, so that the sensitive part of the stump may be relieved from pressure while the artificial limb is in use.

Another feature of the invention consists in a novel construction of hinge joint between the parts of the artificial limb to facilitate freedom of movement, as will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation of an artificial limb embodying this invention. Fig. 2, a front elevation of the limb shown in Fig. 1. Fig. 3, a sectional detail to be referred to, the section being taken on the line 3—3, Fig. 1. Fig. 4, a detail on an enlarged scale, taken on the line 4—4 of Fig. 2, Figs. 5 and 6, enlarged details to be referred to. Fig. 5 being a section on the line 5—5, Fig. 6. Figs. 7 and 8, sectional details of parts shown in Fig. 5, and Figs. 9, 10 and 11, details to be referred to.

In the present instance I have shown the invention as embodied in an artificial leg comprising the leg portion *a*, a foot portion *b* and thigh portion *c*. The leg and foot portions *a*, *b* may be made of metal, wood or other suitable material, while the thigh portion *c* may be of leather or other suitable material. The leg portion *a* is provided

within it with a hollow fluid-tight receptacle, which is herein shown as a rubber tube *e* closed at its opposite ends and arranged about the upper part of the leg portion *a* in layers or coils, herein shown as five in number, but which may be of any desired number according to the length of the stump, and which form a cushioned socket or pocket for said stump. The cushioned socket or pocket may and preferably will be covered by a lining *d* of leather or other suitable material, which is located within the leg portion or casing *a* and is secured at its upper end to an annular ring *8* of leather, which in turn is fastened to the casing or shell *a* by stitches *f* or otherwise (see Fig. 4), thereby closing the space between the lining *d* and the casing or shell *a* at its top.

The hollow receptacle forming the cushion for the stump of the limb, may and preferably will be filled with air under pressure, which may be forced into the receptacle by a pump (not shown), but which is coupled to the end of the tube *e* provided with a valve *g* similar to the valve of a bicycle tube.

Provision is made for relieving a sensitive part of the stump from the pressure of the air cushion, and in the present instance, I have shown one construction of device for accomplishing this purpose. To this end, I have provided a plurality of adjusting devices, shown as bolts 10 having substantially flat heads 12 and nuts 13, which engage the threaded ends of the bolts. These devices or bolts as herein shown are arranged about the shell or casing *a* and within the same so that they form a plurality of annular rows which are interposed between the coils of the tube *e*, and serve as supports for said coils, as clearly shown in Figs. 1, 3 and 4. I prefer to provide the bolts 10 with sleeves 14 of rubber or like material to prevent chafing of the rubber coils on the bolts. I also prefer to have the heads 12 of the bolts located within the leg or casing *a* and the nuts 13 located in countersunk sockets 15 in the outer surface of said casing (see Fig. 4), so that, the said nuts are accessible for adjustment when the artificial leg is on the wearer.

The adjusting device or bolt is extended through a suitable hole in the lining *d*, and the head of the bolt engages said lining, so that by turning the nut 13, for which purpose the latter may be provided with a suitable slot 16 for the reception of a key or tool,

the bolt is moved outward as represented in Fig. 4, thereby causing its head 12 to draw or move with it the portion of the lining with which the said head is engaged, toward the casing *a* and out of line with adjacent portions of the lining, so as to enlarge the pocket or socket at that particular point and thus relieve a sensitive part or point of the stump of the limb from pressure, while leaving the other non-sensitive parts of said stump in contact with and supported by the lining and the yielding cushion behind it.

By providing a plurality of adjusting devices which are distributed about the artificial limb as may be desired, the yielding cushion may be adjusted so as to press only upon those parts of the stump which can stand the pressure without pain or inconvenience, while affording a firm but yielding support for the stump of the limb.

In operation, the cushion may be filled with air or other fluid under pressure, until the lining fits snugly the stump of the limb, so as to firmly but yieldingly support the same, and then if any particular part or parts of the limb should be so sensitive as to occasion pain, the pressure upon said part or parts may be relieved as above described.

I have herein shown one form of fluid receptacle for forming the cushioned socket for the stump of the limb, but I do not desire to limit my invention to the particular construction shown.

In practice the stump of the limb may and preferably will have fitted over it a covering of kid or other soft material, which serves to prevent contact with the heads of the bolts or if desired, the heads of the bolts may be covered by a supplementary lining of soft leather or other material.

I may prefer the form of adjusting device herein shown, but I do not desire to limit my invention in this respect.

Another feature of the invention consists in a novel joint between the leg *a* and the thigh portion *c* of the artificial limb, whereby the leg may be swung with the least possible force or exertion. To this end, the leg portion *a* has secured to its opposite sides metal bars 21, which are provided with forked arms 22 at their upper ends, and the thigh portion *c* has secured to its opposite sides metal bars 23, which are designed to be connected with the side bars 21 of the leg portion by a joint provided with ball bearings and inasmuch as both joints are alike, a detailed description of but one will suffice.

Referring to Figs. 5 to 10, the side bar 23 is provided at its end with a circular portion or ring 25, which is designed to be extended between the forked arms 22 of the side bar 21, said arms being provided with circular openings 27, with which the circular opening in the ring 25 is designed to register.

The circular opening in the ring 25 has fitted into it a disk or plate 30, which is secured therein against rotary movement by a key 31 and is provided on its opposite sides with cones 32, 33, with which cooperate balls 34, 35, carried by caps or side plates 36, 37, which are secured to the arms 22 by a double screw comprising a member 40 having an externally threaded shank to engage a threaded socket in a hub or boss on the inner side of the cap 36, and provided with a threaded socket which is engaged by the threaded shank of the member 41. By turning the screw 40, the ball bearings may be adjusted to their cones so as to obtain the desired freedom of movement, and when properly adjusted the parts are locked by turning up the screw 41. Provision is made for permitting the leg portion to swing freely in one direction and to prevent it turning in the opposite direction beyond a predetermined point, which result may be accomplished as herein shown by providing a lug or projection 50 on the ring 25, which cooperates with a screw 51 carried by the side bar 21 between the forked rings or arms 22. By regulating the screw 51 the leg portion is arrested in its forward movement in the direction indicated by the arrow 52, Fig. 1, with the leg portion in line with the thigh portion.

Claims:

1. In an artificial limb, in combination, a hollow casing, a lining within the same, a fluid receptacle interposed between said lining and casing, a plurality of bolts having heads to engage said lining and provided with threaded shanks extended through said casing, and nuts to engage the threaded shanks and accessible from outside of said casing, substantially as described.

2. In an artificial limb, in combination, a hollow casing, a fluid receptacle within the same, and means for varying the pressure of the fluid receptacle at a plurality of points without varying the volume of the fluid within the receptacle, substantially as described.

3. In an artificial limb, in combination, a hollow casing, a fluid receptacle within the same, and means accessible from outside of the casing for varying the pressure of the fluid receptacle at a plurality of points without varying the volume of the fluid within the receptacle, substantially as described.

4. In an artificial limb, in combination, a leg portion, a thigh portion, side bars connected with said portions, forked arms or rings attached to one side bar and cooperating with an interposed ring attached to the other side bar, a disk secured to the interposed ring and provided on its opposite sides with cones, caps or plates cooperating with the forked arms or rings, balls carried by said caps or plates and cooperating with

said cones, and a double screw to connect said caps or plates together, substantially as described.

5 5. In an artificial limb, in combination, a leg portion, a thigh portion, side bars connected with said portions, forked arms or rings attached to one side bar and cooperating with an interposed ring attached to the other side bar, a disk secured to the interposed ring and provided on its opposite sides with cones, caps or plates cooperating with the forked arms or rings, balls carried by said caps or plates and cooperating with said cones, a double screw to connect said caps or plates together, a lug on the interposed ring, and a screw cooperating with said lug, for the purpose specified.

10 6. In an artificial limb, in combination, a hollow casing, a lining within the same, a fluid receptacle interposed between said lining and casing, and a plurality of devices extended through the said lining and accessible from outside of said casing to vary the position of some parts of the lining with relation to other parts, and thus vary the pressure of the fluid receptacle upon different parts of the limb within the casing, substantially as described.

7. In an artificial limb, in combination, a hollow casing, a lining within the same, a fluid receptacle interposed between said lining and casing, and consisting of a tube arranged in coils, a plurality of bolts interposed between said coils and provided with heads to engage said lining, and nuts to engage the shanks of said bolts and accessible from outside of said casing, substantially as described.

8. In an artificial limb, in combination, a hollow casing, a lining within the same, a fluid receptacle interposed between said lining and casing, and consisting of a tube arranged in coils, a plurality of bolts interposed between said coils and provided with heads to engage said lining, nuts to engage the shanks of said bolts and accessible from outside of said casing, and sleeves upon said shanks to engage adjacent coils of said tube, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. MANNING.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.