(No Model.)

M. B. DONALDSON & W. KESPOHL.

ARTIFICIAL LIMB.

No. 602,386. Patented Apr. 12, 1898.

Fig. 1.

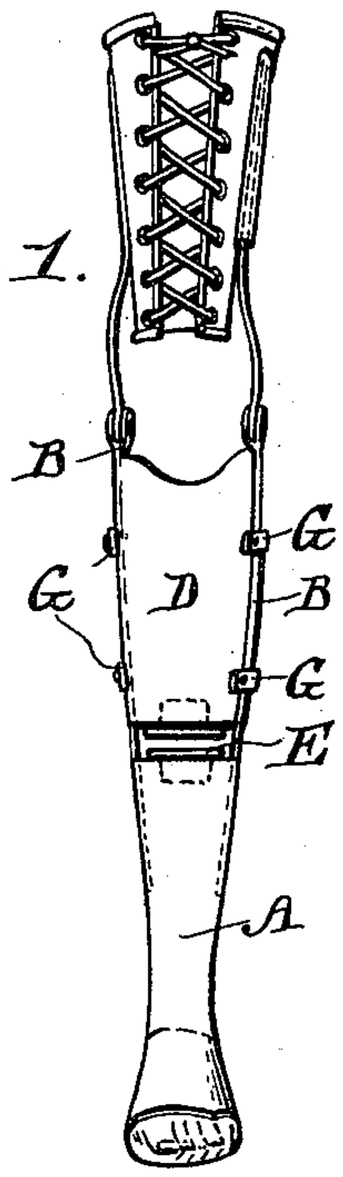


Fig. 2.

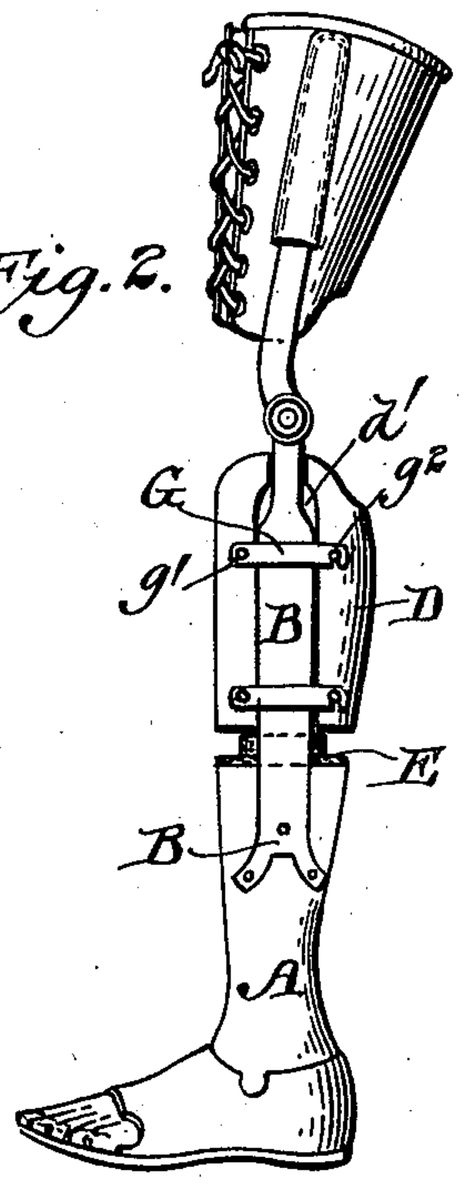


Fig. 3.

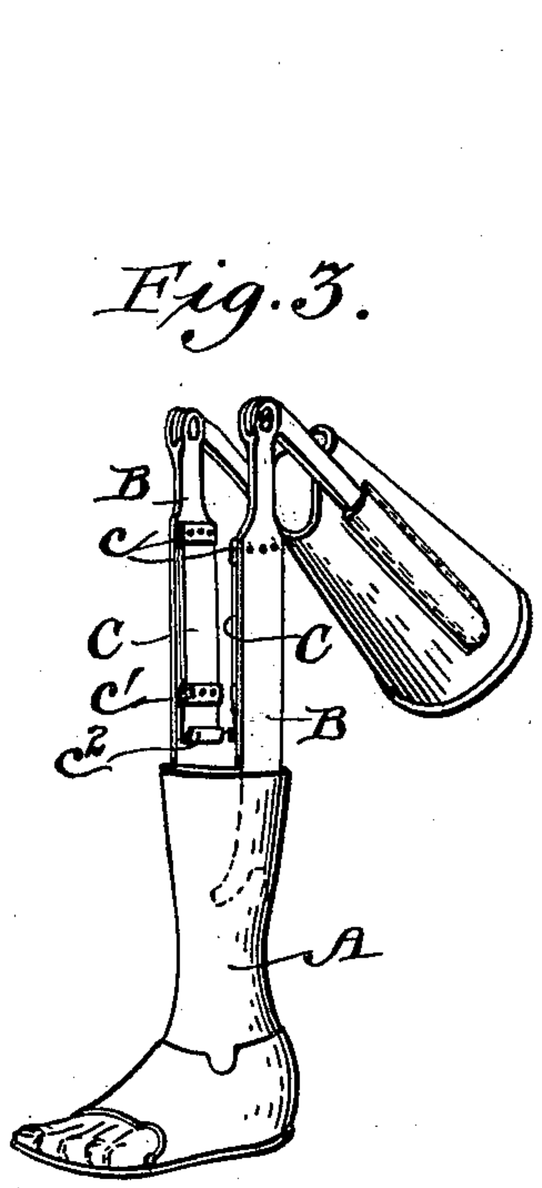


Fig. 4.

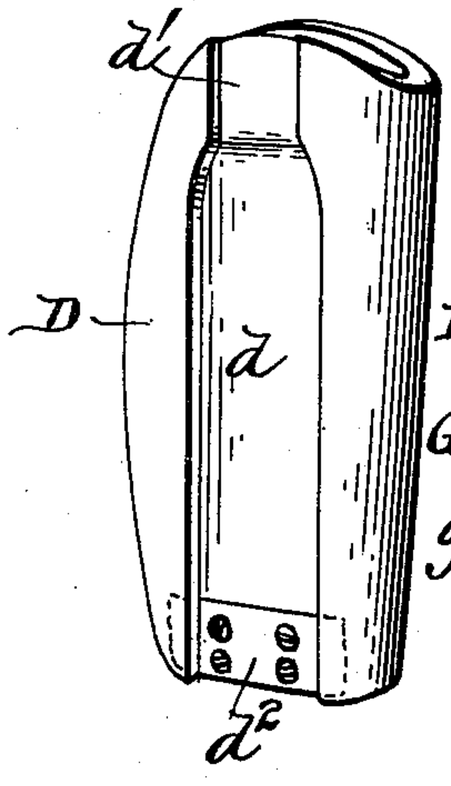


Fig. 5.

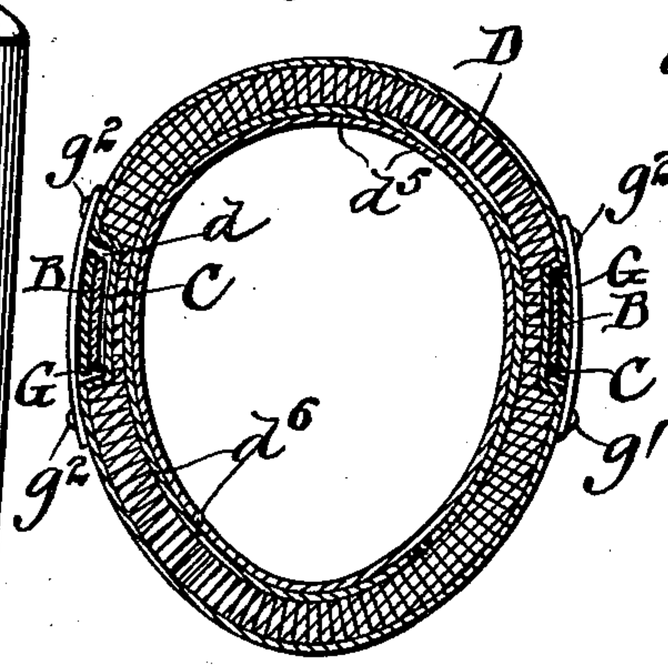


Fig. 6.

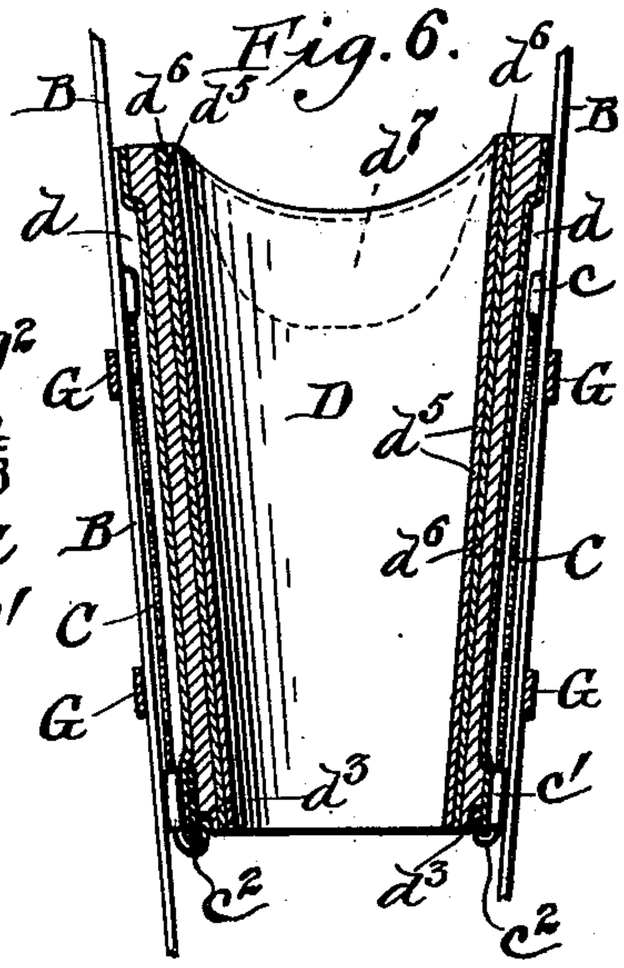
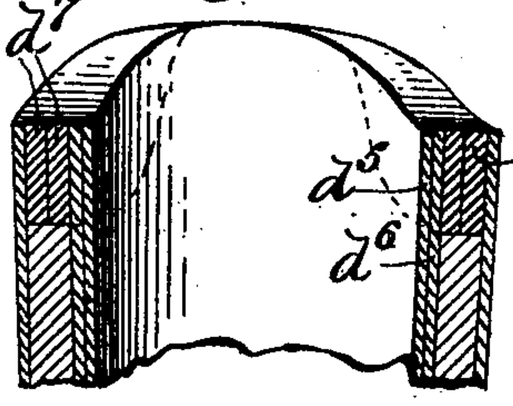


Fig. 7.



WITNESSES

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MARTIN B. DONALDSON AND WILLIAM KESPOHL, OF DULUTH, MINNESOTA.

ARTIFICIAL LIMB.

SPECIFICATION forming part of Letters Patent No. 602,386, dated April 12, 1898.

Application filed October 16, 1897. Serial No. 655,412. (No model.)

To all whom it may concern:

Be it known that we, MARTIN B. DONALDSON and WILLIAM KESPOHL, citizens of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Artificial Limbs; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in artificial limbs, and has for its object the providing of an elastic support for the lower limb which will be fully protected from abrasion by contact with the clothing and the provision of retaining means to keep the rigid side straps from buckling outward.

It consists in constructing in the sides of said lower limb recesses of sufficient depth to accommodate the elastic suspension-straps and the rigid supporting-straps, said supporting-straps being substantially flush with the face of said limb and said suspension-straps being contained in said recesses between the bottom of said recesses and the interior faces of said supporting-straps.

It also consists of certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 represents a front elevation of our said artificial leg, the suspending-straps being concealed. Fig. 2 represents a side elevation of the same under the same conditions as in Fig. 1. Fig. 3 represents a perspective view of our said artificial leg with the socket of the lower limb removed, showing the suspending-strap in place on one side. Fig. 4 shows the socket of the lower limb in perspective. Fig. 5 represents a transverse section through the center of the socket of the lower limb and the suspending-straps and supporting-straps. Fig. 6 represents a vertical section through said socket, suspending-straps, fastenings, and supporting-straps; and Fig. 7 represents a detail vertical section of the said socket, showing the leather pads against which the wooden pieces abut.

In the drawings, A represents the lower portion of a lower limb.

B represents rigid supporting-straps secured to said lower portion A in any suitable fixed manner and substantially flush with the surface of A.

C is an elastic suspending-strap secured to the inner face of B at *c* and free at the lower end. The elastic portion C preferably has a metal binding at its upper edge where it is secured to the supporting-strap B. Said elastic portion C also has a metal binding *c'* about its lower edge, the edge of which lower binding turns inward and upward to form a seat c^2 and clutch, upon which a socket D is supported.

D is a socket portion for the lower limb, having a recess *d* with a contracted upper portion *d'* and a metal footing d^2, which metal footing extends into the body portion of said socket on either side. Beneath said metal footing of said recess there is a secondary recess or alcove d^3, which receives the upwardly-turned flange of the foot-binding of said suspending-strap, the construction being such that when said socket is placed in position between said side straps B the suspending-straps C will lie in the recess *d* and the upwardly-turned flange *c'* will engage the recess d^3 and extensibly support said socket D. The metal straps B on either side project beyond said recesses vertically and upward through the contracted neck of said recesses, substantially as shown, the face of said straps B B being substantially flush with the surface of said sockets and lower portion of said lower limb.

A cushion-plate E is secured in any suitable manner across the hollow portion and wall of lower portion A at the top thereof to keep substances from collecting in the said hollow portion and to cushion the socket D when the same descends upon said lower portion A by the influence of added weight or jarring. The said cushion E is preferably constructed of rubber or felt and may, if desired, be hollow and inflated. A similar plate or cushion is removably constructed or secured across the bottom of socket D to keep drafts from reaching the stump of the limb and also to more effectively cushion said

socket. To prevent any danger of the side straps B buckling outward under severe strain, we provide lateral straps or clasps pivotally secured to the body portion of the socket D at g' and having a hook at the free end which clasps over a suitable stud g^2, said straps G being of any desired number and material and crossing laterally over said vertical straps B B and holding the same in a rigid vertical position. When it is desired to remove said socket from the other portions of the limb, the straps G are disengaged from the studs g^2 and swing upward or downward so as to clear said straps B B. A slight spring of the straps B then permits of the sockets being lifted upward and outward and freed from the main portion of the artificial limb.

The recess d is of sufficient depth and of such contour, as indicated by the drawings, as to permit of the stretching therein of straps C without abrasion or interference, and said straps C C are fully protected from interference by clothes or other articles or impairment through dampness or perspiration and are noiseless and efficient.

The socket D is constructed as follows: A cast is made in plaster of the stump of the amputated limb. Over said cast is molded and sewed a wall of leather d^5, which is kept wet during the operation. A wall of rawhide d^6 is next molded, stretched, and glued over said wall of leather, said rawhide being kept damp during the operation. Caps of leather d^7 are then glued to said rawhide on the front and rear faces of said sockets to form stops for the wooden strips incorporated in said socket. Strips of wood approximately V-shaped or triangular in cross-section are then cut on their sharper edges to conform to the contour of the exposed rawhide and laid vertically side by side with their narrower edges turned inward and glued to said rawhide and to each other, their upper ends abutting against caps d^7, which caps d^7 do not entirely surround said socket. The surfaces of said strips are then shaped to conform to the desired general contour of said socket, and the recesses $d\,d$ and d^3 are then cut into the sides thereof, and the footing-plate d^2 is inserted and secured. The whole surface of said socket is then painted with glue and wet rawhide is molded over it and glued fast, said rawhide conforming to the contour of said socket and recess d and is pressed into said recess d by molding-blocks, which are held in position by a vise until the socket is dry, after which the plaster cast is bored out or otherwise removed, and the socket is rubbed down and shellacked and the cushion-plates and lateral retaining-straps affixed. The lower portion A of said limb is formed of an integral piece of wood hollowed out to effect lightness. Recesses are formed in the sides thereof to receive the lower ends of straps B B, which straps at their extreme ends are forked, and which forked portions are received in forked divisions of said recesses, and said straps are secured to said lower portion by rivets or other means through said forked ends and through the lower portion of the main shaft thereof. Rawhide is then molded to and glued about said lower portion A of said limb.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an artificial limb, the combination with a suitable lower supporting portion, of rigid side straps secured to said lower portion, a socket adapted to be suspended between said straps for supporting the stump, the said socket being provided with recesses upon opposite sides for receiving the said side straps, elastic supporting-straps secured to the inner surfaces of the rigid straps and adapted to engage and support the socket between the said rigid straps, whereby the elastic supporting-straps are completely surrounded and protected by the said socket and the said rigid straps, substantially as described.

2. In an artificial limb, the combination with a suitable foot portion, of straps mounted thereon, a socket adapted to be supported between the said straps, and having side recesses formed on its outer surface for receiving the said side straps and latches secured to said socket and adapted to bridge the said recesses and extend transversely across the said straps to confine them within the recesses and prevent the buckling of the said straps, substantially as described.

3. In an artificial limb, the combination with a suitable foot-supporting portion, of straps mounted thereon, a movable socket adapted to be suspended between the said straps, elastic supporting-strips interposed between the socket and the straps for supporting said socket between the straps, and pivoted latches secured to said socket and adapted to extend transversely to hold them across the straps in position and prevent their buckling, substantially as described.

4. A socket for an artificial limb, comprising layers of rawhide and leather, caps or abutment-blocks secured to the upper end of the socket, strips of wood secured in place over the leather and abutting against the said caps or abutment-blocks and an outer covering of suitable material, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

MARTIN B. DONALDSON.
WILLIAM KESPOHL.

Witnesses:
JAMES T. WATSON,
BERNARD F. FORRESTAL.