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L. G. CARON

2,390,919

ARTIFICIAL LIMB

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Fig. 1.

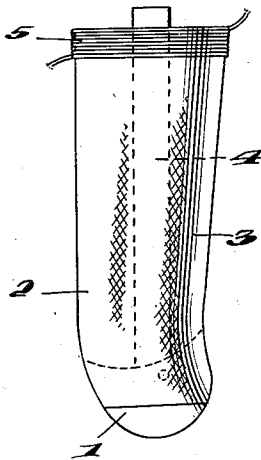


Fig. 2.

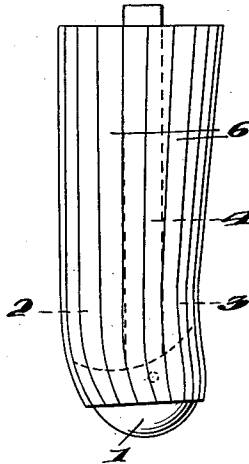


Fig. 3.

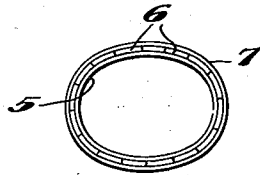
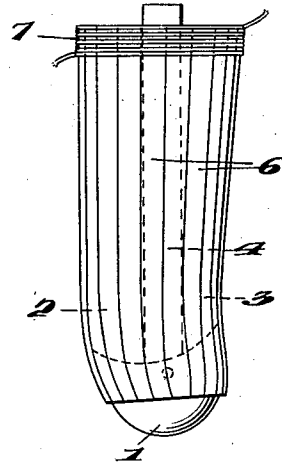


Fig. 4.

Fig. 5.

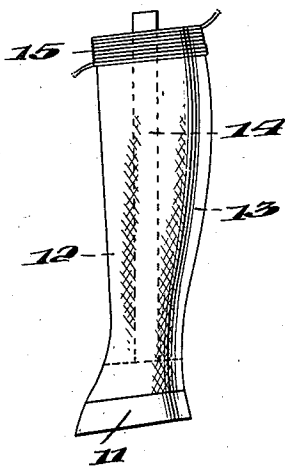


Fig. 6.

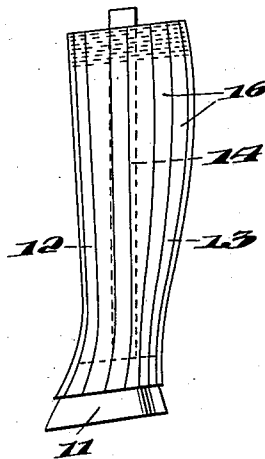
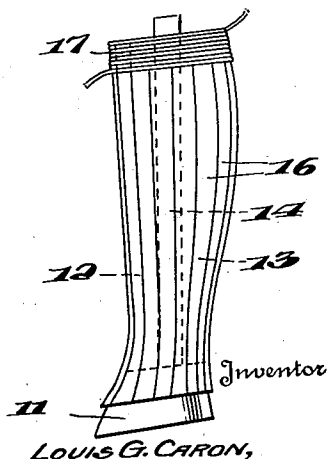


Fig. 7.



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UNITED STATES PATENT OFFICE

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ARTIFICIAL LIMB

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8 Claims. (Cl. 32-2)

This invention relates to an improvement in artificial limbs of the character constructed of thigh and lower leg members articulated together.

Artificial limbs of the character made heretofore have been constructed usually of metal, wood or other heavy material, but these have required special fashioning to construct the parts of the desired shape and size for use, as well as powerful machinery to form the shell of each limb part. Various attempts have been made to improve the manner of constructing such artificial limbs, but these have not been satisfactory for lack of the necessary strength or because the materials required therefor are not now available for use.

The principal object of this invention is to improve the construction of the artificial limb parts by reducing the weight to a minimum while retaining the maximum strength required, and without the use of powerful machinery to form the shell of each leg part. The process of forming a part of the limb is simplified and improved very substantially, not requiring any special steaming or pressure mechanism, and yet the part may be constructed in materially less time and by the use of ordinary labor which may be available, without requiring expert limb mechanics for this purpose.

This is accomplished by constructing the limb sections of a suitable material, such as wood, covered inside and outside by a layer of cord, the outside layer being wound around the wood and serving to shape it to form the shell.

I have illustrated these features of the invention in the accompanying drawing, in which:

Figs. 1, 2 and 3 are side elevations of a form illustrating successive steps of forming a thigh member thereon;

Fig. 4 is a cross section through a thigh member thus formed; and

Figs. 5, 6 and 7 are side elevations of a form for a lower leg member illustrating successive steps in forming said member.

The invention is shown in Figs. 1 to 3 as applied in the method of forming a thigh section which is illustrated generally in Fig. 4. As here shown, a demountable form is shaped to correspond substantially with the artificial limb member to be constructed, in this instance, the thigh member of the limb, and which form may be made of suitable material that may be readily shaped for the purpose, preferably wood. As shown in Figs. 1 to 3, the form comprises a base block 1, and a plurality of sections 2, 3 and 4,

interfitted as shown, and assembled to provide a unitary form. This form is preferably covered throughout the exposed surface thereof, except the base block, over which the limb member is to be shaped, with a suitable masking material to which adhesive does not attach. Any known material suitable for this purpose may be used. A wire or other fabric may be satisfactory for this purpose, any required treating being applied thereto.

After thus arranging the form substantially as shown in Fig. 1, a cord, designated 5, is wound closely around the form, as indicated, said cord being saturated with a suitable cement that will cause its convolutions to adhere directly together and to the base block 1, as well as to the layer applied over the cord. The windings of the cord extend throughout the height of the form or the portion thereof corresponding with the top of the member to be formed, and down over the upper portion of the base block 1 to an extent which will securely fasten the shell thereto, substantially as is illustrated in Figs. 2 and 3.

After thus winding the cord throughout the desired height of the member to be formed and overlapping a portion of the base block 1, the windings of the cord are covered with re-enforcing material as designated generally at 6 in Fig. 2, which material is preferably plywood fitted over the windings of the cord on the forms, and cemented securely to the thin shell formed by the cord. A second layer of cord is then applied over the plywood re-enforcing means, as shown at 7 in Fig. 3, the cord 7 also being saturated with cement, so that the windings thereof will adhere to each other and to the plywood re-enforcement. The second cord 7 wound over the plywood strips, acts as a pressure device to compact the plywood in position about the form, and causing adhesion of the several parts to each other, as well as forming an outer surface to the desired shell which will be substantially solid and rigid when it is set and finished to the required extent.

This produces a laminated wall construction of minimum weight and maximum strength, as illustrated in Fig. 4, that makes it particularly advantageous for the construction of members of an artificial limb. Such a laminated member may be finished or covered in any desired manner, by the application of a suitable covering thereover.

It will be evident that the shell member thus formed may be made without any special machinery or equipment for the formation and shaping

thereof, and that it does not require expert limb mechanics for its manufacture. The way in which the cord is applied makes use of the cord itself as a pressure device in forming the shell and insures its sturdy and rigid construction, but of minimum weight.

It will be evident from Figs. 5 to 7 that the lower leg member may be formed in like manner, utilizing an ankle base block 11 and form sections 12, 13 and 14 connected together in a unitary manner but demountable as described above. A layer of cement-saturated cord 15 is first applied to the form and to the upper portion of the ankle base block 11, as shown in Fig. 5. This is covered with re-enforcing material, such as plywood strips 16 shaped thereover and which are adhesively secured to the thin shell formed by the first layer of cord 15. A second layer of cement saturated cord 17 is then wound tightly around the re-enforcing strips and hold these to the required shape.

It will be evident that the form members 2-4 and 12-14 may be removed from the thin shell forming the limb member after the adhesive has set and the parts dried in hardened condition. Thus these form members may be used repeatedly for manufacture of the limb member.

I claim:

1. A process of making an artificial limb member comprising shaping a sheet of semi-rigid material to the form required and in overlapping relation with a base block, and winding cement-saturated cord in a layer over said formed sheet and overlapped portion of the base block with the windings of said cord adhesively secured to each other and to said sheet to form a substantially rigid structure and retaining the form of said sheet.

2. A process of making an artificial limb member comprising, associating a base block with a form of the shape of the human limb, winding a cord tightly around the form and base block in a layer with the convolutions of the cord in abutting relation, applying plywood re-enforcing elements over said cord on the form and base block and shaped to correspond with the form, winding a second cord tightly in a layer around the re-enforcing elements compressing said elements and retaining the shape thereof, and adhesively securing the cord windings to each other in each layer and to the re-enforcing elements forming a laminated wall construction.

3. An artificial limb member comprising a shell of the shape of the human limb, said shell including inner and outer cord windings each formed in a layer, and interposed semi-rigid re-enforcing material, the windings of each layer being adhesively secured to each other and to the re-enforcing material.

4. An artificial limb member comprising a shell of the shape of the human limb, said shell including inner and outer layers with an interposed semi-rigid re-enforcing material therebetween and arranged in crossed relation with respect to said layers, each layer being adhesively secured to the re-enforcing material, and a base block embraced and overlapped by said shell and permanently secured thereto.

5. An artificial limb member comprising a shell of semi-rigid reinforcing material, and a layer of cord windings with the convolutions thereof in side-by-side abutting relation and adhesively secured together holding said material substantially in rigid shape.

6. An artificial limb member comprising a layer of cord windings having convolutions in side-by-side abutting relation and adhesively secured together, and a layer of plywood superposed over said cord and secured thereon, said layers being shaped substantially to correspond with the shape of the human limb.

7. A process of making an artificial limb member comprising assembling a form of the shape of the human limb, masking a portion of said form, winding a layer of cord over said form having convolutions in side-by-side abutting relation and adhesively secured together, and removing the masked portion of the form from the unmasked portion and said layer of cord, thereby forming a shell for the limb member.

8. A process of making an artificial limb member comprising assembling a base block and a demountable form substantially of the shape of a human limb, masking the demountable form, winding a layer of cement-saturated cord over said form with the convolutions thereof in side-by-side abutting relation and adhesively secured together and to the base block, the masking of the form preventing adherence thereto of the cord, and thereafter removing the form from the base block and cord, providing a shell substantially of the shape of the human limb.

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