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B. CORN

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LIMB-CONFORMING DEVICE AND METHOD OF MAKING THE SAME

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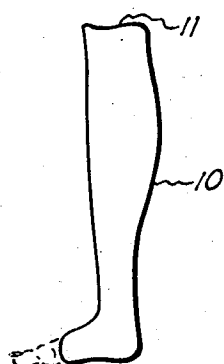


Fig. 1.

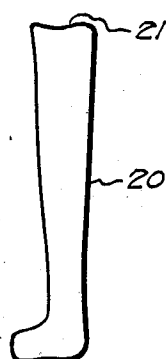


Fig. 2.

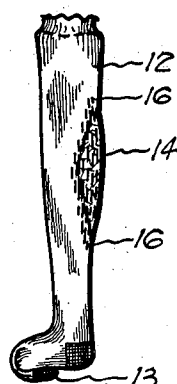


Fig. 3.

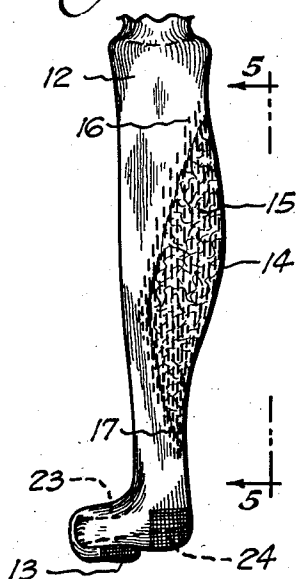


Fig. 4.

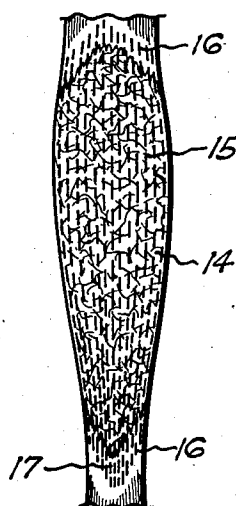


Fig. 5.

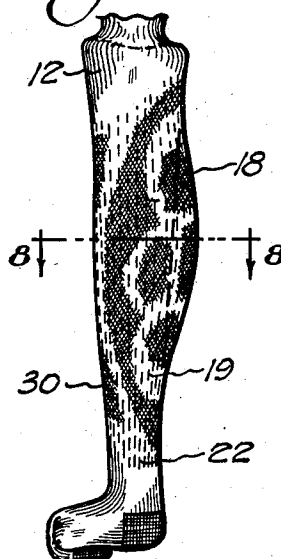


Fig. 6.

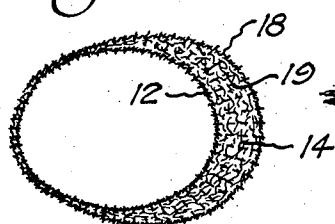


Fig. 8.



Fig. 7.

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UNITED STATES PATENT OFFICE

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LIMB-CONFORMING DEVICE AND METHOD
OF MAKING THE SAME

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8 Claims. (Cl. 2—267)

This invention relates to new and useful improvements in limb-conforming devices and methods of making the same.

As is well known, infantile paralysis or acute anterior poliomyelitis is a specific acute disease which generally occurs among infants and children and, if not promptly and properly treated, frequently results in a permanent affliction. Of course, some cases are of such severity or have such an effect upon some victims or persons that treatment is of little or no benefit. Since the disease is a disease of the spinal cord, the limbs (usually only one limb) of the victim of the disease are afflicted in the form of a partial or total paralysis. In most cases of permanent affliction, it has been found that, while the other limbs of the victim remain normal and unaffected, atrophy attacks the flesh of one of the legs and said flesh becomes atrophied. Thus, the atrophied leg is deformed and is of a smaller diameter than the normal leg, differing in contour or shape and sometimes in length. Obviously, an atrophied leg is unsightly and difficult to conceal, especially when the victim is a female, and subjects the victim to undesired pity and involuntary ostracism with a consequent embarrassment to said victim.

Therefore, one object of the invention is to provide an improved limb-conforming device or boot which when worn upon an atrophied limb will effectively conceal the deformity thereof.

An important object of the invention is to provide an improved limb-conforming device which is adapted to be constructed in the form of an inner-stocking and worn upon an atrophied leg beneath the usual hose or stocking, whereby the deformity of the leg will be concealed and said leg will have substantially the same appearance as the normal leg of the victim.

A particular object of the invention is to provide an improved limb-conforming device adapted to be worn beneath the usual hose or stocking and constructed of a foundation hose or member of yieldable material, padded with layers of suitable material, such as wool, and covered in such manner as to be durable and sufficiently firm for continual and prolonged effective use; the material used for covering being preferably of a color simulating flesh.

Another object of the invention is to provide an improved limb-conforming device, of the character described, wherein the padding of the foundation member is readily tapered or varied in thickness at desired points to compensate for discrepancies between the contours of the normal and atrophied legs, the padding being confined to the

boot of said member or being also applied to the foot or knee portions if necessary.

5 An important object of the invention is to provide an improved method of making a limb-conforming device or boot which consists of constructing a foundation member of the proper size and shape, padding the member to build up the same to the desired contour, and then covering the member to conceal the padding.

10 A further object of the invention is to provide an improved method of making a limb-conforming device which consists of making an exact form of the atrophied leg, placing a yieldable foundation member or hose over the form, and then padding the hose with suitable material wherever necessary so that the combined form and padded hose will have substantially the same dimensions and configuration as the normal leg of the person having the atrophied leg.

20 Still another object of the invention is to provide an improved method, of the character described, wherein the padding consists of a loose fibrous material, such as wool batting, which is torn off in a plurality of swatches or bunches with each swatch being affixed individually to the foundation member by stitching, the limb-conforming device being completed by covering the padded hose with fine-mesh net or other suitable material; said padding being applied to the foot-portion of said foundation member if necessary; for example, to the bottom of the heel to compensate for the shorter length of the atrophied leg.

30 A still further object of the invention is to provide an improved method, of the character described, wherein forms are made of both legs, the normal as well as atrophied leg, so that frequent measurements may be taken from time to time during the construction of the device to assure that the combined dimensions of the atrophied-leg form and said device will conform to the normal-leg form dimensions.

40 A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, in which an example of the invention is shown, and wherein:

50 Figure 1 is a side elevation of a form made from the normal or unaffected leg of an infantile paralysis or poliomyelitis victim,

55 Figure 2 is a view, similar to Figure 1, of a form

made from the atrophied or afflicted leg of the victim,

Figure 3 is a view, similar to Figure 2, illustrating the step of affixing a swatch of material to a foundation hose positioned upon the form of the atrophied leg,

Figure 4 is a similar view, showing the hose after padding thereof has been completed,

Figure 5 is an elevation, taken on the line 5—5 of Figure 4,

Figure 6 is a view, similar to Figure 4, of the completed limb-conforming device constructed in accordance with the method,

Figure 7 is a plan view of a typical swatch of material, and

Figure 8 is a transverse, vertical, sectional view, taken on the line 8—8 of Figure 6, with the form omitted.

In the drawing, the numeral 10 designates a form made from the normal leg of a victim of infantile paralysis or poliomyelitis, while the numeral 20 designates a form made from the afflicted or atrophied leg of the victim for carrying out the method. Although the forms may be constructed in any suitable manner, it is imperative that said forms be exact duplicates or replicas of the afflicted person's legs. In making the forms, it is preferable to fit a piece of suitable material, such as high quality muslin, upon each leg by means of straight pins (not shown) and then to sew with thread each piece of material by hand or by a sewing machine (not shown). The seams of the pieces of material are external and are finished by flat, felled seams. Darts or fells are used to tailor the material of each form to the desired shape or contour which is then filled with sawdust, or other suitable light-weight material. The upper end of the form, which has been left open for the introduction of the sawdust, is then closed and held in such position by suitable stitching.

It is pointed out that the foot portion of each of the forms 10 and 20 terminates at a point approximately the equivalent of the ball of the foot, because the toes of the atrophied leg are concealed or are unaffected. Although each form may include a considerable portion of the thigh, said thigh is usually unaffected and, if afflicted, will be usually covered by the clothing of the person. Therefore, if desired, in most cases the upper ends of the forms may terminate immediately below the knee as shown by the numerals 11 and 21 in Figures 1 and 2. It is again stressed that the forms must have exactly the same dimensions and contours as the legs of the afflicted person or victim in order to obtain the best possible results. Both forms must be accurate because one represents the desired dimensions, while the other is a replica of the deformity to be compensated for and concealed. The completed forms are placed side by side upon a table (not shown) or other suitable working surface with their foot portions pointing downwardly, whereby frequent measurements may be taken and comparisons made from time to time.

After the construction of the forms 10 and 20, a foundation member of yieldable material, such as a knitted, pre-formed hose or stocking 12 which is preferably made of high quality cotton and ribbed, is placed upon said form 20 and fitted snugly and accurately thereto. This fitting is accomplished by removing the excess portions of the material and making a seam, or a new seam when a pre-formed hose is employed, at the back thereof. As shown in Figure 3, the

hose has its toe portion 13 folded upon itself and pinned to the foot portion of the form. The upper portion of the hose may be folded upon itself and pinned to the top of the form 20 or may be pinned to the thigh portion of said form in the event that the latter extends above the knee. With the hose snugly fitting the form, said hose provides a foundation for receiving padding as will be hereinafter more fully explained.

Although any relatively-loose, fibrous material may be used to pad the hose 12, it has been found that long staple wool is preferable due to its light-weight, durability and resiliency. In building up or padding the hose 12, swatches or bunches of wool 14, as shown in Figure 7, are torn from a long staple wool batting (not shown), or other suitable supply of wool fiber, and the swatches are worked into thin sheets or layers having tapered or feathered marginal edge portions. In order to obtain feathered edge portions, it is important to refrain from cutting out the swatches. After a swatch has been worked to the desired thinness, it is placed upon the hose circumferentially or transversely of the form and hand-sewn with silk thread to said hose by spaced, longitudinal rows of stitches 15. Each stitch is preferably one-half inch in length and the rows of the stitches are spaced substantially three-quarters of an inch apart. Although this stitching firmly secures the swatch 14 to the hose 12, it is manifest that said swatch will be yieldable and not tightly compressed or packed.

Attention is directed to the fact that when a swatch is placed upon the foundation hose, the same is smoothed out to assure tapered or feathered edge portions. Since the boot or calf portion of the hose requires the greatest amount of padding, it is desirable to apply the first swatch to the central, rear portion of said hose and then to continue from that portion.

As has been hereinbefore pointed out, the swatches 14 are relatively small and, even when thinned and applied to the hose, cover only a small area thereof. Each swatch is applied or stitched to the hose in the same manner as the original swatch. The stitches by which the additional swatches are secured to the hose are disposed between the stitches of the previously applied swatch or swatches, with the result that the stitches of one swatch are offset relative to the stitches of the other swatches. It is also desirable to extend the stitches beyond their respective swatch as shown by the numeral 16 so that each swatch will be connected to its adjacent swatches and all of the swatches will be secured together as a unit. Due to the fact that the forms are filled with sawdust, or other suitable material, which is packed, the point of the needle (not shown) used in applying the stitches is not damaged if it pricks or punctures the form 20. Also, the tautness of the covering of the form prevents the needle from piercing said form, whereby stitching of the padding and hose 12 to the form is avoided.

Generally, the exact manner of padding the hose is immaterial so long as the swatches are applied to the portion requiring the greatest amount of padding. The hose is gradually padded or built up by a plurality of thin layers with each layer consisting of an indeterminate amount of swatches. As the swatches approach the forward portion of the hose, the same are reduced in thickness as very little padding, if any, is required along this portion (Fig. 8). Also, the number of

layers of swatches are materially reduced at this point as well as at the ankle and immediately below the knee. Thus, the tapered or feathered edge portions of each swatch are especially important at these points. During the padding of the hose, frequent measurements and comparisons of the form 10 and said padded hose may be made to assure accurateness. Since the ankle is of considerably less diameter than the remaining portion of a leg, it is manifest that the stitches applied to the ankle portion of the hose 12 will taper or converge toward each other as shown by the numeral 17. (Figs. 4 and 5.) Thus, the stitches of the ankle portion will be disposed more closely adjacent to each other, whereby said portion will be less pliable than the remainder of the padded hose. This is beneficial and highly desirable because the ankle portion is subjected to excessive wear and strain.

When the required amount of padding has been applied to the hose, the latter will have the appearance shown in Figure 4. Although the padding consists of a plurality of individually-applied swatches 14, said padding appears to be of one piece and actually is a unit due to the fact that each swatch is connected to adjacent swatches by its respective stitches 15. Attention is directed to the fact that the stitches which connect each swatch to the hose 12 necessarily extend or pass through the underlying swatches. The padded portion of the hose is next covered with a foraminous material, such as a fine-mesh net 18 which is preferably of the finest mesh obtainable. The net material 18 is secured to the hose 12 by a plurality of spaced, longitudinal rows of locked stitches 19 which extend through the padding, as is clearly shown in Figure 3.

The completed hose, padded and covered, provides a limb-conforming device or boot 30 which, when placed upon the form 20 as shown in Figure 6 or when worn upon the atrophied leg of the person for which the device has been made, will effectively conceal the deformity thereof. Thus, the combined dimensions of the device 30 and the form 20, or atrophied leg, will be substantially equal to the dimensions of the form 10. Although any fine-mesh net obtainable may be used for covering the padded hose, it is preferable to employ flesh-colored net for obvious reasons. Attention is directed to the fact that the locked stitches 19, which secure the net 18 to the hose, have their longitudinal rows spaced relatively close together, it having been found that a spacing of approximately one-quarter of an inch is desirable. Of course, due to the contour of the device 30, the stitched rows will converge toward each other at the ankle portion and immediately below the knee as shown by the numeral 22.

Usually, the limb-conforming device will be of such dimensions as to compensate for the deformity of the form 20, or atrophied leg, with the result that the applied or worn device and the form 10, or normal leg, will have substantially the same external measurements or dimensions. When sheer hose, such as silk or nylon, are worn by the afflicted person, it is desirable that a thin, seamless cotton hose be worn over the device. In this event, the device should have smaller external dimensions or measurements, when applied or worn, than the normal leg or form 20. The dimensions or measurements need vary only slightly, such as one-eighth of an inch in circumference. When lisle or other relatively-heavy or thick hose are worn, the limb-conforming device may have external dimensions or measurements identical to the form 20, or normal leg.

If the foot of the afflicted leg is also atrophied, the corresponding portion 23 of the hose 12 may be padded or covered in exactly the same manner. In the event that the atrophied leg is of less length than the normal or unaffected leg, as is frequently the case, the heel 24 of the hose 12 is padded at its rear and under surfaces in exactly the same manner as has been hereinbefore described. Manifestly, it is sometimes unnecessary to pad the foot portion or heel of the hose as these portions of the atrophied limb are unaffected or normal. Likewise, it is also sometimes unnecessary to pad the ankle portion of the hose 12.

The limb-conforming device is adapted to be worn over the atrophied leg in exactly the same manner as any other hose and is adaptable to similar laundering. Of course, it is desirable to employ the best material obtainable so as to increase the durability of the completed limb-conforming device and prolong its usefulness. For example, the best silk thread obtainable is utilized and beeswax is applied to the thread employed so as to preserve the same.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made, within the scope of the appended claim, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. A limb-conforming device adapted to be worn upon an atrophied limb including, a tubular yieldable foundation member, padding secured to the member to cover a predetermined area thereof, the padding consisting of unwoven wool fibers applied to said member in individual bunches, longitudinal rows of stitching for securing the fiber bunches to the member, fine-mesh foraminous cloth covering the padded portion of said member, and longitudinal rows of stitching for affixing the foraminous cloth to the member and padding.

2. A limb-conforming device adapted to be worn upon an atrophied limb beneath the usual hose including, a foundation member, padding stitched to the member, the padding being applied to said member at the requisite points, means secured to the padding for covering the same, a plurality of longitudinal rows of stitching for securing the padding to the foundation member, and similar rows of stitching for securing the covering means to said padding as well as said member.

3. A limb-conforming device adapted to be worn upon an atrophied limb beneath the usual hose including, a foundation member, padding stitched to the member, the padding consisting of a plurality of individual bunches of loose fibrous material applied to said member at the requisite points, each bunch being separately stitched to the member and coacting with the other bunches to provide a substantially unitary padding, and means secured to said padding for covering the same.

4. The method of making a limb-conforming device for an atrophied limb which includes, constructing a complementary form of the atrophied limb, fitting a foundation member of yieldable textile material to the form, padding the member with a loose fibrous material, the padding being secured to said member by stitching, said padding being applied to the member in a plurality of bunches torn from a supply of the material with each bunch being worked to provide feath-

ered marginal edge portions and being individually applied and stitched to said member, then covering the member with a fine-mesh foraminous material to conceal the padding, and stitching the foraminous material to the member through said padding. 5

5. A limb-conforming device adapted to be worn upon an atrophied limb beneath the usual stocking including, a tubular yieldable foundation member, an unwoven fibrous padding secured to the member to build up predetermined portions thereof, and a flexible material covering the padded portion of said member and affixed thereto. 10

6. A limb-conforming device as set forth in claim 5 wherein the padding consists of a plu-

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rality of individual pads of loose fibrous material separately fastened to the foundation member, the pads coacting to provide a substantially unitary elastic padding.

7. A limb-conforming device as set forth in claim 5 wherein the padding consists of a plurality of individual layers individually stitched to the tubular foundation material.

8. A limb-conforming device as set forth in claim 5 wherein the marginal edge portions of the padding are tapered and feathered, whereby the device upon being worn upon an atrophied limb will coact with said limb to provide an external contour of anatomical symmetry.

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