

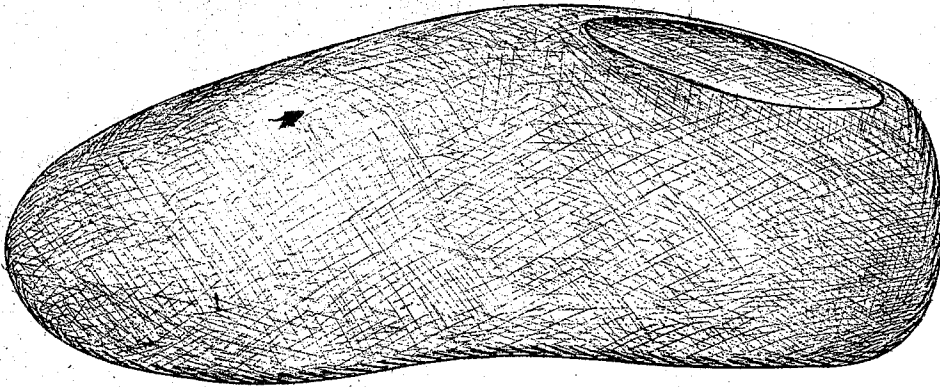
*Palmer & Houghton,*

*Felted Fabric.*

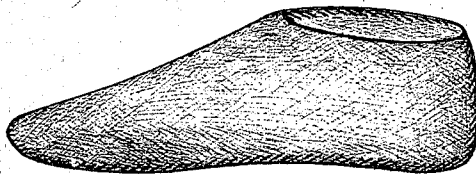
*No. 105830.*

*Patented July 26 1870.*

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*J. Sullivan  
M. S. S. S. S.*

*Charles W. Palmer  
Harry E. Palmer } Inventors:  
Charles Houghton }  
By Crosby, Hales & Gould  
Attys*

# United States Patent Office.

CHARLES W. PALMER AND HENRY E. PALMER, OF LYNN, AND CHARLES HOUGHTON, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO CHARLES HOUGHTON.

Letters Patent No. 105,836, dated July 26, 1870.

## IMPROVEMENT IN MANUFACTURE OF HOLLOW FELTED ARTICLES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that we, CHARLES W. PALMER and HENRY E. PALMER, both of Lynn, in the county of Essex, and CHARLES HOUGHTON, of Boston, in the county of Suffolk, all in the State of Massachusetts, have jointly invented an Improved Manufacture of Hollow Felted Articles; and we do hereby declare that the following is a description of our invention sufficient to enable those skilled in the art to practice it.

This invention relates to the production of hollow felted goods in a peculiar manner, and to such goods as new articles of manufacture, when so produced.

In making hats the nearest approach is made to our invention of which we are aware, and reference thereunto seems necessary in order to set forth the difference between that process and the product resulting therefrom, and our process and its resulting product.

In the manufacture of felted wool hats a "former" is employed, which, in shape, is a rhomb-solid, or two cones joined at their bases, on which is wound the sliver of wool as it comes from the carding-engine, the "former" being revolved so as to wind the wool-sliver upon itself as fast as produced, the angle of presentation of the axis of the "former" being changed at intervals, so that the layers of the sliver will cross each other at angles.

In our invention we proceed in the same manner with the "former," and wind the sliver produced by a carding-engine around the "former," which is made to revolve, and also to change its angle of axial presentation, preferably intermittently. But in our invention we make the "former" of the shape of the finished article to be produced, differing therefrom only in being of larger size, so that the finished shape of the article is obtained in the felting or hardening process, and not by the stretching, shaping, and blocking operations performed after the hardened bat is produced, as in the manufacture of hats.

It is well known that wool hats, made as described, lose, in use, their form obtained by stretching and blocking, and approximate the conic shape of the "former" on which the wool-sliver was wound. This difficulty our invention wholly avoids.

Goods called seamless are made by cutting up, to any desired shape and number of pieces, a partially-hardened bat, the edges of which are brought together, and, by reworking, are made to unite, and sometimes the joints so made are strengthened by re-enforcing pieces or strips of felted or partially-felted wool, which, by working, are made to unite with the body; but joints made after a bat is hardened are always the weakest parts of the goods. In our products, resulting from our process, there are no seams or joints.

Our invention may be described with reference to

its practice in the manufacture of shoes, and the drawing, in Figure 1, illustrates the bat as it comes from the "former," before it has been felted or hardened, and Figure 2 the same bat, when reduced to the size and form of the finished article.

The "former" is then made of the shape of a last, enlarged in its dimensions; this may be held in the hands of an operator, and by him turned, so as to wind upon it the sliver of wool coming from a carding-engine, and also changed as to its angle of presentation. But the enlarged last is preferably made to revolve, and to assume angularly changed positions between two rollers of a machine similar to the machines now used for carding wool for hat-bodies, and in either of said ways any desired number of layers of the carded wool-fiber will be wrapped about the last, each layer being disposed in an angular direction to its adjacent layers, and, when sufficient wool has been so laid upon the last, it and its wool covering are removed from the carding-engine, a new last being used therewith to repeat the described operation.

If it is desired to thicken the sole of the shoe to be produced, then films of carded wool may be laid upon the sole portion of the sliver-covered "former," so as to be wound and bound between the layers, or a layer or several layers may be placed outside of those on the last. The wool is taken from the last by cutting a slit in the soft bat where the shoe is to be open, and the last is drawn out of the opening so made, and the bat is felted and hardened in the same way as are hat-bodies, and is thus reduced to the requisite size, though preserving the shape given it on the "former," which shape it does not afterward lose in wear. Soles of leather or other suitable material and heels may be afterward secured to shoes by any suitable fastenings, and the opening made in the shoe may be brought to the desired shape by cutting away material, and may be bound or stitched and otherwise suitably trimmed for use.

The "former" for shoes may be made like a pair of large lasts, united in a line at the rear, so that the two ends of the "former" are the toes of two shoes. The wool covered or wound on such a "former" is removed therefrom after it has been cut through around the "former" at the center of its length; the slit is then made in each half, which forms the opening through which the foot will enter the shoe, and the parts of the wool at the open rear are brought together and lapped, or re-enforced by more wool if desired, before the hardening process is commenced.

This invention is not limited to the production of shoes, but embraces any articles in which the wool is deposited as slivers coming from carding-machines, the layers thereof crossing each other on "formers" of the shape of the articles to be produced, but of greater size, so that the form of the article is produced in the

first disposition of the wool, and its size by the continuous working of it in that shape until finished, the contraction resulting from the felting and hardening process.

When sufficient wool has been deposited upon the "former," a cloth bag containing cotton or other yielding material, and made of the proper shape, so as not to change the shape of the bat, is placed inside of it to prevent the inner parts of the shoe or other article uniting together during the process; it is then placed upon an iron or other table with a steam-chest underneath, the table being perforated with holes to allow the steam to penetrate the wool; it is then rubbed and worked until properly hardened or felted.

The shrinking process may be continued in an ordinary fulling-mill, the filling being previously withdrawn from the hollow article, or by rolling or handling, care being taken to preserve the shape. It being thus reduced to the desired size, it is put upon an ordinary last, or, preferably, upon a hollow iron one, into which hot steam is introduced, so that it may be dried rapidly.

The crossing of the fibers and the layers of the wool give strength to any article so made, and the absence of any stretching or blocking, as in forming hats, insures permanency of form under wear.

In making boots, shoes, slippers, &c., soles of felt, leather, or other material may be sewed or otherwise fastened upon or to the hardened shoe. For long-legged boots for men's wear the legs are made, by the process described, on large "formers" of the proper shape, and, when reduced to the right size by the felting and hardening operations, they will be sewed to the feet, which will commonly be of leather, in the same way that morocco legs are now united to calf and patent-leather feet.

We claim—

The process of forming hollow felted articles, consisting in depositing in obliquely-arranged layers slivers of carded wool upon "formers" of the shape of the article to be produced, but of greater size, opening the deposit to permit the extraction of the "former," and then felting or hardening such deposit substantially in the manner described.

Also, as a new manufacture, hollow felted articles, made by the above-claimed process.

CHAS. W. PALMER.  
HENRY E. PALMER.  
CHS. HOUGHTON.

Witnesses:

J. B. CROSBY,  
FRANCIS GOULD.