

(No Model.)

M. V. BEIGER & A. EBERHART.

SEAMLESS KNITTED BOOT OR SHOE.

No. 367,333.

Patented July 26, 1887.

Fig. 1.

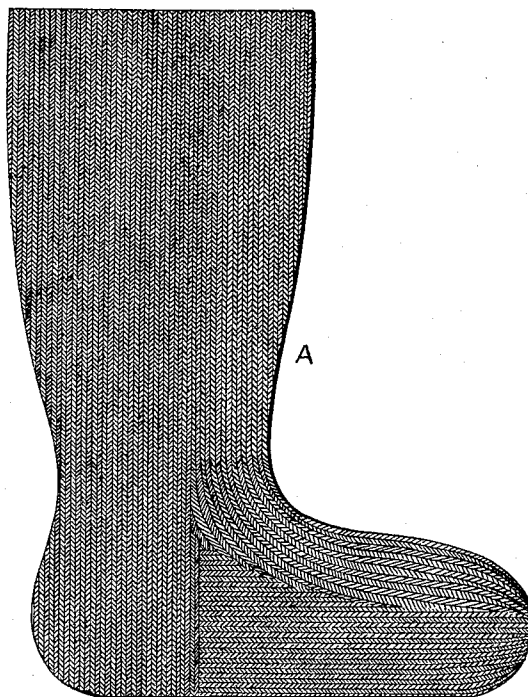


Fig. 2.

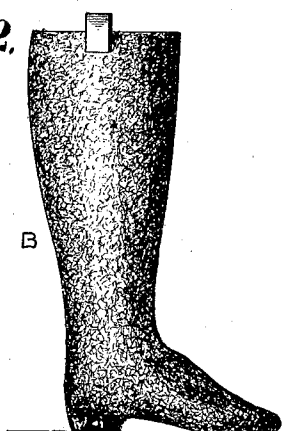
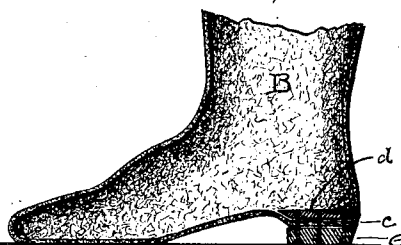


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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SEAMLESS KNITTED BOOT OR SHOE.

SPECIFICATION forming part of Letters Patent No. 367,333, dated July 26, 1887.

Application filed February 26, 1887. Serial No. 222,998. (No model.)

To all whom it may concern:

Be it known that we, MARTIN V. BEIGER and ADOLPHUS EBERHART, of Mishawaka, in St. Joseph county in the State of Indiana, have
5 invented new and useful Improvements in Fabric Boots or Shoes; and we do hereby declare that the following is an accurate description of the same.

In this specification by the term "boots" we intend to be understood as referring to that particular class of foot-covering which is provided with a long top or leg to come up on the calf of the wearer and having sufficient inherent stiffness to stand up and maintain its
15 shape and place on the wearer's limb in contradistinction to that other class of foot-covering known as "stockings," which are limber and more or less limp.

Within the last few years boots fabricated from wool have come into general use as a substitute for leather boots, being warmer than leather; but they are required to have the same qualities as to stiffness in the leg.

Our invention relates to that class of boots which are made from a seamless fabric.

In boots made from wool the required stiffness can only be attained by the use of a quantity of stock in the leg sufficient when shrunk and full to acquire thereby the desired hardness and stiffness. Carded bats can be made
30 of any required thickness, and felted to desired stiffness; but felt has limited strength to resist frequent bending and soon cracks and breaks in places where wrinkles occur in use, whereas a knit or woven fabric has tensile
35 strength, due to the twisted fibers or yarn, irrespective of the hardness due to shrinking or fulling. Heretofore no one, so far as we are aware, has known how to knit or weave sufficient stock into the leg and foot to secure the requisite rigidity when full.

We are aware seamless boots have been made from carded-wool bats which, after having been formed in the semblance of boot, have
45 been felted and finished on tree or last. We are aware, also, that a skeleton boot has been knitted or woven and covered with a layer of wool bats and afterward felted, whereby the requisite rigidity was secured by use of the
50 carded bat and a slightly-increased cohesion attained by the knitted or woven fabric inter-

mingled with the felt. We are also aware that stockings and other garments have been knit of large size and then reduced in size by fulling, but said stockings or garments remained
55 flexible and unable to support themselves like a boot; but we are not aware that any one has heretofore made a stiff-leg seamless boot wholly by knitting and subsequently fulling the same to the required size.

In all stockings or other garments made by knitting woolen yarn and subsequently fulling the same, yarn of ordinary twist and size has been employed; but with such yarn it is impossible to knit in sufficient stock to render
60 the leg as thick and stiff as is necessary for the purposes of a boot. We discovered, therefore, that to procure a boot with sufficient stock knitted into the leg it is necessary to make a loosely-twisted yarn, and much larger
65 than any heretofore in use, and to do so it was necessary to construct carding and spinning machines larger in size than those heretofore in use. The yarn we employ is very loose and, say, three-sixteenths or one-quarter of an
70 inch in diameter, equivalent to fifteen to twenty-five times the size of woolen yarn spun for any other purpose. A fabric knitted of said yarn and subjected to fulling will, by reason of its loose twist, firmly and solidly shrink together, stronger and harder than felt, either
75 alone or in connection with a knit web.

We therefore do not claim, broadly, a seamless boot made from a fabric partly knit and partly of felt, or wholly of felt, but confine ourselves to the particulars set forth—to wit, a
80 seamless stiff-leg boot made wholly by knitting, or substantially so.

All boots made with carded bats are necessarily more or less uneven in thickness and lumpy, and they are therefore not only uncomfortable to the wearer, but, owing to their unequal flexibility, they are not durable, but tend to wrinkle and break down near to the thicker portions. It is also impossible to make
85 them with bats with accuracy as to size, so that when felted they will not require trimming. There is, therefore, very considerable waste in trimming the tops and legs to size and shape. The cuttings must be reworked or
90 wasted. Our knitted boots are made of uniform thickness and rigidity and so accurately

as to size and shape that no cutting or waste is involved.

Felted shoes have been made with soles and heels of felt integral with the uppers, and felt boots have been made with leather soles and foxings; but all fabric boots have heretofore been made without heels, and for this reason they are tiresome to the wearer, difficult to remove from the foot, and cannot be worn with an ordinary arctic or rubber overshoe, because the latter are always made with hollow heels and are soon broken down and spoiled when worn with a heelless boot. This defect is obviated in our boots, to which we attach heels of some suitable material.

We have thought it wise to make this comprehensive statement of the art in order as clearly as possible to define the object which is the subject of our invention and to distinguish it from what is old in the art.

In the accompanying drawings, Figure 1 represents the mammoth boot as it comes from the loom; Fig. 2 represents the same when finished, the sizes being substantially comparative. Fig. 3 is a section showing the way of applying the heel.

In manufacturing our boots we spin the yarn exceedingly coarse—say from ten to twenty-five times the size of any yarn heretofore spun for any other purpose—and thereby secure enough stock in the leg and foot to produce the desired stiffness when full. From this exceedingly coarse yarn we knit a mammoth boot, A, say thirty (30) inches in circumference and forty (40) inches long, in one seamless piece, including leg, foot, and sole and very nearly in proper form and proportion, so that we not only get the requisite stock, but we make it uniform in thickness, and without waste by trimming.

This mammoth boot is then submitted to a process of fulling until it is reduced to the desired size B, and correspondingly consolidated, hardened, and stiffened and rendered capable of standing up alone, the same as a leather or felt boot. It is then finished upon a tree or last.

Heretofore, as far as we are aware, no boot of any kind of fabric has been provided with a heel attached to the outside, except in the cases mentioned above, where sole and foxing were also added, and therefore in this part of our invention we do not desire to confine ourselves as to the fabric of the boots. The heel is preferably attached wholly exterior to the boot; but we prefer to finish our boot with an interior hollow or indented heel, *c*, like the heel of an ordinary overshoe, designed to re-

ceive the solid heel of a boot, but not so deep, and we fill said hollow heel with a suitable block or plate, *d*, which may be fastened by cement or by metallic or other fasteners, as set forth, and the external heel proper, *e*, is attached by fastenings, which we prefer to extend through the material of the boot into the material of the inner plate or heel. These fastenings may consist of stitches, rivets, &c. By this means the material of the boot is firmly secured between the external and internal parts of the heel and cannot be pulled loose.

It is well known that a knit or woven fabric has more tensile strength than a felted fabric containing the same quantity of material, and it is therefore apparent that our all-knit boot will be necessarily stronger than a boot having the same quantity of material wholly or partly felted.

Having described our invention, we claim as new—

1. The herein-described method of making knitted seamless boots, which consists, essentially, first, in spinning the yarn loosely twisted and very coarse, as set forth; second, in knitting the same loosely in a boot of mammoth proportions; third, in shrinking and consolidating the same down to size by fulling; fourth, in finishing the same on tree and last, substantially as set forth.

2. A boot constructed according to the herein-described method—to wit, the foot and leg wholly formed by knitting from exceedingly-coarse yarn loosely twisted in mammoth proportions, said leg and foot being then shrunk and consolidated by fulling, and finally finished on tree and last, as set forth.

3. As a new article of manufacture, a seamless stiff-leg boot made wholly of wool, consolidated and stiffened by fulling, as set forth, and provided with an external heel-lift attached directly to said boot, as set forth.

4. A seamless boot of exceedingly-coarse yarn knitted in a mammoth size and reduced to desired size by fulling, provided with an internal heel or plate and an external heel-lift the fastenings whereof extend through into the internal heel or plate.

5. A new article of manufacture consisting of seamless boot constructed of woollen fabric, full to size, and provided with a heel of different material attached directly to the boot, substantially as set forth.

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Witnesses:

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