D. W. ANDERSON.

METHOD OF MAKING CONVEXED OR CONCAVED BODIES OF FELT OR OTHER FLEXIBLE SUBSTANCES.

APPLICATION FILED FEB. 2, 1914.

1,145,654. Patented July 6, 1915.

Fig. 1.

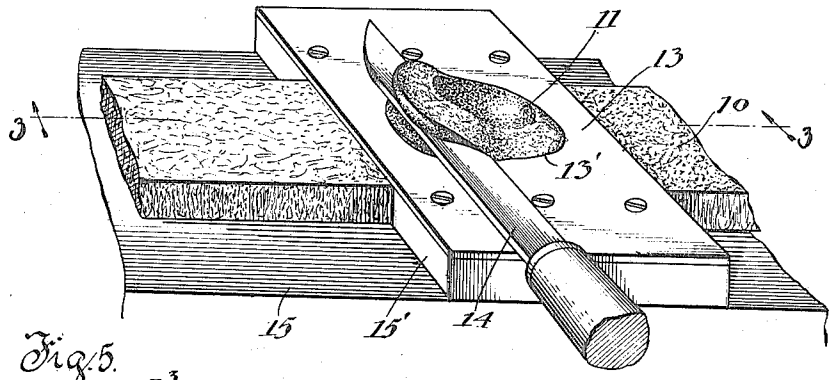


Fig. 5.



Fig. 2.

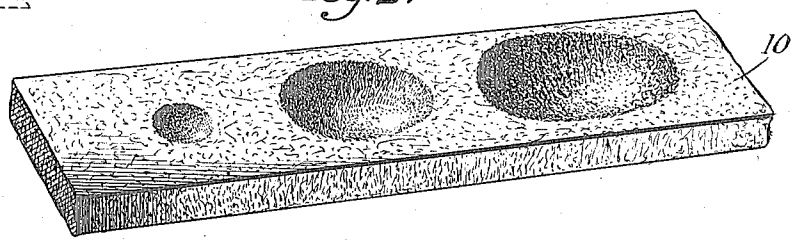


Fig. 6.



Fig. 3.

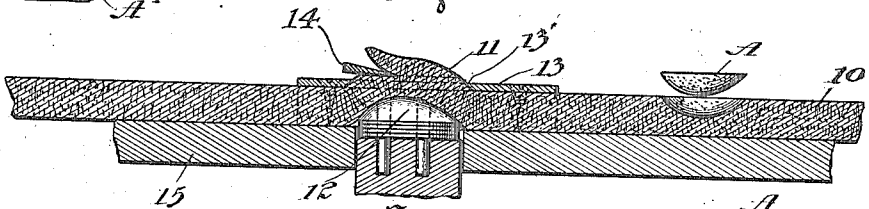
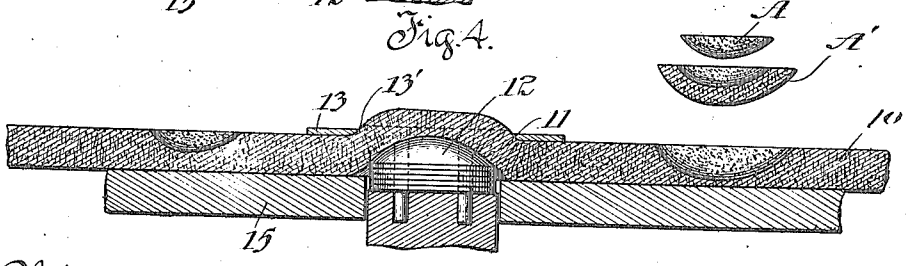


Fig. 4.



Witnesses
Arthur M. Cadam
Robert F. Weir

Inventor
David W. Anderson
By Foster Freeman & Watson Attys.

UNITED STATES PATENT OFFICE.

DAVID W. ANDERSON, OF LA FAYETTE, INDIANA.

METHOD OF MAKING CONVEXED OR CONCAVED BODIES OF FELT OR OTHER FLEXIBLE SUBSTANCES.

1,145,654. Specification of Letters Patent. Patented July 6, 1915.

Application filed February 2, 1914. Serial No. 815,911.

To all whom it may concern:

Be it known that I, DAVID W. ANDERSON, a citizen of the United States, residing at La Fayette, in the county of Tippecance and State of Indiana, have invented certain new and useful Improvements in Methods of Making Convexed or Concaved Bodies of Felt or other Flexible Substances, of which the following is a specification.

My invention relates to a method of making convexed or concaved bodies of felt or other flexible, somewhat-resilient substances; and more especially to making such articles as bunion and corn shields, shoe fillings and kindred pads which must be made of definite shape and of varying thickness, tapering toward their edges. It is in connection with the making of such articles that I will describe my invention, although it will be apparent that the uses of my invention may be widely diversified as to the articles made and the substances worked upon, without departure from the spirit of my invention and within the scope of the appended claims.

Felt,—such as advantageously may be employed in making protective pads to relieve pressure on, or to afford protective covering for corns, bunions, and affected portions of the feet, or for other medical or surgical purposes,—is particularly difficult to shape, by cutting, into convexed or concaved bodies. Its fibrous toughness, elasticity, and lack of "grain" make its manufacture into a body of parti-ovate cross section, by ordinary methods of clipping, cutting or trimming, a task of considerable difficulty, requiring much skill, patience and practice for the attainment even of reasonable uniformity of result, and involving, therefore, undue expense from the standpoint of commercial production. To the best of my knowledge no satisfactory method of "skiving" felt for the easy and cheap production of such articles has ever been developed prior to my present invention.

My invention provides a simple and efficacious method of producing such bodies rapidly, easily, and with great uniformity in the product, and the method is one which may be practised by hand or by suitable automatic machinery.

In the accompanying drawing I have illustrated the practice of my invention, as it may be carried out by simple hand operated tools.

Figure 1 is a perspective view illustrating the practice of my invention. Fig. 2 is a detail of a stock-strip from which convexed bodies of various sizes have been cut, indicating the character of a felt strip which I may successfully employ as stock from which to cut the desired articles. Fig. 3 is a longitudinal section, as on line 3—3 of Fig. 1 illustrating the method of producing such convexed bodies as small corn or bunion pads and the like. Fig. 4 is a similar section showing the method of producing convexo-concave bodies. Figs. 5 and 6 illustrate other forms of bodies which may be produced by the practice of my invention.

In the preferred practice of my invention I take a portion of resilient stock, such as the felt strip 10 illustrated, of suitable thickness; present a node thereof, as at 11, generally less than the thickness of the stock, upon a former or male member 12 to protrude in a bend through an outline defining aperture 13′ in a female die 13, with the outer and inner surfaces of the protruded portions under different degrees of tension or compression as the result of the bending, and then scalp the node, by the use of a suitable cutting tool or other severing means, indicated as the knife 14, preferably with a planar cut, preferably effecting the severance of the protruded stock at the plane of the die 13, giving it the outline configuration of die opening 13′ and a surface contour substantially similar to that of the active end of the former 12. The severed body of material tends by reason of its resiliency to return to its initial condition as to tension and therefore reverses, when severance is completed. That is the severed article takes a shape the reverse of that which was imposed on the stock by the bending operation that presented the node to the action of the cutter, the curved node-surface springing back to its original shape, planar or otherwise, and the cut-surface assuming a convex form.

The proper conditioning of the stock to receive the cut is insured by the coöperation of the female die 13 and male former 12, the latter having a convexed surface-configuration of any desired form and an outline similar to, but effectively smaller than the

aperture 13′ in the female die. For the convenient manual practice of my invention the male die 12 may be mounted to reciprocate through a table or platform 15 above which the female die 13, in the form of a flat metal plate, may be supported upon spacing blocks 15′, with the die aperture 13′ registering with the path of reciprocation of the former 12. For the simple cutting of a plano-convex pad, a strip 10 of felt or other suitable material is threaded through the inter-space between the table 15 and the die plate 13; the male die is raised to and held in a position where its crest or crown lies at or below the level of the upper face of the die 13, bending the felt strip 10 and projecting the node 11. In such operation it will be apparent that as the male die rises, bending the stock and forcing it through the opening in the female die, the stock bordering the node will be substantially clamped between the two work-presenting members and the outer surface of the node will be stretched within the confines of the area defined by the die-aperture 13′. Hence, when the severed body springs back to substantially its normal tension the stretched surface resumes a substantially planar condition, and the severed surface, which was cut by the knife in a plane, takes a convex curve which is, reversely, substantially similar to the curve of the acting surface of the former 12. In making a convexo-concave body as illustrated at the right of Fig. 4 it will be apparent that the stock strip may be twice operated upon to scalp two successive nodes, the first cut removing a section A produces a depression in the upper surface of the stock strip, which is to form the concavity of the ultimate article, and then a larger node, including the area from which a portion of the stock has already been removed, is protruded through a larger die as indicated in Fig. 4 and a second cut is made producing a convexo-concave article as at A′. It will be apparent that a body of the shape shown in Fig. 5 may be formed by the practice of my invention, by first cutting out a piece of stock of the shape indicated by the dotted outline A^2 and then using that body as a piece of stock, and cutting away the superfluous material to form the double convex body A^3. Other variations of form may obviously be made, that illustrated in Fig. 6 being a generally plano-convex pad A^4 with concavities cut in both surfaces thereof. Such an article may readily be formed by first cutting the stock to present the two opposed concavities and subsequently cutting the major body out of the stock strip.

In the practice of my invention, in working in felt, I have usually found it to be advantageous to restrict all of the bending and forming operations within the limit of elasticity of the material, for if the fiber be torn, the structure is weakened and more or less "flabby" but within some limits it will be apparent that the curvature given to the articles by cutting may be accentuated to some extent by fiber-tearing stretching incident to the formation of the node to be cut, as a means of avoiding the use of too thick a stock, and for other reasons. Further, it will be apparent that while the surface of the female die would generally be a flat plane, it might be given curvatures to be followed by the severing instrumentality to correspondingly affect the surface contour of the convex face of the severed body.

Having thus described my invention, what I claim with a desire to secure by Letters Patent is:

1. The process of making a convexed or concaved body of elastic material, which consists in bending a piece of stock of said material into a node over a former, holding it under pressure at the perimeter of said former, and scalping the node over the former.

2. The process of making a convexed or concaved body of fibrous, elastic material, such as felt or the like, which consists in protruding a piece of stock of said material through a die aperture and clamping it against the die aperture at its perimeter and, with a cutter that moves both lengthwise and crosswise with respect to the said material, scalping the node that is protruded beyond the die.

3. The process of making convexed or concaved bodies of fibrous, elastic material, such as felt or the like, which consists in bending a body of the stock of said material over a former that presents the desired surface contour, holding portions of the stock at the perimeter of the former by projecting said bent body through a die having the desired outline contour and slicing off the projected node beyond the die.

4. The process of making convexed or concaved bodies of elastic material, which consists in stretching a body of the material stock, substantially within its limits of elasticity, into a node with its perimeter held clamped in all radial directions, and scalping the node.

5. The process of making convexed or concaved bodies of elastic material which consists in presenting a fixed stretched node of material stock by protruding said stock on a former through a die aperture and slicing off the node beyond the former and die by lengthwise, or draw cutting, movement of a cutter with respect to the fixed node.

6. The process of making convexed or concaved bodies of fibrous, elastic material, such as felt or the like, which consists in

protruding a node of the material stock, carried on a former, through an aperture of the desired outline configuration in a die that clamps the stock against the former in all radial directions and scalping the node.

7. The process of making convexed or concaved bodies of felt or the like, which consists in protruding through a die opening of desired outline configuration a node of material stock, carried on a former of substantially the desired surface configuration that coöperates with the perimeter of the die opening to hold the node tensioned and free from extraneous pressure, and scalping the tensed node.

8. The process of making convexed or concaved bodies of elastic, fibrous material, such as felt or the like, which consists in protruding through an aperture of desired outline configuration in a planar die, a node of material stock carried on a former, of substantially the desired surface configuration and that clamps the stock against the perimeter of the die so that the node is under surface tension, and scalping the node at substantially the surface plane of the die.

9. The process of making a convexed or concaved body of elastic material, which consists in conforming a piece of material stock to a node shaped former, restraining the stock in such position with an outwardly presented surface stretched over the former and clamped at its edges, and scalping the node in a plane beyond the former, whereby the severed body may reverse itself elastically, presenting its severed surface as the convexed curve and restoring its previously stretched surface to planar condition.

10. The process of making a convexed or concaved body of elastic material, which consists in forcing a relatively thick body of the stock through a die opening by means of a former, that presents approximately the desired surface configuration and that acts to clamp the stock against the perimeter of the die, and slicing off the node beyond the die.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

DAVID W. ANDERSON.

In the presence of—
SIOUX K. GRIGSBY,
MARY E. LARKIN.