

May 20, 1941.

A. W. DONOVAN
MANUFACTURE OF SHOES

2,242,818

Filed Jan. 12, 1940

2 Sheets-Sheet 1

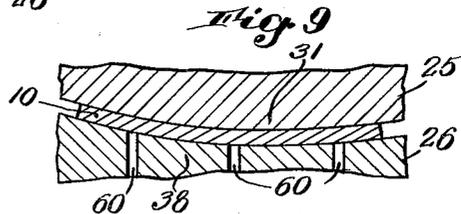
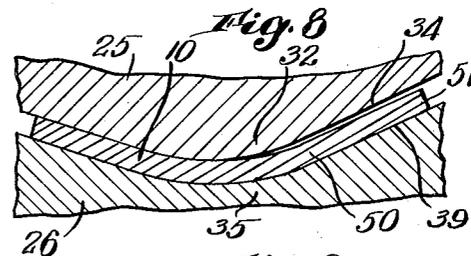
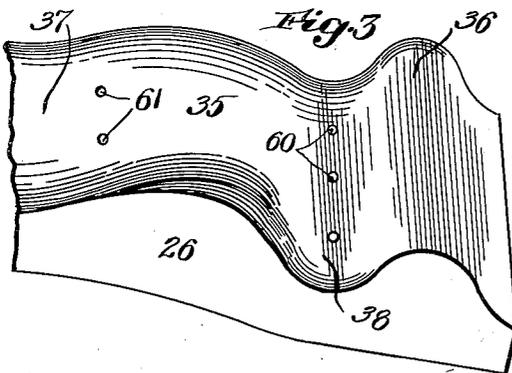
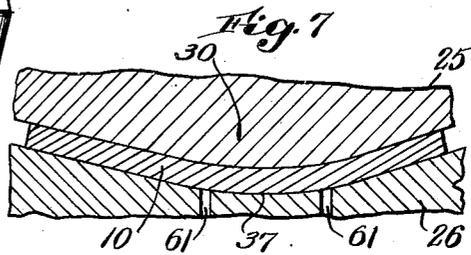
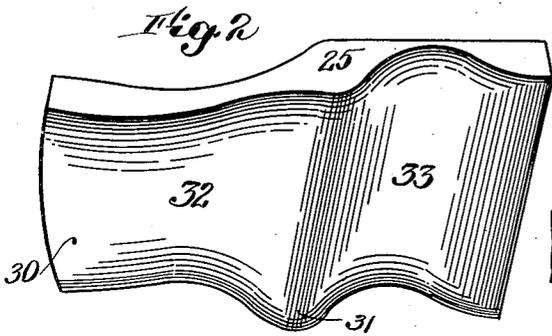
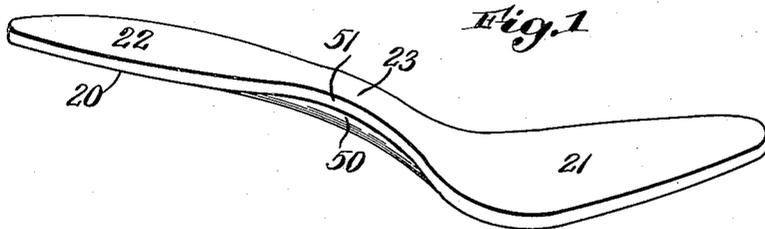


Fig. 11

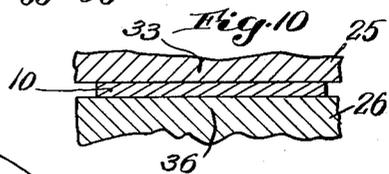
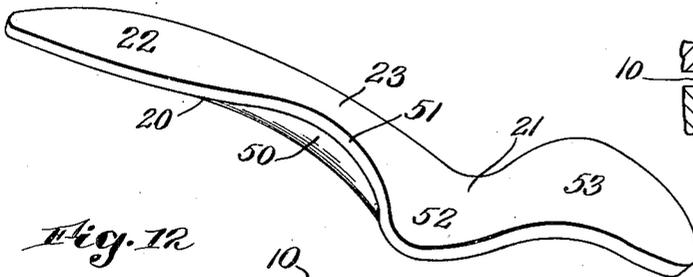
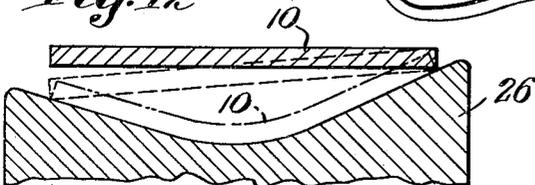


Fig. 12



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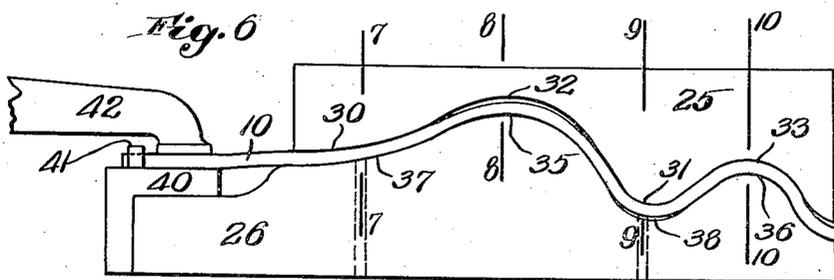
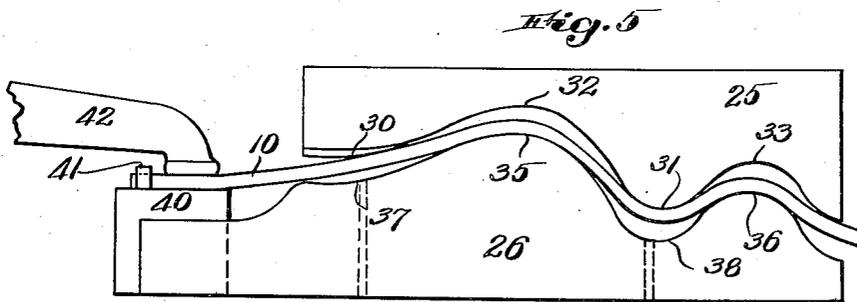
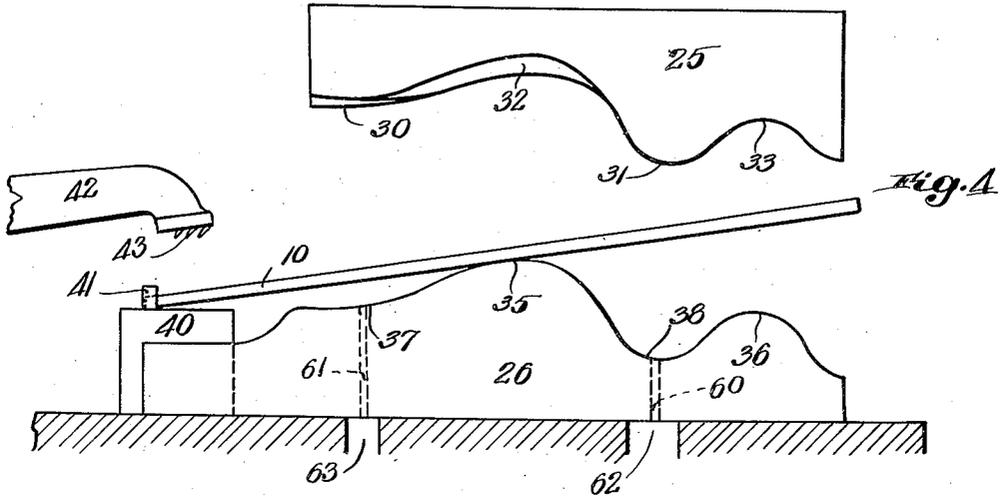
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MANUFACTURE OF SHOES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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MANUFACTURE OF SHOES

Alfred W. Donovan, Quincy, Mass.

Application January 12, 1940, Serial No. 313,489

5 Claims. (Cl. 12-146)

This invention relates to an improvement in the manufacture of shoes, and more particularly to a treatment of the outer sole of a shoe prior to its assembly with the upper upon a last in the usual course of shoe manufacture, and to the method by which such treatment is carried out, being a further development of the invention set forth in my copending application Serial No. 280,763, filed June 23, 1939.

Heretofore the assembly of the outer sole has included the step of shaping the sole to conform to the hills and dales of the bottom of the last, particularly at the shank which engages the hollow of the foot. This step results in a reduction in the effective length of the sole and also an orientation of the forepart of the sole toward the inner side of the shoe. In consequence it has heretofore been necessary to supply the operator with soles which are in fact longer than the actual distance from tip of the toe to the back edge of the heel and wider at the forepart than will be required in a finished shoe. According to the present invention the sole is so shaped previous to its assembly with the upper that it will conform to such hills and dales without the application of undue stress, or any reduction in the length of the sole to be assembled or any orientation of the sole during assembly.

In carrying out this invention the sole blank is clamped at the ends to prevent any contraction or orientation thereof, the inside portion of the shank is supported at an inclination transverse of the sole, and the material between the clamped ends is subjected to stresses or strains whereby is produced in the sole a shank portion which includes an upturned lip at the inner side, the formation of said lip including a lateral stretching of the shank portion and a forepart which is flexible, so that such sole is readily conformable to the last; as will be hereinafter set forth and claimed.

In the accompanying drawings,

Fig. 1 is a perspective view of a sole for a left shoe which has been treated in accordance with this invention;

Figs. 2 and 3 are perspective views of the dies which coact to form the sole in accordance with this invention;

Figs. 4, 5 and 6 are progressive views in side elevation illustrating the sole blank between the dies at the beginning of the treatment, at an intermediate stage of the treatment, and at the position when the treatment is completed;

Figs. 7, 8, 9 and 10 are enlarged cross sections

taken along the section lines 7-7, 8-8, 9-9 and 10-10 respectively in Fig. 6;

Fig. 11 is a perspective view similar to Fig. 1 of the sole when first removed from between the dies; and

Fig. 12 illustrates certain of the positions taken by the shank portion of the blank during the formation thereof.

The sole 20 when treated in accordance with this invention (Fig. 1) comprises a forepart 21, a heel 22, and a shank 23. As shown in Fig. 8, the portion of the sole forming the shank 23 includes an upturned lip.

The sole 20 is formed from a blank 10 in accordance with this invention by an upper die 25 and a lower die 26 (Figs. 2 and 3). The abutting inner faces of the dies are suitably contoured so that the sole 20 has the appearance shown in Fig. 11 upon its removal from the dies.

The inner face of the die 25 is provided with transversely extending ridges 30 and 31 and transversely extending depressions 32 and 33, the ridge 31 being between the depressions and the depression 32 being between the ridges. Similarly, the inner face of the die 26 is provided with transversely extending ridges 35 and 36 and transversely extending depressions 37 and 38, the ridge 35 being between the depressions and the depression 38 being between the ridges. The ridge 30 and depression 32 of the die 25 are crowned at the longitudinal center thereof and the depression 37 and ridge 35 of the die 26 have a longitudinally extending recess at the center.

The ridges of each die register with the depressions of the other die and are so formed that a sole blank 10 placed between is shaped thereby. The dies, by the coaction of which the sole 20 is formed from the blank 10, bear upon the opposite faces of the blank except at the inner side of the shank of the sole. The shank of the blank is primarily formed between the ridge 35 and the depression 32. That part of the ridge 35 in contact with the inner side of the shank is substantially higher at the edge than the rest of the ridge and is somewhat inclined. The corresponding part of the depression 32 is recessed so that at no time does it come into contact with the blank. These recessed and raised parts are shown in Fig. 8 of the drawings and designated by the numerals 34 and 39 respectively.

At one end of the die 25 is a block 40 upon which the heel seat end of the blank 10 rests. A suitable gauge 41 on the block, here shown as transversely spaced pins, serves to position the

blank, and a hold down 42 having curved teeth 43 holds the blank in place and prevents any shifting thereof during the forming operation. The hold down is supported in any suitable manner so that it can be moved toward and from the blank as desired.

The formation of the blank 10 into the sole 20 by the dies 25 and 26 proceeds as follows: The blank 10 after the usual mulling to impart the proper temper is placed between the dies with its flesh side adjacent the die 25. The blank rests upon the block 40 and ridge 35 as shown in Fig. 4 in the position determined by means of the gauge 41. The upper die 25 now descends and the hold down 42 is at the same time moved against the heel seat of the blank, the claws 43 thereof entering the body of the blank to prevent any shifting of the blank during the shaping operation. The blank 10 is first engaged by the tip of the die 25 and then by the ridge 31 and bent over the ridge 35 until it contacts the ridge 36. As the descent continues the forepart of the blank is bent transversely. The blank is thus clamped against longitudinal movement and orientation not only at the heel seat by the hold down 42, but also at the forepart by the coacting ridges 31 and 36 and depressions 38 and 33. The ridge 30 now acts upon the blank and forces it into the depression 37, while the ridges 31 and 36 force the forepart of the blank into the depressions 38 and 33 respectively.

It will be noted that the blank 10 initially rests upon the ridge 35 and is bent first at its forepart and then at the heel, the latter bending taking place after the forepart has been gripped between the ridges 31 and 36. Since the ends of the blank 10 are firmly clamped before the formation of the shank by the ridge 35 and depression 32, and since the part 39 of the ridge 35 is inclined and higher than the remainder of the ridge, the inner edge of the shank portion of the blank resting on that part is thereby tensed and held firmly in contact with the ridge by the longitudinal stresses exerted in opposite directions which increase as the upper die descends. The outer edge of the shank portion, while not supported, is similarly tensed by such longitudinal stresses. When the surface of the depression comes in contact with the blank the blank is first tilted on the line of contact of the inner edge with the ridge 35 and is then depressed at its longitudinal center. Fig. 12 illustrates these three positions taken by the shank portion.

As pointed out above the side edges of the shank portion of the blank are tensed by longitudinally exerted stresses, and since the blank has been tempered, it will, in response to the pressure applied normally thereto by the upper die, be stretched transversely. Since the side edges are tensed this stretching takes place midway between the edges, being caused by the crown at the longitudinal center of the depression 32. The crown at the longitudinal center of the ridge 30 similarly stretches the blank at the rear of the shank. However, while the surface is thus unsymmetrically contoured, no substantial orientation or twist is imparted to the forepart, the longitudinal axis of the sole being substantially unchanged by this treatment.

While the forming has been described in several stages, it will be understood that the operation is a continuous one. Preferably the dies are placed between the bed and platen of a press (only the bed 40 of which is shown) which may be of any well-known type suitable for this purpose.

The sole 20 made from the blank 10 by such pressing and stretching treatment, is, when removed from the dies, of the contour shown in Fig. 11, having at the shank 25 the upturned lip 50 which terminates in a stretched edge 51, and at the forepart 21 a transversely extending recess 52 and a transversely extending mound 53. The formation of the mound 53 and recess 52 increase the flexibility of the forepart 21. By holding the blank at the heel and beating the forepart against a table, bench or the like, the recess 52 and mound 53 are eliminated so that the forepart has the final contour shown in Fig. 1. When a sole so prepared is assembled with the bottom of a lasted shoe, the lip 50 follows the contour of the lasted insole at the shank and the flexible forepart readily accommodates itself to any unevenness in the forepart of that insole.

The usual forcing or straining of the sole into proper position at the shank is not required when the outsole is so prepared since the sole already has a contour substantially like that of the shoe bottom. In contrast to this, and in accordance with usual practice, the forepart is of necessity orientated during application of the outsole to the shoe bottom, being shifted to the inside of the shoe to provide the additional material required at the shank, and such orientation of the forepart so displaces its edge that it may not overlap the shoe bottom thus necessitating the use of an abnormally wide sole. Thus the present procedure makes it possible to employ a sole which is theoretically of the correct size for a given shoe, rather than a sole of from 1/2 to 1 1/2 sizes longer than the theoretically correct size which is necessitated by usual practice, with a resultant substantial saving in expensive sole leather. Moreover, since the inner side of the shank is usually placed under substantial stress and while so stressed is fixed to the insole, it has an inherent tendency to separate from the upper at that point, particularly after the shoe has been subjected to the usual strains set up when it is in use. This is of particular importance in the manufacture of men's shoes, which have heavy outer soles of substantial thickness.

Furthermore it is well recognized to be the best practice to cut the soles from the hides so that the longitudinal axis of the sole is parallel to the backbone. The fibers of the leather are thus in the position found most advantageous to resist wear. When, as has heretofore been the practice, the outer sole, as it is assembled with the lasted insole, is first forced into contact with the shank at the inside, the requisite subsequent re-orientation of the forepart disturbs this best position of the fibers and hence the wearing properties of the forepart are impaired. While I am aware that it has previously been suggested that the outer sole itself be conformed by a treatment prior to its assembly with the lasted upper, such treatment has not included either a positive clamping of the ends of the blank to prevent orientation or a tensing of the side edges of the shank portion by longitudinally exerted stresses and a transverse stretching of the shank portion midway between such edges.

The blanks being treated between the dies have, as pointed out above, been mulled and consequently moisture is driven off during the treatment. Such moisture is in part the mulling water and in part the tan liquor from the blanks. In order to take care of the moisture, and to prevent its injuring the pressing mechanism, not shown, drains 60 and 61 are provided which lead

from the depressions 37 and 38 to drains 62 and 63 through the plate on which the dies rest. From the drains 62 and 63 the moisture and tan liquor are led to any suitable reservoir or receptacle. The blank is not pressed into surface contact with the bottoms of the depressions 37 and 38, so that the mouths of the drains 60 and 61 do not leave any impression upon the blank.

I claim:

1. In the manufacture of shoes, that method of preparing an outer sole for assembly with a lasted upper which includes the steps of supporting the blank at its shank upon its inner side edge only, clamping the heel seat to hold the blank against longitudinal movement, bending the forepart downwardly and clamping it against longitudinal movement, and bending the portion of the blank between the supported shank and the clamped heel seat downwardly about its supported inner side edge as a fulcrum, and permanently stretching transversely such portion.

2. In the manufacture of shoes, that method of preparing an outer sole for assembly with a lasted upper which includes the steps of supporting the blank at the shank upon its inner side edge, clamping the heel seat to hold the blank against longitudinal movement, bending the forepart downwardly and longitudinally flexing it to clamp the blank against longitudinal movement, and bending the portion of the blank between the supported shank and the heel seat downwardly about the supported inner side edge as a fulcrum, and permanently stretching it transversely.

3. In the manufacture of shoes, that method of conforming the outer sole prior to its assembly with the lasted shoe upper which comprises the steps of clamping the ends of the sole to prevent orientation thereof, exerting longitudinally applied stresses upon the side edges of the shank portion, supporting one side edge of the shank

portion, tilting the shank portion about said supported edge, supporting the other side edge, and stretching the shank portion midway between the supported and longitudinally stressed side edges thereof.

4. In the manufacture of shoes, that method of conforming the outer sole prior to its assembly with the lasted shoe upper which comprises the steps of holding down the heel end of the sole, bending the forepart of the sole longitudinally to increase its flexibility, said bending thereby holding the forepart in position whereby the ends of the sole are clamped to prevent orientation thereof, setting up longitudinally acting stresses upon the side edges of the shank portion while one side edge thereof is supported, tilting the shank portion about said supported side edge until the other side edge is supported and stretching transversely the shank portion midway between the supported and longitudinally stressed side edges thereof.

5. In the manufacture of shoes, that method of preparing an outer sole for assembly with the bottom of a lasted shoe which includes as steps providing a substantially flat outer sole blank, tempering said blank, supporting the blank on the bottom inner edge of its shank portion, gripping the blank at points near the forward and rear ends respectively of its shank portion and tensing longitudinally the side edges thereof, and, while so gripping the blank and thus preventing said points from approaching, and while so tensing the side edges, bending the shank portion downwardly about said supported inner edge until the outer edge of said shank portion is also supported and thereafter subjecting the material of the shank portion between said supported edges to normally exerted stress so applied as to stretch permanently the shank transversely intermediate said supported edges.

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