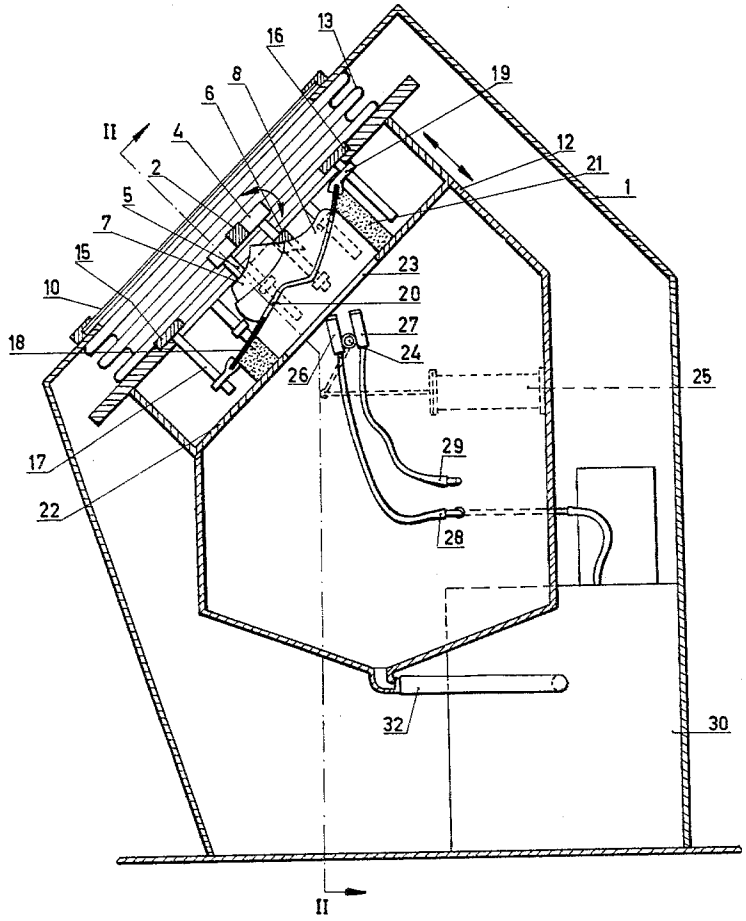
March 29, 1966 W. J. M. BAETEN ETAL 3,242,515

ROUGHENING THE UNDERSIDE OF A SHOE

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FIG. 1

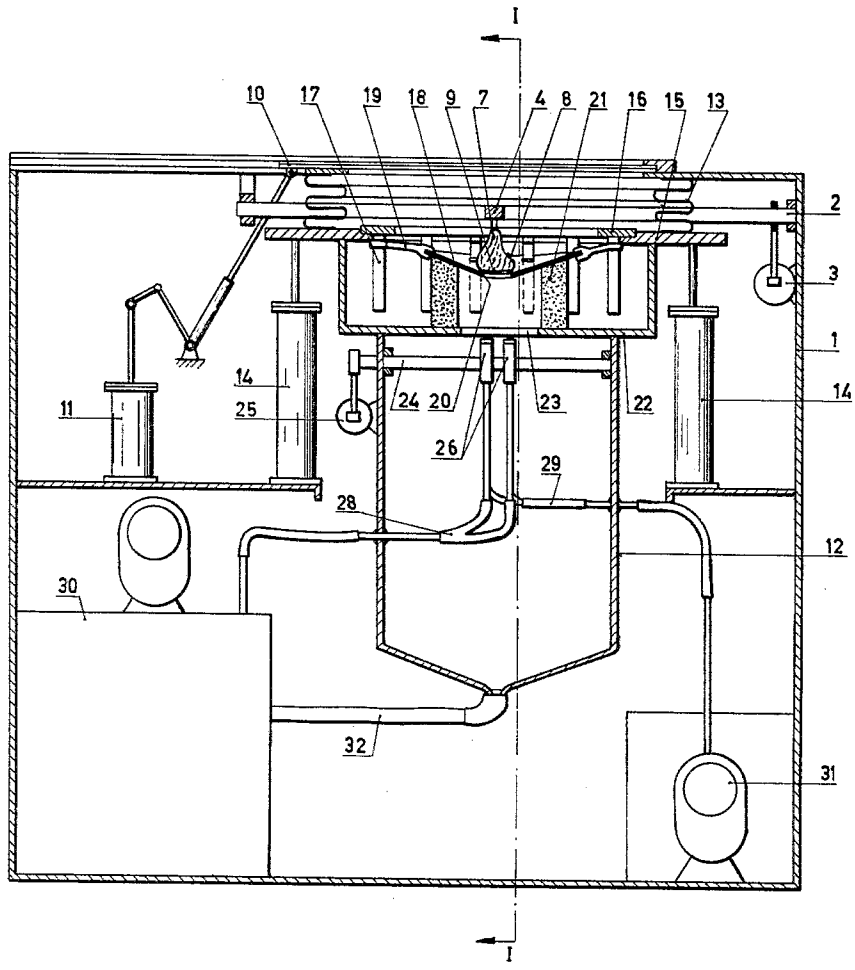


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ROUGHENING THE UNDERSIDE OF A SHOE

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FIG. 2



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ROUGHENING THE UNDERSIDE OF A SHOE

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The invention relates to a machine for preparing a turned over and wiped down portion of an upper applied to a last and overlying an insole, with the aid of a mobile blast apparatus and a template, prior to the outer sole's direct application to said upper by means of gluing, vulcanizing, spraying and the like. The blast apparatus may, for example, use abrasive grit.

It is known to roughen or rasp the turned over and wiped down portion of an upper inside the aperture of a template with the aid of movable blast nozzles by way of preparation for the final junction with the outer sole and thus to obtain a regular rough but clean surface, so that a solid junction between the outer sole and the upper leather of the shoe may be obtained. In this machine use is made of a metal template, consisting of one or more sections, which are as accurately as possible pressed against the upper leather prior to blasting.

This gives rise to difficulties, because it is necessary that the surface to be roughened or rasped should precisely correspond to that part of the sole's surface which is to be fixed onto it. In case the roughened surface should be too small, the junction in the edge would be adversely influenced, whereas in a shoe it is exactly this junction in the edge which is decisive. If the roughened surface is too large, part of it becomes visible and must be worked up by hand after the outer sole has been glued on, whereby it is impossible to remove by reparation the enfeeblement of the upper leather caused by the roughening at the visible places.

It is, therefore, necessary that the template should be of fixed size and resistant against wear by the blasting agent, because otherwise the template aperture, which determines the surface to be blasted, would within a short time become too large, so that the aforesaid reparation by hand would progressively increase with time in the serial production. Using a thick template will not check this wear, because it is exactly at that edge of the template which adjoins the surface to be blasted that wearing occurs.

Moreover, a much more important problem presents itself, the cause of which lies in the material of the upper. Leather is a product of nature, the properties of which will vary over short distances in spite of the most accurate selection. It is more specially the elongation and the changes in thickness consequential to this caused by the leather being brought under tension that will show large differences. It is true that for the upper leather the best quality for evenness is sought after, but when turning over and wiping down the upper, the leather is always subjected to tension and locally more or less stretched. The folds which occur during wiping down can be removed by flattening, but the variations in thickness which have arisen cannot be completely removed. In addition to this, these variations never occur to the same extent in the same place in successive shoes on one and the same last, and the limits between which the deviations are encompassed are so wide apart as to render a complete adjustment to a metal template impossible,

even when this template is composed of sections which are pressed on separately.

It has been found that in serial production, especially when the transition from the ball part to the shank is marked by a sharp angle as in high-heeled ladies' shoes, it is impossible to achieve a correct fitting of the uppers to a metal template. It is, therefore, impossible to maintain accurate tolerances for the shape and the size of the roughened or rasped surface. The upper's deviating from the template gives rise to further damages which have brought the roughening of the uppers by means of blasting into disrepute. As soon as the upper owing to the aforesaid variations in thickness fails to fit exactly against the template in any place, the blasting agent will penetrate into the chink which has formed itself and find a way out along the surface of the upper. This will cause the said surface to be roughened stripwise, causing the upper leather to be seriously damaged. It is clear that, when the transitions are sudden or when there are seams in the upper leather and junctions between the sections of the template, such damages are not to be avoided.

These circumstances have in many instances led to the roughening by means of blasting being superseded by the roughening by means of steel brushes or grinding wheels, which practically excludes the upper leather's being damaged under the template, i.e. outside the surface determined by the aperture in the template. An example of such a machine is known, wherein a grinding wheel is moved by hand above the surface limited by a sectional template.

It is an object of this invention to obviate these drawbacks and to make it possible to use a completely automatized machine for production and adapt it to the use of so-called prefinished soles.

For this purpose the present invention makes use of a thick but supple template such as for instance a rubber template, which is statically stretched in the correct shape by means of clamps provided on an exchangeable frame and which is pressed against the turned over and wiped down upper by means of overpressure, in such a way that the deviations which would normally occur are, by their being taken up in the template, reduced to the tolerances necessary for prefinishing.

The aperture in the template is preferably made with the same punching tool with which the insoles have been punched. An aperture which nominally determines the surface to be roughened is obtained by stretching the template statically on the clamps, whilst the deviations of the upper are received into the thick, supple material of the template without the nominal measurements being modified.

In addition to this, the machine can according to this invention be provided with a number of movable blowing nozzles for cleaning purposes, for which a higher pressure is applied to the template than when blasting.

By subjecting the template in the same machine after blasting to a higher pressure, the supple template is stretched a little under this overpressure and thus the aperture is enlarged. Blowing even on an extremely narrow strip of the not-roughened leather beside the roughened surface will facilitate the said strip's being cleaned of dust and adhering blasting agent.

It has been found that by using this machine the reparation work on the upper leather has practically been eliminated and in addition to this it has surprisingly become possible to use prefinished soles, the sides of which have been abraded and polished or have even been completely finished in advance, so that after the mounting of the sole on the shoe no further treatment of the sides is necessary.

The invention is hereinafter further illustrated with reference to the accompanying drawing showing an embodiment of a machine according to the invention, in which drawing FIG. 1 is a cross-section of the machine along the line I—I in FIGURE 2 showing a side view of a last and FIG. 2 is another cross-section along the line II—II in FIG. 1 showing a cross-section of the last.

A horizontal shaft 2 is rotatably mounted in a closed casing 1. This shaft can be rotated over an angle of about 180 degrees, between a working position which is shown in the drawing and a charging position which is not shown, by means of a driving gear 3 comprising a pneumatic cylinder and elements of transmission. A carrier 4 is mounted on the shaft 2, a pin 5 and a fork 6 being adjustably mounted on the carrier. A last 7 is placed on the pin 5 and held thereon by means of a spring connection, the instep of the said last being supported in the fork 6, so that the said last is fixed in a determined position.

An upper 8 is applied to the last 7, said upper 8 being turned over and wiped down on an insole 9. In the charging position the last 7 can easily be exchanged for another one of the same size and model when the upper and the insole of a preceding last have been treated.

In the working position a sliding cover 10 closes an aperture in the casing 1 above the shaft 2 in a dust-tight manner. This cover 10 is shifted with the aid of a driving mechanism 11, also comprising a pneumatic cylinder and transmission elements.

A box 12 is movably suspended under the cover 10 in the casing 1, a bellows 13, admitting of a movement of the box but forming a dust-tight connection between box and casing, being connected in between. Naturally, the passage of the rotatable shaft 2 through the bellows 13 is also executed in a dust-tight manner. The box 12 can be moved towards and away from the last 7 according to the direction of the arrow in FIG. 1, with the aid of two cylinders 14 which are supported in the casing.

A frame 16 is exchangeably fastened in a rabbet of the upper rim 15 of the box 12. This frame carries a number of pins 17 between which a supple rubber template 18 of about 10 mm. thickness has been stretched with the aid of clamping pieces 19. The clamping pieces 19 can be fixed on the pins 17 at any height and in any position and in this way the rubber template 18 can be held fast bent in any desired shape. The template 18 is provided with an aperture 20 corresponding to the size of the surface of the lasted shoe which is to be roughened and to which the sole is to be fixed by means of gluing, vulcanizing or spraying. For this purpose the aperture 20 is preferably punched with the same punching tool with which the insoles of these shoes are punched. The stable stretching between the pins and the nature of the template material make it possible to achieve an excellent assimilation between the supple rubber template and the turned over and wiped down portion of the upper, also when using a last presenting a sharp bend between different portions of the sole, as in high-heeled ladies' shoes.

A wall 21 of foam rubber, is fastened in the box 12 under the template 18, fits against the template in a dust-tight manner, and is by its elasticity capable of adapting itself also to templates of a different shape, as the frame 16 with a template 18 mounted on to it is exchangeably provided in the box 12.

The foam rubber wall 21 is supported on a plate 22 which divides the box 12 into two compartments. A shaft 24, which can be rotated over a limited angle by a driving gear 25, again comprising a pneumatic cylinder and transmission elements, is provided under a central opening 23 in the plate 22 in the box 12. Two sets of nozzles are mounted on this shaft 24: a number of blasting nozzles 26 and a number of blowing nozzles 27, the orifices of which are turned to the last 7, so that the whole of the bottom surface of this last can be covered during the rotation of the shaft 24.

The blasting nozzles 26 are connected to a blasting agent supply 30 by means of pipes 28 and passages through the wall of the box 12, whereas the blowing nozzles 27 are connected to a compressor 31 by pipes 29. The blasting agent which has dropped into the bottom part of the box 12 is returned to the blasting agent source, in which it can be cleaned for repeated use.

The operation of this machine is as follows.

When a last 7 with upper 8 and insole 9 has been placed on the pin 5 and the fork 6 in the charging position of the shaft 2, the machine is started. Then the shaft 2 rotates into the working position shown in the drawing and the sliding cover 10 is closed by the driving mechanism 11 and the transmission elements. Subsequently, the box 12 is raised by the cylinders 14 until the rubber template 18 has been pressed against the bottom side of the last. Hereby the edge of the template running along the aperture 20 fits precisely against the leather of the upper 8 throughout, not only because it has followed the main form of the last from the moment of its being adjusted by means of the pins 17 and the clamping pieces 19, but also because, when the box is raised, it is pressed on to the turned over and wiped down portion of the upper and is in addition to this supported by the pressure of the foam rubber wall 21. Its natural suppleness makes it possible for the template to adapt itself to the ideal last form without any appreciable deviation from the nominal sizes of the surface. When subsequently the blasting device is put into operation and a jet of blasting agent is levelled at the piece of leather limited by the aperture 20, an overpressure is caused at the same time in the closed space inside the box 12 which still improves the pressing together of the template and the leather. In order to prevent the overpressure from leaking out of the machine, the space between the cover 10, the bellows 13 and the upper portion of the box 12 containing the template 18 is preferably connected to the sucking side of the compressor via a filter, so that there is an underpressure on that side of the template which is turned towards the last 7. The driving mechanism 25 for the shaft 24 is put into operation simultaneously with the blasting device so that the blasting nozzles swing about slowly and cover the whole of the surface of the turned over and wiped down portion of the upper as well as the insole. Because the template 18 now fits closely everywhere, it is now under any circumstances impossible for the blasting agent to blow between the template and the upper leather and so cause damage.

When the surface has been sufficiently subjected to blasting and the required roughness has been attained, the blasting agent supply is turned off and cleaning can be started. For this purpose the compressor 31 and the blowing nozzles 27 should be moved in the same manner with the shaft 24. However, during blowing the static pressure in the box 12 is increased, which also gives rise to a higher pressure on the template 18. By this higher pressure the template is strained more firmly, which is to say that it is as it were drawn over and pushed up a little farther against the upper. Not only does this make it close on the upper leather still firmer, but the aperture 20 also becomes somewhat larger. Hereby the surface to be blown clean by the nozzles 27 is larger by a few tenths of millimetres than the surface covered by the blasting agent before. This surface is completely freed by this blowing, also at the edges, from adhering blasting agents, dust and fibres and is then ready for the application of the glue.

After this surface has been blown clean the overpressure is eliminated and the box 12 sinks back into its starting position. The last then gets clear of the template and as soon as the cover 10 has been shoved away the shaft 2 turns the last outside the machine. The last 7 can then be taken off the pin 5 and replaced by another last of the same size.

The great advantage of this machine is not only that

the roughening as well as the blow-cleaning are effected in a closed machine, but especially that by using the supple template exclusively that predetermined part of the surface is treated, which is actually to be roughened, whilst in addition to this no manual labour is involved. By the precise adjacency of the template against the upper leather it has become possible to eliminate an entire preparation operation, whilst it has surprisingly been found that the after treatments of the sides of the soles of the ready footwear have become completely superfluous. In the machine according to the invention, in which the template fits exactly on the upper leather, it is no longer necessary to make the soles in excess of the nominal sizes and to abrade them later on to the correct dimensions, but use can be made of prefinished outsoles, whereby the abrading and polishing machines for treating the sides after soling have become superfluous.

In addition to this it has been found to be possible, if the tension on such a supple template is increased by stretching it more tightly between the pins **17**, to work a shoe which is larger by half-a-size. Naturally it is then necessary to bestow much care on the adjustment lest the suppleness and the adaptability be lost in consequence of the higher tension in the template. It is also possible to use template material other than rubber, provided it combines thickness and suppleness with resistance against wear. Metal templates are quite unsatisfactory because their adaptability is insufficient.

Furthermore, it is a matter of course that, if the last of a certain model is exchanged, the frame with the template must also be exchanged. By using an exchangeable frame, spending much time on the adjustment in the machine when the size or the model of the last are changed, becomes unnecessary. This adjustment can be effected separately in a special jig, in which the last and the frame are mutually positioned in the same way as in the machine.

Although the above-described embodiment of the machine according to the invention is a single realization, it is a matter of course that a number of lasts placed either beside or after one another can be treated in a multiple machine while using adapted cycles. The fact that pneumatic cylinders have been used as power supplies for the various movements in the above-described machine, does not mean that other power sources, such as separate motors or mechanical transmissions derived from a main shaft, are impossible. However, the fact of the compressed air being required for blasting and blowing indicates a preference for a pneumatic installation.

Shoes the uppers and the insoles of which have been treated on the machine according to this invention thus are superior in this respect that they do not show any repaired spots on the upper leather in the edge between upper and sole and that all the shoes of one and the same model and size possess identical soles.

We claim:

1. A machine used in the manufacture of shoes for preparing a turned over and wiped down portion of an upper applied to a last and overlying an insole prior to the outer soles direct application to said upper, comprising a blast aparatus, a supple template having an aperture the shape of the sole of a shoe, a frame, and clamps

provided on said frame for stretching said supple template and for pressing said supple template against a turned over and wiped down upper so that the irregularities which normally occur are taken up in the template and reduced to the tolerances necessary for prefinishing.

2. A machine according to claim **1**, wherein a number of movable cleaning and blowing nozzles are provided beside the blasting device in combination with means for applying a higher pressure to the template when cleaning than when blasting.

3. A machine used in the manufacture of shoes for treating the underside of a shoe prior to the application of the outer sole, comprising:

(a) means adapted to carry a last with a turned over and wiped down portion of an upper applied to said last and underlying an insole;

(b) a blasting device within a housing, said housing being closed on one surface by a supple thick template provided with an aperture the shape of the sole of a shoe determining the contour of the surface to be treated;

(c) clamping means mounted on a frame, said clamping means statically stretching said template; and

(d) said means adapted to carry a last being movable relative to said housing whereby said wiped down portion of said upper contacts the edge of the aperture of said template in response to movement of said template relative to said wiped down portion and said edge is sealed against said portion by the pressure in said housing caused by operation of said blasting device.

4. A machine according to claim **3** in which the container includes a plurality of nozzles for cleaning purposes and means for producing a higher pressure against the template through said nozzles when cleaning than is applied when blasting.

5. A method of manufacturing shoes comprising:

(a) applying to a turned over and wiped down shoe upper, overlying an insole, a supple thick cut out template the shape of the sole of a shoe;

(b) stretching said template against the turned over and wiped down upper;

(c) clamping said stretched template against said shoe upper with the entire cut out portion of said template against said upper;

(d) blasting said template and said upper exposed in the cut out portion of said template with abrasive grit to roughen the surface of said upper; and

(e) adhering an outer sole to the blasted surface of said upper.

References Cited by the Examiner

UNITED STATES PATENTS

1,819,331	8/1931	Lytle	51—8
2,299,405	10/1942	Prange	51—8
2,846,820	8/1958	Persak et al.	51—8
3,044,218	7/1962	Munn	51—8

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