March 7, 1939. G. W. HOWLETT 2,149,293

DECORATIVELY COVERED OBJECT OF IRREGULAR SURFACE CONTOUR AND METHOD

Filed June 10, 1936 4 Sheets-Sheet 1

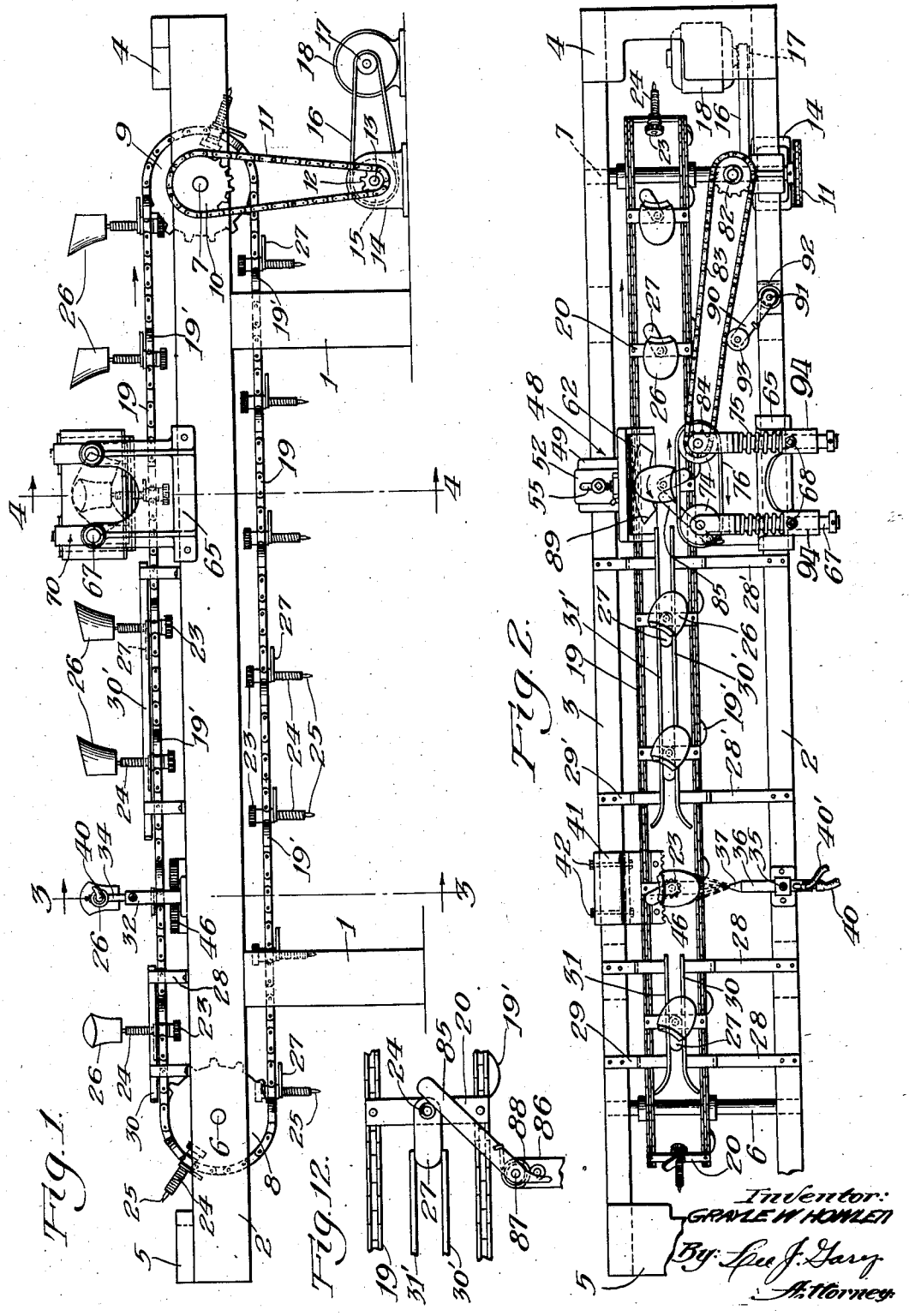

Fig. 1.

Fig. 2.

Fig. 12.

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DECORATIVELY COVERED OBJECT OF IRREGULAR SURFACE CONTOUR AND METHOD

Filed June 10, 1936 4 Sheets-Sheet 2

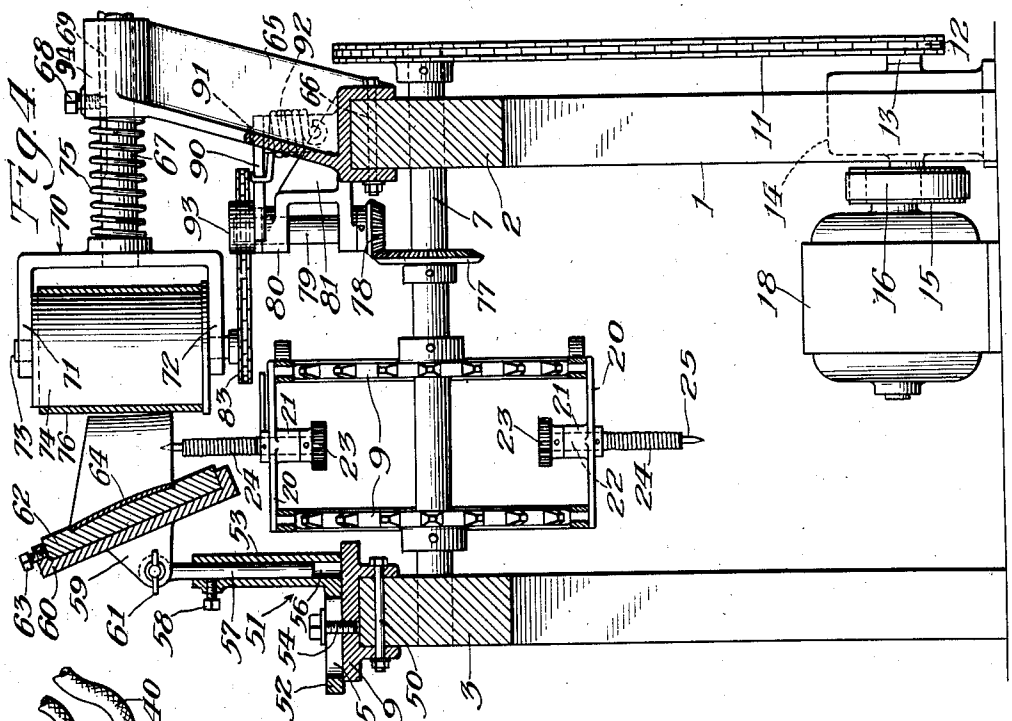

Fig. 4.

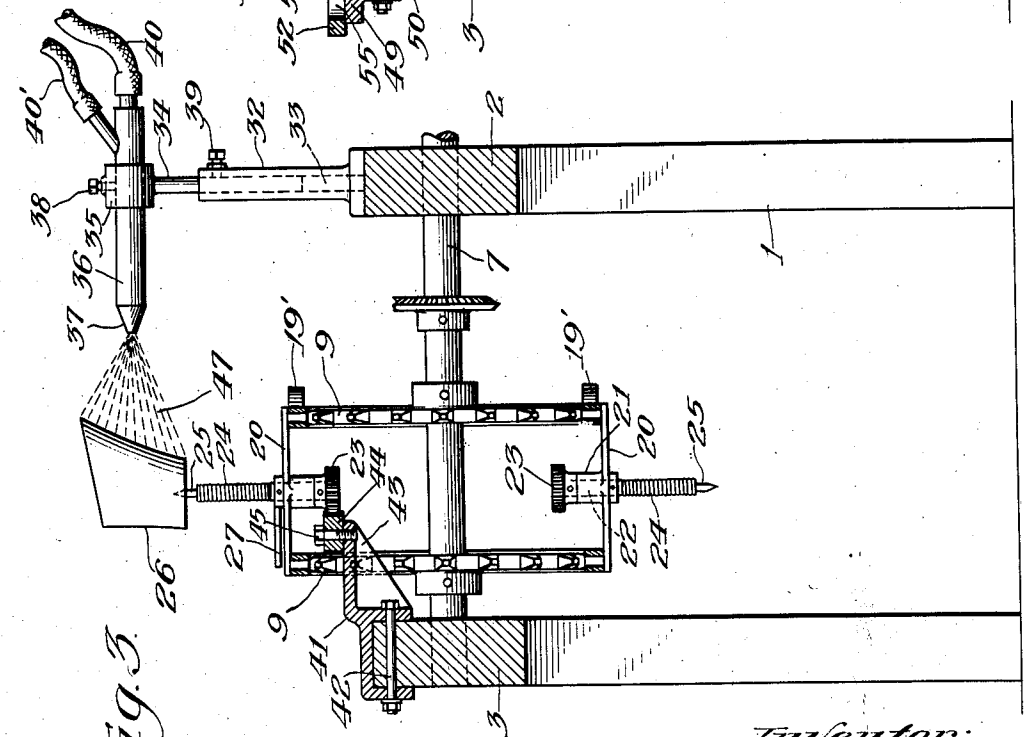

Fig. 3.

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DECORATIVELY COVERED OBJECT OF IRREGULAR SURFACE CONTOUR AND METHOD

Filed June 10, 1936 4 Sheets-Sheet 3

Fig. 5.

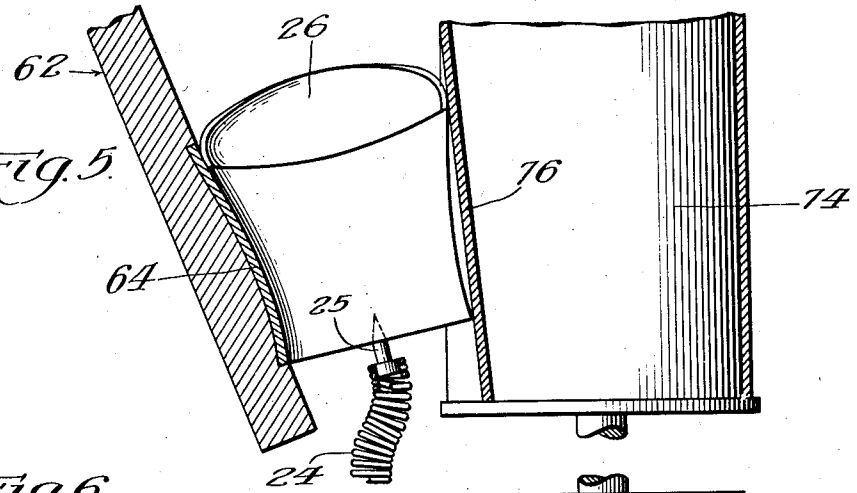


Fig. 6.

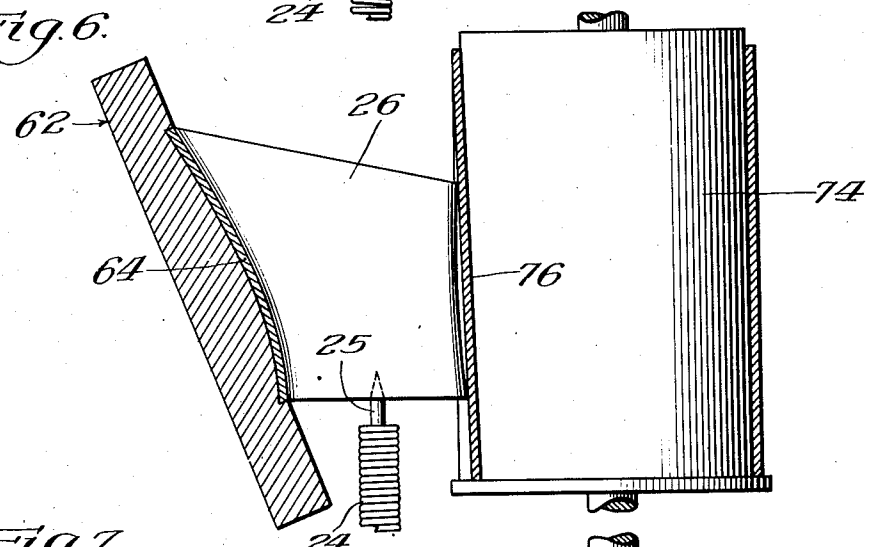
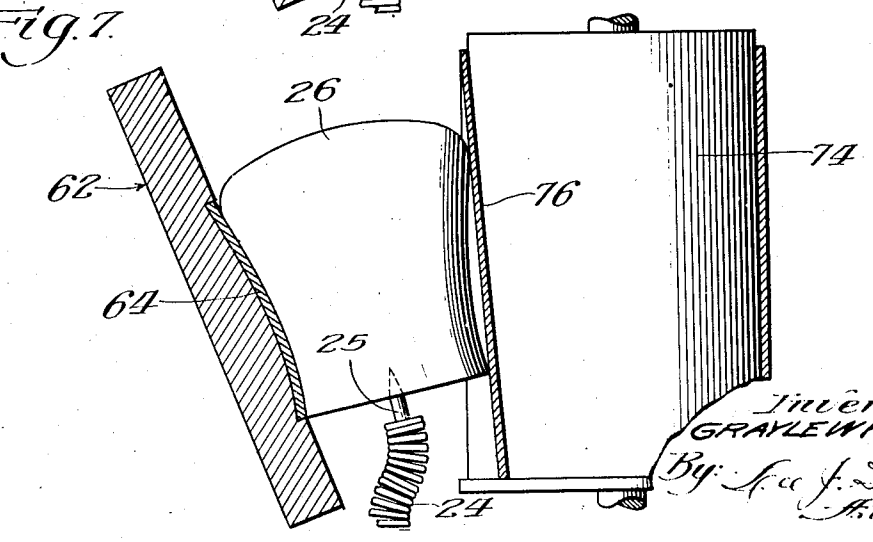


Fig. 7.



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DECORATIVELY COVERED OBJECT OF IRREGULAR SURFACE CONTOUR AND METHOD

Filed June 10, 1936 4 Sheets-Sheet 4

Fig. 8.

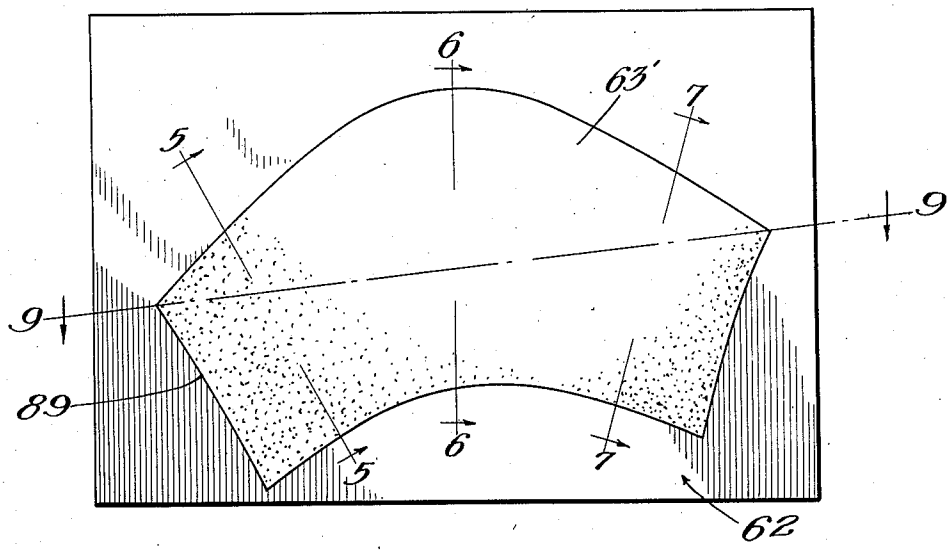


Fig. 9.

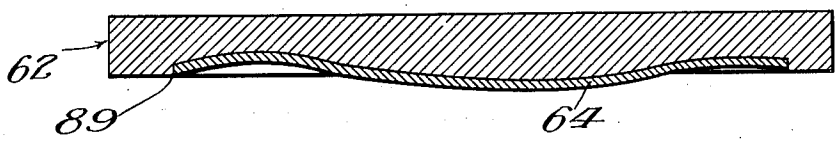


Fig. 10.

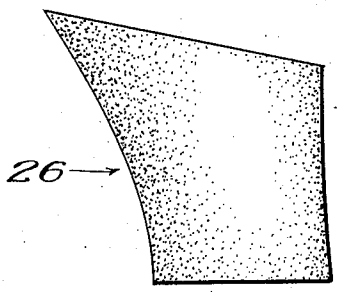
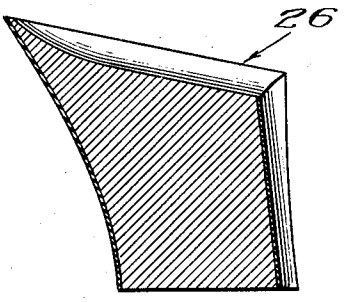


Fig. 11.



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Patented Mar. 7, 1939

2,149,293

UNITED STATES PATENT OFFICE

2,149,293

DECORATIVELY COVERED OBJECT OF IRREGULAR SURFACE CONTOUR AND METHOD

Grayle W. Howlett, Evanston, Ill.

Application June 10, 1936, Serial No. 84,429

10 Claims. (Cl. 91—67.9)

This invention relates to improvements in decoratively covered irregular shaped objects and a method and means for manufacturing the same, and refers specifically to a decoratively covered heel wherein the decorative covering is uniformly united to the heel surface throughout the entire area of the covering, and a method and means for continuously applying and decorating said covering.

Decorative coverings have heretofore been applied to heels in the form of a sheet of elastic Celluloid or the like which has previously been embossed to produce thereon the grain marks of leather. The application of such covers is substantially a manual operation and is relatively expensive. In addition, in stretching the sheet over the peripheral surface of the heel the embossed marks are frequently obliterated or stretched out which, of course, is undesirable. Further, the sheet is usually only united to the heel by adhesive along the edges thereof, and if cracked readily peels from the heel.

The present invention is directed to the provision of a covered heel characterized in that the covering is applied in the fluid state and is consequently uniformly secured to the heel throughout the entire area of the covering. Prior to the setting of the fluid upon the heel surface the same may be embossed to provide the characteristic grain marks of leather.

The process of my invention is preferably continuous and automatic, reducing manual operation and hence cost to a minimum. The apparatus is comparatively simple and ideally adaptable for carrying out my process.

Briefly described, my process comprises passing heels forwardly continuously in seriatim, during such passage spraying or otherwise coating the heel with a suitable coating and prior to the complete setting of the coating, rolling the coated heel upon a die or mold whereby the desired decorative marks are formed in the coating.

Other objects and advantages of my invention will be apparent from the accompanying drawings and following detailed description.

In the drawings, Fig. 1 is a diagrammatic side elevational view of a suitable apparatus for carrying out my process and making my product.

Fig. 2 is a top plan view of the apparatus illustrated in Fig. 1.

Fig. 3 is a transverse sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 1.

Figs. 5, 6 and 7 are a series of sectional views illustrating the rolling of the coated heel over the die or mold, said sections being taken respectively upon lines 5—5, 6—6 and 7—7 of Fig. 8.

Fig. 8 is a face view of the mold or die.

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8.

Fig. 10 is a side elevation of the finished heel.

Fig. 11 is a sectional view taken through the heel shown in Fig. 10 illustrating particularly the covering thereof.

Fig. 12 is a detail view of the device for tipping the heel prior to its contact with the mold.

Referring in detail to the drawings, 1, 1 indicate legs or supports for oppositely disposed longitudinally extending frame members 2 and 3. The frame members 2 and 3 are spaced by end supports 4 and 5. A shaft 6 is journalled at each of its ends in the frame members 2 and 3 adjacent one end of the machine. A shaft 7 is similarly journalled at the opposite end thereof. A pair of sprocket wheels 8 are mounted upon shaft 6 and a corresponding pair of sprocket wheels 9 are mounted upon shaft 7. Sprocket wheel 10 is also mounted upon one end of shaft 7 and is driven by sprocket chain 11 which is trained around sprocket pinion 12 mounted upon shaft 13 of a conventional speed reducing mechanism 14. The input to the speed reducing mechanism comprises a pulley 15 which is driven by means of a belt 16, the belt in turn being driven by pulley 17 mounted on the armature shaft of motor 18.

Sprocket chains 19, 19 travel around both pairs of sprocket wheels 8 and 9 in a continuous or endless fashion. A plurality of bars 20 are secured to the chains 19, said bars transversely spanning the space between said chains. The bars 20 are spaced from each other along the length of chains 19, the degree of said spacing being determined, as will be hereinafter more fully described, by the length of the mechanism which resiliently forces the heels to be coated into contact with the mold or die.

Referring particularly to Fig. 3 it will be seen that each bar 20 carries intermediate its length a bearing 21 in which a pin 22 is journalled, the axis of said pin extending at right angles to the length of the bar 20. At one end of the pin 22 a pinion 23 is keyed and rigidly secured to the opposite end of said pin on the opposite side of bar 20 is a coil spring 24. The coils of the spring 24 are normally in contact with each other and the pitch of said coils is relatively small. At the opposite end of the spring 24 a sharpened pin 25 is mounted. During the operation of the machine in carrying out my process, the bottom of the

heels 26 to be coated are impaled upon the points of the pins 25.

When the motor 18 is set in operation, chains 19 travel continuously over sprocket wheels 8 and 9. When each of the pins 25 pass around sprocket wheel 8 a heel 26 is impaled thereon. In this manner, as will be hereinafter more fully described, the heels are continuously carried forwardly to be coated and subsequently acted on to produce the desired decorative graining.

Lug 27 is rigidly secured at one end to pin 22 and when the heels are impaled upon pins 25 they are placed thereon at a definite position with respect to the lug 27. This relationship is clearly illustrated in Fig. 2. Strips 28 and 28' are secured at their ends to the frame member 2 and extend substantially horizontally toward the opposite frame member 3. Similar strips 29 and 29' are secured at their ends to the frame member 3 and extend oppositely toward frame member 2. Adjacent the path of travel of chains 19, the strips 28, 28', 29 and 29' are bent upwardly to a point above the path of travel of chains 19 and are again bent to bring the free ends of the strips horizontally over the path of travel of the chains. The free ends of the strips 28 carry a guide bar 30 which is curved outwardly at one end. The free ends of strips 29 carry a similar guide bar 31 which is positioned oppositely from the guide bar 30. Similarly to free ends of strips 28' carry guide bar 30' and the free ends of strips 29' carry spaced guide bar 31'. The arrangement is such that as chains 19 travel in the direction indicated by the arrows in Figs. 1 and 2, lugs 27 contact the curved ends of the opposite guide bars 30 and 31 and in order to permit passage of the lugs forwardly, said lugs must be so moved as to dispose their longitudinal axes parallel to the length of the guide bars 30 and 31. As has been hereinbefore pointed out the heels 26 are impaled at a predetermined position with respect to the position of the lugs 27. Consequently, when said lugs are so moved as to be disposed with their axes parallel to the guide bars 30 and 31, the heels 26 will be carried forwardly in a predetermined position.

A standard or support 32 is mounted upon frame member 2 and is provided with an elongated central bore 33 which is adapted to receive a spindle 34. The spindle 34 carries a clamp 35 at its upper end which, in turn, is adapted to carry a spray gun 36 having a nozzle 37. The spray gun 36 is movable longitudinally within the clamp 35 and may be locked therein by means of bolt 38. The spindle 34 is movable vertically within the bore 33 and may be locked at a desired position by means of the set screw 39. The gun 36 is connected by means of flexible conduits 40 and 40' to respective sources of coating liquid and air under pressure (not shown). The character of the coating material delivered by gun 36 will be hereinafter more fully described.

A bracket 41 may be secured by means of bolts 42 or the like to the frame member 3 directly opposite the gun 36. The bracket 41 is provided with an extension 43 which projects beneath the path of travel of one of the chains 19. A rack 44 is secured by means of screws 45 or the like to the extension 43, said rack being provided with a plurality of gear teeth 46. In operation, when chains 19 have moved a heel 26 and its supporting assembly to the vicinity of rack 44, the pinion 23 engages the teeth 46 upon said rack. Simultaneously a trigger (not shown) which is adapted to actuate the spray gun 36, is tripped by conventional means (not shown) carried by one of the chains 19 which causes a spray of coating material 47 to issue from nozzle 37. As the chains 19 move, the engagement of pinion 23 with the teeth 46 of rack 44 causes rotation of pin 21, spring 24 and, consequently, rotation of heel 26. The length of the rack 44 is so correlated with the diameter of the pinion 23 and the initial position of the heel 26, as lug 27 leaves the tracks 30 and 31, that the heel 26 is rotated within the volume of spray 47.

If desired, the spray gun 36 may be actuated by means (not shown) to swing the gun during the entire period of rotation of the heel, so that the spray will be trained on the heel during the entire period of its rotation.

When the heel leaves the vicinity of the rack 44 a trigger (not shown) is tripped by the movement of one of the chains 19 so as to shut off the spray. The coating fluid which I prefer to use comprises a cellulosic compound or mixture, the mixture comprising in general nitrocellulose, an active solvent, a diluent and a plasticizer. The characteristics of this material are such that when dry or set it forms a durable, attractive surface, and the proportions of the materials are so selected as to provide a fluid which may be readily dispersed from a spray gun and which will partially set before the graining operation takes place. Therefore, I do not wish to be limited to the exact proportions which are hereinafter set forth. In general, I have found that a mixture comprising 128 ounces of diluent, 128 ounces of active solvent, 2 pounds of nitrocellulose and 1 to 4 pounds of plasticizer provide a suitable mixture. As specific materials I have found that a composition comprising the following materials in the proportions given makes a suitable coating mixture:

	Ounces
Amyl acetate	16
Denatured alcohol	8
Benzol or toluol	48
Ethyl acetate	24
Olium recini (castor oil)	32
Nitrocellulose	16

Desired pigment in suitable quantity to produce the desired color.

In the above set forth list alcohols may be substituted as diluents for benzol or toluol. In general, esters or ketones may be utilized as active solvents, for instance, butyl acetate, amyl acetate or "Cellusolve", being esters, may be used in place of ethyl acetate or among the ketones, acetone or ethyl methyl ketone may be substituted for the ethyl acetate. In place of castor oil as a plasticizer linseed oil, dibutyl phthalate or other well known plasticizing compounds may be used.

If desired, gums such as dammar, ester, synthetic resins, may be added to the above materials in suitable proportions to increase the solid content of the mixture and produce a more flexible resulting film. Such gums may, if desired, be used along with proper diluents and/or solvents in place of the cellulosic mixture above suggested. However, in general the material sprayed upon the heel must be one which is capable of resulting in a relatively durable and attractive film and one over which the rate of drying or setting can be controlled so that the subsequent step of graining or embossing can be carried out while the film is in a suitable plastic condition.

If desired, the sprayed material may comprise a thermo-plastic material which may be permitted to completely set after spraying and before graining. In order to emboss such a film the heels may be passed through a preheating zone before graining whereby the film may be changed to the plastic state, and, if desired, the embossing die may be heated to perform the embossing operation without the application of excessive pressures. Of course, regardless of the material used to establish the film the embossing pressure will be dependent upon the hardness of the film during the embossing operation, as hereinafter described.

After leaving rack **44** the heel is carried forwardly by the chains **19** and again said heels are oriented by rails **30'** and **31'** which act upon lugs **27**. In this manner the heels are carried forwardly to the embossing unit designated generally at **48**. It can readily be seen, therefore, that the proportions of the materials sprayed upon the heel, particularly with reference to the diluents and solvents, must be correlated with the distance between the point of spraying and the embossing unit **48** taken in conjunction with the rate of travel of the chains **19** so that the film carried by the heel is in proper plastic condition to be acted upon in the embossing unit **48**.

The embossing unit **48** comprises a bracket **49** which is secured to the frame member **3** by means of bolts **50**. A standard **51** having a base portion **52** and an upwardly extending portion **53** is adjustably mounted upon bracket **49**, the adjustable mounting comprising a set screw **54** which extends through slot **55** provided in the base member **52**. By this provision the standard **51** may be adjustably disposed and locked at a desired position determined by the length of slot **55**. The upright member **53** is provided with a central bore **56** in which a spindle **57** is adapted to be positioned. The spindle **57** is movable longitudinally within bore **56** and may be locked at a desired position vertically by a set screw **58**. A lug **59** is pivotally secured to the upper end of the spindle **57**, said lug being rigidly attached or formed integral with frame **60**. By the provision of the pivotal mounting of frame **60** upon spindle **57**, said frame may be moved to a desired angular position and may be locked in such position by means of a winged nut **61**. The frame **60** is adapted to carry an embossing mold **62** which may be locked in said frame by means of set screw **63**. The embossing mold **62** comprises a block having a portion **63'** of its face provided with a surface contour which conforms with the exterior or coated surface of heel **26**, that is, the development of such external surface excluding the breast of the heel.

During the embossing operation each heel **26** is rolled over the section **63'** of the mold **62** and therefore the section **63'** of the mold is formed with a surface contour which will register with the surface of the heel during the rolling operation. The face of the section **63'** is adapted to contain a series of relatively minute projections or indentations which resemble in inverse relationship the grain marks of leather. To provide such surface the block **62** including the section **63'** may be cast from metal as a unit, the indentations and projections being cast upon the surface of the section **63'**. If desired the mold **62** may be so cast as to provide at the section **63'** only the surface contour of the rolled heel and the embossing projections and indentations may be carried upon a strip **64** which may be adhesively or otherwise secured to the face of the section **63'**. In this event the surface of the strip **64** serves as the embossing surface. The strip **64** may be constructed of leather, hard rubber, or any material which can be embossed to provide the desired projections and indentations and which may be shaped to conform with the surface contour of the section **63'**. In the event this latter type of embossing surface is used, it is preferable that the strip **64** be backed with a layer or sheet of resilient material whereby compensation may be made for slight variations in the surface contours of heels which are presumably similar but which are actually slightly different in contour.

Opposite to the mold **62** a pair of standards **65** are secured to rail or frame member **2** by means of bolts **66** or the like. The upper end of each of the standards **65** is provided with a sleeve **94** in which a shaft or rod **67** is positioned. The shaft or rod **67** is slidably but non-rotatably positioned within the sleeve **94** and it may be prevented from rotating by the end of screw **68** which acts as a key by registering with the keyway **69** provided in the surface of shaft **67**. At the outer end of each of the shafts **67** a U-shaped member **70** is rigidly carried, the arms **71** and **72** of said member serving as bearings for a shaft **73** upon which a pulley **74** is mounted. A coil spring **75** embraces shaft **67** between sleeve **94** and the member **70**, the opposite ends of said coil spring bearing upon sleeve **66** and the member **70**. As can readily be seen by reference to Figs. 2 and 4, the pulleys **74** are vertically positioned adjacent the path of travel of the heels **26**. A belt **76** is trained around the spaced pulleys **74** and is provided with a relatively high friction surface.

A bevel gear **77** is keyed to shaft **7** and meshes with bevel pinion **78** carried by shaft **79**. Shaft **79** is journalled in spaced bearings **80** which are formed integral with the bracket or support **81**. A sprocket wheel **82** (Fig. 2) is mounted at the upper end of shaft **79** and is adapted to drive sprocket chain **83** which, in turn, is trained around sprocket wheel **84** carried upon the lower end of one of the shafts **73**. In this manner one of the pulleys **74** is driven from shaft **7** and through the medium of belt **76** drives the other pulley **74**. In practice the linear speed of belt **76** is equal to or slightly greater than the linear speed of the chains **19**. The purpose of so driving belt **76** will be hereinafter more fully described.

Cams **19'** are mounted upon the outer side of the chain **19** which travels adjacent the frame member **2**, said cams being mounted slightly in advance of the cross members or bars **20**, considered in the direction of travel of the chains. An extension (not shown) is provided upon the lower end of the shaft **73** upon which the driven pulley **74** is mounted, said extension being positioned in the path of travel of cams **19'**.

As chains **19** move forwardly carrying the coated heels toward unit **48**, cams **19'** contact the above mentioned extension of the shaft **73**, and consequently the driven pulley **74** is moved backwardly away from the passing heel against the tension of the first spring **75**. This permits the positioning of the heel between the belt **76** and die. After the heel has assumed this position cam **19'** will have so moved as to permit the return of the driven pulley **74** to its normal position and, hence, the belt **76** will exert a lateral

pressure upon the heel tending to move the same toward the die.

An arm 85, Fig. 12, is pivotally connected to member 86 which, in turn, is mounted upon frame member 2. The pivotal connection comprises a pin 87 embracing which is a spring 88 anchored at one end to the member 86 and at the other end upon arm 85. The arrangement is such that spring 88 resists motion of arm 85 in a clockwise direction. The end of arm 85 extends in the path of travel of the upper portion of the coil spring 24. Consequently, as the chains 19 move forwardly the upper end of the coil spring 24 is contacted by the end of arm 85 just prior to the period when lug 27 leaves tracks 30' and 31'. This action tilts the spring 24 in a backwardly direction and also in a direction toward mold 62 until the adjacent corner of the heel engages the side 89 of the section 63'. At the period that this engagement takes place the end of lug 27 will have left tracks 30' and 31' and, hence, heel 26 will be free to rotate. Consequently, due to the motion of the belt 76 which resiliently presses said heel toward the section 63' of the mold 62, the heel is rotated so that its external surface rolls over the mold or die 64. Inasmuch as the coating or film upon the external surface of the heel 26 at this period is in a more or less plastic condition, the projections and indentations formed in the surface of the die 64 will impress or emboss said plastic film carried upon the heel whereby the grain marks characteristic of leather will be imparted to the plastic film. By driving the belt 76 at a slightly greater speed than chains 19, the possibility of slippage occurring between the external face of the heel and the section 64 is eliminated.

By referring to Figs. 5, 6 and 7 the position of the heel 26 between the belt 76 and mold 62 is illustrated, said views respectively showing the heel at its initial position between the belt and the mold, at its central position and also at its final position. The three positions illustrated are indicated upon the development or mold illustrated in Fig. 8. When the heel leaves the mold 62 the second pulley 74 is moved away from the mold thereby compressing the spring 75 associated with said pulley. Since this pulley constitutes the driving pulley, provision is made for maintaining chain 83 in taut condition and comprises an arm 90 pivotally connected at 91 to frame member 2. A spring 92 embraces the pivot pin and is anchored at one end upon the pivot pin and at the other upon an intermediate portion of arm 90. A roller 93 is carried at the end of arm 90 and contacts chain 85. The heels 26 which pass from the embossing unit 48 are carried forwardly and may be subsequently removed from the pins 25, or said heels may be passed through a drying conduit in which warm air may be circulated. The drying conduit is not shown but may be of conventional construction. If desired the return path of travel of chains 19 may be enclosed and warm air may be circulated through the enclosed space thus formed. In this case the dried heels may be removed from the pins 25 just prior to the impalement of the uncoated heels.

To prevent the semi-plastic film carried upon the surface of the heel from adhering to the embossing surface 63, said surface may be periodically sprayed with a material resembling a masking paste or resist. These materials are common in their use for similar purposes with lacquers and I have found that the following mixture constitutes a suitable masking paste or resist for purposes of my invention.

	Parts by weight
Glycerol	20
Starch	20
Pigment	10
Water	50

It is to be understood, of course, that the above composition is set forth merely for purposes of illustration and is not intended to serve as a limitation of my invention.

In carrying out the process of my invention, the material initially sprayed upon the heels may be compounded to match the color and sheen of the other portions of the shoes which they are adapted to be used, or a finishing coat of lacquer enamel or other like material made to match the shoes in color may be sprayed or otherwise applied over the dried embossed film.

By the expression "external lateral surface" as used in the specification and claims with reference to the heels is meant, the surface of the heel excluding the top, bottom and breast portion.

One of the decided advantages of decoratively covered heels as made according to my invention resides in the fact that the covering film is caused to set in conformation with the surface contour of the heel. Although the cover may or may not qualitatively or chemically differ from a cover which is applied as a previously set flat sheet, physically there is a decided difference in that the cover during application has not been deformed and, consequently, when the heel does not possess the stresses of tension and compression which are existent at all times in the cover which must be bent to be applied to the heel surface.

I claim as my invention:

1. A heel prepared in accordance with the process of claim 4 having a portion of its surface covered with a continuous film comprising a cellulosic mixture, said film having decorative embossed marks, characterized in that said film is uniformly united to the entire external lateral surface of the heel throughout the entire area of the film.

2. A heel prepared in accordance with the process of claim 4 having its lateral surface covered with a film having marks embossed only on the external lateral surface thereof, characterized in that said film is uniformly bonded to the entire surface of the heel throughout the entire area of the film.

3. A heel having a decoratively covered external lateral surface characterized in that the cover comprises a hardened film resulting from the spraying of a potentially hardenable liquid to said surface which has been embossed after partial setting and while in a plastic condition to simulate grain marks of leather.

4. A method of applying a decorative covering to a portion of a heel which comprises spraying a potentially hardenable film in the fluid state to a portion of the heel, and embossing a predetermined portion of the film while in a plastic condition to simulate grain marks of leather.

5. A continuous method of applying decorative coverings to heels which comprises, passing the heels forwardly in seriatim, spraying a potentially hardenable film in the fluid state to a portion of the surface of each heel as it passes forwardly, and embossing said films carried on the heels as the heels travel forwardly while in a plastic

condition with grain marks to simulate leather prior to the hardening of said film.

6. A continuous method of applying decorative coverings to heels comprising passing the heels forwardly in seriatim, applying a potentially hardenable film in the fluid state to a portion of the surface of each heel as it passes forwardly, and rolling each heel over an embossing surface as said heel travels forwardly and before the film upon said heel completely sets.

7. A method of applying a decorative covering to a portion of a heel which comprises spraying a potentially hardenable liquid film comprising nitro-cellulose, a diluent, a solvent and a plasticizer to a portion of the surface of the heel, and embossing said film while in a plastic condition to simulate grain marks of leather.

8. A method of applying a decorative covering to a portion of a heel which comprises spraying a potentially hardenable liquid film comprising nitro-cellulose, amyl acetate, denatured alcohol, benzol, ethyl acetate and castor oil to a portion of the surface of the heel, and embossing said film while in a plastic condition to simulate grain marks of leather.

9. A continuous method of applying decorative coverings to heels comprising passing the heels forwardly in seriatim, applying a potentially hardenable film in the fluid state to a portion of the surface of each heel as it passes forwardly, rolling each heel over an embossing surface as said heel travels forwardly and before the film upon said heel completely sets, and periodically applying a resist to said embossing surface to prevent adherence of the films thereto.

10. A continuous method of applying decorative coverings to heels comprising passing the heels forwardly in seriatim, applying a potentially hardenable film in the fluid state to a portion of the surface of each heel as it passes forwardly, rolling each heel over an embossing surface as said heel travels forwardly and before the film upon said heel completely sets, and periodically applying a resist comprising glycerol, starch, pigment and water to said embossing surface to prevent adherence of the film thereto.

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