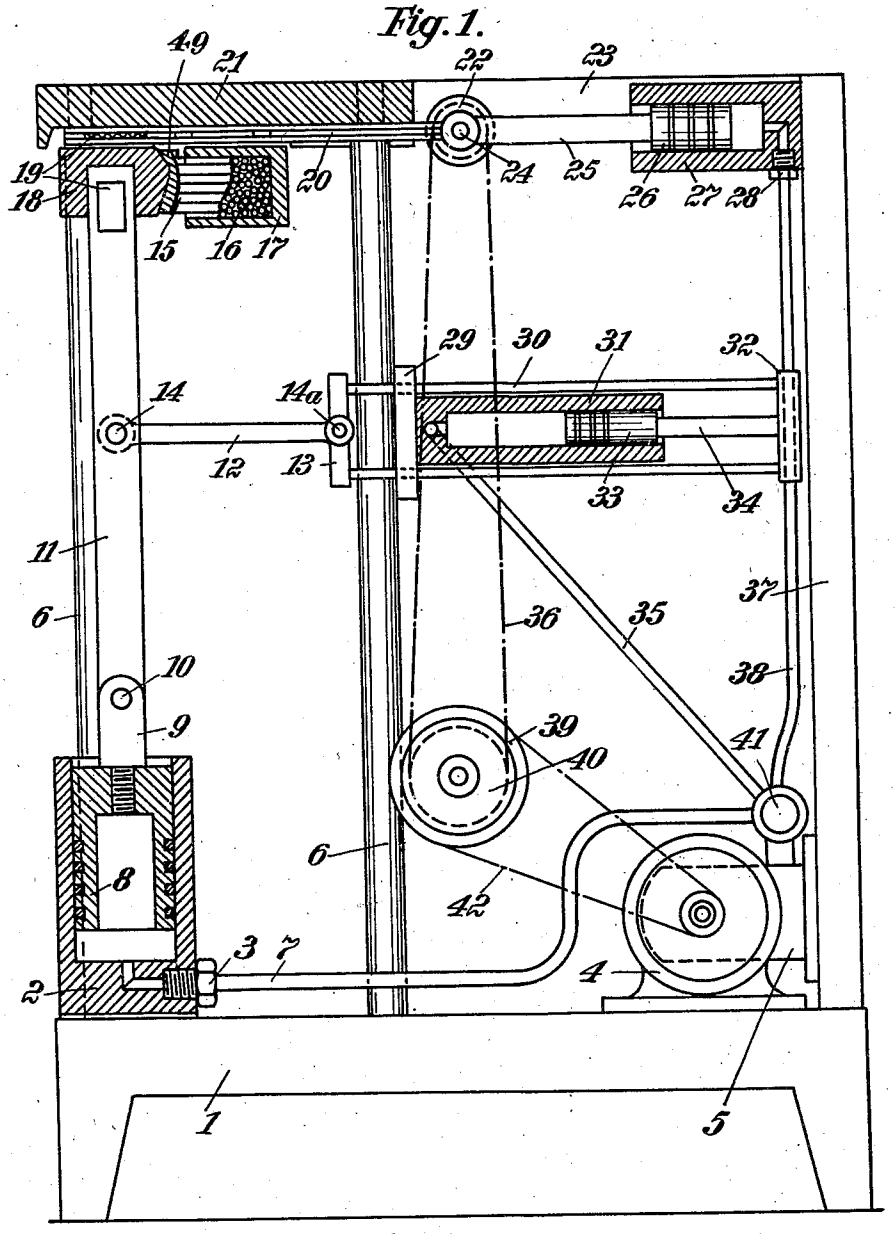
Nov. 14, 1939. C. HABER ET AL 2,180,234

PRODUCTION OF BOOTS AND SHOES

Filed April 23, 1936 3 Sheets-Sheet 1

Fig. 1.



Inventors:
C. Haber and E. Haumann

By: Glascock Downing & Seebold
Attys.

Nov. 14, 1939. C. HABER ET AL 2,180,234

PRODUCTION OF BOOTS AND SHOES

Filed April 23, 1936 3 Sheets-Sheet 2

Fig.4.

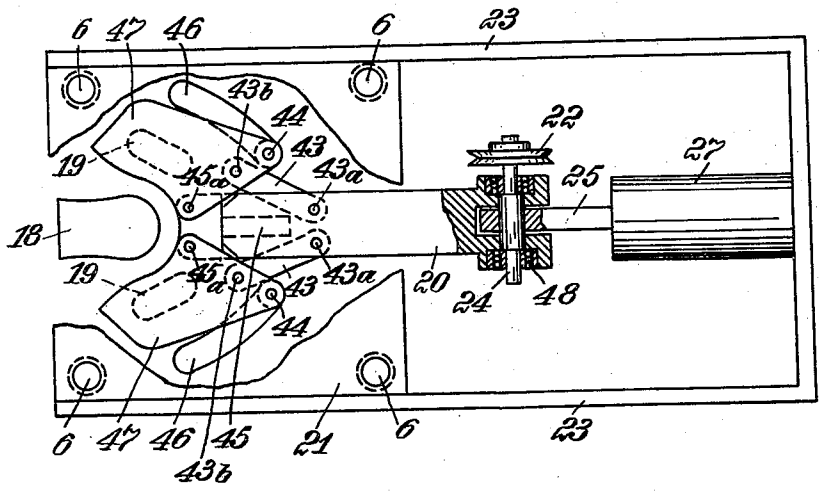
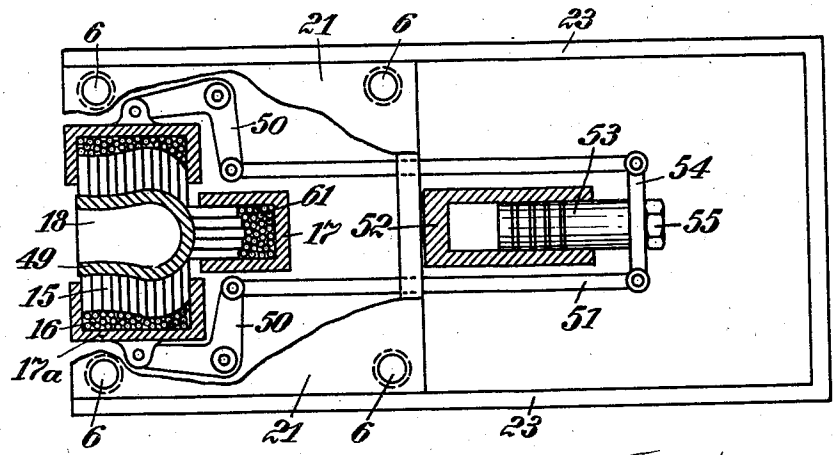


Fig.2.



Inventors:
C. Haber and E. Haumann



Fig.3.

By: Glascock Downing & Seebold
Attys.

Nov. 14, 1939. C. HABER ET AL 2,180,234

PRODUCTION OF BOOTS AND SHOES

Filed April 23, 1936 3 Sheets-Sheet 3

Fig.5.

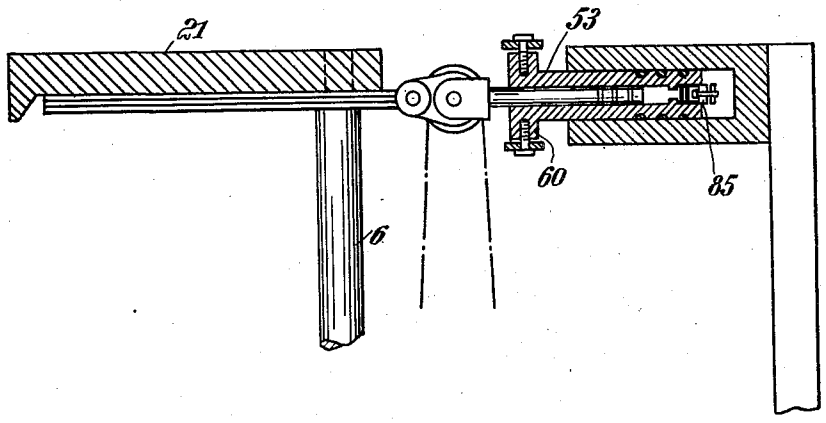
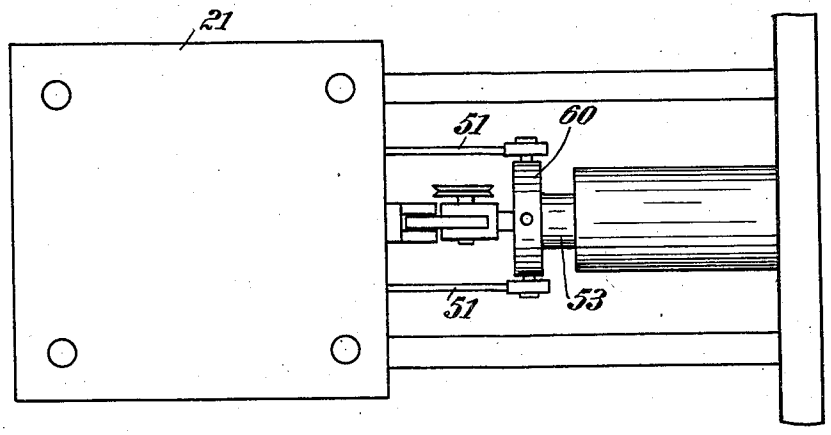


Fig.6.



Inventors:
C. Haber and E. Haumann
By: Glascock Downing & Seebold
Attys.

Patented Nov. 14, 1939

2,180,234

UNITED STATES PATENT OFFICE

2,180,234

PRODUCTION OF BOOTS AND SHOES

Christian Haber, Hechingen, and Ernst Haumann, Stetten, near Hechingen, Germany

Application April 23, 1936, Serial No. 76,052
In Germany May 3, 1935

3 Claims. (Cl. 12—145)

This invention relates to a method and device for producing boots and shoes, particularly the uppers thereof, and has for its object to simplify existing working methods and, simultaneously, to increase output and to improve the quality of the products.

According to the methods hitherto in use, the uppers are fitted with counters and toe puffs, then tightly drawn over the last, either by hand or by means of a pulling over machine, and secured in front by a few tacks. The next steps comprise in any desired order the working of the side, toe and heel by a lasting machine, a toe wiping machine and a counter lasting machine, the wiping and nailing of the heel or toe being carried out in one operation. When the sides have been lasted and the toe and heel worked, pounding up takes place to level unevennesses at the toe and heel. This is usually done by hand, though automatic pounding-up machines may be employed also.

The upper is thus moulded with respect to its stiffened portion comprising the front and rear parts on the last, and the various steps of this process require the employment of different working machines and of auxiliary measures, such as the use of tacks, which complicates production and takes up much time.

In contradistinction to prevailing working methods the invention proposes to finish the stiffened portions of the upper by means of a single ingeniously combined device without the help of tacks before the upper is placed on the last on which it is arranged later on to have the soles attached thereto.

For this purpose stiffening insertions are first pasted into the unmolded upper fitted with the usual toe puff and counter. For pasting, a rapidly drying adhesive like latex is preferably employed, in which the insertions requiring no working under the new process are simply immersed. Then the rear portion and the toe portion of the upper are either successively or simultaneously worked, according to the type of device employed. The following description of the invention assumes that first the heel and then the toe of the upper is being molded.

The rear portion of the upper prepared in the manner indicated is placed over a preferably heated mold made of metal or other suitable material and corresponding to the desired inner outlines of the upper, so that heat is supplied from the inside to the portions of the upper adjacent to the mold, whereupon the rear portion is brought into proper position and lightly drawn by the operator towards himself. The mold carrying the upper is then introduced into the actual working device, in which all parts of the upper, preferably by hydraulic means, are subjected to relatively high uniform pressure by means of a collar of leather, rubber, etc., which may also be provided with a heating device so as to press the upper upon the mold and adapt it thereto. Immediately afterwards, while the upper remains on the mold, a preferably heated wiping device begins to act for working in the portion of the upper projecting beyond the edge of the mold. During wiping, the pressure upon the upper is continued. In contrast with the working method of known wiping devices which carry out several reciprocatory motions, wiping is effected by a single motion of this kind over the width of the projecting portion while the wipers rapidly vibrate at the rate of several thousand motions per minute. This new wiping method effectively prevents the production of superposed folds in the leather, as frequently happens at present, it being merely upset and arranged practically without creases.

After completion of the wiping operation the projecting portion previously supplied with an adhesive is compressed between the mold and the wiping means by the application of pressure vertically to the direction of operation of the wiping and by applying additional deforming pressure, and is fully levelled by the action of pressure and increased temperature, i. e., the heel portion of the upper is brought into the proper shape which it retains. The application of additional pressure in the original shaping direction after the wiping of the projecting part is of importance for the reason that owing to the application of vertical pressure for levelling purposes a displacement between the mold and the work occurs, which must be compensated for.

It is of special importance in this respect that the molding action of the relatively high pressure required both for causing the upper to cling to the outlines of the mold and for levelling the projecting portion is uniform, free from jerks and regulatable and that continuous pressure independent of the thickness of the material can be applied and maintained, even if for instance portions of the material are reinforced by ornaments, etc. These requirements are fully met in most advantageous manner by the hydraulic pressure device employed according to the invention.

To attain a uniform molding action it is of course necessary that the pressure applying

leather collar, etc., of the mold carrying the work possesses corresponding outlines. According to the invention, this is insured by a novel construction of the pressing member carrying the leather collar, which consists in subdividing the surface applying the pressure into a large number of small, preferably prismatic, elements which are displaceable in their longitudinal direction independently of one another. Owing to the pressure transmitted to them by freely displaceable steel balls which make possible their relative displacement in longitudinal direction, these elements, according to the contours of the mold, are more or less displaced, i. e., to such an extent that their head portions in their entirety automatically yield an absolutely true reproduction of the outlines of the mold carrying the work.

The shaping of the toe is carried out in practically the same manner as that of the counter, the mold and the pressing means being of course adapted to the altered form of the toe. This step can follow the working of the counter or be effected simultaneously therewith if the device used is correspondingly constructed.

The projecting portion is wiped on the sides in the manner already described with respect to the counters.

The final product of the operations carried out by a single device is an upper whose stiffened portions comprising the front and rear parts thereof have been fully worked merely by the exertion of pressure. Further finishing by pounding up, etc., or the use of tacks, clamps, and the like can be dispensed with, and the upper thus produced absolutely retains its shape.

The uppers made according to the new method are preferably so dimensioned that they are somewhat shorter than the inserted lasts.

The finished upper is finally placed over a last which is adjustable as to length and first shortened to an extent, say, 3 cm. that the upper can be put on.

The last is then given the proper length to stretch the upper between the firm front and rear portions. As the outlines of these portions subjected to elongation stresses are fixed and these portions cover a large part of the last, an extension of the latter causes an elongation of the lateral portions of the upper between the toe and counter without the risk of drawing the upper so that it becomes distorted.

By way of example, one form of a device for carrying out the method according to the invention is illustrated in the accompanying drawings without, however, restricting the invention as to the device covered thereby to the embodiment shown and described.

In the drawings, Figure 1 is a vertical section of the device; Fig. 2, a plan of the device showing means for pressing the upper onto the mold. Fig. 3 shows a detail of the pressing device; Fig. 4 is a top view of the wiping means; Figs. 5 and 6 are detail views of the pressure unit, showing, respectively, a side view in section and a plan.

Referring to the drawing, 1 designates the base plate of the machine which is preferably of twin type and comprises two alternately acting working devices. On the base plate 1 four columns 6 are arranged which carry a counter pressure plate 21 inserted in U-shaped rails 23. 37 is the rear wall secured to the bars 23 and the base plate 1. To the base plate 1 a motor 4 for driving an oil forcing pump 5 is attached whence the various driving devices are actuated including the vertical pressure cylinder 2 on the base plate 1, in which the piston 8, the piston rod 9 of which is articulated to the mold carrier 11, can be moved to and fro. The carrier 11 supports the presser mold 18.

In the construction according to Fig. 1 the horizontally acting cylinder 31 with the piston 33 is arranged above the motor 4 or the pressure cylinder 2 on a bearing member 29 attached to the columns 6. By means of the piston rod 34 and the cross bar 32 the piston 33 acts on the draw bars 30 which displace a connecting member 13 parallel to itself in the direction of the motion of the piston. The connecting member 13, by means of the link member 12 articulated to the mold carrier 11 by the pin 14 and to the connecting member 13 by the pin 14*a*, is connected with the carrier 11. In Fig. 1 the piston 33 in the cylinder 30 is shown in its extreme operating position. It is actuated like the piston 8 in the usual manner, i. e., on completion of its working travel the return valve is opened and reversal effected by the action of subatmospheric pressure. The piston 33 serves for drawing the mold with the work against the pressing device if, according to Fig. 2, the pressing device operates with a cylinder having a drawing effect.

Fig. 2 shows a construction of the actual pressing device not shown in Fig. 1. It is actuated by means of the piston 53 and having a tranverse member 54 firmly connected with the extension of the piston by the nut 55, and of the draw bars 51 provided with bell cranks 50 arranged on both sides of the mold, a lateral part 17*a* of the three-part actual pressing member comprising the two side parts 17*a* and a central part 17 being secured to each bell crank. The boxlike parts 17 and 17*a* contain the largest possible number of elongated prism-shaped bodies 15 which completely fill out the openings of the boxlike parts facing the mold and the heads of which cling to the outside of the leather collar 49. Behind the prisms 15 steel balls 16 of preferably about 2 mm. diameter fill the remaining portion of the inner space of the boxlike parts. The steel balls 16 are freely displaceable relative to one another and during the relative approach of the two halves of the casing transmit the pressure of the bell cranks 50 by means of the prisms 15 to the leather collar 49 and thus to the work.

It is apparent that in this manner, independently of the thickness of the work and of its outlines, the pressing member is always uniformly adapted to the outlines and therefore must show outlines which exert uniform pressure. In the drawings the piston is shown at its highest working point which corresponds to the pressing position of the pressing member. Reversal of the piston is effected in the usual manner, as indicated above.

To improve still more the adaptation of the prisms 15 to the contours of the work, it is advisable to provide the heads of the prisms in the top rows with small plates 36 flexibly disposed on the prismatic bodies and automatically adjusting themselves to the curvatures of the mold, as shown in Fig. 3.

The wiping device shown in Fig. 4 is actuated by a connecting rod 20 slidably secured to the counter pressure plate 21 and terminating in the eccentric pin 24 running in the ball bearings 48. The pin 24 carries the belt pulley 22 which, by means of a belt drive, communicates with the pulley 39 driven from the motor 4 by the disc 40.

At the other end of the connecting rod 20 links 43 are articulated by means of the bolts 43*a* and rotatably secured in the wipers or pressure mem-

bers 47 by the bolts 43b. The pressure members 47 are articulated to a guide slide 45, which can move on the connecting rod 20, by means of the bolts 45a and carry the cam rollers 44 moving in curved member 46 secured to the counter pressure plate 21. During advance of the connecting rod 20 the pressure members 47 are simultaneously moved in closing direction and pushed forward, and this motion is influenced by the course of the curves 46 in such manner that a certain fixed relation between the extent of the forward motion and that of the closing motion of the pressure members 47 is produced. Owing to the rotation of the eccentric pin 24 at the rate of several thousand revolutions per minute, the pressure members 47 are simultaneously vibrated. In the figure the piston 26 is shown in its end position corresponding to the full opening of the pressure members 47.

Figs. 5 and 6 show in detail the construction of the drive for the pressing member with a pressure balancing device. This compensation of pressure is required for insuring the exertion of equal pressure upon both sides of the work and is effected by connecting the two connecting rods 51 with the pressure piston 53 by means of the movable ring 60 arranged on the piston, the ring taking up any inequalities in pressure by moving in one or the other direction. The piston is preferably provided with an overflow valve 85 combined with a check valve.

During working of the heel the machine functions as follows:

The upper fitted with the counter and stiffening insertion requiring no shaping is placed over the mold 18, and the mold carrier 11 is then swung into the open pressing member and pressed against the leather collar 49, either by actuating the piston 33 by means of the piston rod 34, the connecting member 32, the draw rod 30, the connecting member 13, the hinge member 12 and the link pins 14 and 14a in the construction shown in Figs. 1 and 2, or by simple lever transmission from a foot lever when the piston 53 is constructed as pressure piston. The outlines of the collar 49 automatically adapt themselves to those of the mold 18 when the pressure sets in, owing to the prisms 15 contained in the casing 17 and clinging to the collar 49 and to the rearwardly disposed steel balls 16, so that the upper and the stiffening insertion contained therein is compressed between the mold 18 and the stationary casing 17. When the piston 53 is actuated, it exerts pressure during its advance by means of the cross member 54, the draw rods 51, the bell cranks 50 upon the casing members 17a and thus, through the medium of the steel balls 16 and the prisms 15, upon the leather collar 49. In this way the circumferential portions of the upper are pressed between the collar 49 and the mold 18, and the upper is thus to the extent of the stiffening insertion firmly pressed around the mold 18, as indicated in Fig. 2.

By the opening of the valve for the cylinder 27 the piston 26 is then actuated and during its advance, by means of the piston rod 25, the eccentric pins 24 and the linkage connections 43, exerts pressure upon the members 47 acting upon the projecting portion of the upper, so that the cam rollers 44 are forced to travel over the curved path 46. As the members 47 are rotatably secured at 45a to the freely movable guide member 45, the latter also moves forward while the cam rollers 44 describe the curves 46, the path travelled by the cam rollers 44 being brought into the desired proportion to the travel of the guide member 45 by a corresponding choice of the radius of the curves 46. During its rotation, the eccentric pin 24 imparts to the members 47 and thus to the material to be worked several thousand vibrations per minute, whereby the material is wiped and during wiping lasted. When the piston 26 has reached the end of its travel, the members 47 are fully closed and the material projecting on top beyond the mold 18 is wiped. At this position of the piston the eccentric pin 24 is stopped and thereby the wipers 47 are stopped also. Then additional pressure is exerted by means of the piston 53 to equalize unevennesses possibly caused by the various operations, and finally the piston 8 is actuated in the cylinder and pressed up to press the wiped and lasted material between the mold 18 and the members 47 and thereby to smooth it. The pressure of the piston 8 is taken up by the counter pressure plate 21. The operation is now completed, and the pistons 8, 26, 53 and 33 are reversed. Since the machine is preferably of the twin type, one mold is alternately under pressure until the other is filled.

The wipers as well as the mold and the pressure devices are preferably heated by electric heating means, as indicated at 19, to improve still more the, as it were, ironing effect upon the material of the upper during working.

The finished upper is then taken from the mold, placed on the first shortened last, stretched in the manner described by extending the last and finally connected with the sole.

The invention is not limited to the embodiments shown and described, but may be varied in many ways without departing from its fundamental idea. In particular, the steel balls employed for transmitting pressure to the prisms of the pressing member may be replaced for instance by solid, liquid or gaseous means permitting free movability of the prisms, such as a container filled with liquid and having elastic walls, which fills the pressure casing behind the prismatic bodies.

We claim:

1. A process for shaping the uppers of boots and shoes having stiffening insertions and a lining adhesively connected to the upper before the application of the upper to a last which consists in firmly holding the portion of the upper to be worked upon between a mould of substantially similar shape to the last and a pressing member, applying a shaping pressure to the upper between the mould and the pressing member, wiping in the projecting portion of the upper while the shaping of the upper takes place under pressure and simultaneously applying heat whereby the leather, stiffening insertions and lining are united together to effectively prevent the leather to return to its original shape, the wiping in of the projecting portions being accomplished under pressure by rapidly vibrated inwardly closing wiping members, and smoothing the surrounding edge parts by subjecting the upper to pressure applied in a direction perpendicular to the direction of the wiping pressure.

2. A process for shaping the uppers of boots and shoes having stiffening insertions and a lining adhesively connected to the upper before the application of the upper to a last which consists in firmly holding the portion of the upper to be worked upon between a mould of substantially similar shape to the last and a pressing member, applying a uniformly distributed shap-

ing pressure to the upper between the mould and the pressure member, wiping in the projecting portion of the upper while the shaping of the upper takes place under pressure and simultaneously applying heat whereby the leather, stiffening insertions and lining are united together to effectively prevent the leather to return to its original shape, the wiping in of the projecting portions being accomplished under pressure by rapidly vibrated inwardly directed wiping members, smoothing the surrounding edge parts by subjecting the latter to pressure applied in a direction perpendicular to the direction of said vibrating wiping pressure, and continuing the application of the shaping pressure to the upper after the wiping of the projecting portion.

3. A process as claimed in claim 1, in which said shaping pressure for moulding the upper between the mould and the pressure member is uniformly distributed and equalized on both sides of the work.

CHRISTIAN HABER.
ERNST HAUMANN.