

Jan. 14, 1969

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3,421,183

MOULDS FOR VENTILATED FOOTWEAR

Filed Sept. 30, 1963

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Fig.: 1

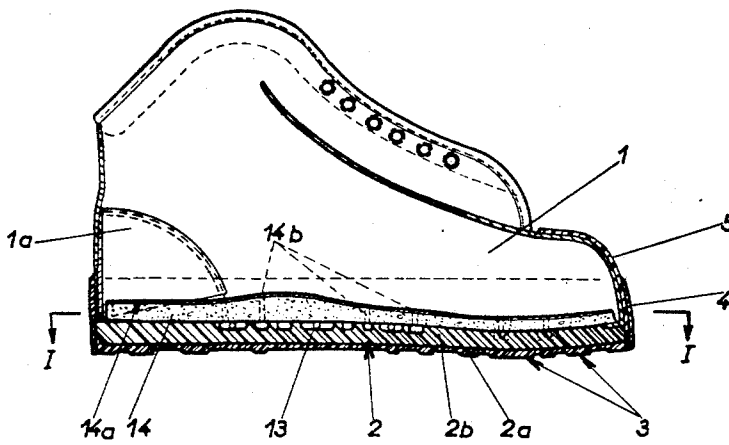
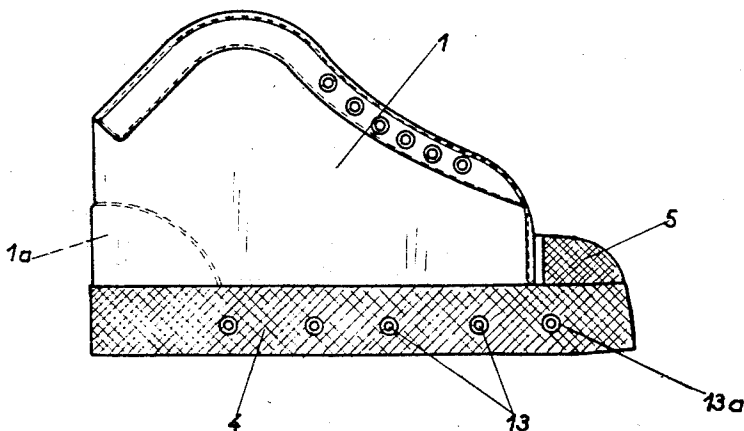


Fig.: 2



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Fig.:3

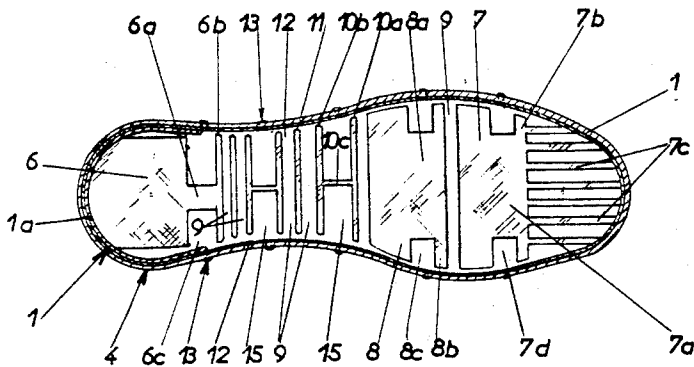


Fig.: 4

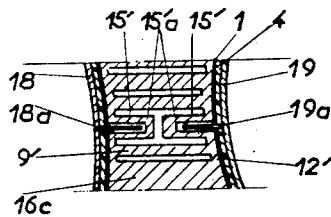
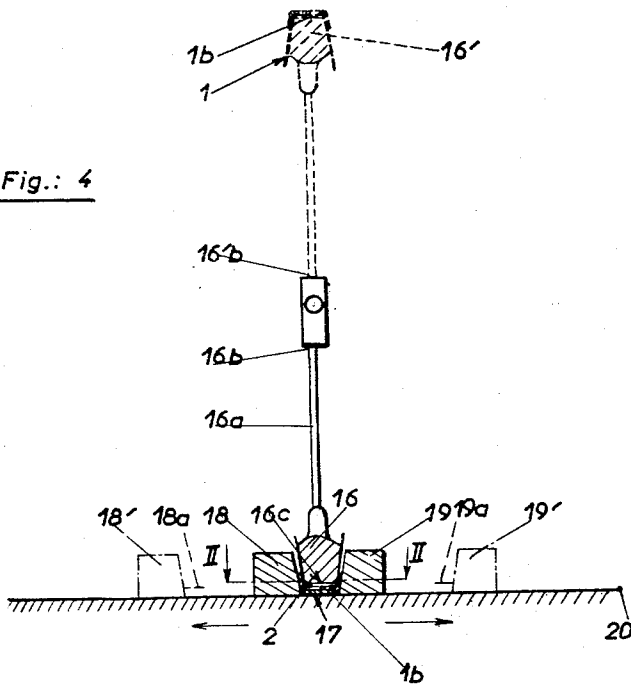


Fig.:5

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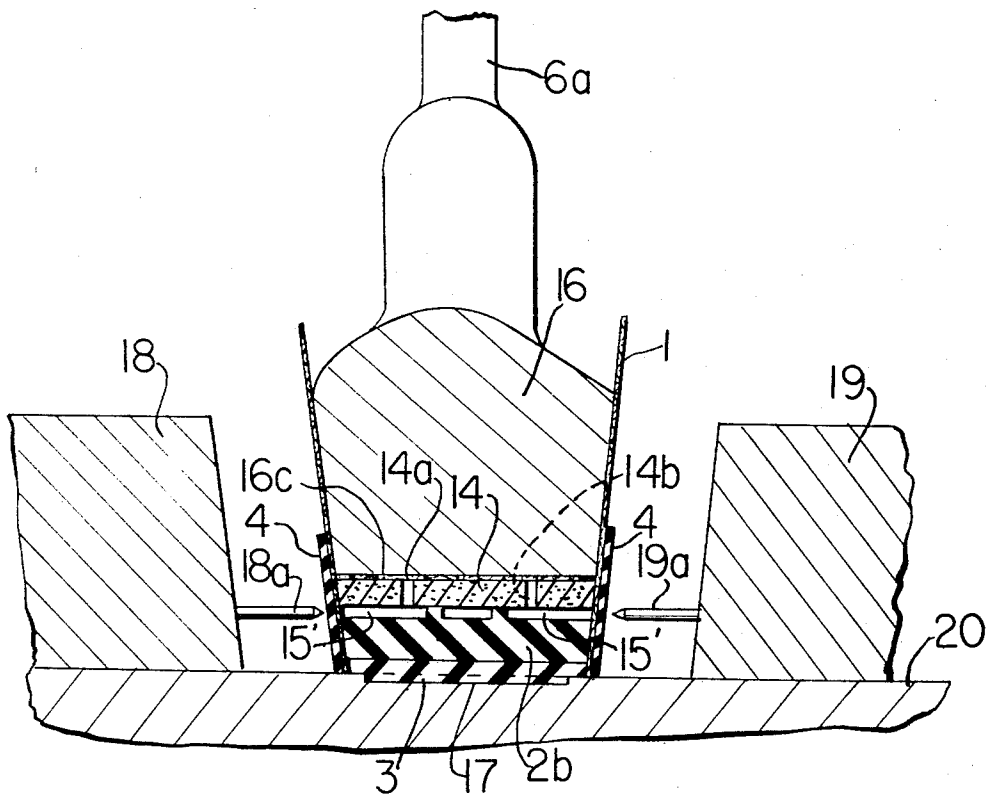


FIG. 4A

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Fig. 6

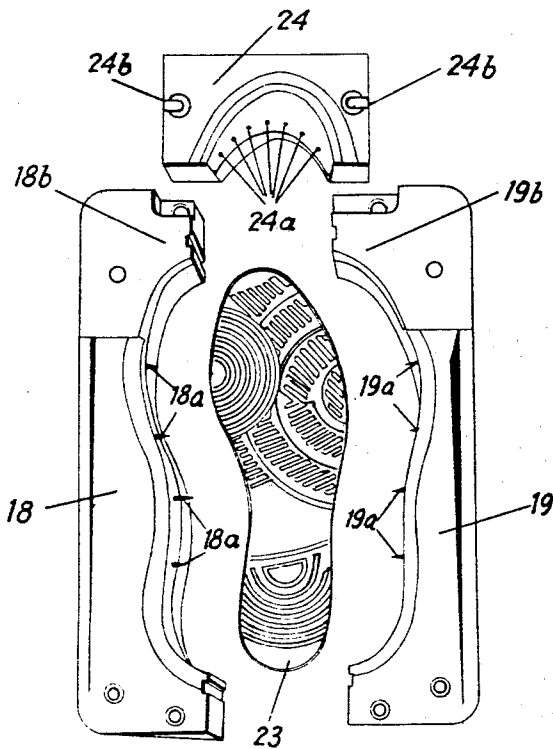
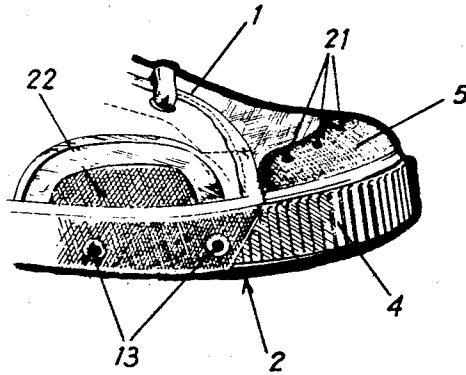


Fig. 7

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3,421,183
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The invention provides a means for obtaining, in a single operation, the sole provided with its ribs and attached to the upper of the boot, the reinforcing band, when provided, adhering to the sole and to the upper, while the ventilation holes pass through the upper and the reinforcing band exactly opposite the ventilation channels formed by the ribs in the sole.

In addition, in the case of boots provided with a supplementary reinforcement on the top of the front portion, the invention also provides a means for piercing ventilation holes in this reinforcement without making any perforation of the underlying upper, in order to permit circulation through the top of the boot of the air enclosed in the space located above the foot, while preventing any penetration of sand, gravel, etc., to the interior of the boot.

According to the invention, the sole and, when provided, the reinforcing band and the front reinforcement round the upper of the boot are prepared, the ribs on the inner face of the sole on the one hand, and the ventilation holes on the other, being obtained by the impression of moulds which are movable with respect to each other and which act as guides each for the other.

In one form of embodiment, the mould enabling the sole to be produced in a single operation, together with the reinforcing band and, when provided, the front reinforcement, is provided with pins substantially parallel to the sole, passing through the reinforcing band and the upper, so as to penetrate into guiding orifices drilled in bosses on the mould, said pins being capable of moving laterally parallel to their axis so as to permit de-moulding of the boot. The bosses on the mould form impressions which constitute the ventilation channels of the sole, and in consequence, the ventilation holes pierced by the pins through the upper and the reinforcing band fall exactly in these channels.

In a further form of embodiment appropriate to boots which comprise an additional front reinforcement, the mould further comprises another member or upper lateral portion provided with pins which come into application against the top of the front part of the boot, and the position of which is fixed in dependence on the supports of the other pins.

If, for example, the boot has an upper of canvas and a rubber sole, the mould will of course be of the type employed for moulding and vulcanizing rubber. It is known that this method of manufacture gives a sole moulded on the canvas upper, to which it adheres perfectly. A mould according to the invention can also be utilized to manufacture footwear having soles of plastic material, the sole being obtained by an injection process which also enables a very good adherence to the upper to be obtained.

The mould preferably comprises one or two upper parts and a lower part for the two faces of the sole, and two lateral parts to which the pins are fixed and which can be withdrawn transversely towards the outside with a lateral movement parallel to the sole, in order to permit de-moulding. The moulding machine according to the invention which permits this movement is distinguished thereby from sole-moulding machines of known types, the lateral chill-moulds of which do not move laterally but in rotation about an axis generally parallel to the longitudinal axis of the sole, which furthermore makes it possible to

have a mould made of three parts, whereas the said moulding machine according to the invention necessarily comprises four or five parts.

It is necessary to give a certain width to the bosses on the mould into which the pins pass, so that they are not too fragile. The result is that the ribs of the sole located on each side of these bosses are located at a fair distance from each other, and they are preferably joined together by a central rib. The circulation of air in the channels is then improved by stopping at least a part of the transverse ribs, at their extremities, just before the upper of the boot.

The description which follows below with reference to the accompanying drawings, given by way of example only and without any implied limitation, will explain clearly the various particular features of the invention and the method of carrying them into effect, any arrangement brought out either in the text or in the drawings being understood to fall within the scope of the present invention.

FIG. 1 shows a view in longitudinal section of a boot in accordance with the invention.

FIG. 2 is an external view in elevation.

FIG. 3 is a cross-section taken along the line I—I of FIG. 1, with the insole removed.

FIG. 4 shows a diagrammatic view of a mould in transverse section, arranged on the moulding machine.

FIG. 4A is a detailed diagrammatic view of a mould shown in transverse section similar to FIG. 4.

FIG. 5 is a cross-section taken along the line II—II of FIG. 4.

FIG. 6 shows in perspective the front part of a boot, the front reinforcement of which is provided with orifices in accordance with one form of embodiment of the invention.

FIG. 7 shows views looking from underneath and in perspective of the lateral portions and the front upper portion of a mould according to the invention.

The boot is provided with an upper 1 of canvas and a sole 2 of rubber, composed of two parts joined together by vulcanization: a patten 2a provided with portions 3 in relief and an inner portion 2b, for example of rubber having a large proportion of filler. To the back of the upper 1 is sewn, on the inner side of the boot, a reinforcement 1a of canvas or sheepskin. The upper 1 is firmly fixed on the sole 2, as will be seen later, by moulding and vulcanization. The strength of the whole assembly is ensured by a reinforcing band 4 and, when so required, by a front reinforcement 5. This band 4 and the reinforcement 5, also of rubber, are fixed to the sole 2 and the upper 1 by moulding and vulcanization.

The inner part 2b of the sole is provided on its upper face with several kinds of projections. As the place where the heel of the foot will rest, there is provided a projecting plate 6, connected to a transverse rib 6b by a central portion 6a. At the place where the front part of the sole of the foot will rest, are provided two projecting plates 7 and 8, separated by a space 9; the plate 7 is connected by the narrower central projection 7a to a transverse rib 7b, which is in turn connected to several longitudinal projections 7c; the plate 8 is coupled by the narrowed central projection 8a to a transverse rib 8b. At the central part of the sole, under the arch of the foot, are located a certain number of H-shaped projections comprising two transverse ribs 10a and 10b connected together at their centres by a longitudinal rib 10c; in this same central zone, there are also provided a certain number of separate transverse ribs 11.

The projecting plate 6 extends towards the rear up to the canvas reinforcement 1a of the upper 1 and the longitudinal ribs 7c extend towards the front up to the front portion or vamp of the canvas upper 1. On the other hand, all the projections stop laterally at a certain dis-

tance from the upper 1 so that there exists along the upper 1 on each side of the boot a free space 12 having no projection. Facing the centre of each of the longitudinal ribs 10c and of each of the narrowed central projections 6a, 7a and 8a, substantially at the mid-height of the projections, the boot is provided on each side with ventilation holes 13 passing through the canvas upper 1 and the reinforcing band 4. Inside the boot, between the foot and the sole 2, there is interposed a removable insole 14, of sponge rubber, on which is stuck a piece of cotton material 14a. This insole is pierced with a number of small holes 14b, opening towards the upper face of the inner sole 2b, in the spaces between the projections. The air passes in through the ventilation holes 13 and circulates through the whole empty space formed between the projections, limited at the top by the said insole 14, at the bottom by the inner face of the sole 2, and on the sides by the upper 1. This ventilating air penetrates through to the foot by the holes 14b in the insole.

In the form of embodiment shown, the two arms 10a and 10b of each H-shaped projection are separated for example by a space 15 of 10 mm., while the arms of the H are separated from the adjacent ribs by spaces 9 of only 5 mm. This arrangement is an important and particular feature of the invention. In fact, if the sole is manufactured in a mould, as will be seen below, the pins which form the holes 13 must pass into the bosses of the mould, forming the impression of the spaces 15. In order that the mould may have adequate mechanical strength, it is necessary that these bosses which serve to guide the pins should have a relatively large width, which is 10 mm. in the case considered. The transverse ribs 10a and 10b, separated by this relatively-large space 15, would not of themselves have sufficient resistance to the compression forces to which they are subjected by the foot; it is to improve this resistance that they have been joined together by a longitudinal rib 10c. On the other hand, the spaces between projections such as the spaces 9, which are not located opposite a hole 13, can be much narrower without adversely affecting the strength of the mould. They can therefore be given a width, namely 5 mm. in the case considered, which is sufficiently small for the ribs 11 to have satisfactory resistance to compression forces. It will be observed that this width of 5 mm. is equal to the diameter of the holes 13.

The arrangement of the rear projections 6 and the front projections 7 and 8 is a further important particular feature of the invention. The non-projecting portions 6c, 7d, 8c of the rear and front plates are arranged opposite the orifices 13 and are therefore obtained by the impression of the bosses on the mould which serves as guides for the pins which form these orifices 13. These non-projecting parts have therefore a width equivalent to that of the spaces 15.

It is not satisfactory to make a pure and simple arrangement of the projections 10 in the said front and rear parts, since the foot rests directly on these parts and the projections would make themselves felt painfully through the insole 14. It is therefore necessary to widen considerably the projections which form these front and rear plates so as to obtain a ratio of the projecting surfaces to the non-projecting surfaces having a value substantially greater than unity. In the central portion of the sole located under the arch of the foot, this ratio is on the other hand very much less than unity. The projecting front block, the surface of which is relatively large, is transversely by a groove 9 which separates the projection 7 from the projection 8b and forms a communication between the two lateral spaces 12.

Rather unexpectedly, it has been found that, from the point of view of ventilation of the foot, the boot which has just been described gives results superior to those obtained with boots having soles ventilated by lateral orifices, in which the ribs are uniformly spaced apart from the front to the rear. The reason for this must probably be

looked for in the fact that, in the case of hand-made boots and also where the boots are made by moulding and the lateral orifices are pierced subsequently, these orifices are never made to coincide precisely with the channels passing through the sole between the ribs. In the boot which has just been described, there are much less channels and hollows under the parts of the foot which work most (heel and sole of the foot) than under the arch of the foot, and yet the ventilation is just as good at the front and the rear as at the centre of the foot. The reason for this is doubtless that the movements of the heel and the sole of the foot cause a pumping effect in the cavities located under the insole, which produces a circulation of air.

The mould which permits the production in a single operation of the sole 2 provides with its ribs and adhering to the upper 1 of the boot, the reinforcing band 4 adhering to this sole 2 and to the upper 1, and the holes 13, is shown diagrammatically in FIG. 4. It comprises an upper portion 16, a lower portion 17, and two lateral portions or chill-moulds 18 and 19.

The upper portion 16 consists of a metal foot fixed to a rod 16a of the moulding machine, this rod 16a being pivotally mounted on a slide which can occupy two positions 16b and 16'b. In the position 16, the upper portion of the mould is urged by known means towards the lower portion 17, so as to effect the moulding of a sole 2. By raising the slide 16b up to the position 16'b, and causing the rod 16a to pivot through 180°, the upper portion of the mould comes into the loading position 16' shown in dotted lines in the drawing. At its extremity opposite to the rod 16a, the upper portion of the mould carries an impression plate 16c which is partially shown in FIG. 5.

The lower portion 17 of the mould is fixed on the plate 20 of the moulding machine, and is constituted by an impression plate which gives by moulding, the relief portions 3 of the patten 2a of the sole (see FIG. 1). The two lateral chill-moulds move sideways over the plate 20 of the machine between the moulding position 18, 19, at which they are urged towards the interior by known means, and the loading position 18', 19', shown in dotted lines on FIG. 4. In the moulding position, these two chill-moulds encase the lower portion of the boot; they are engraved inside with patterns which, on moulding, give the design of the reinforcing band 4 (FIG. 2). They also carry pointed pins 18a and 19a (see FIG. 5) which serve to pierce the holes 13 (FIG. 3).

Upon examination of FIG. 5, which shows in cross-section the central portion in the moulding position, it is seen that when the chill-moulds 18 and 19 are moved laterally, the pins 18a and 19a pass into guiding orifices 15'a pierced in bosses 15' on the impression plate 16c of the upper portion 16 in the moulding position. These bosses 15' will give on moulding the depressions 15 shown in FIG. 3; in the same way, the projections 9' and 12' will produce the channels 9 and 12 of FIG. 3.

The moulding machine is of course provided with devices for heating the mould during the moulding and vulcanization operations. These devices, generally of the electrical or steam type, are well-known, and those skilled in the art can readily adapt them to the particular arrangement of the mould described.

In order to utilize the mould, the upper portion is put into the position 16' and the lateral chill-moulds into the position 18' and 19'. The upper 1 is passed over this upper portion and is attached by means of cords 1b with which it is provided. The blanks of raw rubber which are to form the sole are then placed on top; in the example shown in FIG. 1, the blank of the inner part 2b is first put in position, and then that of the patten 2a of the sole. If necessary, the upper is capped by a sheet of raw rubber cut-out to a suitable shape and intended to form the front reinforcement 5. The blanks of the sole and the lower part of the upper

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1 which is placed immediately below these blanks, are encircled with a strip of raw rubber cut to a suitable length and which is to constitute the reinforcing band 4. The extremities of this strip overlap slightly and adhere to each other, which provisionally fixes the sole blanks and enables the upper part of the mould to be turned over to the position 16. When this upper portion 16 is correctly applied to the lower portion 17 of the mould and brought to the required temperature, the two chill-moulds 18 and 19 are brought together, the pins 18a and 19a piercing the holes 13 through the reinforcing band 4 and the canvas upper 1, before passing into the guiding orifices 15'a. When once the chill-moulds 18 and 19 are truly applied and forced against the boot, the mould is kept at its temperature for the period necessary for the vulcanization to be completed.

De-moulding is then carried out by separating the lateral chill-moulds to 18' and 19', and then bringing the upper part of the mould into the position 16'.

All these arrangements are obviously applicable to the form of embodiment of FIG. 6, which represents in perspective the front portion of a boot, as in FIG. 1, comprising a front reinforcement 5 provided according to the invention with ventilation holes 21 and an additional side reinforcement 22.

The perforation of the front reinforcement is effected by means of the device shown in FIG. 7, which shows a view from beneath and in perspective, on the one hand of a boot 23 arranged between the chill-moulds 18 and 19 which have been shown in this example provided with their pins 18a and 19a, and on the other a supplementary front mould or upper lateral portion shown in inverted position with respect to the chill-moulds 18 and 19, and provided with pins 24a and which is intended to come into position on top of the front portion of the boot while being guided by the chill-moulds 18 and 19, so as to perforate the front reinforcement of the boot without piercing the upper which lies beneath it. This mould 24 is further provided internally with engraved patterns which, when moulded, give the design of the front reinforcement 5.

To this end, according to the form of embodiment shown in FIG. 7, the chill-mould 24 is provided with housings 24b capable of co-operating with projecting members (not shown in the drawing) suitably arranged on top of the front portions 18b and 19b of the lateral chill-moulds.

Thus, at the time of moulding, the chill-mould 24 is applied on the lateral chill-moulds 18 and 19 in a strictly-defined position, and its edges penetrate to the desired depth into the front reinforcement of the boot, piercing this reinforcement without perforating the upper which lies beneath the reinforcement.

Boots or other footwear obtained by the method which has just been described are readily distinguished from those which are made by hand or from those in which the holes are pierced in the reinforcing band after manufacture. In fact, in the present case, the holes 13 can be

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perfectly round, whereas in the two other cases referred to, they are always oval. Furthermore, with boots obtained by the method described, the entrance of each of the holes 13 can be surrounded by a circular projection 13a, having the appearance of an eyelet (see FIG. 2).

What I claim is:

1. A mould for the manufacture of footwear with soles of a material selected from the group consisting of rubber and plastic, and a cloth upper having an outer reinforcing material selected from the group consisting of rubber and plastic extending partially above said sole, comprising an immovable plate, a lower portion for moulding the pattern of the sole fixed on said plate, a movable upper portion for moulding the inner sole, said upper portion containing bosses for moulding ribs in said inner sole, said bosses having guided orifices laterally drilled partially therethrough, two lateral portions, laterally movable parallel to said plate for moulding the sides of the sole, said lateral portions being provided with pins capable of penetrating into said guiding orifices and a movable upper lateral portion provided with perforating pins and adapted to form a reinforced area from said outer reinforcing material extending partially above said sole in said cloth upper, said movable upper lateral portion cooperating with said two lateral portions in their moulding position whereby said perforating pins perforate said reinforcing material without perforating said cloth upper.

2. The mould of claim 1, wherein said upper lateral portion provided with perforating pins is patterned in the part of said portion in contact with said reinforcing material.

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55 J. HOWARD FLINT, JR., *Primary Examiner*.

U.S. Cl. X.R.

18—17, 34