

Oct. 5, 1943.

G. D. NEVILLS

2,330,989

APPARATUS FOR RESOLING FOOTWEAR

Filed March 4, 1942

2 Sheets-Sheet 1

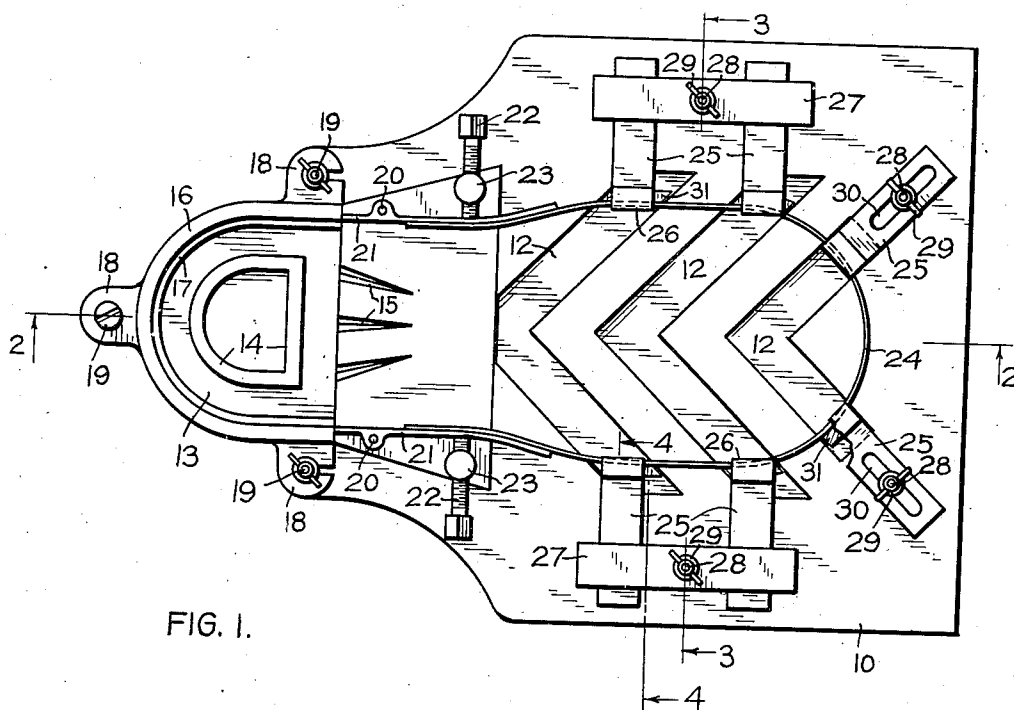


FIG. 1.

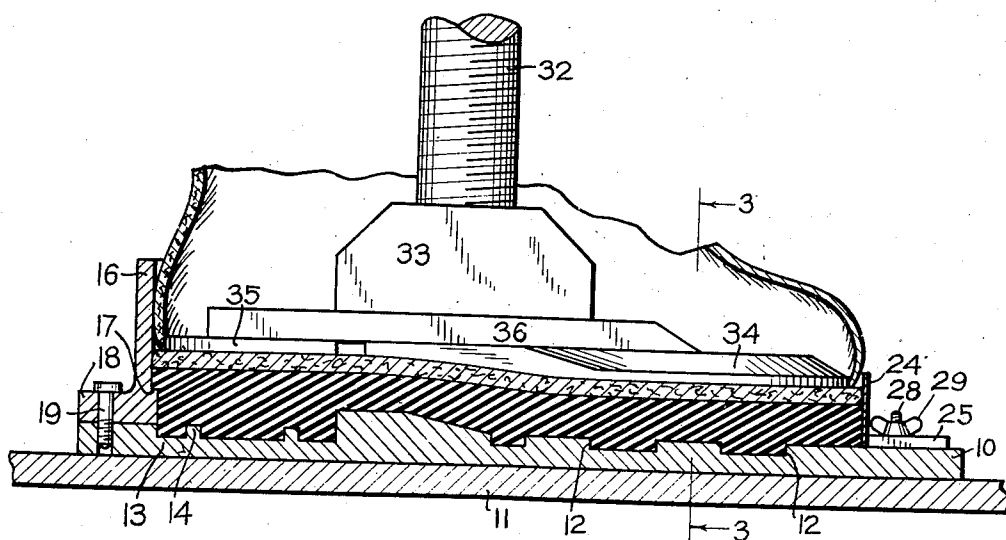


FIG. 2.

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2 Sheets-Sheet 2

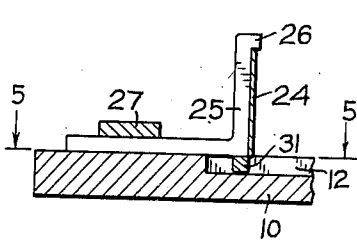


FIG. 4.

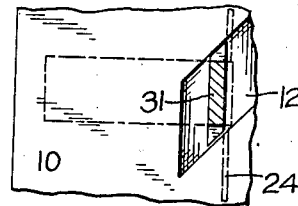


FIG. 5.

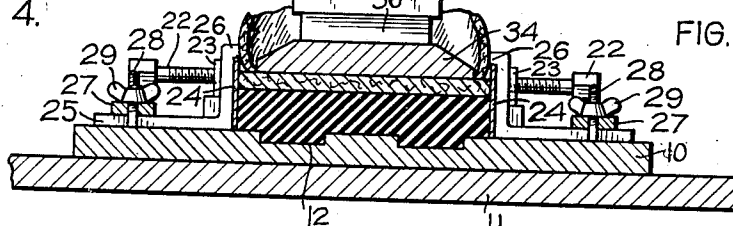


FIG. 3.

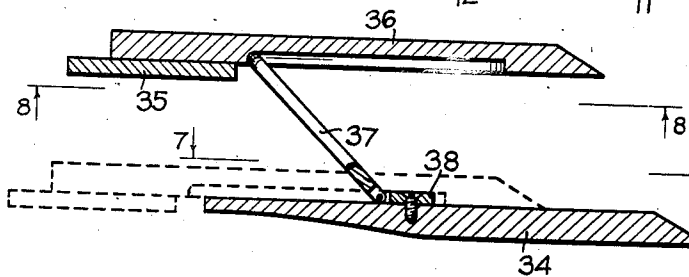


FIG. 6.

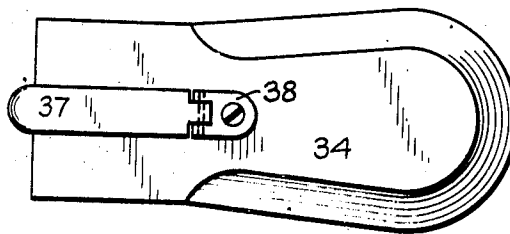


FIG. 7.

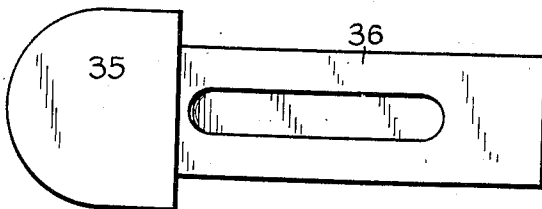


FIG. 8.

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2,330,989

APPARATUS FOR RESOLING FOOTWEAR

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Application March 4, 1942, Serial No. 433,253

16 Claims. (Cl. 18—34)

This invention relates to the soling of foot-wear, and more particularly to the rehabilitation and repair of worn soles, and has as an object to provide improved means for moulding a new sole of rubber or like plastic material on and affixing such sole to an article of footwear.

A further object of the invention is to provide an improved sole mould susceptible of convenient adjustment into marginal conformity with an article of foot-wear to be soled or repaired.

A further object of the invention is to provide an improved sole mould adapted for use in the vulcanizing of rubber soles directly on and to articles of foot-wear.

A further object of the invention is to provide an improved sole mould arranged to form traction cleats on the soles of foot-wear treated therein.

A further object of the invention is to provide improved means in a sole mould for aligning the margin of a new sole with the outline of an article of foot-wear.

A further object of the invention is to provide improved means for the pressure-positioning of an article of foot-wear in or relative to a shoe mould.

A further object of the invention is to provide an improved device of the character described that is simple and inexpensive of manufacture, positive and efficient in use, adopted for employment in the repair of foot-wear of various types, sizes, and specific constructions, and which is arranged for cooperation with vulcanizing equipment of conventional type.

With these and other objects in view, all of which will more fully hereinafter appear, my invention comprises certain novel constructions, combinations and arrangements of parts, as will be hereinafter fully described and claimed, and as illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my improved mould as assembled and arranged for practical use.

Figure 2 is a cross section taken on the indicated line 2—2 of Figure 1 and showing an article of footwear as positioned for treatment in the mould.

Figure 3 is a cross section taken on the indicated line 3—3 of Figures 1 and 2.

Figure 4 is a fragmentary, detail section, on an enlarged scale, taken on the indicated line 4—4 of Figure 1.

Figure 5 is a fragmentary, detail plan view, partly in section, taken on the indicated line 5—5 of Figure 4.

Figure 6 is a cross section taken longitudinally through a pressure foot assembly advantageously employed with the other elements of the invention.

Figure 7 is a plan view taken substantially on the indicated line 7—7 of Figure 6.

Figure 8 is a bottom plan view, taken substantially on the indicated line 8—8 of Figure 6.

In the manufacture and repair of foot-wear, it has become a well-established practice to affix wear soles of rubber or like material directly to the welt without stitching, pegging, or nailing, and apparatus suitable for the heat-treating and consequent vulcanizing of such soles is commonly and quite generally available. When new foot-wear is manufactured, it may be feasible to provide a sole mould for each size and shape of the product, but in the repair and rehabilitation of worn foot-wear it is important that sole moulds be available in a form which permits of their convenient adjustment throughout a wide range of foot-wear sizes and shapes, and the instant invention is directed to the provision of such a mould wherein a new sole may be shaped to conform with the outline of and cured in position on the article to be repaired.

As shown in the drawings, the elements of the improvement are carried in large part by and arranged for association with a base or matrix plate 10 of suitable heat-conducting material, such as metal. The plate 10 preferably has a smooth, plane under surface adopted to engage against and rest in heat-conducting relation on the upper surface of a vulcanizing plate or table 11, so that heat from said latter element may be transmitted to and through the plate 10 for curing and setting of the plastic material wherefrom the new wear sole is to be formed. A central portion of the upper surface of the plate 10 is worked to provide suitable channels 12 for the formation of ribs or cleats on the forward portion of the finished sole, and the channels 12 may be of any specific pattern and arrangement suitable to their purpose and intersect the upper surface of the plate 10 to an extent greater than the maximum size of sole contemplated for formation by the mould. The V-shaped, forwardly-diverging, parallel arrangement of relatively wide channels 12 illustrated by the drawings is simple and particularly desirable for tractive effect on rubber boots and like articles of foot-wear.

Adjacent one end of the plate 10 and in spaced relation with the plate portion intersected by the channels 12, a heel mould 13 is formed in intersecting relation with the plate upper surface, and the face of said heel mould may be provided with upstanding ribs or lugs 14, in such specific arrangement and pattern as may be desired, to mould grooves and depressions in the finished heel surface and enhance the tractive effect. The plate portion between the heel mould 13 and the channels 12 is inclined and extends adjacent the heel mould somewhat above the normal plane of the plate surface to provide a conventional

instep in the finished sole, and the elevated margin of said inclined portion is intersected by longitudinally-disposed, upwardly-opening grooves or notches 15 adapted to mould reinforcing ribs connecting between the instep portion and the forward heel margin of the finished sole.

The upstanding, marginal outline of the heel is determined by a cup removably and replaceably associated with the plate 10 and comprising a vertical wall portion 16 conforming in outline with and adapted to fit snugly about the heel portion of the article to be repaired, and said wall opens forwardly to conform with the instep portion of the plate 10 and is preferably formed with an inwardly-offset shoulder 17 positioned adjacent the lower margin of its inner surface to form a shoulder on the finished heel. The heel cup may be associated in the desired relation with the plate 10 in any suitable or convenient manner, and is shown as provided with a flat lower surface adapted to bear directly against the upper surface of said plate and with a plurality of laterally and rearwardly projecting ears 18 suitably apertured or notched to receive bolts and screws 19 whereby said cup may be removably secured to the plate with its wall 16 positioned to conform with the outline of the heel mould 13. Pinned as at 20 to the instep portion of the plate 10 in substantial alignment with the open ends of the heel-cup wall 16, a pair of adjustable flanges 21 are disposed in spaced, parallel, upstanding relation to engage against the opposite sides of the welt sole instep portion of the article to be repaired, and adjusting screws 22 threadedly engage through posts 23 rising in fixed relation from the instep portion of the plate 10 outwardly of the flanges 21 to bear at their inner ends against and adjustably position the forwardly extending portions of said flanges. The forward ends of the flanges 21 extend beyond the screws 22 and are bent to diverge outwardly, somewhat to conform in general with the corresponding shoe sole outline and the free ends of a flexible band or strip 24 engage the inner surfaces of said diverging flange portions to position said band 24 as a loop on and in upstanding relation with the portion of the plate 10 intersected by the channels 12. The band 24 may be of any material suitable to its purpose, such as strip metal, and is sufficiently flexible as to readily conform with the outline of a welt sole portion forwardly of the instep, and said band is engaged with its inner surface against the outer margin of the welt sole of an article to be repaired, the lower margin of the band 24 resting on the upper surfaces of the plate 10, and being initially held in such adjusted position by friction of its free ends against the inner surfaces of the flanges 21 when the screws 22 are tightened against the instep portion of the welt sole.

To position, steady, and hold the loop portion of the band 24 in the desired adjusted relation with a welt sole, a plurality of clips 25 are adjustably and clampably associated with the plate 10 exteriorly of said band. Each of the clips 25 is preferably an L-shaped member having a longer arm slidably engaging the surface of the plate 10 and a shorter, vertically-upstanding arm disposed to bear against an outer surface of the band 24 and formed with an inwardly-offset hook 26 on its upper end positioned to engage over the upper margin of said band so that pressure applied to hold the longer arm of the clip against the surface of the plate 10 will act through engagement of the hook 26 against the upper mar-

gin of the band 24 to clamp said band downwardly against the matrix plate. The clips 25 are spaced along the loop portion of the band 24 in such number as may be practical or desirable, and the adjacent clips on a long side of the band loop may be arranged for simultaneous clamping to the plate 10 by means of a clamp bar 27 above and extending across their longer arms in intersected relation with a threaded stud 28 rising from the plate 10 for cooperation with a wing-nut 29 whereby the bar 27 may be clamped to and against said clips. Where it is desired to individually clamp the clips to the plate 10, as at the curved portion of the band 24, the longer arms of said clips may be formed with longitudinal slots 30 arranged to engage about and accommodate a threaded stud 28 rising from the plate 10 for cooperation with a wing-nut 29 thereby positioned to bear against the upper surface of the clip arm and directly clamp the clip against the plate. The clips 25 are preferably disposed and positioned on the plate 10 so as to partially overlie end portions of the channels 12 normally extending beneath and beyond the band 24, and the clips are formed with lugs 31 extending downwardly from their vertical, shorter arm portions to engage within and obstruct said channels 12 beneath and immediately adjacent the lower margin of the band portion 24 bridging said channels; the lugs 31 thus constituting movable dams adjustable along the channels 12 to prevent escape of plastic material through said channels and under the band 24.

The combination thus far described completes a sole-forming mould adjustable into conformity with the outline of the article to be repaired, and the mould is conditioned for use by selecting a heel cup of proper size and securing said cup in position on plate 10, inserting the article to be repaired in position on the mould, adjusting the band 24 and clips 25 into marginal engagement of said band with the forward portion of the article sole, and tightening of the adjusting screws 22 to move the overlapped ends of the flanges 21 and band 24 into bearing engagement against instep portions of the article sole. After the mould has been properly adjusted, the article to be repaired is removed and the bottom of the article is buffed or smoothed off and the wear-sole, trimmed to conform to the article, is pasted to the bottom of the article with vulcanizing cement, whereafter the article is again inserted in the mould, pressure is applied within the article to press the lower surface of the article tightly against the wear-sole and to press the wear-sole against the mould, and heat is applied to and through the plate 10 to soften the wear-sole, whereupon the pressure forces the softened material into the channels 12, and into the other depressions in the mould, and continued heat vulcanizes the sole to the article and cures the sole.

Conventional heat-treating and vulcanizing equipment normally includes an element for applying pressure to hold an article against the operating surface of the apparatus, and such an element is shown conventionally in perpendicular relation with the plate 11 as a threaded stem 32 adapted for altitudinal adjustment by any suitable means, and carrying a pressure head 33 on its lower end. To efficiently utilize the pressure transmitted through the head 33 for holding an article of foot-wear in the desired relation with its mould, a pressure foot assembly of the type shown in the drawings is provided. As will

be obvious, a pressure foot assembly for insertion in an article of foot-wear should be arranged to distribute the pressure to both heel and toe portions of such article, and should also be constructed for retraction and extension to facilitate its insertion and removal. As shown in the drawings, the pressure foot comprises separable toe and heel portions, the toe portion consisting of a flat plate 34, curved at its forward portion to fit within the toe portion of an article of foot-wear, having a length sufficient to extend rearwardly into covering relation with at least a portion of the article instep, tapered rearwardly to accommodate the narrow instep section, and having its lower surface undercut to accommodate the upward inclination of said instep section. The heel portion of the pressure foot assembly includes a flat, suitably-contoured, plate 35 engageable within and in bearing engagement against the heel of an article of foot-wear, and a somewhat narrower, straight tongue 36 fixed to the upper portion of the plate 35 to extend forwardly through the instep section in overlying, bearing engagement against the upper surface of the major portion of the toe plate 34, so that, when the pressure foot is assembled within the article of foot-wear in the position shown in Figure 2, the pressure-head 33 may be brought into bearing engagement with the upper surface of the tongue 36 for the application of the desired pressure through the elements 34 and 35 to the toe and heel sections, respectively, of the article of foot-wear. While the toe and heel portions of the pressure foot may be employed as entirely separate units, it is convenient to provide means for positively associating said units in the desired operative relationship, and one form of such means is illustrated as comprising a longitudinal recess in and opening through the lower surface of the tongue 36, and an arm 37 hinged at its forward end to and extending rearwardly from a block 38 fixed to the upper surface of the unit 34, said arm 37 being thus disposed for actuation through a vertical arc and being of a length and size to engage within and substantially fill the longitudinal recess in the tongue 36. With the arrangement shown, the heel unit may receive the arm 37 in its longitudinal recess and be thus positively positioned, when moved into bearing engagement of its tongue 36 against the upper surface of the unit 34, in the desired relationship with the toe portion of the pressure foot, the arm 37 operating to determine the longitudinal and lateral relationship of said units. When it is desired to insert or remove the pressure foot relative to the article of foot-wear, lifting of the heel unit results in arcuate upward travel of the arm 37 and consequent forward as well as upward travel of the heel unit, thus reducing the length of the assembly, facilitating separation of the heel and toe units, and simplifying manipulation of the pressure foot relative to its associated article of foot-wear.

As will be readily apparent, the improved method may be utilized for the half-soling of articles of foot-wear, in which case only the sole and instep portions of the matrix plate will be utilized in outlining and affixing relation with corresponding portions of an article of foot-wear and the new material constituting the half-sole. Since many changes, variations, and modifications, in the specific form, construction, and arrangement of the elements shown and described may be had without departing from the spirit of my invention, I wish to be understood as be-

ing limited solely by the scope of the appended claims, rather than by any details of the illustrative showing and foregoing description.

I claim:

1. A foot-wear sole mould, comprising a plate defining the bottom of the sole and instep, flexible means adjustably upstanding from said plate adapted to be flexed into marginal conformity with the sole and instep of an article of foot-wear, means for flexing said flexible means into, and for maintaining, such conformity, and means for pressure-urging an article of foot-wear toward said plate.
2. A foot-wear sole mould, comprising a heat-conductive plate defining the bottoms of the sole and instep, flexible means adjustably upstanding from said plate adapted to be flexed into marginal conformity with the sole and instep of an article of foot-wear, means for flexing said flexible means into, and maintaining, such marginal conformity and means for pressure-urging an article of foot-wear toward said plate within the limits of said marginal outlining means.
3. A foot-wear sole mould, comprising a heat-conductive plate defining the bottom of the sole and instep, channels intersecting the sole portion of said plate, flexible means adjustably upstanding from said plate adapted to be flexed into marginal conformity with the sole and instep of an article of foot-wear, clips adapted to flex said flexible means into said marginal conformity, said clips having depending portions adapted to adjustably obstruct said channels, and means for pressure-urging an article of foot-wear toward said plate.
4. In a mould of the character described, a heat-conductive plate defining the bottoms of the sole, heel and instep, a heel cup removably associated in outlining relation with said heel portion, adjustable flanges upstanding from said plate and cooperating with said heel cup to marginally define an instep portion, a flexible band looped around the sole portion of and slidably resting upon said plate and having its ends within and in sliding engagement with said flanges, means for flexing said band and for clamping it to said plate, and means for pressure-urging an article of foot-wear toward said plate within the outline defined by said band, flanges and cup.
5. In a mould of the character described, a heat-conductive plate defining the bottom of the sole and heel interconnected by a relatively elevated instep portion, cleat-forming means intersecting the surface of said sole portion of the plate, a removable and replaceable cup adapted to outline said heel and being open into registration with said instep portion, flexible band means adjustably upstanding from said instep and sole portions adapted to be flexed to marginally conform with the outline of an article of foot-wear, means carried by said plate and engageable with said flexible means to position and hold the latter, and means for pressure-urging an article of foot-wear toward said plate within the outline defined by said cup and upstanding means.
6. In a mould of the character described having a heat-conductive matrix plate formed with sole and heel impressions interconnected by a relatively elevated instep portion, a heel-outlining cup removably upstanding from said plate about said heel impression and opening into registration with said instep portion, means for clamping said cup to said plate, instep-outlining flanges adjustably upstanding from the in-

step portion of said plate and cooperating with said cup to marginally define an instep channel diverging forwardly from said cup, a flexible band upstanding from the sole impression of said plate with its free ends slidably engaging within diverging portions of said flanges, means for clamping said band in adjusted relation with said plate, and means for pressure-urging an article of footwear toward said plate within the outline defined by said cup, flanges and band.

7. In a mould of the character described having a plate defining the bottoms of the sole, heel and instep, a heel outlining cup removably associated with said heel impression, flanges adjustably upstanding from said plate in cooperation with said cup to marginally define said instep portion, a flexible band upstanding from the sole portion of said plate with its free ends slidably engaging said flanges for adjustment into marginal conformity with the outline of a sole portion of an article of foot-wear, a plurality of clamps slidably carried by said plate and engageable with and against said band to hold the latter in adjusted relation on said plate, and means for pressure-urging an article of foot-wear toward said plate within the outline defined by said cup, flanges and band.

8. In a mould of the character described including a plate having heel, sole and instep portions, and heel and instep defining elements upstanding in outlining relation with the heel and instep portions of said plate, cleat-forming channels intersecting the sole portion of said plate, a flexible band upstanding from the sole portion of said plate adapted to be flexed into marginal conformity with the sole outline of an article of foot-wear, clamp elements adjustably carried by said plate in partially-overlying relation with end portions of said channels adapted to flex and hold said band in adjusted relation on said plate, and extensions from said clamp elements slidably engaging within said channels to adjustably obstruct said channels.

9. In a mould of the character described having a sole-forming matrix plate and means upstanding therefrom for adjustment into marginal conformity with the outline of an article of foot-wear, means for pressure-urging an article of foot-wear toward said plate, said means comprising a pressure foot including a toe plate engageable within the toe portion of an article of foot-wear and formed with a rearwardly and upwardly tapered extension adapted to engage the instep portion of said article, a heel plate engageable in bearing relation with the heel portion of said article, an upwardly-offset tongue on said heel plate in overlying relation with the rearward extension of said toe plate, a downwardly-opening longitudinal recess in the under surface of said tongue, a lug on said toe plate engageable within one end of said recess, and a rearwardly-extending arm hinged to said lug for actuation through a vertical arc for engagement within said recess to substantially fill the latter when said tongue is in bearing relation against said toe plate and extension, and means for applying pressure to the portion of said tongue overlying said toe plate extension.

10. In a mould of the character described having a heat-conductive plate formed with a sole portion cooperating with a relatively elevated instep portion, instep-outlining flanges adjustably upstanding from the instep portion of said plate and diverging forwardly to embrace the adjacent rearward portion of said sole impression,

and a flexible band upstanding from and about the sole impression of said plate with its free ends slidably engaging within the diverging portions.

11. In a mould of the character described having a heat-conductive matrix plate formed with a cooperating sole portion and instep impression, and instep-outlining flanges adjustably upstanding from said plate, relatively wide, cleat-forming channels intersecting the sole portion of said plate in parallel, outwardly and forwardly diverging relation with the longitudinal median line of said sole impression, a flexible band upstanding from the sole impression of said plate in bridging relation across outer portions of said channels for slidable engagement of its rearwardly-disposed free ends within and against forward portions of said flanges, a plurality of clamps slidably carried by said plate for adjustment laterally and longitudinally thereof and engageable with and against said band to hold the latter in adjusted relation on said plate, said clamps partially overlying portions of said channels extending outwardly beyond said band, extensions depending from said clamps adjacent said band and slidably engaging within the corresponding channels to obstruct the latter, and means for holding said clamps to said plate in their adjusted positions as determined by engagement of their extensions within said channels.

12. In apparatus for forming and attaching soles to foot-wear, a matrix plate for the bottom of the sole, a looped flexible band adapted to be flexed to define the edges of the sole, band-end confining means at the rear of the sole portion of the plate adapted to prevent outward movement while permitting longitudinal movement of the ends of the band, and clips adjustably attached to the plate and adapted to confine the band against movement outward from said sole-defining position.

13. In apparatus as defined in claim 12, said plate having channels adapted to mould cleats on the soles and said clips carrying downward projections having a sliding fit in the channels whereby to adjustably dam said channels against exudation of sole-forming material.

14. In a footwear sole mould, a plate having a portion of its top surface conformed to the bottom of a sole, a flexible band upstanding from and having its edge seated upon said plate and substantially surrounding said portion of said top surface and adapted to be flexed into conformity with the margin of a sole, means adjustably carried by the plate and adapted to thus flex said band and means for locking said flexing, means whereby to hold said band in said flexed position.

15. In apparatus of the class described, means for pressure-urging an article of foot-wear toward a base plate, said means including a pressure foot having separable toe and heel elements adapted to interrelatively overlap, means for interengaging said elements when spaced apart, said interengaging means being adapted to permit said elements to move into overlapping contact and to longitudinal interrelatively extend said elements during such movement and means for applying pressure to the overlapped elements.

16. In a structure as defined in claim 15, said interengaging means being adapted to limit lateral interrelative movement of said elements when overlapped.