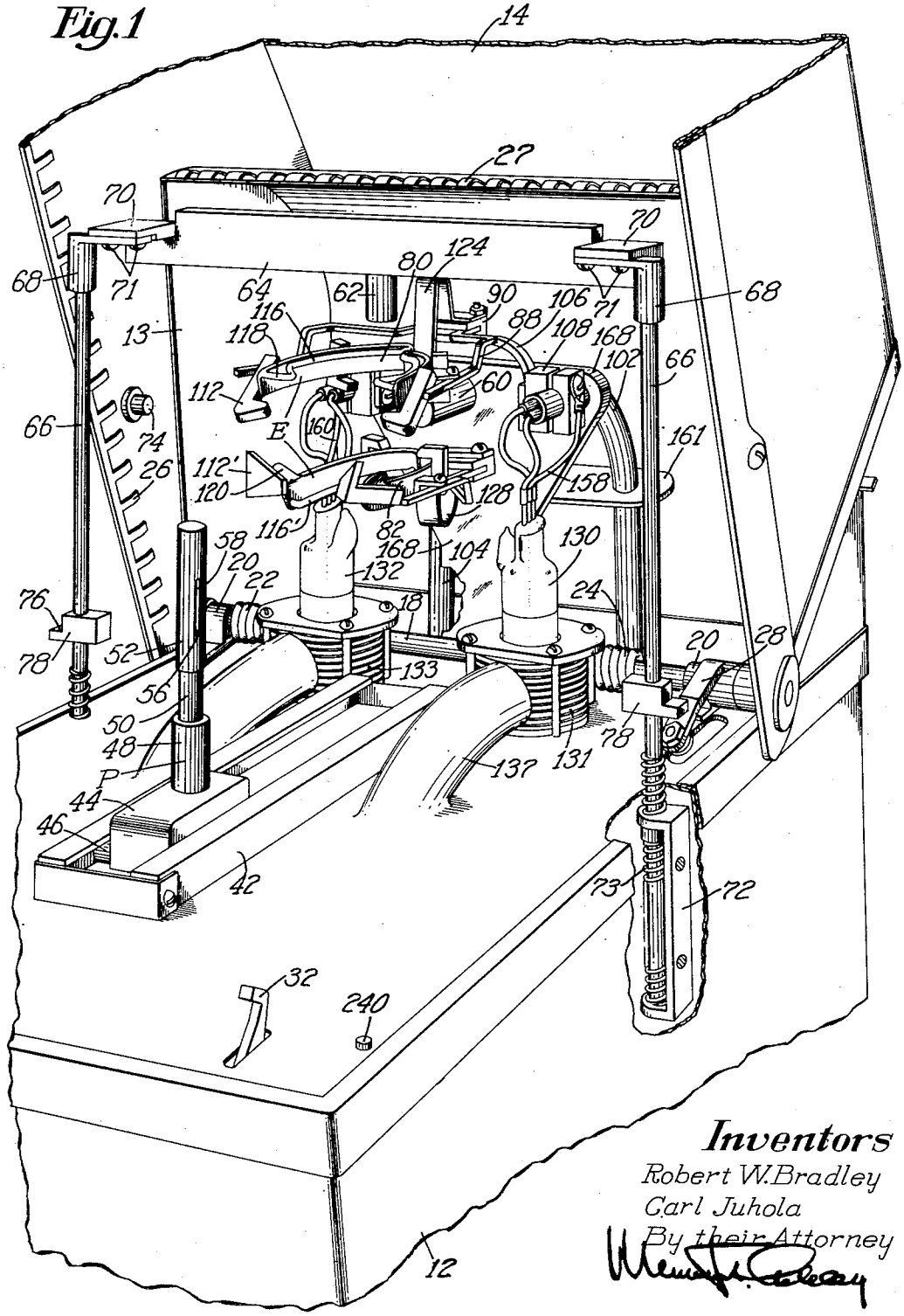
Nov. 7, 1950 R. W. BRADLEY ET AL 2,528,492

SHOEMAKING APPARATUS

Filed Dec. 11, 1948 4 Sheets-Sheet 1

Fig. 1



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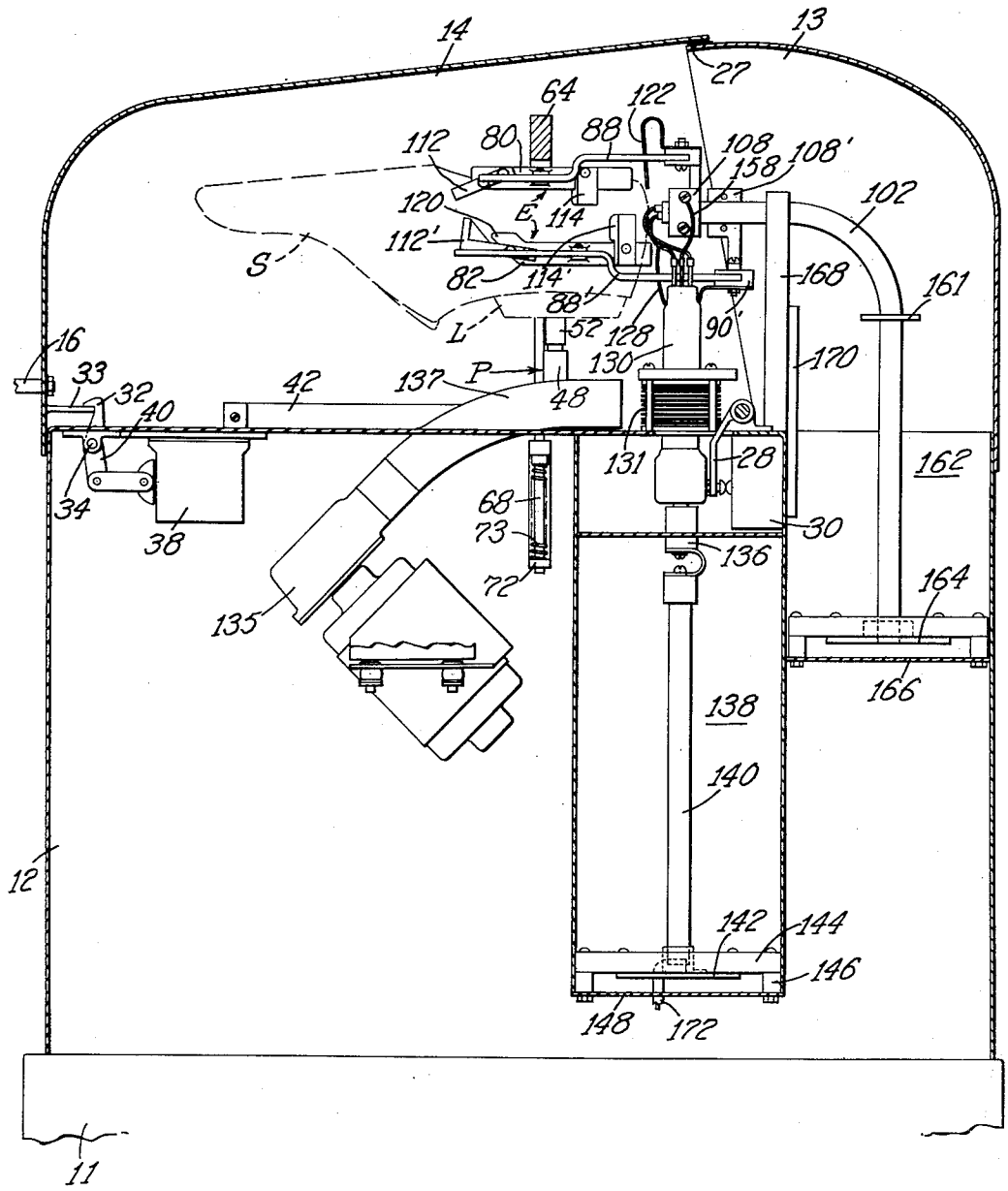
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SHOEMAKING APPARATUS

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Fig. 2



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SHOEMAKING APPARATUS

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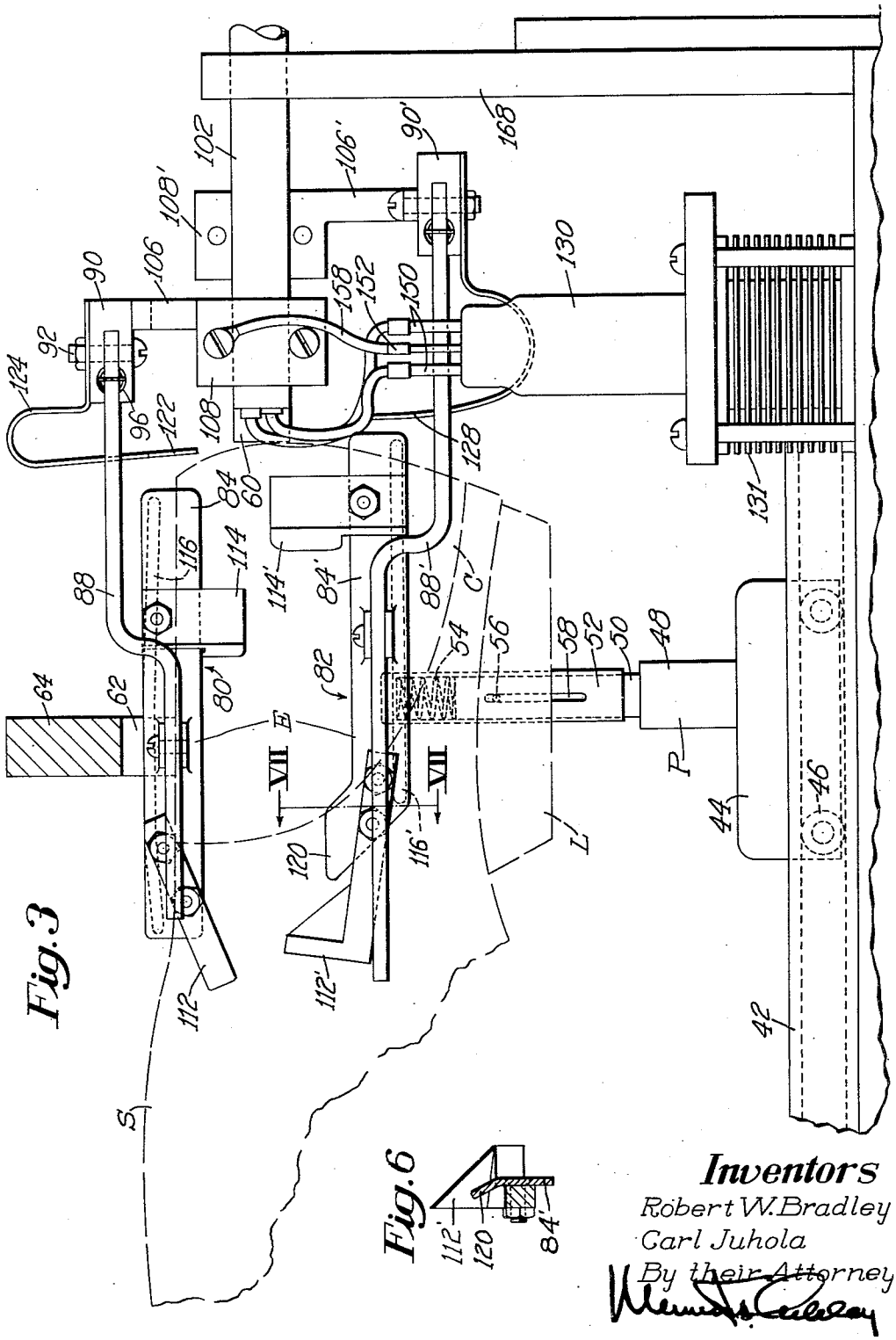


Fig. 3

Fig. 6

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SHOEMAKING APPARATUS

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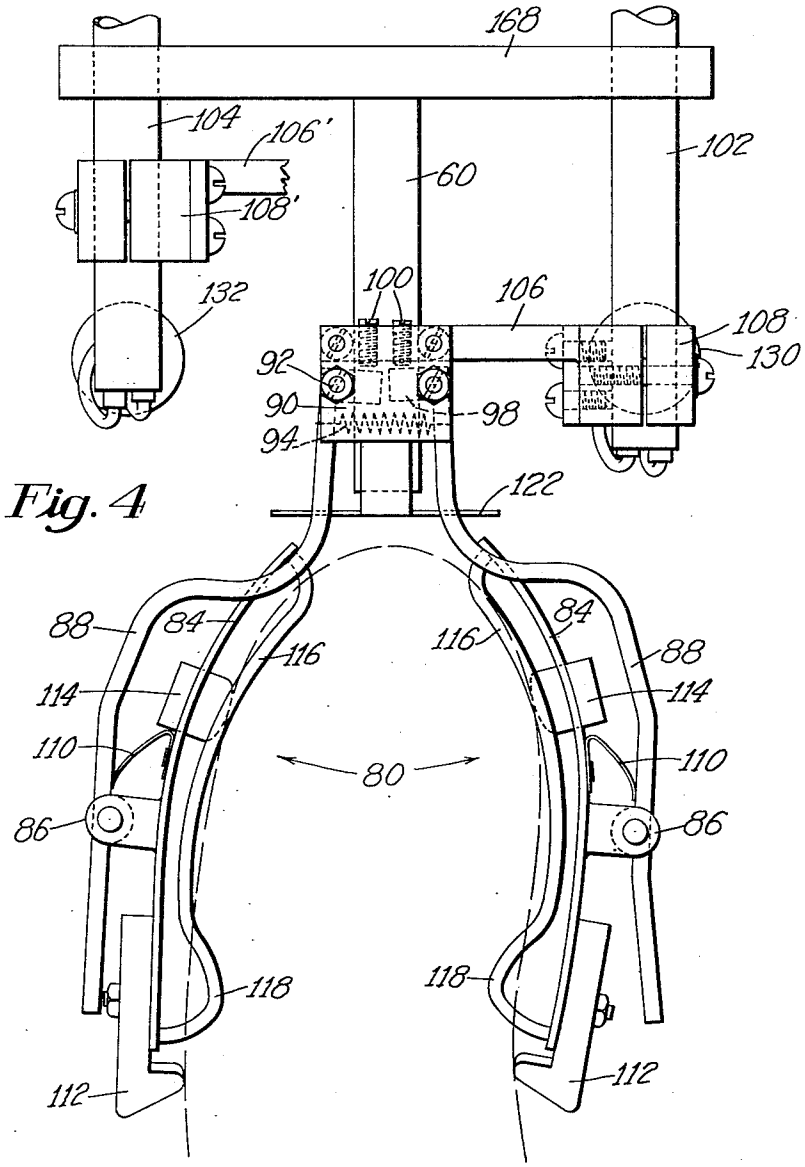


Fig. 4

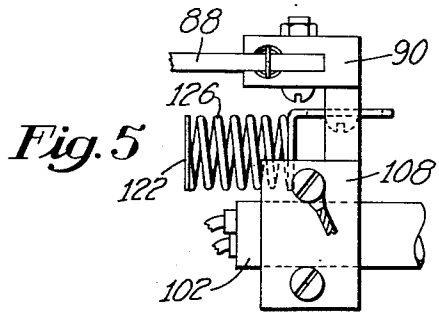


Fig. 5

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UNITED STATES PATENT OFFICE

2,528,492

SHOEMAKING APPARATUS

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Application December 11, 1948, Serial No. 64,858

22 Claims. (Cl. 12—1)

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This invention relates to apparatus for making shoes and more particularly to apparatus for activating stiffener material incorporated into an upper at the heel end of a lasted shoe.

In the manufacture of shoes it is found desirable to stiffen particular portions of the heel end of the shoe. Such stiffening has been provided by incorporating into the upper, prior to lasting, so-called counters which are sometimes made of fiber board, celluloid, or the like. In an improved shoe process, however, such stiffening has been provided by incorporating into the upper in the selected portion a material which is initially limp but which may be caused to become stiffened by the application of heat. Since this material is disposed in the lasted shoe beneath a layer of leather, ordinary means for heating the stiffener material, such as by baking or by radiating heat toward and through the upper layer of leather, must necessarily be either slow or result in damage to the leather. Accordingly, it has been found advantageous to activate the stiffener material by means of the heat produced therein by a high-frequency electric field.

In order that the material may be uniformly stiffened, it is necessary to provide an electric field having a suitably distributed intensity throughout the space occupied by the stiffening material. Further, because such activating apparatus is to be used in factory production, means should advantageously be provided whereby the shoe may be rapidly and efficiently positioned in the apparatus and subsequently withdrawn therefrom after treatment. Advantageously also, the machine should be efficient and safe.

Accordingly, it is an object of the invention to provide improved apparatus for activating stiffener material incorporated into the upper of the heel end of a lasted shoe, which apparatus shall provide for rapidity of operation, uniformity of activation, and economy and safety of operation.

In accordance with the foregoing object, invention is to be found in the provision of improved apparatus for the dielectric heat activation of stiffener material in the heel end of a lasted shoe, said apparatus having an oscillator, electrodes adapted to conform to various sizes and shapes of heel ends, and means for quickly and easily mounting shoes in the machine and for positioning them in operative position.

A feature of the invention resides in the provision of a pair of U-shaped electrodes for bracketing the heel end portion of a shoe, which electrodes are supported only at spaced points and

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may expand or contract widthwise to accommodate various sizes and contours of lasts. In the illustrated machine, one electrode is disposed adjacent to the heel seat and the other electrode is disposed between the heel seat and the free edge of the upper at the foot opening and nearer the latter. Each said electrode comprises a pair of conductive electrode members disposed to extend substantially from the tip of the heel end of the shoe partly around opposite sides thereof. The members of each electrode are supported by a yoke comprising inwardly urged, supporting members to which said electrode members are pivoted at a point between their ends. The housing to which the supporting members are attached is fabricated of conductive material to contain and shield a spring urging the supporting members together. By another feature of the invention spring means are additionally provided by which the electrode members are yieldingly urged to open forwardly to receive a shoe inserted lengthwise.

Another feature of the invention resides in the provision of a conductive member forming an inward flange-like projection from each electrode, which projections, together with extensions at the ends of the lower electrode projecting toward the other electrode, adapt the electrodes to the generation of a suitable electric field throughout a contoured counter of stiffener material.

A shoe-supporting mechanism is provided upon which an inverted shoe may be mounted on a spring-loaded extensible jack-pin and moved lengthwise of the shoe upon a track for operative positioning between the electrodes. A cover is also provided for shielding the electrodes, and by another feature of the invention, movement of the cover into shielding relation with the electrodes operates a shoe-bottom gage to position the inverted shoe heightwise of the electrodes. If desired, the shoe may be positioned by manual operation of the bottom gage.

These and other features and advantages of the invention to be defined in the claims are described in detail in the following specification in connection with the accompanying drawings in which

Fig. 1 is an angular view of an apparatus embodying the features of the invention showing a cabinet having a tiltable cover thereon;

Fig. 2 is a side elevation of the apparatus of Fig. 1 with a side of the cabinet cut away, omitting various electrical components and wiring;

Fig. 3 is an enlarged side elevation of the elec-

trodes and shoe-supporting mechanism shown in Fig. 2;

Fig. 4 is an enlarged plan view of a shoe-end-bracketing electrode shown in Fig. 1;

Fig. 5 is an enlarged side elevation of a portion of the electrodes showing a modified form of an auxiliary electrode; and

Fig. 6 is a sectional view taken along line VII—VII of Fig. 3.

Referring to Figs. 1 and 2, the machine comprises generally a lower section or cabinet 11 containing a power supply and an upper section or chassis 12 on and within which are mounted the components of a high-frequency oscillator and on which are mounted the counter-activating electrodes E and the shoe-supporting mechanism P. To provide safety for the operator and to prevent radiation from the electrical system, a housing is provided for enclosing the top of the chassis, said housing comprising a stationary hood 13 and a tiltable cover 14 having a handle 16. The cover 14, shown open in Fig. 1 and closed in Fig. 2, is mounted on the chassis 12 by a rod 18 rigidly attached to the cover and journaled in brackets 20 secured to the chassis. Torque is yieldingly supplied to the rod 18 by a spring 22 so that the cover is normally held open against a buffer spring 24. Leaf spring contacts 26 (Fig. 1) of conductive material such as beryllium copper are disposed around the inside of the bottom edge of the cover to engage the upper edge of the chassis 12 when the cover is closed in order to prevent radiation through the slot between the cover and the chassis. Similar springs 27 are disposed at the upper edge of hood 13 to engage the cover (Fig. 2). When the cover is closed, an arm 28 on the rod 18 contacts and closes a normally open switch 30 which, when open, prevents, in a manner to be later explained, the application of power to the primary circuit of the high voltage transformer of the oscillator power supply (Fig. 6).

The cover is held closed is shielding relation to the electrodes, during operation, by cover latches 32 which engage lips 33 on the cover. These latches are mounted on the ends of a rod 34 journaled in bearings fixed to the chassis 12 and are yieldingly urged out of engagement of the cover 14 by a spring 36 (indicated diagrammatically in Fig. 6). A solenoid 38 is mounted to pull on an arm 40 in opposition to the spring. The solenoid is arranged to be energized during operation from the power line by means not shown.

The positioning of shoe S in the electrodes E is aided by a track 42 (Figs. 1 to 3) mounted on the top of the chassis 12. In this track a shoe-supporting mechanism including a carriage 44 is movable on wheels 46 toward and away from the electrodes which are disposed rearwardly of the chassis. From this carriage, a post 48 supports an extensible jack pin comprising a rod 50 over which telescopes a sleeve 52 having a closed end and being adapted to enter and engage the socket of a last L in the shoe. The sleeve is upwardly urged by a loading spring 54, a pin 56 in the rod engaging a slot 58 in the sleeve to limit its heightwise telescoping movement. The rod 50 is constructed of insulating material to float the metallic last socket and sleeve in the electric field to minimize disturbance of the electric field due to the presence of the metal. A heel-end-engaging insulating member 60 is mounted at the rear of the electrodes to limit the rearward movement of the shoe in the correct lengthwise position relative to the electrodes. It will be seen that the lasted shoe may be held in inverted position upon the jack pin, positioned heightwise by pressure upon the shoe bottom, and positioned lengthwise by movement of the carriage 44 in its track.

When the cover is closed, the shoe, mounted on the jack pin, is automatically correctly positioned heightwise to meet the electrodes by a bottom gage 62 attached to a transverse member 64 which is supported at each end by rods 66 connected thereto by brackets 68, plates 70 and screws 71. The rods 66 are slidable in apertures at the ends of brackets 72 affixed to the sides of the cabinet 12, said rods being yieldably urged upwardly by springs 73. Stubs 74 attached on each inner side of the cover 14 are adapted to engage the shoulder portions 76 of blocks 78 attached to each rod 66 to move the bottom gage 62 downwardly to a predetermined position when the cover 14 is in its closed position.

The two electrodes 80 and 82 which are adapted for generating a high-frequency electric field through the counter portion C (Fig. 3) of a shoe S, as operatively positioned by the previously described mechanism, are substantially U-shaped and are disposed substantially parallel to each other and to the shoe bottom for bracketing the heel end, one at the heel seat and the other at a location somewhat more than half-way toward the foot opening. The electrodes are adapted, when energized from an oscillator, to set up a high-frequency electric field extending heightwise of the shoe and adjacent to electrodes.

Each electrode is supported at spaced points (Fig. 4) and is arranged to accommodate different sizes and shapes of shoes and also to adapt itself to possible misalinement of the shoe. Thus electrode 80 comprises a pair of curved elongated electrode members 84 (Fig. 4) having appreciable width heightwise of the shoe and disposed to extend substantially from the tip of the heel end of a shoe along opposite sides thereof. Each member 84 has a boss 86 between its ends by which it is pivoted to a supporting member or arm 88. An end of each arm 88 is pivotally attached in a housing 90 by a bolt 92. The two arms are urged toward each other by a spring 94 disposed in a groove 96 (Fig. 3) in the housing, which disposition serves to shield the spring from picking up radio-frequency energy. The inward movement of each arm is limited by a stop 98 integral therewith which bears against a set screw 100 in the back of the housing. The two arms together form an electrode-supporting yoke whose rest position may be adjusted by screws 100.

The housing 90 is supported by attachment to an end of a conductive tubular member 102 which, together with a similar tubular member 104, comprise the conductors of the filament tank circuit of the oscillator, said attachment being made by a curved bar 106 and clamp 108. Attached to each electrode member 84 is a leaf spring 110 which bears against the arm 88 to urge the pair of electrode members to pivot to open forwardly for the ready lengthwise insertion of the end of a shoe. Insulating spacers 112 attached to the forward ends of the members and spacers 114 attached thereto near the rear ends are adapted to engage the surface of the shoe at spaced locations to aline the electrode members with the side of a shoe and maintain a predetermined spacing of the electrode members from the shoe. The electrode 80 has conductive members 116 forming inwardly projecting portions of the electrode members 84,

equivalent electrically to a flange on each, to overlie the overlasted margin of the upper at the heel seat for producing a suitable field in this region. These conductive members 116 attached to electrode 80 are characterized by having a portion 118 near the heel breast line which portion extends inwardly a greater distance than the rest of the member.

The other electrode 82, for association with the heel end of a shoe at a level between the heel seat and the foot opening, is similar in construction and mounting to electrode 80, as is indicated by the use of prime reference numerals. However, conductive members 116' (Fig. 1) project inwardly a uniform distance throughout their length while the electrode members 84' are characterized by having conductive extensions 120 (Fig. 3) at their heel breast ends. These extensions are inclined outwardly from the shoe (Fig. 7) and project toward the heel seat electrode 80. The projecting portions 116 and 120 adapt the electrodes to the generation of an electric field through the contoured counter of stiffener material.

To provide an electric field at the back seam line where there may be a gap between electrode members 84, an auxiliary electrode 122 is attached to the housing 90 by screw 92 for presenting a conductive surface adjacent to the heel seat portion of the back seam substantially coplanar with the members. Because of standing waves, the high-frequency voltage at any given point on the electrodes increases with the electrical distance of said point from the housing 90 along the conducting path. Advantageously, the high-frequency voltage appearing upon the said surface of the auxiliary electrode should be substantially the same as or greater than that appearing at the rear ends of the electrode members 84 at the back seam gap. Because of the length of the electrical path from housing 90 along the arms 88 and back to said ends, the high-frequency voltage at said ends is higher than that which would appear upon the said surface of the auxiliary electrode were this electrode connected to the housing by a straight conductor. Accordingly, this connection is made by a conductive loop 124 effectively to increase the electrical length from the housing to the said surface beyond that afforded by a straight conductor and thereby to increase the voltage appearing on said surface. A similar increase of electric path length may be obtained in other ways, for example, by connecting electrode 122 to the housing 70 through a plurality of loops formed by a coiled conductive member 126 (Fig. 5). A second supplemental electrode 128 is connected to the housing 90' by another looped conductor for presenting a surface adjacent to another portion of the back seam.

Referring to Figs. 1 and 2, the oscillator comprises triodes 130, 132 connected in a push-pull, grounded anode, oscillator circuit. The triodes are mounted on the top of chassis 12 so that the anode connections 131, 133 of the triodes are directly connected to the chassis. The connections 131, 133 are formed with cooling fins which are supplied with a current of air by a motor driven blower 135 connected to an air duct 137. The grid connections 136 (Fig. 2) extend into a shielded cubicle 138 containing a resonant line grid tank circuit 140. The cold end of the grid tank is formed by a shorting plate 142 into which the ends of the tank lines 140 (Fig. 2) run. For grounding the cold end of the tank for radio-frequency currents, the plate 142 is supported in closely spaced relation to the bottom of the cubicle 138 by attachment to an insulating support 144 mounted upon spacers 146 footed on the bottom plate 148 of the cubicle.

Leads from the filaments of the triodes emerge through the tops of the glass envelopes, as illustrated in Figs. 1 and 3. Outside leads 150 are connected within the envelopes to the ends of the filaments and through these leads there is supplied the heating current. A center lead 152 of each triode is connected to the midpoint of the filament. As illustrated, the center leads are connected, by leads 158, 160 (Fig. 1), respectively, to the clamps 108, 108' at the ends of the tubular members 102 and 104 of the filament tank circuit. This tank circuit has an adjustable shorting bar 161 and extends rearwardly and down into another cubicle 162 (Fig. 2), where it is grounded for radio-frequency currents by a plate 164 mounted in closely spaced relation to the bottom plate 166 of the cubicle 162. The hot end of the filament tank is supported by an insulating block 168 (shown partly broken away in Fig. 1) through which the tubular members 102, 104 pass. The block is attached to the chassis 12 by a metallic bracing member 170. By this means, the filament lines and electrodes are rigidly supported with a minimum amount of supporting structure whereby dielectric losses and the possibility of electrical breakdown are minimized. Leads for supplying filament current to the triodes are run from supply circuits omitted for clarity through the respective filament tank lines from the cold end. Upon emerging from the upper ends of the lines, the leads are connected to the respective outside triode filament leads 150. Connection of the grid-return lead of the oscillator to the cold end of the grid tank is provided by means of a dissipative choke (or inductive resistor) 172 mounted in vertical position through central holes in plates 142 and 148, the upper end of the resistor being connected to the upper surface of shorting plate 142 near its midpoint. In operation, a lasted shoe is inverted and positioned on the jack pin sleeve 52 and the carriage 44 is then slid rearwardly until the heel of the shoe engages the insulating member 60. The shoe is thus correctly positioned lengthwise of the electrodes but slightly above its operating position. The shielding cover 14 is then closed whereupon the gage member 62 descends to position the shoe heightwise of the electrodes. A timer (not shown) may be adjusted to the desired treating period and the cover is then depressed slightly below its operating position whereby a cover-over-travel switch 240 (Fig. 1) is closed and the cover 14 is then held in operating position by the latches 32 until the timer has run its course. Thereafter the cover opens for the removal of the shoe.

While the invention has been described by relation to the specific embodiment herein illustrated, alternative arrangements within the scope of the invention will occur to those skilled in the art. Accordingly, it is intended that the invention be not limited to such a specific embodiment but rather as defined in the appended claims given a broad interpretation commensurate with the scope of this invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In high-frequency dielectric heating appa-

ratus for activating stiffener material incorporated into the heel end of a lasted upper, a pair of substantially U-shaped electrodes disposed substantially parallel to each other for bracketing the heel end of a shoe, said electrodes being supported only at spaced points and being adapted for connection to a source of high-frequency electric energy for establishing a high-frequency electric field zone in portions of the upper adjacent to the electrodes to activate counter material in such portions.

2. In high-frequency dielectric heating apparatus for activating stiffener material incorporated into the heel end of a lasted upper, activating electrodes adapted for connection to a source of high-frequency electric energy comprising a first substantially U-shaped electrode for bracketing the heel end of a shoe adjacent to the heel seat and parallel to the shoe bottom, and a second substantially U-shaped electrode disposed substantially parallel to said first electrode for bracketing the heel end of the shoe at another location, each electrode being supported only at spaced points.

3. Apparatus as in claim 2 in which said first electrode has a conductive member forming an inwardly projecting portion to overlie the overlasted margin of the upper at the heel seat.

4. Apparatus as in claim 2 in which each electrode has appreciable width heightwise of the shoe and has a conductive member forming an inwardly projecting portion from each electrode and in which said second electrode additionally has at its forward ends conductive extensions projecting toward said first electrode.

5. Apparatus as in claim 4 wherein said inwardly projecting portion of said first electrode extends inwardly a greater distance near the heel breast line ends thereof than otherwise, and wherein said extensions of said second electrode incline outwardly from the shoe and toward said first electrode.

6. An expansible electrode for bracketing the end portion of a shoe comprising a pair of conductive electrode members adapted to extend along the sides of the end portion of a shoe, and inwardly urged supporting members to which said electrode members are pivoted at a point between their ends.

7. In high-frequency dielectric heating apparatus for activating stiffener material incorporated in the end portion of a lasted shoe upper, an expansible electrode for bracketing said portion comprising a pair of curved elongated electrode members adapted to extend along the sides of the end portion of a shoe, and a pair of inwardly urged supporting members to which said electrode members are attached respectively at a point between their ends for pivoting in the plane of the shoe bottom whereby, upon insertion of a shoe therebetween, said electrode members may pivot in the said plane to aline themselves with the sides of the shoe.

8. An expansible electrode as in claim 7, and additionally comprising spring means urging said pair of electrode members to pivot to open forwardly for the ready lengthwise insertion therebetween of the end of a shoe.

9. Apparatus as in claim 7, wherein additionally, said electrode members have inwardly extending insulating spacers attached thereto at spaced locations to engage the surface of a shoe to aline the members with the side of a shoe and maintain a predetermined spacing between said members and said shoe.

10. In high-frequency dielectric heating apparatus for activating counter stiffener material incorporated in the heel portion of a lasted shoe upper, an electrode extending substantially around said heel portion adjacent to the shoe bottom and a cooperative electrode extending around said heel portion at a location nearer the foot opening of the shoe, each of said electrodes comprising a pair of curved elongated electrode members, supporting means for each electrode permitting relative separation of the members of a pair, and connecting means between said members and said supporting means permitting pivoting of said members in the respective plane of said electrodes.

11. Apparatus as in claim 10, wherein said supporting means individually comprise a yoke having a pair of arms pivoted at one end for relative movement toward and away from each other, and spring means connected between said arms to urge them toward each other.

12. Apparatus as in claim 10 and additionally comprising means for positioning a shoe heightwise in said electrodes by reference to the plane of the shoe bottom.

13. In apparatus of the class described, means for positioning the heel end of a lasted shoe in operative position relative to electrodes for activating a counter stiffener piece incorporated in such a shoe, comprising a shoe-supporting mechanism for supporting the shoe on a last in inverted position and in operative position laterally relative to said electrodes, said mechanism including spring means tending to maintain said shoe higher in position than that to be assumed when in operative position, a shielding cover mounted for movement into and out of shielding relation to the electrodes, and heightwise positioning means operable by movement of said cover into shielding relation to said electrodes for depressing the shoe into operative position heightwise relative to the electrodes.

14. Apparatus as in claim 13, additionally comprising a track over which said mechanism is adapted to move in bringing a shoe lengthwise into engagement with the electrodes, and a heel-end-engaging insulating member positioned to stop such movement when said shoe is in proper position lengthwise of the electrodes.

15. Apparatus as in claim 13, in which said mechanism includes a vertical post of insulating material, and supported in telescoping relation thereon, a spring-loaded sleeve adapted for engaging a last socket.

16. In high-frequency dielectric heating apparatus, an expansible electrode for treating the end portions of shoes of various sizes comprising a pair of curved elongated electrode members adapted to extend along the sides of a shoe substantially from the tip of said end portion, means for pivotally supporting said members in bracketing relation to a shoe end, and an auxiliary electrode member comprising a conductive member mounted adjacent to the rear ends of said pivoted electrode members and substantially coplanar therewith to present a conductive surface adjacent to said tip.

17. Apparatus as in claim 16 and including means for connecting said auxiliary electrode member to the same side of a source of high-frequency electric energy as said pair of electrode members.

18. Apparatus as in claim 17, wherein said connecting means includes a conductive loop to

increase the electrical length of said means beyond that provided by a straight conductor.

19. In apparatus of the class described, expansible electrode means comprising two relatively separable electrode members, a conductive housing provided with a recess, supporting members connected respectively to said electrode members and pivotally connected to said housing for lateral separating movement, said housing having spring means contained within said recess and connecting said supporting members for urging the same toward each other, said construction effectively shielding said spring from the high-frequency electric field of said electrode members.

20. In shoe heating apparatus, an expansible electrode comprising two electrode members adapted to extend along opposite sides of the end portion of a shoe, and relatively movable supporting members to which the electrode members are pivoted.

21. In shoe heating apparatus, an expansible electrode for bracketing an end portion of a shoe comprising two electrode members adapted to extend along opposite sides of the end portion of a shoe and two supporting members to each of which an electrode member is pivoted, one of said supporting members being movable relative to the other supporting member to move the respective pivot points toward or away from each other.

22. Apparatus as in claim 21 wherein said supporting members comprise arms, one of said arms being mounted to swing toward and away from another arm.

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