Sept. 29, 1953 J. P. QUIRK ET AL 2,653,424

SHOE HEEL SURFACING MACHINE

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FIG. 1.

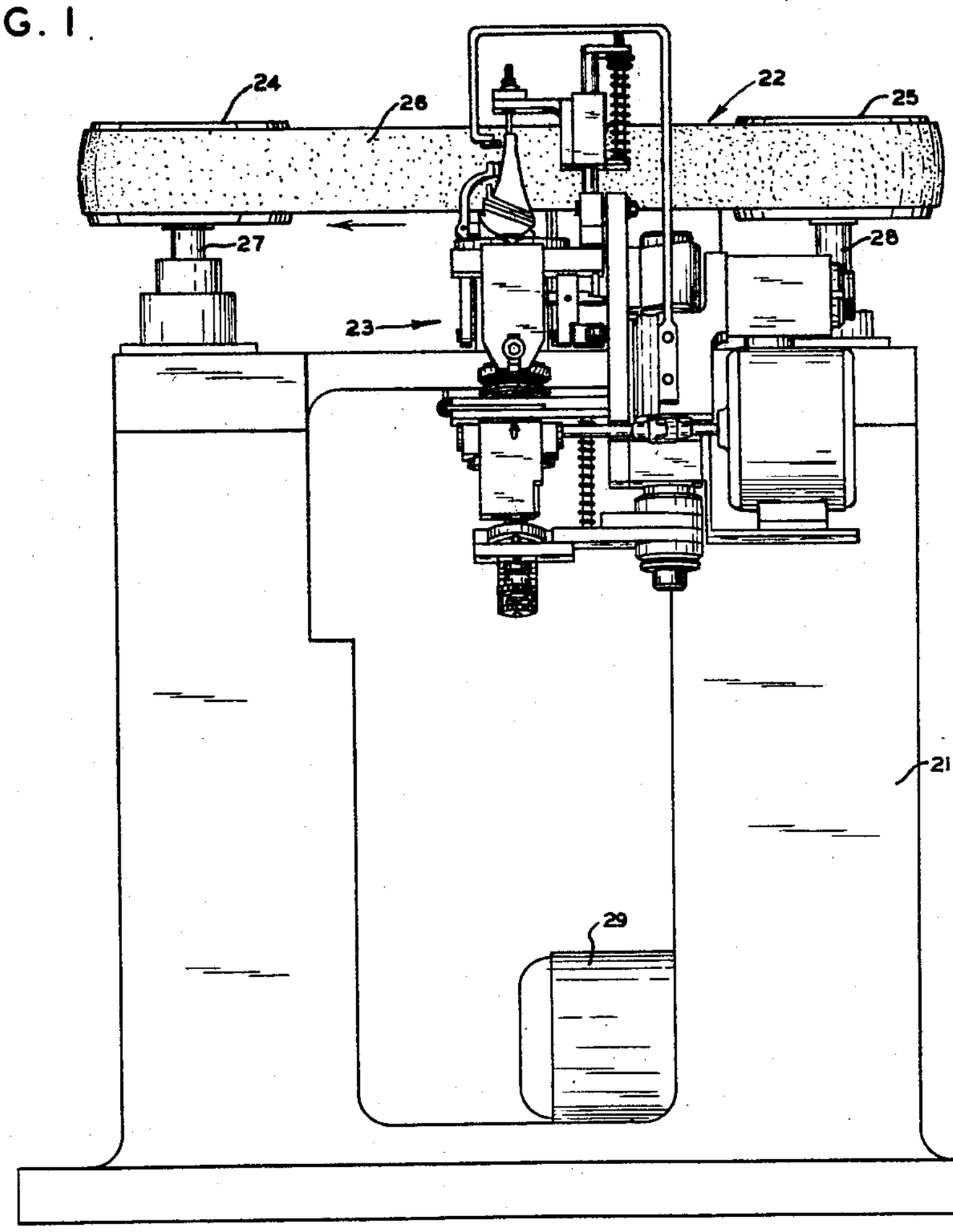

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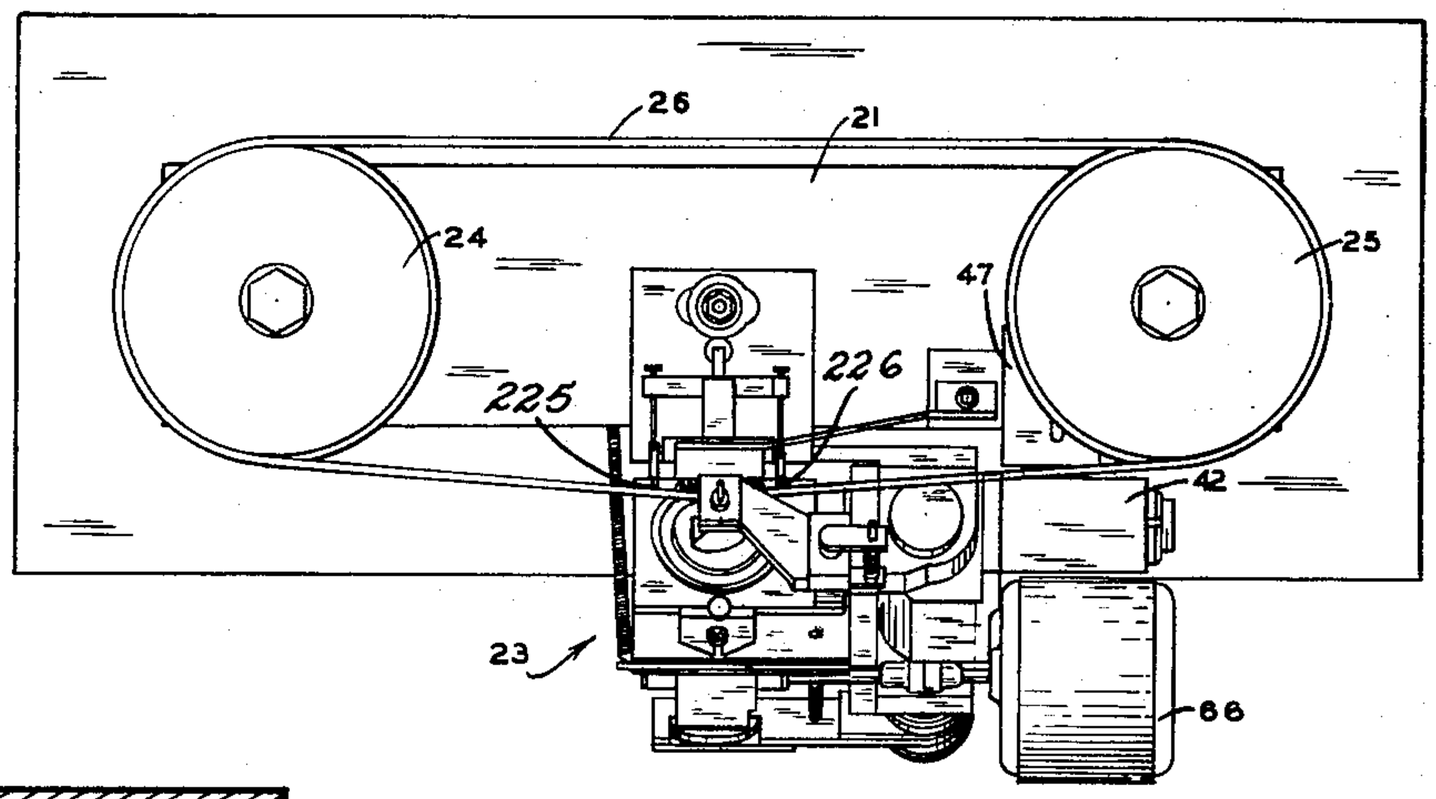
FIG. 2



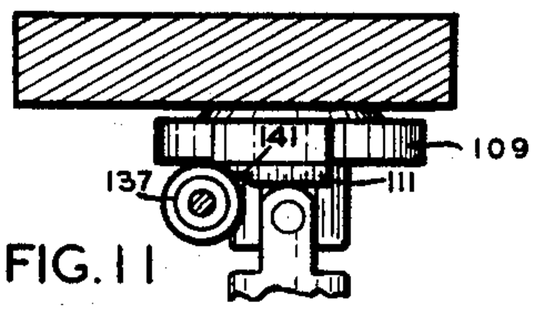


FIG. 11

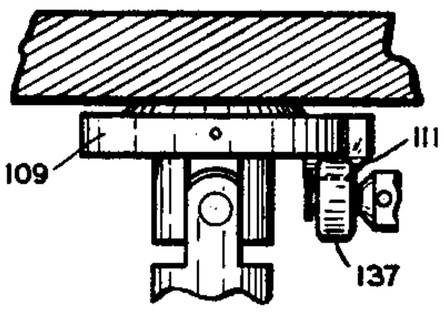


FIG. 12

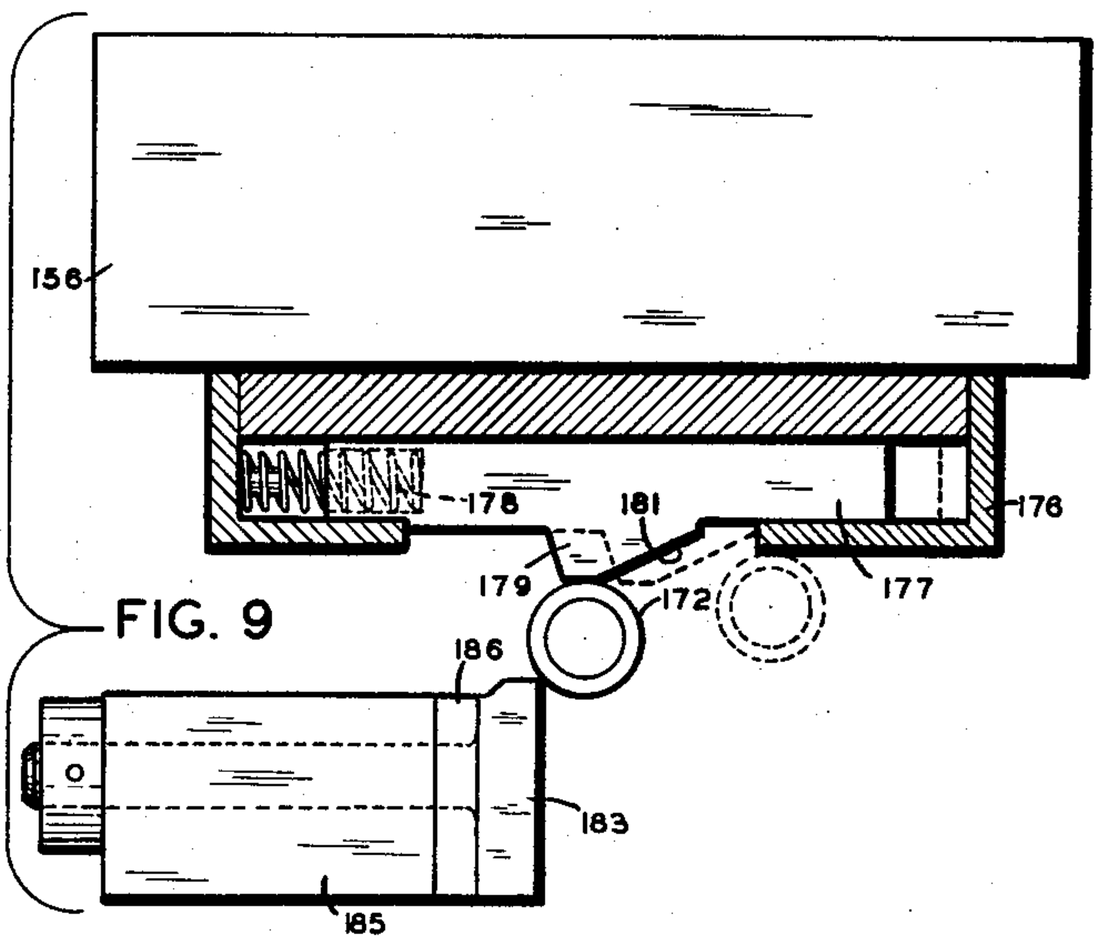


FIG. 9

FIG. 7

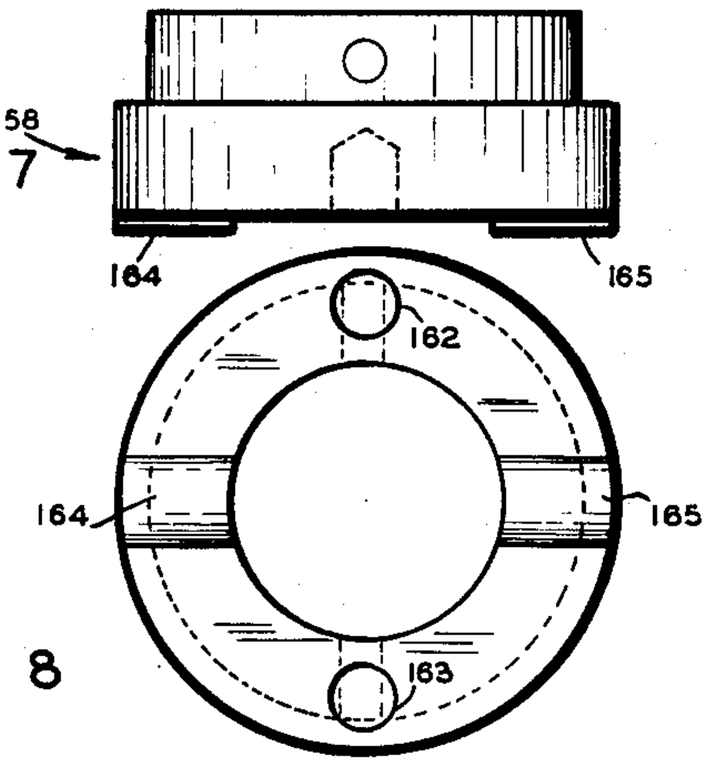


FIG. 8

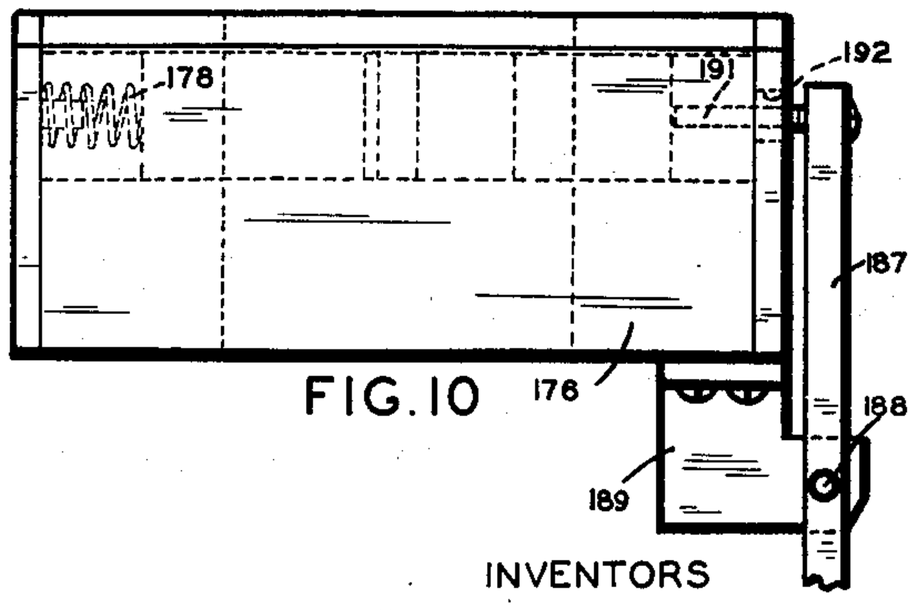


FIG. 10

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SHOE HEEL SURFACING MACHINE

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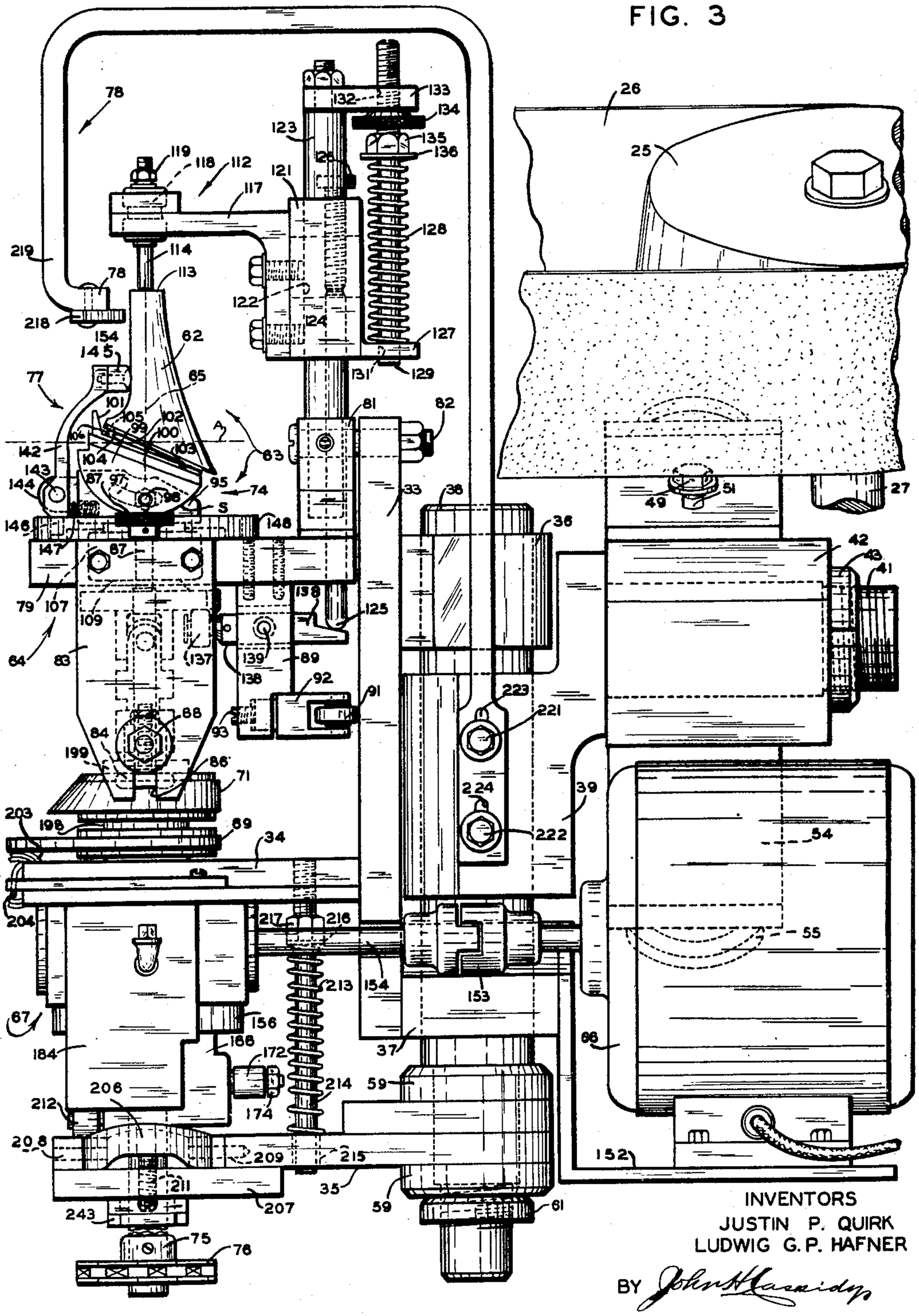
FIG. 3



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SHOE HEEL SURFACING MACHINE

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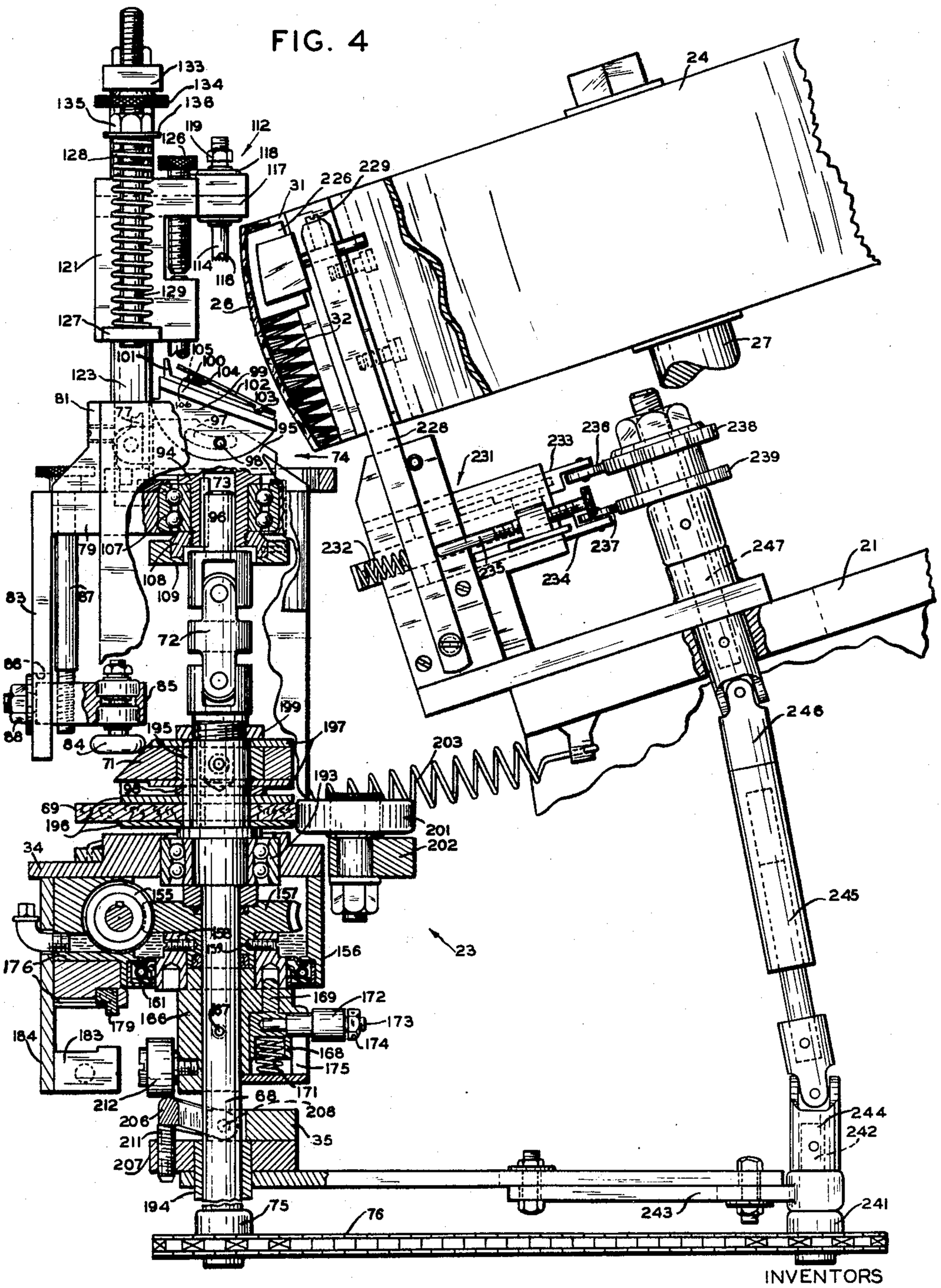
FIG. 4



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SHOE HEEL SURFACING MACHINE

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FIG. 5

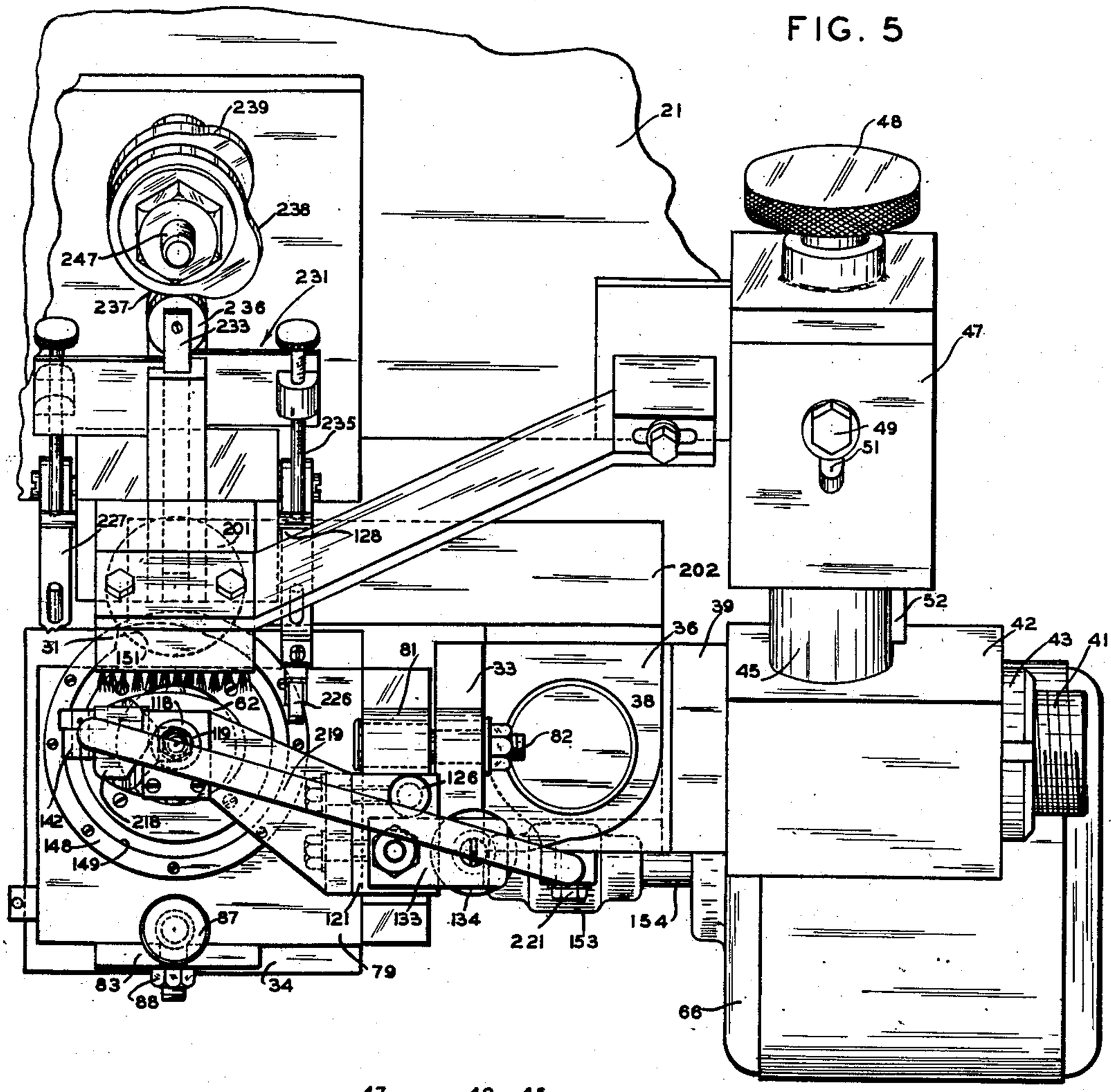
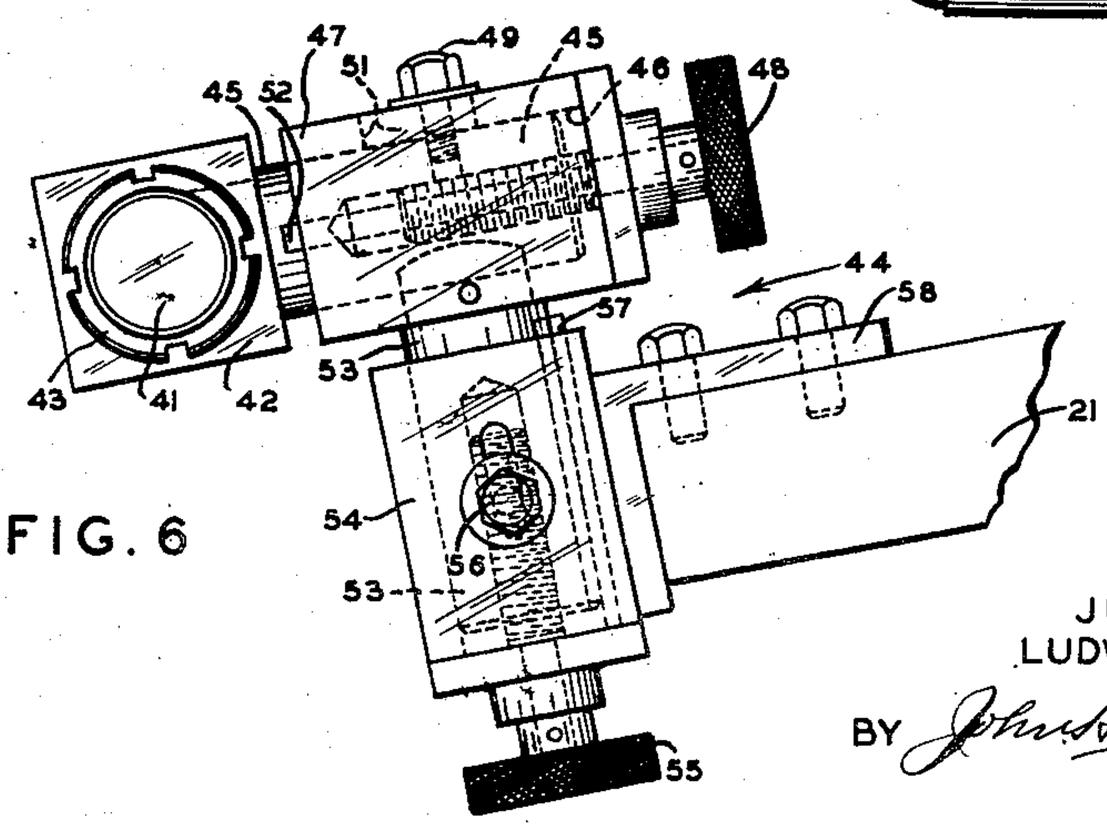


FIG. 6



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Patented Sept. 29, 1953

2,653,424

UNITED STATES PATENT OFFICE

2,653,424

SHOE HEEL SURFACING MACHINE

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Application December 3, 1947, Serial No. 789,454

8 Claims. (Cl. 51—145)

1

This invention pertains to a shoe heel surfacing machine, generally, and concerns itself more particularly with a device that is capable of performing such operations as sanding a wooden heel, and buffing, polishing or otherwise operating upon a shaped or partially shaped shoe heel, entirely automatically with the exception of a loading operation.

Generally, it is an object of the invention to provide a machine of the type described which when once put in operation will thereafter continuously and automatically perform surface operations upon shoe heels without manual intervention, manual loading excepted.

More specifically, it is an object of the invention to provide a machine of the type described which will impart to a shoe heel the necessary complex motions for moving the same against a surfacing tool whereby the latter will pass over and follow given contours of the heel, the said surfacing tool also being given complex motions capable of giving to the heel additional shape or surface characteristics.

Further, it is an object of the invention to provide a machine of the type described having an automatic one-revolution clutch for imparting intermittent rotative movement to a heel jack whereby the latter is stopped periodically to receive a shoe heel.

Also, it is an object of the invention to provide a machine of the type described having an automatic heel jack and an automatic heel ejecting mechanism.

Briefly stated, the machine embodying the instant invention comprises a frame upon which is mounted a shoe heel surfacing tool and a shoe heel feeding mechanism which latter device, in broad terms of operation, feeds or moves the shoe heel against the surfacing tool. The heel surfacing tool, per se, may take any one of several forms, for example, a wooden heel sander, which includes a continuous abrasive strip passed around two horizontally disposed disc spools, one of which is powered to move the strip longitudinally. The shoe heel feeding unit is powered by a separate motor mounted on a bracket which is pivotally connected to the frame in a manner such that the same may be moved toward and away from the surfacing tool. This bracket supports a cradle in which is mounted an automatic heel jack and an automatic heel ejecting mechanism and further carries the necessary mechanisms, including an automatic one-revolution clutch, by means of which the heel jack is rotated and is moved relative to the

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surfacing tool with the complex movements, well known in the art. Additionally, a power take-off is associated with a central shaft of the shoe heel feeding unit which take-off powers and controls the movement of two fingers adapted to give additional movements to the surfacing tool in timed sequence with the movements of the heel feeding unit.

Other objects and advantages of the machine will become apparent as the specification proceeds and a more comprehensive understanding of the invention will be afforded from the following detailed description when considered in conjunction with the accompanying drawings, in which

Fig. 1 is a front elevational view of a shoe heel surfacing machine embodying the instant invention,

Fig. 2 is a top view of the same,

Fig. 3 is a front elevational view of the machine's heel feeding unit showing parts thereof and illustrating its mounting arrangement on the frame,

Fig. 4 is a side view of the machine, in partial section and with parts removed for clarity, showing details of its heel feeding unit, surfacing tool, and the power connection through which control of the latter is effected in timed relationship with the operation of the former,

Fig. 5 is a fragmentary plan view of the machine, with parts removed, illustrating the relative positions of its surfacing tool control mechanism and heel feeding unit,

Fig. 6 is a detail view, in side elevation, of an adjustable mounting bracket for attaching the heel feeding unit to the machine's frame,

Figs. 7 and 8 are side and bottom views, respectively, of a clutch plate employed in the machine's automatic one-revolution clutch,

Fig. 9 is a front view, in partial section, of a sliding cam, its cam follower and cam follower stop by means of which the machine's one-revolution clutch is automatically engaged and disengaged,

Fig. 10 is a top view of the sliding cam illustrated in Fig. 9, showing a manually operated latching mechanism therefor, and

Figs. 11 and 12 are detail views of a jack lift cam and its follower which controls the machine's automatic heel jack, the latter view more clearly illustrating these parts in the positions which they occupy in Fig. 3.

As previously stated, the instant invention contemplates a machine which is adaptable to perform a number of different surfacing opera-

tions on a shoe heel. It is especially well adapted to function as a sanding machine, however, and, by way of illustrative example, only, it will be so shown and described.

With reference to Fig. 1, the machine comprises, broadly, a frame 21 which supports a shoe heel surfacing tool, or sander, 22 and a shoe heel feeding unit 23.

The sander 22, against which a shoe heel is turned by the feeding unit 23, includes two horizontally disposed disc spools 24 and 25 around which is passed a continuous abrasive strip, or sand paper belt 26. The spools 24 and 25 are rounded and are mounted for rotation on their respective shafts 27 and 28. For driving the shaft 28, an electric motor 29 is provided, which latter element moves the belt 26 in the direction of the arrows. An adjustably positioned brush 31 (Fig. 2) is supported on top of the frame 21 in a manner such that its bristles 32 ride against an inner surface of the belt 26 (Fig. 4) and hold the same firm at a point where the feeding unit 23 presents the shoe heel to the belt for performing the sanding operation.

Although the function of the feeding unit 23 has been described broadly, as that of presenting a shoe heel to its surfacing tool, it also performs numerous sub-functions, each of which requires its own specific mechanism. These mechanisms combine to form the feeding unit as a whole, and accordingly, each will be described as a part of it.

For supporting the various components of the feeding unit, a frame is provided which comprises a vertical member 33 (Fig. 3) and two horizontal members 34 and 35. The vertical member 33 has two bearing collars 36 and 37 formed as a part thereof which pass over, slide along, and pivot about a shaft 38, the latter element being retained in a shaft bracket 39. A stub shaft 41, which forms a part of the bracket 39 is passed into a block bearing 42 and is held therein by a collar nut 43. The position which the block bearing 42 occupies with respect to the frame 21 is determined by a two-way adjustable mounting bracket 44 (Fig. 6) by means of which it is connected to the said frame.

Here, a rod-like extension 45 of the block bearing 42 is passed into a bore 46 of a first rigid bracket member 47. A thumb screw 48, threaded into the ends of the extension 45 moves the latter longitudinally of the bore 46 to adjust the position of the shaft 41, which adjustment is maintained by a bolt 49 passed through a slot 51 into the extension 45. A key 52, positioned in keyways in the extension 45 and the bore 46, prevents the rotation of the former in the latter. Similarly, an extension 53 of the member 47 is arranged in a second bracket member 54 to provide a second adjustment for the position of the shaft 41 at right angles to the first, a thumb screw 55, a lock bolt 56, and a key 57 completing the assembly. Here, the member 54 is secured to the frame 21 by an angle bracket 58.

The horizontal member 35 is passed over a shouldered end of the shaft 38 and is held thereon to pivot about said shaft between two thrust bearings 59 held in place by a shaft lock nut 61. The member 35 pivots about the shaft 38 with the rest of the frame but does not more vertically as do the members 33 and 34.

The foregoing describes the means provided for mounting the heel feeding unit 23, on the frame 21 for certain of its movements with respect to the surfacing tool 26 and for making adjustments to their relative positions. Thus, it is seen that the members 33, 34 and 35 and all that they support are free to pivot about the shaft 38; that the members 33 and 34 are adapted to move vertically with respect to the shaft 38 and that the position of all three of these members, collectively, may be adjusted with respect to the surfacing tool 26; horizontally, by the thumb screw 48; vertically, by the thumb screw 55; and tiltingly, by rotating the shaft bracket 39 in the block bearing 42. All of these movements and adjustments together with others to be described are given ultimately to a shoe heel which is supported for movement in the heel feeding unit in a manner now to be described.

With reference to Fig. 3, a heel 62 is supported in an automatic jack 63 which, in turn, is mounted for tilting movement in a cradle 64. In addition to being tilted in the cradle 64, the heel 62 is rotated about an axis 65, known as the heel axis, and is further given a lifting motion parallel to said axis. Power for operating the heel feeding unit is supplied by an electric motor 66 and is transmitted through an automatic single-revolution clutch 67 to a central drive shaft 68. This shaft, which mounts a shape cam 69 and a tilt cam 71, is connected by means of a double universal joint 72 and a slip joint 73 (Fig. 4) with a revolving base 74 of the jack 63, the universal and slip joints providing for the positive rotation of the heel jack 63 during the time it is being tilted in the cradle 64. Additionally, power is taken from the central drive shaft 68, by a sprocket wheel 75 and chain drive 76 for purposes yet to be described. Also forming a part of the heel feeding unit 23 is an automatic heel ejector 77 (Fig. 3) and a heel loading guide 78. Beginning with the cradle 64 upon which the automatic heel jack 63 is supported for tilting action, each of these mechanisms of the heel feeding unit will be described in greater detail, although possibly not in the order given.

The cradles 64 comprises a horizontal base member 79 from which arises a vertical member 81. Through this last mentioned member a bolt 82 is passed into the frame member 33 (Fig. 5), the bolt 82 serving as a pivot about which the cradle tilts. Depending from the base member 79 is an apron 83 (Fig. 4) which supports a cam roller 84 for contact with the tilt cam 71. The cam roller 84 is bearinged in a movable arm 85 which is vertically adjustable in a slot 86 (Figs. 3 and 4) in the apron by means of a thumb screw 87 passed through the member 79 and threaded into the arm 85. The adjustment given to the cam roller 84, through the movement of the arm 85, changes the degree of tilt given the cradle 64 and is maintained by means of a lock nut 88. Also depending from the base member 79 is a cradle guide arm 89 which supports a guide roller 91 to contact a face of the member 33. The guide roller 91 is adjustable against the member 33 in a movable roller block 92 by means of a set screw 93 passed through the member 89, all as shown. The guide roller assembly just described provides for the arcuate movement of the cradle 63 about its pivot 82.

The automatic jack 63, which is supported on the cradle 64, has as a part thereof, the revolvable base 74, previously mentioned. This base comprises a disc-like member 94 (Fig. 4) from which arises an upright portion 95 and from which extends downwardly a threaded extension 96 passing through the base member 79 of the cradle 64. The upright 95 has an arcuate slot 97 (Fig. 3) cut therein, through which a fasten-

ing bolt 98 is passed into a threaded hole in a semi-circular depending extension 99 of a base plate 100 (Figs. 3 and 4), said semi-circular extension 99 nesting itself on a semi-circular shoulder S cut in a face of said upright 95. By rotating the extension 99 in the upright 95, it is possible to adjust the position of a heel within the jack 63 about an axis A (Fig. 3), which passes through the base of the heel and is normal to the longitudinal axis 65 thereof. Further, the axis A and the longitudinal axis of the bolt 82 lie in a common plane, so, for two positions of the base 74 (90 degrees in either direction from that which it assumes in Fig. 3), this adjustment may be thought of as being made about the tilt axis of the cradle 64.

Supported on the base plate 100 is an adjustable heel stop plate 101 over which is carried a heel plate 102 pivotally connected to the stop plate at opposed points 103. The heel plate 102 is biased to its upper position by a spring 104 and has a plurality of holes 105 cut therein, through which sharp pointed pins 106 pass to engage a heel when the same is clamped in the jack. The heel plate 102 is shaped to fit and support any sized heel.

Returning to the extension 96, the same is rotated in a bearing 107 and the base 74 is held in place in the cradle by a ring nut 108 which is threaded onto the extension 96. A cam support 109 is pinned to the ring nut 108 to rotate therewith and mounts a jack lift cam segment 111 (Figs. 11 and 12) whose function will be described later.

Also forming a part of the jack 63 (Figs. 3, 4 and 5) is a heel clamp 112, which is automatically movable toward and away from a top lift 113 of the heel 62 first to clamp the heel in the jack and to thereafter release it for automatic ejection. The heel clamp 112 comprises a rod 114 having its free end 116 serrated, as shown, to contact the heel. This rod is mounted for rotation in a clamp arm 117 and is retained within its bearing 118 by a nut 119. The clamp arm 117 is bolted to a clamp arm block 121 which has a bore 122 extending therethrough provided to receive a supporting rod 123 along which the block slides. As shown, the rod 123 is anchored in the upright member 81 of the cradle 64 to move therewith. The block 121, which is shaped in cross section substantially as shown in Fig. 5, has a second bore 124 in which a lift pin 125 slides. Aligned with the lift pin 125 and threaded into the block 121 as shown in Fig. 4 is a thumb screw 126 which is used to adjust the block 121 to accommodate the jack 63 for different sized heels. The block 121 is further provided with an extension 127 (Fig. 3) which supports a compression spring 128. The spring 128 has a rod 129 passed therethrough which extends into and slides freely in a hole 131 in the extension 127. The other end of the rod 129 is threaded and is slidably passed through a hole 132 in an arm 133 bolted onto the upright 123. Lying underneath the arm 133 is a thumb nut 134 which is threaded onto the rod 129, the same being actionable to move the rod 129 downwardly and to carry with it a nut 135 and a washer 136, the latter bearing against the top of the spring 128 to compress the same between it and the extension 127. Through this expedient the clamp rod 114 is held against the top lift of the heel 62 when the same is in clamping position in the heel jack. The strength of the spring 128 is of course adjustable by means of the thumb nut 134.

The heel clamp 112 is automatically operated to clamp, and release from clamping, the heel 62 through means now to be described. With reference to Figs. 11 and 12, the previously mentioned jack lift cam segment 111 is supported to rotate with the heel jack. As the cam segment 111 is thus rotated, it moves against a cam roller 137 (Fig. 3) which is mounted on a roller arm 138 pivotally connected to the guide arm 89 at a point 139. As the beveled face 141 of the cam segment 111 is moved against the roller 137 the arm 138 is pivoted in a counterclockwise direction (Fig. 3) and the lift pin 125 is raised to bear against the thumb screw 126 (Fig. 4) to lift the block 121 and the clamp arm 117 and its associated elements vertically. Such lifting action is against the forces of the compression spring 128, which forces hold the heel clamp 112 engaged. Thus, at an appropriate time in each revolution of the heel jack 63, the heel clamp 112 is automatically raised to release the heel.

Very closely related with the automatic action of the heel clamp 112 is the action of the automatic heel ejector 77, which will now be described. This mechanism comprises an ejector arm 142 (Fig. 3) which is pivotally connected at a point 143 to an extension 144 of the revolvable base 74 of the jack 63. At its upper end, the ejector arm 142 is provided with a tip 145 which contacts the heel 62 when the latter is ejected, and, at its lower end, the arm extends into a section 146 which acts as a cam follower. The ejector arm 142 is biased in a clockwise direction (Fig. 3) about its pivot point 143 by means of a compression spring 147. With the exception of a small period of time during the rotation of the jack 63, the ejector arm 142 is held against the action of the spring 147 by means of an ejector cam 148 (Fig. 5). A face 149 of this cam, which is rigidly attached to the member 79, is so dimensioned as to bear against the section 146 and hold the ejector arm 142 outwardly from the heel until ejection is to be effected. At such time, the section 146 falls into a drop 151 (Fig. 5), and, under the action of the spring 147, the ejector arm 142 is biased to move the tip 145 against the heel 62 with a snap action and eject the heel. This action is subsequent to the release of the clamp 112 previously described.

All of the movements given to the heel 62 by the heel feeding unit 23 are completed in a single cycle of operation, which cycle of operation is repeated continuously through the action of the automatic one-revolution clutch 67. The motor 66, which is mounted on a motor bracket 152 (Fig. 3) to pivot with the feeding unit 23 about the shaft 38, drives, through a coupling 153, a shaft 154 to which is keyed a worm 155 (Fig. 4). The latter is enclosed in a housing 156 secured to the member 34 and meshes with and drives a worm gear 157 which idles freely on the central drive shaft 68. To this worm gear is attached a clutch plate 158, illustrated in detail in Figs. 7 and 8, which likewise rotates freely about the shaft 68, these elements being connected by the screws 159. The worm, the worm gear and clutch plate are oil immersed in the housing 156 and the latter is sealed by an oil seal 161. With further reference to Figs. 7 and 8, it will be noted that the clutch plate 158 has two holes 162 and 163 drilled in a face thereof. These two holes are spaced 180° apart. On the same face of the clutch plate are two lugs 164

and 165 which are likewise spaced 180° apart, the lugs and the holes being positioned on diameters of the clutch plate which are normal each to the other. Lying immediately below the clutch plate 158 is a cam follower block 166 which is pinned to the shaft 68, as at 167. This block rotates with the shaft 68. In the right-hand section of the block 166 as viewed in Fig. 4, there is housed a spring pressed plunger 168 which has, as a part thereof, a pin 169 adapted to be moved, under the forces of a compression spring 171, into either of the holes 162 or 163 in the clutch plate 158. The plunger 168 also has associated therewith a cam roller 172 which moves with it, the same being mounted for rotation about a shaft 173 and held thereon by a nut 174. A slot 175 in the walls of the follower block 166 provides for the vertical movement of the cam roller shaft 173.

Once the machine is started, the single revolution clutch 67 is automatically operated, to carry the work feeding unit through repeated cycles of operation in a continuous manner, by means of a clutch control mechanism now to be described with the aid of Figs. 9 and 10 of the drawings. Positioned underneath the worm housing (Figs. 3 and 4) is a cam block retainer 176 in which is mounted a spring biased movable cam block 177. The cam block 177 is biased to its dotted line position in Fig. 9 by means of a spring 178. This cam block carries a cam segment 179 which presents a cam face 181 to the cam roller 172. The cam block 177, under the action of the cam roller 172, is movable from its dotted line to its full line position as shown in the figure. Here, the cam roller 172 has engaged a cam roller stop 183 which is bracketed below the slidable cam assembly on a bracket 184. The stop 183 is bolted onto its mount 185 as shown and has interpositioned between the mount and the stop a rubber cushion 186 which absorbs the shock of the cam roller 172 as it moves against the stop 183.

When occupying their relative positions as shown in full lines in Fig. 9, the cam roller 172 has moved to a position on top of the cam segment 179 and the plunger 168 in the block 166 is moved downwardly against the forces of the spring 171 to withdraw the pin 169 from either one of the holes 162 or 163 in the clutch plate 158. When the clutch is thus disengaged, the heel feeding unit 23 is at rest, and although the motor 66 is in operation, the clutch plate 158 is the only part of the clutch which is being driven. At this time, the heel jack is in loading position to receive a heel.

The engagement of the clutch is effected by the action of the cam block 177 which moves it to its dotted line position as shown in Fig. 9 permitting the cam roller 172 to rise vertically and pass over the stop 183. After this action has been completed, the pin 169 will pass into either one of the holes 162 or 163 to engage the clutch.

It will be observed, in all probability, that provisions must be made to release the cam block 177 from its full line position in Fig. 9. Thus, it will be seen that when the cam roller 172 moves on top of the cam segment 179 and comes to rest against the stop 183, it locks the cam block 177 against its return movement due to the forces of the spring 171. In other words, once the parts have assumed the position illustrated in full lines in Fig. 9, it is impossible for the spring 178 to return the cam block 177 to its dotted line position.

Accordingly, means taking the form of the lugs 164 and 165 on the face of the cam plate 158 have been provided. As these lugs move against the head of the pin 169 they press the same downwardly against the action of the spring 171 and carry with it the cam roller 172. The downward movement of the cam roller 172 withdraws it from contact with the cam segment 179 and the spring 178 is free to move the cam block 177 to its dotted line position. Once the cam block 177 has moved to this position, the cam roller is free to rise and pass over the cam stop 183 to engage the clutch.

It is advisable, in the operation of the machine, to provide positive means for locking the clutch control mechanism just described in its full line position as shown in Fig. 9 whereby the clutch is held out of engagement. Such means, which is illustrated in Fig. 10, is manually operated and comprises a lever 187 which is pivoted at 188 for movement on a bracket 189 extending horizontally from the retainer 176. The lever 187 carries a probe 191 which extends through a hole 192 in the retainer 176 to bear against an end of the cam block 177. When the lever 187 is positioned as shown in Fig. 10, it holds the cam block 177 against movement under the action of the spring 178 and the clutch operating mechanism is conditioned to hold the clutch disengaged. Pivoting the lever 187 in a clockwise direction about the point 188 withdraws the probe 191 and permits the cam block 177 to move to its dotted line position as illustrated in Fig. 9 whereupon the above described action of the mechanism to engage the clutch takes place.

The central drive shaft 68 is bearinged for rotation in the member 34 in a bearing 193 (Fig. 4) and extends through the member 35 in a sleeve 194, the shaft being movable vertically in the last mentioned element. To the shaft 68 is splined the shape cam 69 and the tilt cam 71 by means of a key 195, each being retained in their respective mounts 196 and 197. Between these two cams, a separator 198 is interpositioned, the cam assembly being retained on the shaft by a ring nut 199. The shape cam 69 rides against a cam roller 201 which is mounted in an arm 202 extended from and attached to the shaft bracket 39 attached to the frame 21. This cam controls the movement of the feeding unit 23 toward and away from the surfacing tool 26, the shape cam 69 being urged at all times against the cam roller 201 by a spring 203 which connects at one end 204 (Fig. 3) with the member 34 and at its other end 205 with the frame 21.

The entire heel feeding unit lying above the member 35 is given vertical motion by means of an adjustable lift cam 206 which lies above a set screw block 207 carried on the underneath side of the member 35. The cam segment 206 is pivoted at its ends about the pins 208 and 209 and is raised or lowered by way of adjusting the effective height of the same by means of a set screw 211 passed through the set screw block 207. The top surface of the lift cam 206 is engaged by a cam roller 212 which is fixed to the block 166 attached to the shaft 68. Accordingly, as the follower 212 rides on the cam 206, the shaft 68 is moved vertically to give lift to the heel feeding unit, the shaft 68 sliding within the sleeve 194. The top surface of the member 35 provides a track upon which the cam roller 212 rides when the same is not engaging the lift cam 206.

Inasmuch as the component parts of the heel feeding unit lying above the member 35 have con-

siderable weight, a counterbalancing spring **213** (Fig. 3) is interpositioned between the members **34** and **35** to relieve a portion of the weight burdent falling on the cam follower **212**. This spring is retained on a rod **214** which extends through a hole **215** in the member **35** to pass therethrough. One end of the rod is threaded into the member **34** as shown and a retaining washer **216** is held against the spring by means of an adjusting nut **217**. The amount of loading on the cam follower **212** is therefore adjustable by means of the nut **217**.

In the process of loading a heel into the jack **63**, it is required that the top lift portion of the same be guided in a manner such that the clamp rod **114** will engage the top lift of the heel at a point marking the heel axis. For this purpose the heel guide **78** is provided, the same comprising a fiber guide block **218** which is mounted on an arm **219**. The arm **219** is bolted to the shaft bracket **39** with two bolts **221**, and **222**, which are passed through two slots **223** and **224** in the arm. The slots **223** and **224** are made wider than the bolts which they accommodate and accordingly provide for a lateral adjustment of the fiber guide block **218** with respect to the heel **62** as well as for a vertical adjustment thereto. These adjustments are necessary to position the guide block for various sized heels.

As mentioned previously, one of the features of the instant invention resides in the provision of means for giving movement or movements to a surfacing tool in timed relation to the movements of a heel given by a heel feeding unit moving the heel against the tool. In the illustrative example, in which the surfacing tool has been shown and described as a sander, this portion of the device takes the form of two movable fingers which act against the abrasive strip **26** to perform a function known in the art as "spooling."

In spooling a heel the two breast corners at the top lift of the heel are removed, when the heel is cut in the heel cutting machine or by a subsequent operation. When the heel is later sanded, it is necessary that this particular surface of the heel be scoured and in the prior art this has been accomplished by giving to the heel certain movements against the sander. In the present machine the spooled portion of the heel, if cut in a prior operation, may be sanded, or the spooling may be accomplished completely as a sanding operation, by giving certain movements to the continuous abrasive strip **26**. The mechanism for doing this will now be described with reference to Figs. 2, 3, 4 and 5.

As seen in Fig. 2, two fiber fingers **225** and **226** are provided which are movable against the inner surface of the abrasive strip **26** to move portions of the same outwardly toward the heel feeding unit. These fingers are mounted upon vertically disposed arms **227** and **228** and are horizontally adjustable within their respective arms as is shown in Fig. 4 for the finger **226** by means of a set screw **229**, the arms **227** and **228** are separately movable toward the heel feeding unit in a suitable frame **231** against the forces of separate springs, such as the spring **232** (Fig. 4) for the arm **228**. The arm **227** is moved thusly by a cam follower arm **233** and the arm **228** by a cam follower arm **234**, the throw of each of these arms being adjustable by separate thumb screws such as the screw **235** for the arm **234**. The arm **233** mounts a cam roller **236** and the arm **234** a cam follower **237**. Against these two cam followers two cams **238** and **239** are rotated respectively to

impart the required movements to the fingers **225** and **226** in timed relationship with the rotation of the heel **62** in the heel feeding unit **23**. For this purpose power is taken from the central drive shaft **68**, as previously stated, by the sprocket wheel and chain drive comprising the elements **75** and **76**. Here, the chain **76** is passed over a second sprocket **241**, which is keyed to a spur shaft **242** mounted for rotation in an adjustable bracket **243** extending from and attached to the set screw block **207** of the heel feeding unit **23**. A first universal joint **244**, a slip joint **245** and a second universal joint **246** connect the spur shaft **242** with a shaft **247** upon which the cams **238** and **239** are carried. With this arrangement of the parts the cams **238** and **239** are shaped to give movement to the fingers **225** and **226** in a manner such that at a given point in the rotation of the heel **62** and with its presentment to the sanding strip **26** the latter element will be moved outwardly in a first instance by the finger **226** to spool the left breast corner of the heel and in a second instance to move the finger **225** to spool the right breast corner of the heel.

Although the immediately foregoing mechanism has been described as being employed in connection with a sander to perform the operation of spooling, it is to be pointed out that the same is readily adaptable to many other uses. For example, the fingers **225** and **226** may be replaced by cutters, buffers, polishers and so forth, which will act directly against the heel to impart various different surface characteristics thereto.

Operation

One of the essential features of the instant invention resides in its automatic operation. That is to say, once the machine is placed in operation no manual control thereof is required to start and stop its individual cycles of operation. These are repeated continuously and automatically, the only manual function being that of loading the heel into the heel feeding unit. As for the illustrative example, the machine is placed in operation by starting the motors **29** and **66**, the former driving the sanding strip **26** and the latter idling the worm gear **157** together with the clutch plate **158** on the central drive shaft **68**. Assuming that the machine has been brought to rest by the clutch control mechanism illustrated in Fig. 10, and that the lever **187** occupies the position shown, the lever **187** is then moved in a clockwise direction to withdraw the probe **191** which conditions the automatic one-revolution clutch **67** to be engaged. At the start of the cycle of operation the jack **63** will occupy a position characterized by a movement of the jack in a clockwise direction of 90° from that of the position which it takes in Fig. 1. The jack will hold this position for one-half revolution of the clutch plate **158** at which time the heel clamp **112** will be in a raised position. When thus conditioned and during this period of time, the operator feeds a heel onto the jack by placing the same on the heel plate **102** and moving the top lift of the heel at all times against the guide block **218**. Thereafter the heel clamp **112** will be automatically operated to clamp the heel in the jack, and the clutch plate **158**, which is rotating, will move one of the lugs **164** or **165** against the pin **169**. This latter action will move the cam follower **172** downwardly to release the cam block **177** for movement to its dotted line position as shown in Fig. 9. Next the cam fol-

lower 172 will ride over the cam segment 179 and the pin 169 will pass into one of the holes 162 or 163 in the plate 158 to engage the clutch. Thereafter, the central shaft 68 of the feeding unit 23 will be moved through one complete revolution, during which time the heel will receive a lifting movement under the action of the cam 206, will be tilted under the action of the tilt cam 71, and will be moved toward and away from the sander 26 by means of the shape cam 69, all of these various movements being well known in the art. At a given point in the rotation of the heel in the jack 63, which occurs prior to the time the heel jack will occupy its loading position, the jack lift cam 111 will be moved against the cam follower 137 and through the operation of the mechanism, previously described, the heel clamp 112 will be raised to release the heel from the jack. Immediately thereafter the section 146 of the ejector arm 142 will fall into the cam drop 151 of the cam 148 and the ejector 77 will operate to snap the heel out of the jack. Next, the cam roller 172 of the automatic one-revolution clutch 67 will move against the cam segment 179 and come to rest against the stop 183. These parts will hold this position to maintain the heel jack 63 stopped in loading position for one-half revolution of the cam plate 153, after which time the clutch will be engaged automatically to repeat the cycle. The machine will thereafter operate continuously, the operator loading a heel into the heel feeding unit at each period in the operative cycle wherein the jack 63 is stopped for the loading period, the number of holes 162 and 163 in the clutch plate 158 determining the length of time for which the jack 63 is stopped.

Various changes may be made in the details of construction, within the scope of the appended claims, without departing from the spirit of this invention. Parts of the invention may be used without the whole and improvements may be added while retaining some or all of the advantages of the invention.

What is claimed is:

1. In a heel making machine, a support. a pair of spools mounted on said support, a continuous strip of heel surfacing material passed around and over said spools, means for driving said spools whereby said surfacing strip is moved as a belt, a heel feeding unit pivotally attached to said support and adapted to move a heel with tilt and lift movements against an outer surface of said surfacing material strip to surface said heel, a movable finger mounted on said support for operation against an inner surface of said continuous strip of heel surfacing material, a shaft journalled for rotation in said support, a cam mounted on said shaft operative to move said movable finger against said strip, and power transfer means connecting said heel feeding unit with said shaft to rotate the same whereby said movable finger is actionable to move said strip of surfacing material against said heel in timed relationship with the movements given to it by said heel feeding unit thereby causing the heel to receive an additional surfacing action from said strip.

2. In a heel making machine, a support, a tool mounted thereon for performing an operation on a work piece, a work piece feeding unit attached to said support and pivoted for movement toward and away from said tool to carry said work piece into contact with said tool, means comprising an automatic jack for holding said work piece in said feeding unit, an automatic work piece ejector, a tiltable cradle supporting said jack and said ejector, power means mounted on said work piece feeding unit and pivotally movable therewith for driving a shaft within said work piece feeding unit, separate cam means driven by said shaft for controlling the pivotal movement of said work piece feeding unit and the tilting action of said cradle, cam means for imparting a lifting movement to said work piece as the same is moved against said tool, an automatic clutch interposed in the drive connections between said motor and said shaft for controlling the rotation of said shaft, means for controlling the engagement and disengagement of said automatic clutch whereby the said jack rotated by said shaft is maintained inoperative for a period of time equal to that required for a part revolution of said shaft and is thereafter engaged to rotate the said shaft through one complete revolution, a device for shifting an effective surface of said tool relative to said work piece supported in said work piece feeding unit, and power take-off means from said shaft within said work piece feeding unit for driving said tool shifting device and controlling the same whereby movements are imparted to said tool in timed relationship with the movements imparted to said work piece by said work piece feeding unit.

3. In a shoe heel making machine having a tool and a work piece feeding unit adapted to move a work piece relative to said tool, an automatic jack for clamping said work piece in said work piece feeding unit comprising a rotatable base mounted for rotation upon a shaft, a spring pressed clamp for holding said work piece between the same and said rotatable base, a cradle mounting said base and said clamp for imparting a tilting movement to both as a unit, a cam operated mechanism associated with a cam mounted to rotate with said shaft for lifting said spring pressed clamp to release said work piece from said jack and means for controlling the rotation of said shaft whereby said rotatable base of said jack is held inoperative for a portion of one revolution of said shaft and is thereafter moved through one complete revolution, said cam operated mechanism being made operative to release said clamp from engagement with said work piece at a fixed period of time prior to the completion of said full revolution.

4. In combination with a shoe heel making machine having a tool and a work piece feeding unit adapted to move a work piece relative to said tool, a device for shifting an effective surface of said tool relative to said work piece, a movable arm mounting said device, cam means for moving said arm, and means for driving said cam to move said arm comprising a power take-off from said work piece feeding unit connected with said device to move the effective surface of said tool relative to said work piece in timed relationship with movements imparted to said work piece by said work piece feeding unit.

5. In a shoe heel surfacing machine having a continuously moving belt and a work feeding unit for moving a shaped heel against an outer surface of said belt with rotational motion to cause said belt to engage and pass over certain surfaces of said shaped heel, the improvement comprising first and second displaceable fingers mounted for displaceable movement normal to the path of the belt against an inner surface of said belt, and means for displacing said first and said second fingers as aforesaid sequentially in timed rela-

tionship with the rotational movement of the said shaped heel.

6. In a shoe heel surfacing machine having a continuously moving belt and a work feeding unit for moving a shaped heel against said belt with rotational, reciprocating and lift movements, the improvement comprising a tiltable cradle mounting a turning shaft and a jack attached thereto in which said heel is supported for rotational movement, means for tilting said cradle in timed relationship with the rotation of said heel to carry the same against a certain given contour of said belt, a finger movable against said belt, and means operating to move said finger in timed relationship with the rotation of said heel to cause the belt to assume a different contour and give to said heel a shape characteristic other than those originally possessed by it upon its introduction into said feeding unit.

7. In a shoe heel surfacing machine, having a continuously moving belt and a work feeding unit for moving a shaped heel against an outer surface of said belt with rotational motion to cause said belt to engage and pass over certain surfaces of said shaped heel, the improvement comprising fingers mounted respectively on either side of a station occupied by the work when in engagement with the belt and each positioned for movement against the inner surface of the belt, and means operable in timed relationship with the rotational movement of said shaped heel for manipulation of the fingers against the inner surface of the belt, whereby they impart to the belt momentarily a contour other than that assumed by the belt in traveling its normal path.

8. In a machine for operating on a work piece to give a desired shape and having a support and a tool on the support, the improvement comprising a work feeding mechanism having a frame mounted for reciprocation on the support, a cradle pivotally supported in the frame, a shaft journalled in the cradle along an axis normal to the pivot of the cradle a clamp on the cradle in alignment with the shaft constructed and arranged to hold a work piece to the shaft, driving mechanism for the shaft, means connected to said driving mechanism, and thereby driven in synchronism with the said shaft and the work piece held thereto, for tilting the cradle on the pivotal support, means also connected to said driving means and operating in synchronism with said shaft for reciprocating the frame on the support, and means also connected to said driving mechanism for changing the position of an effective surface of said tool in synchronism with the rotation of said work piece.

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