Feb. 8, 1966 R. R. DARBY 3,233,266

MECHANICAL SHOE CLEANER DOOR MAT

Filed June 17, 1963 4 Sheets-Sheet 1

FIG. 1

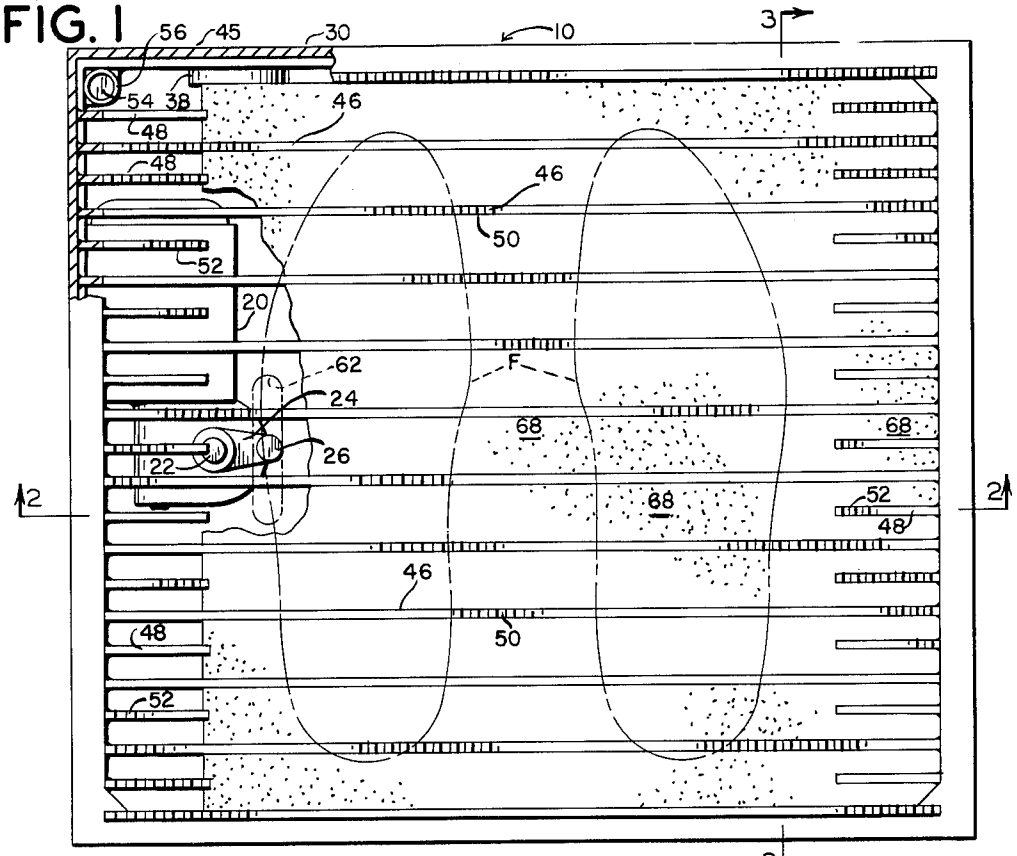
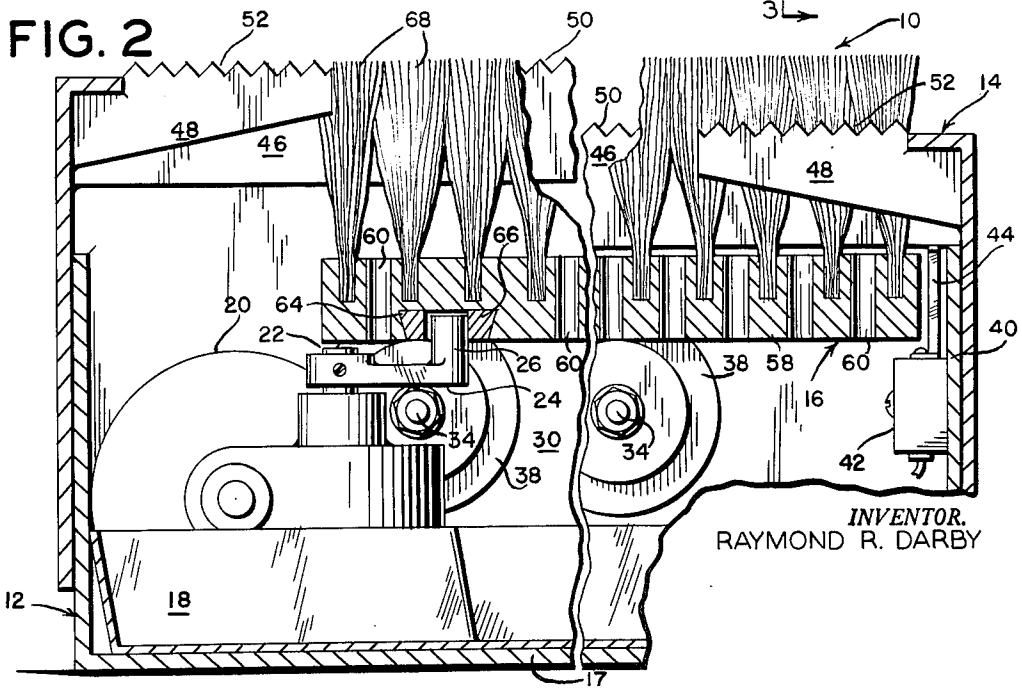


FIG. 2



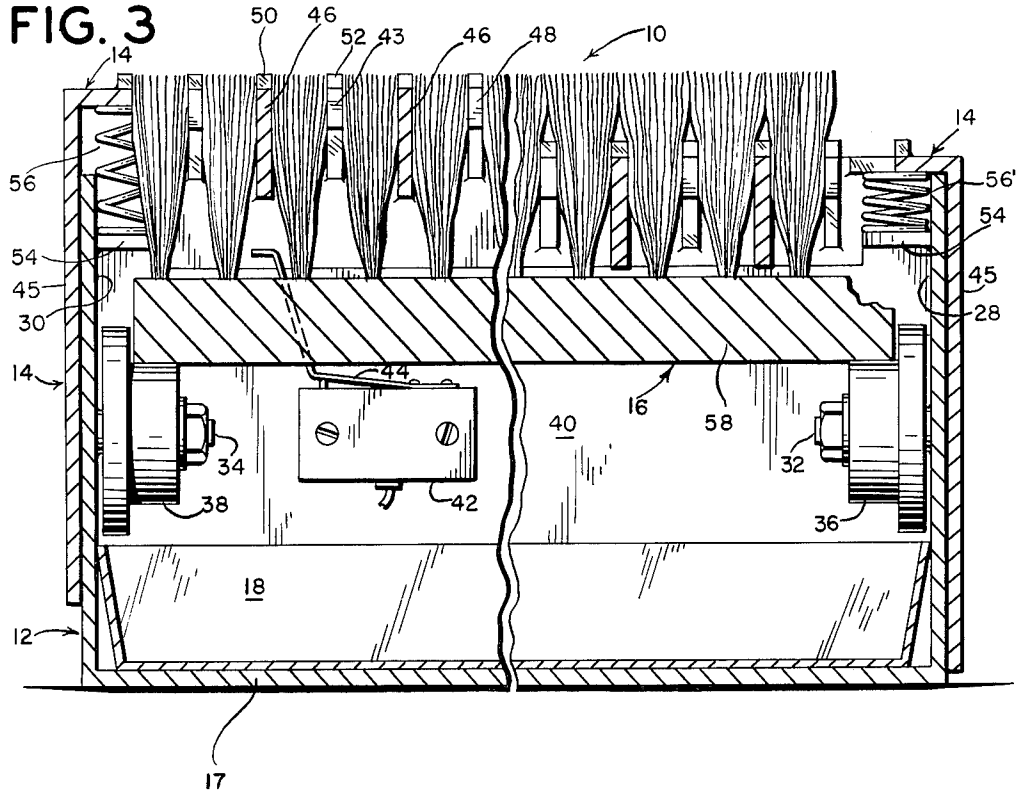
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MECHANICAL SHOE CLEANER DOOR MAT

Filed June 17, 1963 4 Sheets-Sheet 2

FIG. 3



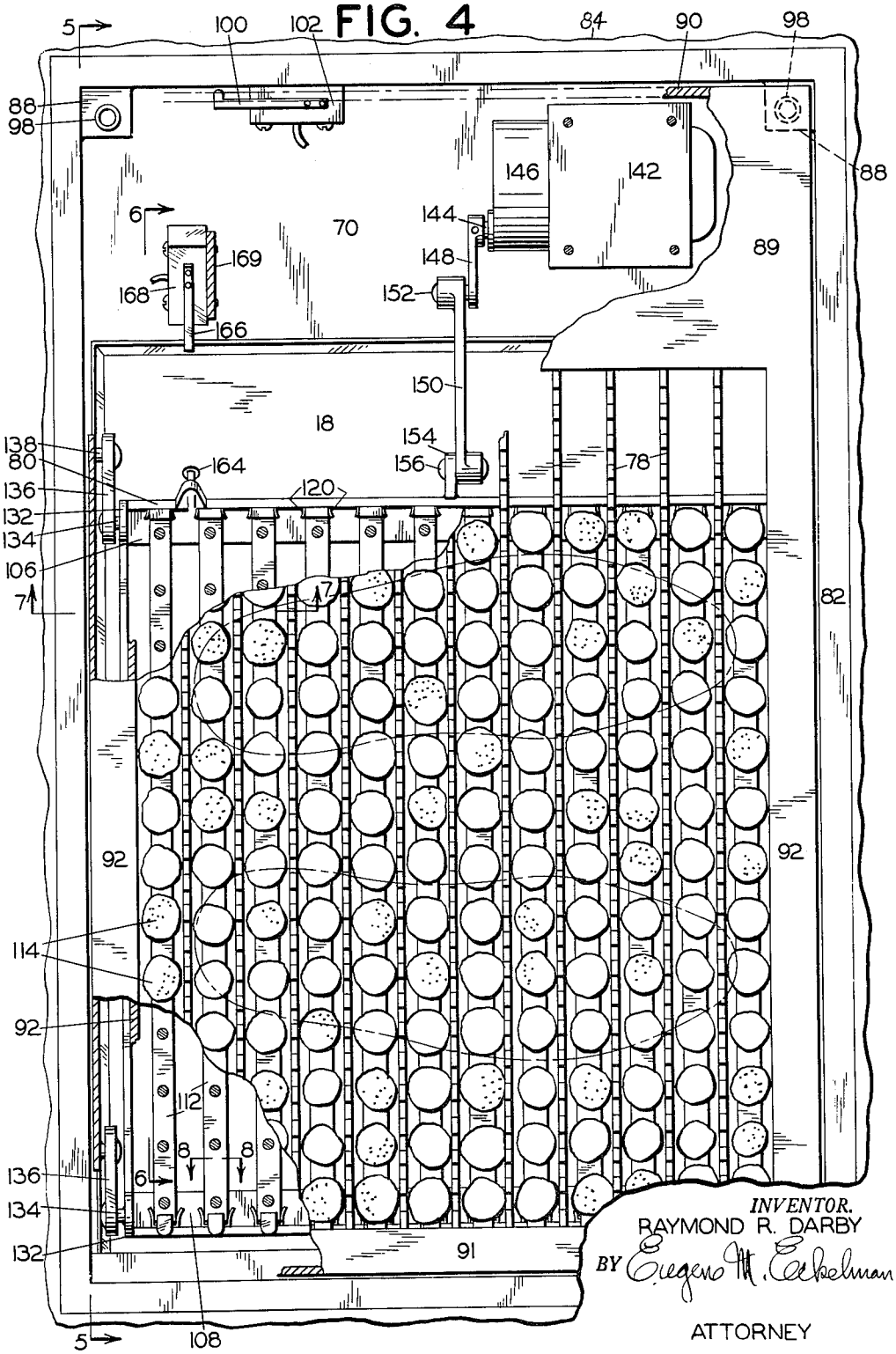
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Filed June 17, 1963 4 Sheets-Sheet 3

FIG. 4



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Feb. 8, 1966 R. R. DARBY 3,233,266

MECHANICAL SHOE CLEANER DOOR MAT

Filed June 17, 1963 4 Sheets-Sheet 4

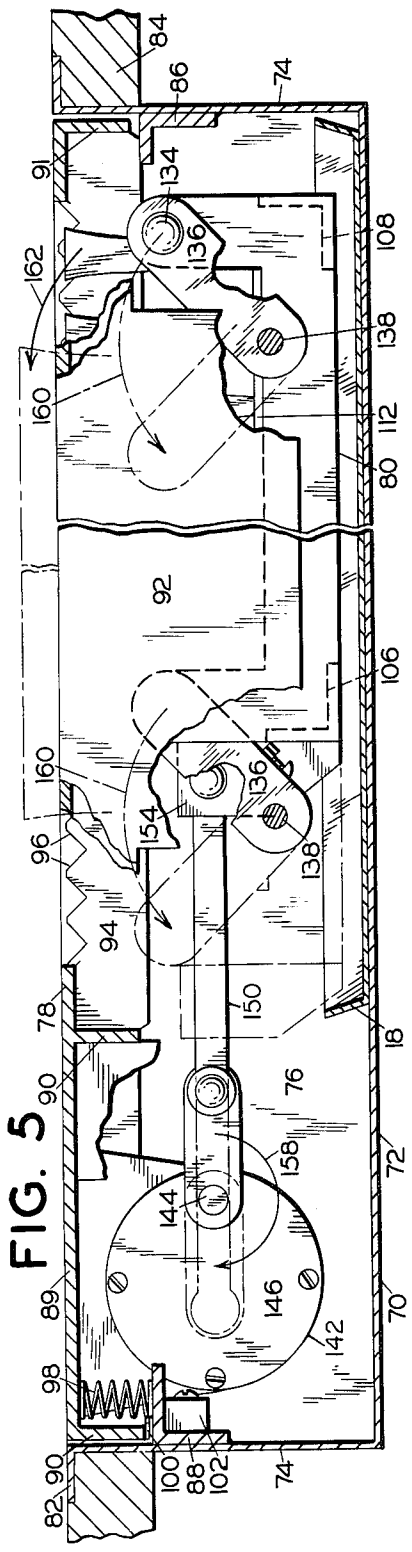


FIG. 5

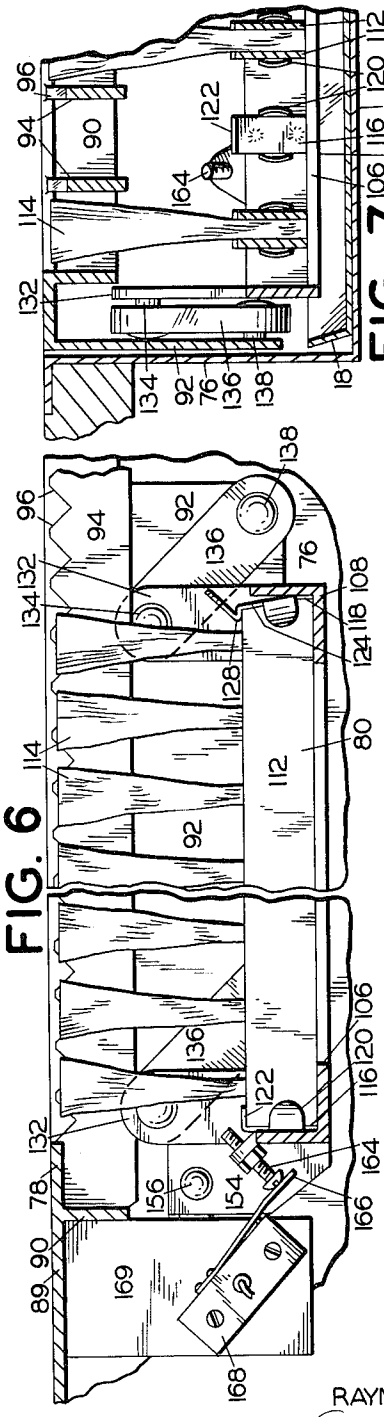


FIG. 6

FIG. 7

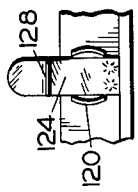


FIG. 8

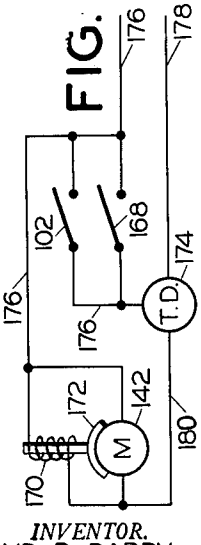


FIG. 9

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3,233,266

MECHANICAL SHOE CLEANER DOOR MAT

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Filed June 17, 1963, Ser. No. 289,168
4 Claims. (Cl. 15—37)

This application comprises a continuation-in-part of application Serial No. 194,298, filed May 14, 1962, for Mechanical Shoe Cleaner Door Mat, said application Serial No. 194,298 now being abandoned.

This invention relates generally to shoe cleaners, and is more particularly concerned with an improved, mechanically operated shoe cleaner and door mat.

A primary object of the present invention is to provide a novel mechanical shoe cleaner and door mat.

A further object of the present invention is to provide a novel mechanical shoe cleaner and door mat which is automatically activated due to the weight of an individual imposed thereon, and which in one embodiment has a delay feature wherein activation is not accomplished until a short interval after the individual has stepped thereon.

Another object is to provide a shoe cleaner and door mat which in one embodiment has brush means operative in a longitudinal arcuate movement and associated with control means acting to stop the brush means at one end of its arcuate movement after the user has stepped off.

Another object of the present invention is to provide a novel mechanical shoe cleaner which is effective to aid physical scraping of one's shoes and includes means whereby women's shoes with pointed toes may be readily cleaned.

A still further object of the present invention is to provide a novel mechanical shoe cleaner and door mat including means for power operating a brush device in free movement in a scrubbing or scraping position with respect to the undersurface of a user's shoes.

And yet a further object of the present invention is to provide a novel mechanical shoe cleaner which is readily and economically installed, easily and highly satisfactory and practical for the purpose intended.

These together with other objects and advantages which will become apparent to those skilled in the art from consideration of the following description taken in conjunction with the drawings, wherein an exemplary embodiment is disclosed; like reference numerals indicating similar parts in the respective views.

In the drawings:

FIGURE 1 is a top plan view of a first embodiment of the novel mechanical shoe cleaner and door mat, portions being broken away for the purpose of showing details; the relative position of a user's feet being shown by phantom lines;

FIGURE 2 is an enlarged vertical section taken substantially on the plane of line 2—2 of FIGURE 1, portions being broken away, the left hand portion showing the inoperative position of the apparatus and the right hand portion showing the operating position;

FIGURE 3 is an enlarged vertical section taken substantially on the plane of line 3—3 of FIGURE 1, portions being broken away in order to show details;

FIGURE 4 is a top plan view of a second embodiment of the present device, with portions broken away;

FIGURE 5 is an enlarged, foreshortened, sectional view taken on the line 5—5 of FIGURE 4;

FIGURE 6 is an enlarged, fragmentary and foreshortened sectional view taken on the lines 6—6 of FIGURE 4;

FIGURE 7 is an enlarged fragmentary sectional view taken on the line 7—7 of FIGURE 4;

FIGURE 8 is an enlarged fragmentary sectional view taken on the line 8—8 of FIGURE 4; and

FIGURE 9 is a wiring diagram of operating control means for the embodiment of FIGURES 4–8.

Before referring to the drawings in detail, it will be understood that the novel shoe cleaner may be supported on any suitable support surface or may be installed in a suitable accommodating recess in a doorstep, for example.

Referring to FIGURES 1–3 of the drawings, a first embodiment of the novel mechanical shoe cleaner is indicated generally at **10**, and comprises a base **12**, a support grid **14**, and a power-operated brush assembly **16** operatively mounted in the base **12** beneath the support grid **14**.

The base **12** is shown to be rectangular. Other shapes could be used, however. The support base includes on the bottom **17** thereof a removable catch pan **18** which will receive debris scraped and brushed from a user's feet F. The manner in which the catch pan **18** is removed may be through a lateral opening (not shown) at one side of the base **12** and grid side walls.

The base **12** has mounted on the bottom **17** a suitably rated electrically driven motor **20** having a vertical drive shaft **22** to which is secured a crank arm **24** having a terminal, vertical pin portion **26**.

The base **12** includes opposed side walls **28** and **30**; see FIGURE 3, upon which are journaled on inwardly extending pairs of spaced shafts **32** and **34**, respectively, roller elements **36** and **38** which will reciprocably support the grid assembly as it is reciprocated by the crank arm **24** as will subsequently be described in detail.

Mounted on the wall **40** of the base **12** is a control switch **42** having a control lever **44** disposed beneath the grid **14** in the path of travel thereof and normally not engaged thereby. The control switch will be operatively connected to the motor **20** in any suitable manner for activating the motor **20** when the weight of a user is imposed on the grid **14**; see FIGURE 2 and the positions of the grid wherein the left-hand portion of this view indicates the inoperative position of the grid and the right-hand portion of the view indicates the operative position.

The grid **14** includes depending side walls **45** telescoped on the side walls of the base **12**, and includes spaced, vertically extending grid bars **46** between which debris may drop. Intermediate the bars **46** are segmental bars **48** which are so spaced as to prevent women's pointed heels from becoming scuffed and stuck in the spaces. The bars **46** and **48** include upper serrated edges **52** to permit physical scraping of a user's shoes as the brush assembly is mechanically reciprocated. Although the bars **48** are shown as being segmented, they can extend the full length of the space between adjacent bars **46**.

The base **12** includes support ledges **54** adjacent the corners upon which are fixed coil springs **56** engaged at the upper ends thereof by the grid **14** and normally support the same out of engagement with the lever **44** of the control switch **42**. The springs **56** will be compressed as seen at **56'** in the right hand side of FIGURE 3, to cause automatic mechanical operation of the brush assembly **16**.

The brush assembly **16** comprises a rigid base plate **58** apertured at **60** to permit debris to descend into the pan **18**, the base plate being reciprocably supported at opposite edges by the rollers **36** and **38**. The base plate **58** includes a downwardly opening slot **62** disposed normal to the direction of reciprocation, and receiving the vertical pin **26** of the crank arm **24** therethrough. The slot **62** may be formed in a suitable bearing material **64** retained by an undercut slot **66**; see FIGURE 2.

The base plate **58** includes a plurality of spaced rows of bristles **68** which project into and above the spaces formed between adjacent scraper bars **46** and **48**; see FIGURES 2 and 3.

Briefly reviewing the operation, the grid **14** is normally supported above lever **44** of the control switch **42**. When

a user's feet F are disposed on grid 12, he may scrape his feet on bars 48, 50, and the bar spacing will prevent the damage entry of women's heels therebetween. When the user's weight is imposed on grid 14, the springs 56 are compressed as seen at 56', the switch 42 is closed, motor 20 will be activated to cause crank arm 24 to reciprocate. The slot 62 will provide a lost motion connection with the crank arm and the bristles 68; see FIGURE 2, will brush the user's shoe soles and the user's shoes will be adequately and satisfactorily cleaned.

Referring now to FIGURES 4–9 of the drawings, a second embodiment of the novel shoe cleaner comprises a base member 70 having a bottom wall 72, end walls 74 and side walls 76. The device also includes a support grid 78 and a power operated brush assembly 80.

The base 70 is open at the top and has an outwardly directed peripheral flange 82, FIGURES 4 and 5, for supporting the unit in a suitable recess of a supporting surface 84. Secured integrally to the inner surface of the rear wall of the base 70 and down from the top thereof is a support 86 in the form of an angle bar. Secured integrally on the inner surface of the front wall of the base 70, in the same plane as support 86, are corner supports 88 in the form of angle tabs.

The support grid 78 comprises a front top plate 89, lateral downturned, front and intermediate flanges 90, a rear angle bar member 91, and side frame members 92 which as seen in FIGURE 7, have an angular configuration to produce a longitudinally rigid element. Secured to the support grid 78 is a plurality of longitudinally disposed, parallel grid bars 94 having upper serrated edges 96. The entire support grid 78 is freely supported on the rear angle bar support 86 and on the forward corner supports 88, the surface of the support being substantially flush with the top of the base 70. A pair of springs 98 are disposed between the front supports 88 and the support grid 78 and are of sufficient strength to maintain the lower edge of forward flange 90 in slightly spaced relation from the supports 88 whereby the grid is depressed at its forward end into engagement with the supports 88 when when a person steps on the support grid. This downward movement causes the forward flange 90 to engage the arm 100 of a switch 102 selectively located so as to close a circuit to operating means when a person steps on the grid, as will be described in more detail hereinafter.

Brush assembly 80 has front angle bars 106 and rear angle bars 108, these bars being arranged in opposed relation and supporting thereon a plurality of longitudinally disposed brush holding bars or plates 112 located in their longitudinal disposition intermediate the grid bars 94, each of such bars supporting a plurality of upwardly extending brush elements 14 which as will be seen are adapted in an operating function to project above the top of the grid bars 94.

The brush holding bars 112 are removably mounted on the frame members 106 and 108 and such is accomplished by front and rear latches 116 and 118, respectively, secured to the said frame members. Front latches 116 each employs a pair of spring tabs 120 engaging opposite sides of the bars and also each employs a right angle top projection 122 to form a socket for the front end of its bar which prevents straight upward movement of the latter. The rear latch members 118 comprise resilient fingers 124 also carrying spring tabs 120 for engaging opposite sides of the bars. Latch members 118 have at their upper ends offset latch portions 128 adapted normally to engage the top surface of the bars 112 to lock the latter in place but also being adapted to be retracted to permit the bars to be lifted upwardly at the rear end thereof and removed from the front latch pocket. Thus the brush assembly bars may be removed for cleaning the brushes, renewing them, or for other purposes.

The brush assembly 80 has upright corner posts 132 to which is pivotally connected, by means of pins 134,

links 136 in turn pivotally connected by pins 138 to the side frame members 92. By this structure, the brush assembly is suspended in the base member and is adapted for oscillation, as will now be described, in a longitudinal arcuate path between the full and dotted line positions shown in FIGURE 5.

Such longitudinal oscillating and arcuate motion of the brush assembly is accomplished by a motor 142 operating a drive shaft 144 through a suitable gear reduction box 146, FIGURE 4. Integrated with shaft 144 is a crank arm 148 pivotally connected to a drive link 150 by means of a stub shaft 152 on the arm 148. Drive link 150 is pivotally connected to the front frame member 106 of the brush assembly through the medium of an upright lug plate 154 integrated with said member 106. A stub shaft 156 connects the plate 154 to link 150.

Upon operation of the motor the crank arm 148 rotates in the direction of the arrow 158 in FIGURE 5. This rotation of the crank pushes and pulls the brush assembly in an oscillating motion on the links 136 and since the bottom mounting pins 138 for the brush assembly are mounted in the stationary side frame members the links 136 when operated between their full and dotted line positions in FIGURE 5, in the direction of arrows 160 and return, move the brush assembly in an arcuate path. In each position of the brush assembly, with the exception of its forwardmost and rearwardmost position, the tops of the brushes 114 project above the top of the grid bars 94, a forward movement of the brushes being designated by the arrow 162 in FIGURE 5 and the uppermost position of the brushes being shown in dotted lines in the same figure.

Brush assembly 80 carries at its leading end a switch engaging finger 164 adapted for engagement with an arm 166 of a switch 168 mounted on a plate 169 depending from grid top plate 89. The purpose of this switch is to stop oscillation of the brush assembly in its forwardmost position after the operator steps off, as will be more clearly illustrated hereinafter.

With regard to the operation of the present device reference is made to FIGURE 9 which shows a wiring diagram incorporating the drive motor 142, the actuating switch 102, and the stop switch 168. Also incorporated in the system, however, is a solenoid 170 operating a brake 172 for the motor 142 the brake stopping the motor when the circuit to the motor is broken, and a time delay 174.

With greater particularity to the power system employed there are feed lines 176 and 178. Line 178 is connected directly into the time delay 174 and line 176 is connected thereto but first leads through the switches 102 and 168 connected in parallel. Upon the closing of the time delay, the circuit to the motor 142 as well as to the solenoid 170 for its brake 172 is completed through the feed line 178, time delay 174, a wire 180 leading from the time delay to both the motor 142 and brake solenoid 170, and back to feed line 176. Switch 102 is a normally open switch and switch 168 is normally closed. This latter switch is opened by engagement of the finger 164 against arm 166 in the forwardmost position of brush assembly 80. In the wiring diagram of FIGURE 9 the switches 102 and 168 are shown in open position which indicates a condition wherein no one is standing on the support grid and the brush assembly is forward to open the switch 168. In this deenergized condition of the system the brake 172 is set on the motor 142.

In operation, a person steps on the support grid 78. This depresses the forward end of the grid downwardly against the action of springs 98 wherein this end of the grid then rests on the supports 88. In its downward movement the grid engages arm 100 of switch 102 to close the latter. This permits current to flow to the time delay mechanism 174 wherein after a selected time, for example two or three seconds or such time to allow a person to get both feet on the grid before the motor starts,

the time delay mechanism is closed to permit current to flow to motor **142** and at the same time to energize the solenoid and withdraw the brake.

The motor thus oscillates the brush assembly in its longitudinal arcuate movement. In this shoe cleaning operation the brushes travel upwardly above the top edge of the support grid to clean the soles of the shoes, the elevated portions of the shoe soles as well, and side portions of the shoes.

Each time the brush assembly reaches its forwardmost position it of course opens the switch **168** but since a circuit is complete through switch **102** as long as the person stands on the grid the device will continue to operate. When the person steps off the grid, the switch **102** is immediately opened but it is apparent that since switch **168** is normally closed it will not open until the brush assembly reaches its forwardmost position. Thus the motor will operate until the grid reaches its said forwardmost position wherein the switch **168** is opened and the circuit to the motor is broken.

By the power drive system illustrated the device is automatically actuated, after a slight delay, when a person steps on the support grid **73**. The delay accomplished permits the person to firmly set himself before the brushes start operation. Furthermore, since the device is stopped after the last operation at its forwardmost position, the person stepping thereon will always have a firm footing on the support grid plates **94** rather than on the top edges of the brushes. Furthermore it is not possible for the person stepping thereon to bend over any of the bristles and pinch them between his shoe and the grid bars which obviously would cause damage to the bristles.

Debris swept from the shoes falls downwardly between plates **112** and into the bottom of the base. A pan **18** may be placed on the bottom of the base to catch such debris. Since the grid assembly is freely mounted in the base, and attached thereto only by the drive link **150**, said grid may be tilted a sufficient distance with its rearward portion uppermost to insert and remove the pan **18**.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not intended to be limited to what is shown in the drawings and described in the specification but only as set forth in the appended claims.

What is claimed is:

1. A mechanical shoe cleaner comprising a hollow support base, grid means supported in said base in a stationary position, said grid means including a plurality of parallel, laterally spaced bars the upper edges of which are arranged to support a person in standing position thereon, a brush assembly in said base beneath said grid means, said brush assembly being supported on said base for longitudinal, arcuate, oscillating forward and rearward movements whereby the upper edge of said brush assembly projects above the grid means in a portion of its arcuate movement to clean shoes supported on the latter, electric power means in said support base operatively connected to said brush assembly for operating the latter, an electric circuit in which the power means is operated, and switch means in said circuit mounted for engagement by said brush assembly as the forwardmost position of the latter and arranged to open the circuit to said power means at said forwardmost position of the brush assembly.

2. A mechanical shoe cleaner comprising a hollow support base, grid means supported in said base in a stationary position at one end, spring means on the base supporting the other end of said grid means whereby said grid is arranged to move downwardly at said one end when a person steps on the grid means, said grid means including a plurality of parallel, laterally spaced bars the upper edges of which are arranged to support a person in standing position thereon, a brush assembly in said base beneath said grid means, said brush assembly being supported on said base for longitudinal, arcuate, oscillating forward and rearward movements whereby the upper edge of said brush assembly projects above the grid means in a portion of its arcuate movement to clean a person's shoes engaged with the grid means, electric power means in said support base operatively connected to said brush assembly for operating the latter, an electric circuit in which said power means is incorporated, first and second switch means arranged in parallel in said circuit, said first switch means being normally closed and mounted for engagement and opening thereof by said brush assembly at the forwardmost position of the latter, and said second switch means being normally open and mounted for engagement and closing by said grid means in its downward position, whereby said power means is activated upon the closing of said second switch means and remains activated until the second switch is first opened followed by the opening of the first switch.

3. The shoe cleaner of claim 2 including a time delay in the circuit between said second switch means and said power means whereby the activation of the latter is delayed upon closing of said second switch means.

4. The structure of claim 2 wherein said power means comprises a rotary, vertical drive shaft having a radial crank lever, and including a terminal, vertical pin, said brush assembly including a downwardly opening lost motion slot receiving said vertical pin whereby rotation of said drive shaft results in reciprocation of said brush assembly.

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