Dec. 4, 1962 J. J. NAPPI 3,066,338

SHOE CLEANING MACHINE

Filed March 29, 1961

4 Sheets-Sheet 1

FIG. 1.

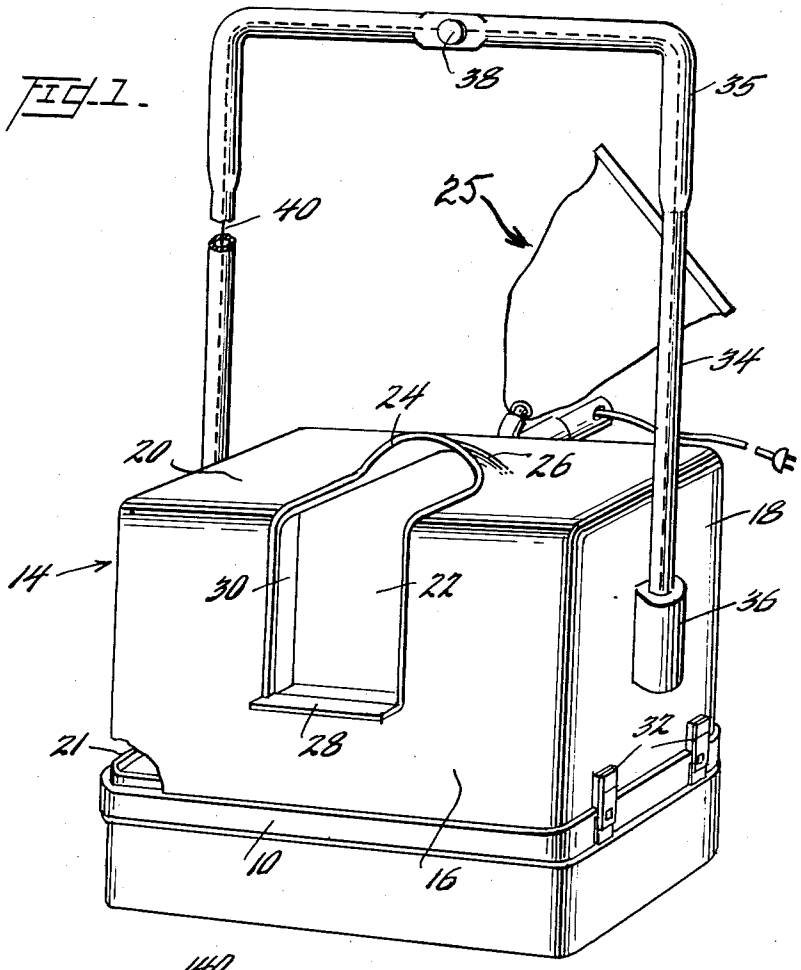
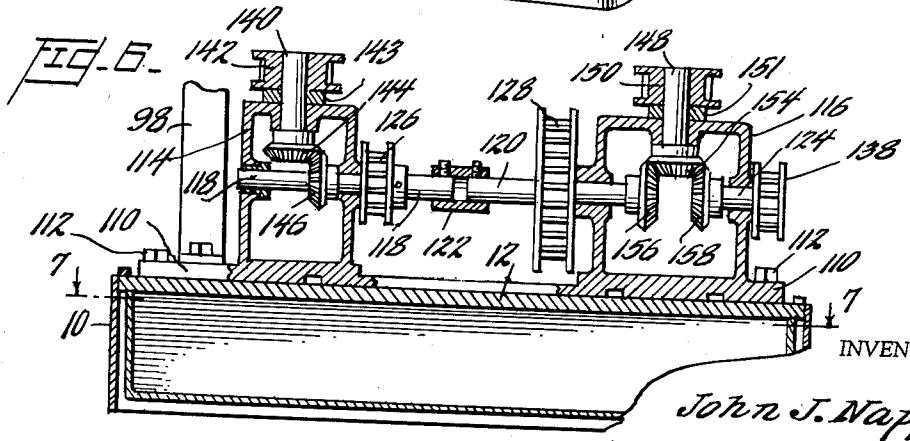


FIG. 6.



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FIG. 3.

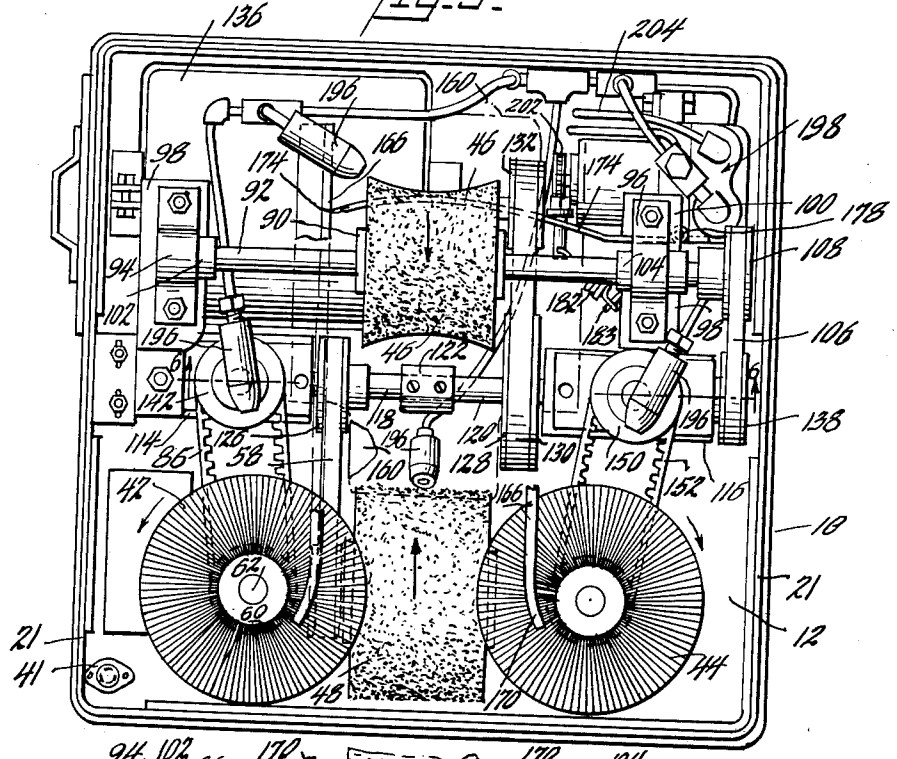
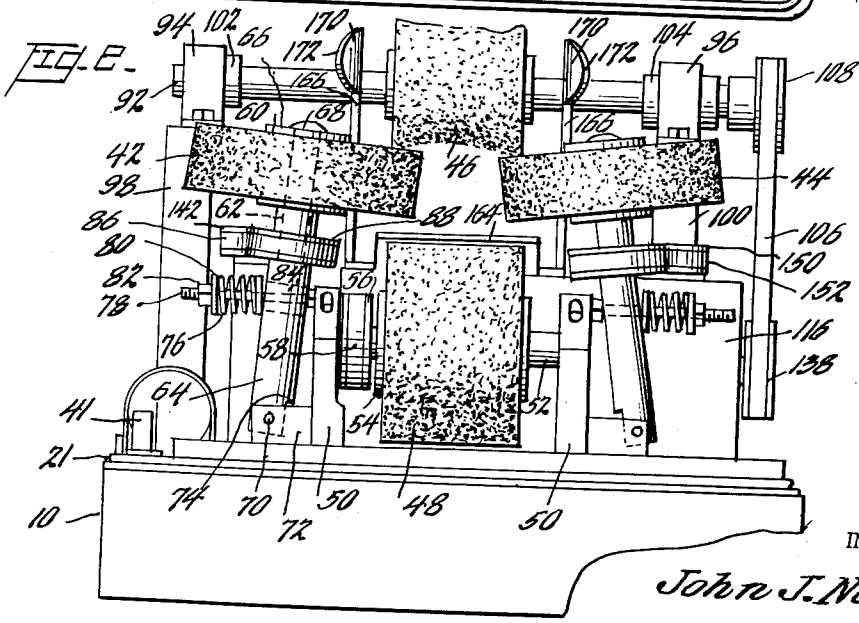


FIG. 2.



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FIG. 4.

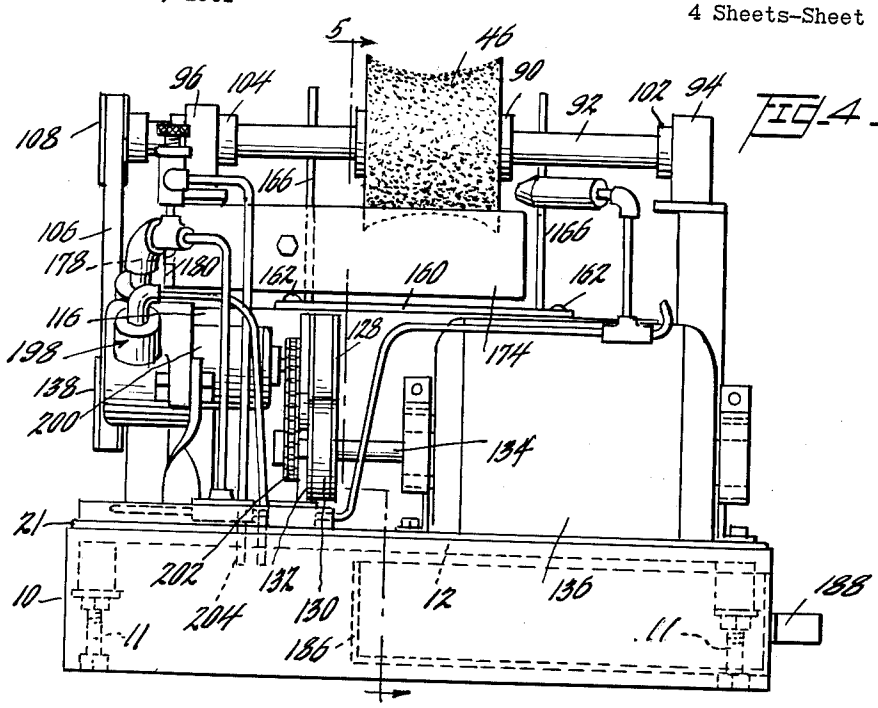
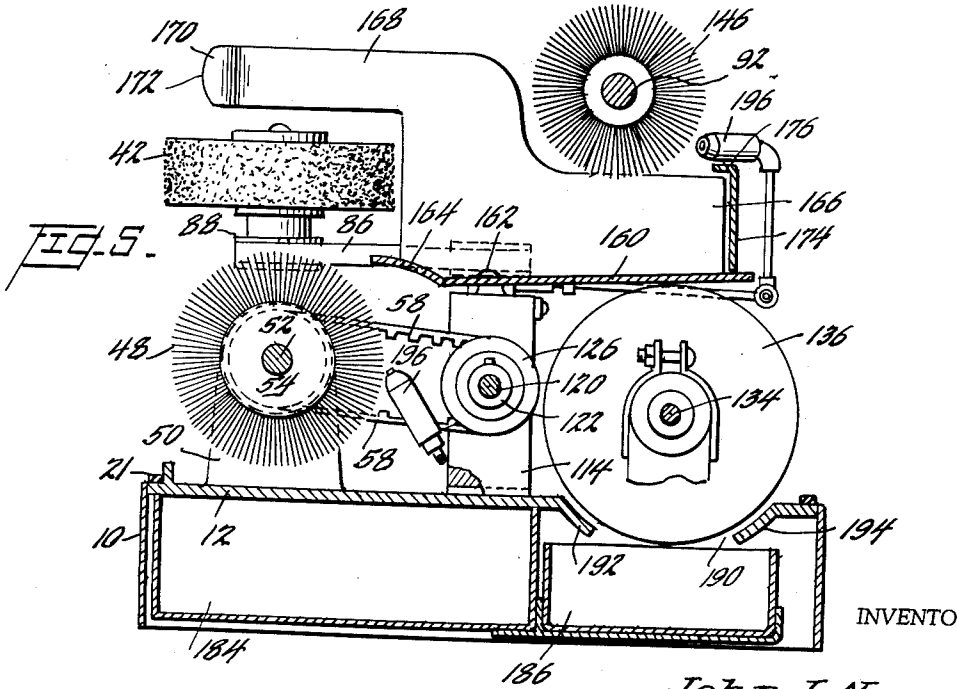


FIG. 5.



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Filed March 29, 1961

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FIG. 7

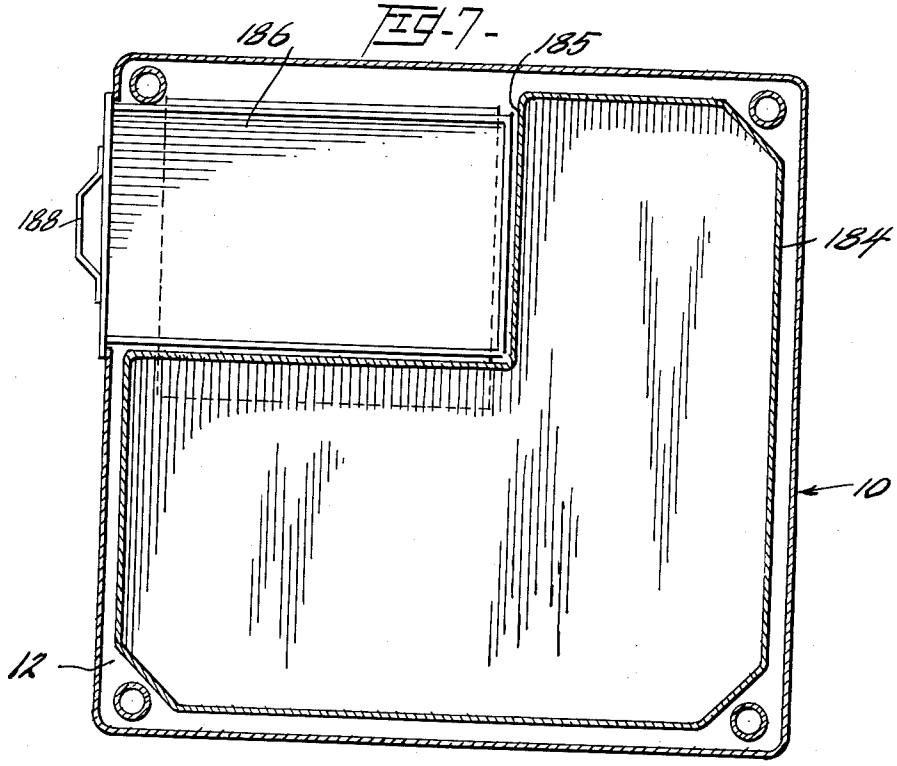
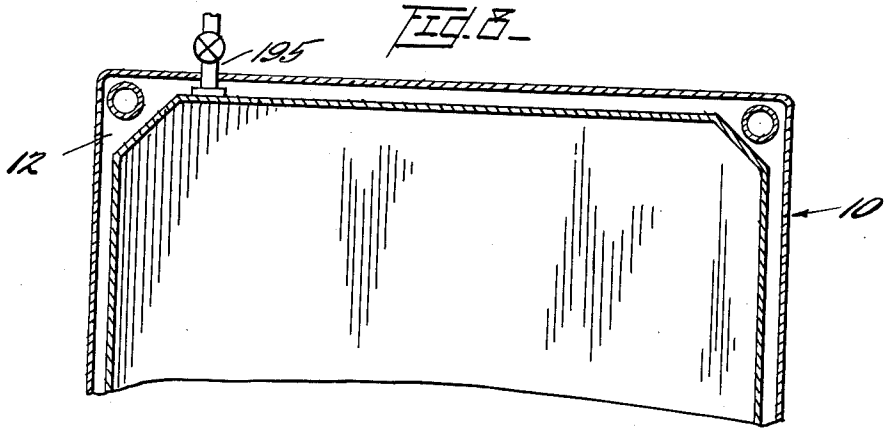


FIG. 8



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United States Patent Office 3,066,338 Patented Dec. 4, 1962

3,066,338

SHOE CLEANING MACHINE

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Filed Mar. 29, 1961, Ser. No. 99,303
4 Claims. (Cl. 15—34)

This invention relates to shoe cleaning, shining, or polishing machines, and in particular to that type of device having a container with an internal brush assembly, and a limited, access opening through which the shoe to be treated is inserted and withdrawn.

Whether for hire, or for untaxed convenience, the success of devices of this nature depends on many factors, among the more prominent of which are convenience, safety, and reliability. In the matter of convenience, the mode of use must be self-suggesting to the user, and the job must be accomplished with dispatch, as well as with a minimum of effort. In the matter of reliability, the point to be considered is that the machine will remain at a working station, unattended, in readiness for use from time to time, as required. Other important factors involved, more or less related to the foregoing will include compactness, ruggedness and simplicity.

It is therefore an object of the invention to provide a shoe treating device which shall possess the enumerated desirable features in optimum degree. More particularly, it is an object to provide a compact, shoe-cleaning unit which combines a highly efficient arrangement of brushes with a shoe guide means which not only contributes to the brushing efficiency, but safeguards the foot against twisting and entanglement.

A further object is to provide a powered drive means harmonizing with the general scheme of compactness and the specialized brush arrangement.

It is also an important object of the invention to include a hygienic spray system in the device in cooperative relation to the brushes, for thorough communication to the shoe.

Yet another object is to provide a powered shoe cleaner having a start-stop means responsive to the stance of the user.

These and other objects are attained by the invention, a preferred form of which is described in the following specification, as illustrated in the drawings, in which:

FIGURE 1 is a perspective view of the assembled device, with outer cover and ready for use, with the hand grasp or bail broken away for foreshortening;

FIGURE 2 is a front elevational view of the device of FIGURE 1, with the outer cover removed to show elements in the interior;

FIGURE 3 is a top plan view of the device shown in FIGURE 2;

FIGURE 4 is a rear elevational view of the device shown in FIGURE 2;

FIGURE 5 is a sectional view taken on the plane of the line 5—5 of FIGURE 4;

FIGURE 6, (below FIGURE 1) is a sectional view taken on the plane of the line 6—6 of FIGURE 3;

FIGURE 7 is a sectional view taken on the plane of the line 7—7 of FIGURE 6; and

FIGURE 8 is a view similar to FIGURE 7, showing a modification.

Referring to the drawings by characters of reference, there is shown a shoe treating unit comprising a base skirt 10 of rectangular form, with rounded corners, in which is mounted as by means of stud bolts 11, a similarly rectangular base plate 12 which serves as a support for the internal mechanism. The latter is enclosed by an open-bottom, rectangular, box-like cover 14 preferably of aluminum or fiberglass, having front and rear faces 16, end faces 18, and a top face 20. Like the skirt 10, the cover preferably has rounded corner edges, for strength, and avoidance of human discomfort in handling, as well as for ornament. Fluid seal between the cover and base plate is provided in a gasket 21.

The cover 14 has a central opening 22 for insertion of a shod foot, the opening being located in the upper portion of front face 16, and being continued through a part of the upper face 20, where its rearward extremity is rounded, as at 24, and where the top face is raised in a dome-like, outward protuberance 26, to accommodate the instep of a shoe. The bottom edge of opening 22, in the front face, is provided with a horizontal, outwardly extending platform 28, which may be conveniently formed by bending the sheet material of the cover, and the sides of the opening are also provided with inwardly turned tabs 30. Platform 28 serves as a slide surface for the shoe on entry and exit, and, of course may also be utilized as a preliminary shoe scraper, while tabs 30 serve to eliminate sharp edges, which would be harmful to the shoe finish, and also give a measure of initial guidance to the shoe in its passage.

The cover 14 is releasably secured to the base by suitable clamps 32, and a steady rest for the user is provided in a bail-like element 34, secured in sleeves 36 secured to end faces 18 of the cover. The bail 34 is tubular in structure and contains a push button 38 associated with an electric lead 40 threaded through the bail and normally holding open the circuit to the motor within the unit which powers the mechanism. Preferably, lead 40 will connect with a socket 41 in base plate 12, within cover 14, to prevent operation while the cover is off. The bail 34 is preferably made of metal to provide firm support for the user and, as shown in FIGURE 1, has its upper portion 35 coated with a suitable plastic or other material of a non-conductive nature to prevent any possibility of electric shock.

With respect to the interior mechanism, the brushes and their mountings will be described first. As seen in FIGURES 2 and 3, the brushes, of generally cylindrical form, are four in number, two of which 42, 44 are mounted for rotation on generally vertical axes, the other two 46, 48, being mounted for rotation on generally horizontal axes. The bristles will preferably be of non-scuffing white nylon, but other suitable materials may be employed. Since brushes 42 and 44 are identical in structure and mounting, except for being arranged in a right and left sense, only one need be described. In their mounting, these are associated with the mounting of brush 48, which comprises a pair of bearing blocks 50 in which is journalled a shaft 52 to which is secured the tubular hub 54 carrying the radially arranged bristles of the brush. It will be understood, of course, that this and other bearing blocks will be suitably provided with bushings or other anti-friction devices. Secured to shaft 52 is a pulley 56 through which rotation is communicated to the shaft by a belt 58, through connections later to be described. For positive drive, all pulleys and belts are of the "Gilmer" type, that is, with meshing cleats or ribs, such as used in timing mechanisms.

Considering brush 42, of the two vertically disposed brushes, the hub 60 thereof is secured to a shaft 62 rotatably mounted on the reduced, upper end of a standard 64, the assembly being secured in any convenient manner as by a washer 66 and screw 68. For rocking motion of the brush 42 to and from central brush 48, the lower end of standard 64 is pivotally mounted on a pin 70, extending between the arms of a bifurcated, outwardly extending base 72 on the block 50. A shouldered portion 74 on standard 64 limits inward swing of the latter. The standard is normally held in inwardly tilted position by a coiled compression spring 76 received on a rod 78 having

a thrust washer 80 secured by an adjusting nut 82, passing through a slot 84 in the standard and anchored by a threaded attachment in the upper part of block 50. Rotation is imparted to brush 42 by a belt 86, engaging a pulley 88 secured on the shaft 62. In the passage of a shoe, the bristles of brushes 42 and 44 will first yield, and, as required, the standards 64 will swing outwardly against the pressure of springs 76, resulting in an efficient, brushing action by the rotating brushes.

As seen in FIGURES 2, 3 and 4, the rearward and uppermost brush 46 has a hub 90 secured on a shaft 92, which is journalled in a pair of pillow blocks 94, 96, bolted to the tops of a pair of standards 98, 100, the shaft being secured against axial displacement by collars 102, 104. Rotation is communicated to shaft 92 and brush 46 by a belt 106 engaging a pulley 108, fixed to one end of shaft 92, outwardly of bearing block 96. Brush 46 preferably has the form of an hyperboloid or revolution, presenting a concave profile adapted to give an even treatment across the rounded toe and instep portions of a shoe.

The power drive for the four belts leading to the respective brushes is consolidated in a countershaft unit, which is shown to best advantage in FIGURE 6. The unit is carried on a base plate 110 secured to supporting plate 12 by screws 112, on which are mounted a pair of bearing units 114, 116 of inverted channel section. Four horizontal, axially aligned bores are provided in the upright walls of the bearing units, to receive the several segments of the horizontal countershaft, the bores being suitably bossed for bearing purposes. The countershaft comprises three different sections, of which one section 118 is journalled in the two upright walls of unit 114, another section 120 is journalled in the inner wall of unit 116, being connected for co-rotation with section 114 through a coupling sleeve 122, and a third section 124 is journalled in the outer wall of unit 116. Inwardly of unit 114, shaft section 118 carries a pulley 126 which receives the belt 58 imparting drive to central, front brush 48. A pulley 128 is driven by a belt 130 which engages the pulley 132 on the shaft 134 of a motor 136, which is completely sealed against fluid penetration. A pulley 138 on shaft 124 outwardly of bearing unit 116 communicates drive to the upper brush shaft pulley 108 through the belt 106.

The drive of the countershaft is communicated to the two front, vertically disposed brushes 42, 44 by means of a pair of stub shafts vertically disposed in the bearing units 114, 116, respectively, operating through bevel gearing, and arranged to rotate in opposite directions. Thus, a shaft 140, journalled in the top wall of unit 114, carries an outer pulley 142, spaced by a washer 143 which receives the belt 86, and carries at its lower end, within unit 114, a bevel gear 144, cooperating with a bevel gear 146 on shaft 118. Likewise, a vertical shaft 148 journalled in the top of unit 116 has a pulley 150, with washer 151, driving a belt 152 associated with the other front brush 44, the drive being imparted to a bevel gear 154 on shaft 148 by a bevel gear 156 on shaft 120. Since gears 146 and 156 are oppositely disposed with respect to their driven gears 144 and 154, the latter, and hence the front brushes 42 and 44, rotate in opposite directions. This results in efficient action, since these engage opposite sides of a shoe. Shaft 124 is also driven by a bevel gear 158, meshing with gear 154, and since gears 156 and 158 are oppositely disposed with respect to intermediate gear 154, the two horizontal brushes 46 and 48 rotate in opposite directions. Again, this makes for efficiency, since these also engage opposite parts of a shoe, namely the top and bottom. As shown by the arrows, the direction of the main drive is such that the bristles are moving against the direction of motion of the shoe during withdrawal thereof. Thus, the main scrubbing action is imparted during a period of dwell of the shoe, motionless within the machine, and an extra polishing action is imparted on withdrawal, due to increase of relative velocity between the shoe surface and the bristles, thus providing a finishing touch.

For foot positioning and guidance, as well as for safety, in addition to the tabs 28 and 30, the working space, interiorly of the container is provided with a pair of side guides, a lower support, and a backstop. The lower support comprises a generally horizontal plate 160, conveniently secured to the tops of bearing units 114, 116 as by screws 162, and having an upwardly bent, downwardly concave, arcuate, terminal tab 164, at its forward end. The side guides comprise a pair of generally parallel, vertically disposed panels 166, with forwardly projecting fingers 168 having diverging end tabs 170, with rounded edges 172. A plate 174 arranged perpendicularly to and rearwardly of the lower support and side guides, and having a forwardly bent upper tab 176, constitutes a back stop, limiting inward movement of the toe of a shoe. To impart resiliency of cushioning to the action of the backstop, the latter is mounted on a hinge pin 178 and a hinge section 180 carried by standard 98, and is normally biased into contact with the rear face of the standard by a tension coil spring 182 anchored in a bracket 184 attached to the standard.

In a further feature, not unrelated to the concepts discussed in the foregoing, the invention contemplates a spray system for communicating a conditioning fluid to the brushes during their periods of action. Depending upon the particular environment or field of use, the conditioner may vary in nature, for example, disinfectants in possibly polluted areas, such as contagious wards, or washing sprays or neutralizers in areas susceptible of other types of contamination, such as that due to radioactive materials. Therefore, the description of the spray system will proceed without limitation as to any type of spray material.

Generally speaking, the spray system comprises a reservoir, a pump, supply lines with spray nozzles strategically located, and disposal means for the spent fluid. In one embodiment shown, the reservoir comprises an L-shaped, rectangular tank 184 of sheet material, such as stainless steel, Monel metal, aluminum, or the like, which is resistant to corrosion, providing a rectangular space 184 at one corner to accommodate a drawer 186, of suitable material, which serves to temporarily hold the used spray material pending disposal, re-use, or re-activation, as the case may be. For easy insertion and withdrawal, the drawer is provided with a handle 188. The base plate 12 of the machine serves as an initial collector for the used fluid, and has a suitable opening 190 overlying the drawer 186 for depositing the fluid therein. Downwardly bent guide tabs 192, 194 assist in this action, and also provide clearance for the underside of the housing of motor 136, which serves to enhance the compactness of the assembly. In FIGURE 8, the drawer has been omitted, disposal being effected through a pipe 195.

The fluid is delivered to the bristles of the several brushes of the system by a series of spray nozzles 196, through a pipe system indicated generally by the numeral 198, the pipes or nozzles being secured to convenient parts of the apparatus to most effectively serve the intended purpose of efficient delivery to the brushes. The power for delivery of the spray is provided by a rotary pump indicated generally by the numeral 200, and which is powered by a belt 202 connected to the motor shaft, the fluid being drawn from the reservoir to the pump through a pipe 204.

Between periods of use, the machinery, including the spray system, is idle, being wholly controlled by the motor, which is inactivated by the "dead man" switch feature in push button 38. At the commencement of an operation, the user will grasp the top, cross rail of bail 34, at the same time placing a thumb on push button 38. This starts the motor and the four brushes are placed in rotation. At the same time, the fluid from the reservoir, unless the system has been deliberately de-activated, as

by valve action, is trained in a spray which is localized as to each brush. The shod foot of the user is then inserted in opening 22 of the box, being guided by tabs 28 and 30, and passes over brush 48 and between brushes 42, 44 with the brushes yielding to the bulk of the inserted shoe and resultant increased bristle pressure on the shoe surface. Upon continued forward advance of the shoe, it receives further and positive guidance by lower plate 160, and side plates 166, and the toe portion and instep come successively into intimate engagement with back brush 46. Due to the provision of yieldable backstop 174, as well as the other guide plates, the shoe may be inserted rapidly and without the exercise of undue care or caution, the system being proof against jamming or twisting of the shoe by the brushes or other parts.

During insertion, the movement of the bristles is in the same direction as the movement of the shoe, but after full penetration, the shoe is brought to rest and the full effect of the speed of the bristles is utilized. Upon withdrawal, the movement of the shoe adds to the relative velocity of the bristles, and a satisfactory finai polishing effect is achieved. Upon withdrawal of the second shoe, the user abandons his hold on the frame 34, thus releasing the push button 38 and stopping the motor. During the entire period of use, the spray is constantly applied to the bristles and efficiently transferred to the shoe. It will be understood of course, that the spray system may include suitable means for adjusting both the rate of flow, and the direction, pattern, and fineness of the spray.

The conditioning fluids employed may include a polishing agent, either alone or in combination with decontaminants. If desired, the device may be provided with vacuum cleaning attachment as indicated generally by reference numeral 25 in FIGURE 1, and a suitable aperture is provided in the rear face 16 of the cover 14 for this purpose.

Whereas certain preferred embodiments have been shown and described, and variations mentioned, these are for general purposes of illustration, and since various other changes may be apparent to those skilled in the art, in the light of this disclosure, the invention should not be deemed as limited, except insofar as shall appear from the spirit and scope of the appended claims.

I claim:

1. A shoe conditioning device comprising a base, a separable cover detachably secured to said base, said cover having an opening for insertion of a shoe, a series of rotary brushes carried by said base within said cover, in alignment with the cover opening, to operate upon the inserted shoe, comprising a first brush mounted for rotation on a horizontal axis and located adjacent and below said opening, a second brush mounted for rotation on a horizontal axis, and located rearwardly and upwardly from said first brush, a pair of brushes on opposite sides of said first brush, mounted on generally vertically disposed shafts, pivot means mounting said shafts for swinging about horizontal axes, resilient means normally biasing said shafts in the direction of said first brush, said brushes being spaced and arranged so that the first brush is applied to the underside of the shoe, the second brush is applied to the toe and instep of the shoe and the pair of brushes is applied, one to each side of the shoe, a drive means with connections to said brushes, and comprising a countershaft with oppositely disposed bevel gear units, arranged to rotate said pair of brushes in opposite directions, said countershaft having a driving connection with said first brush, and one of said gear units including an oppositely disposed bevel gear with driving connection to said second brush, whereby said first and second brushes rotate in opposite directions, a lower shoe guide plate generally horizontally disposed rearwardly of said first brush, and above the axis thereof, a pair of parallel, vertical side plates rearwardly of and on opposite sides of said first brush, a vertical back plate above and perpendicular to said lower plate, and mounted for swinging action at one end and having resilient means normally urging it toward said first brush, fluid supply and delivery means, and spraying devices operatively associated with said means and located in cooperative relation to said brushes.

2. The structure of claim 1 including a bail secured to said cover, extending upwardly of said cover to hand-height and containing an electric motor lead with a normally open switch operable only in response to continuous manual grasp of the bail.

3. The structure of claim 1 wherein the fluid supply and spray means includes a fluid supply tank adjacent to said base, a fluid pump carried by said base and communicating with said tank, a motor, drive connections from said motor to said pump and said countershaft, and a series of spray nozzles mounted for spraying the respective brushes and having fluid connection to said pump.

4. The structure of claim 3 including marginal guide tabs on the cover, transverse to the opening for insertion of the shoe, an opening in the base for draining sprayed fluid and a removable receptacle for receiving the drained fluid.

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