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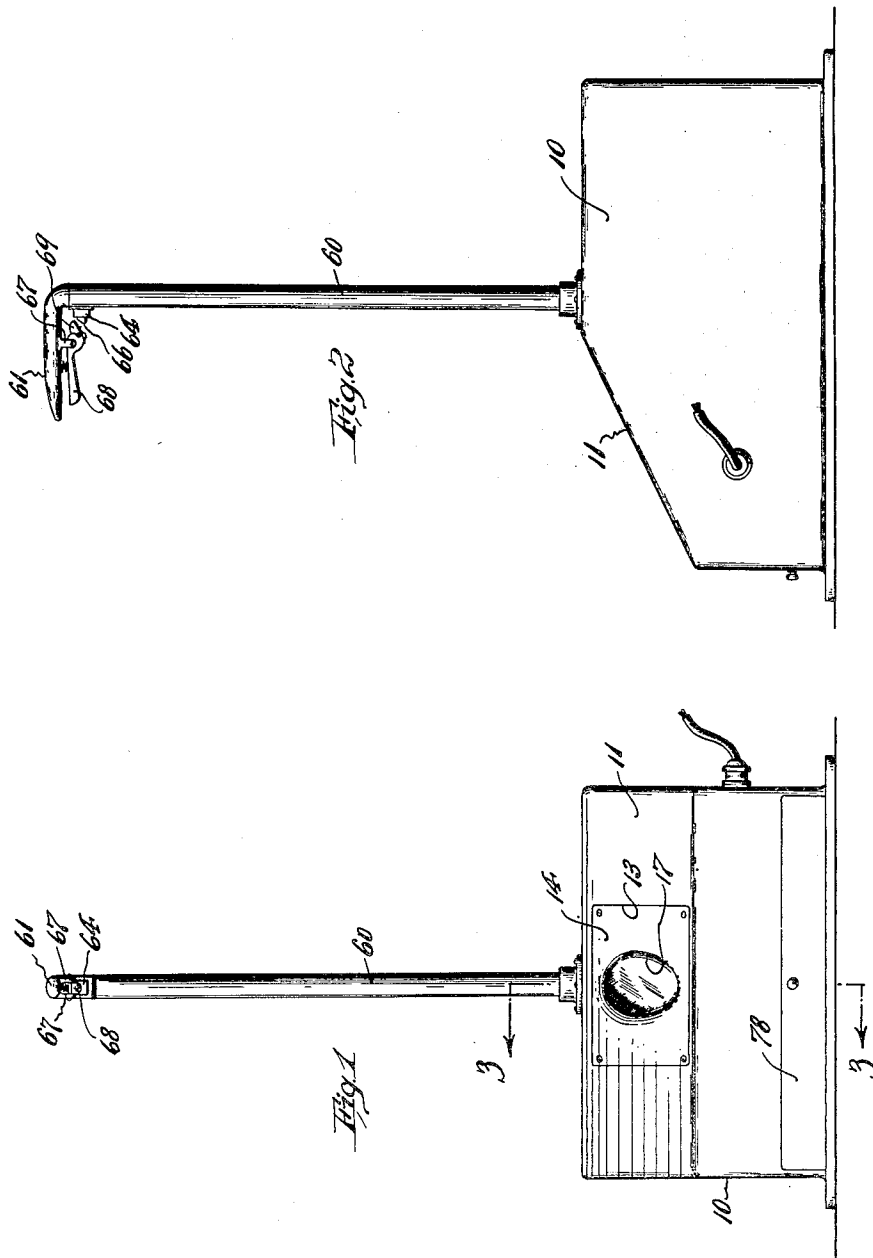
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2,025,936

FOOT TREATING APPARATUS

Filed Dec. 8, 1934

3 Sheets-Sheet 1



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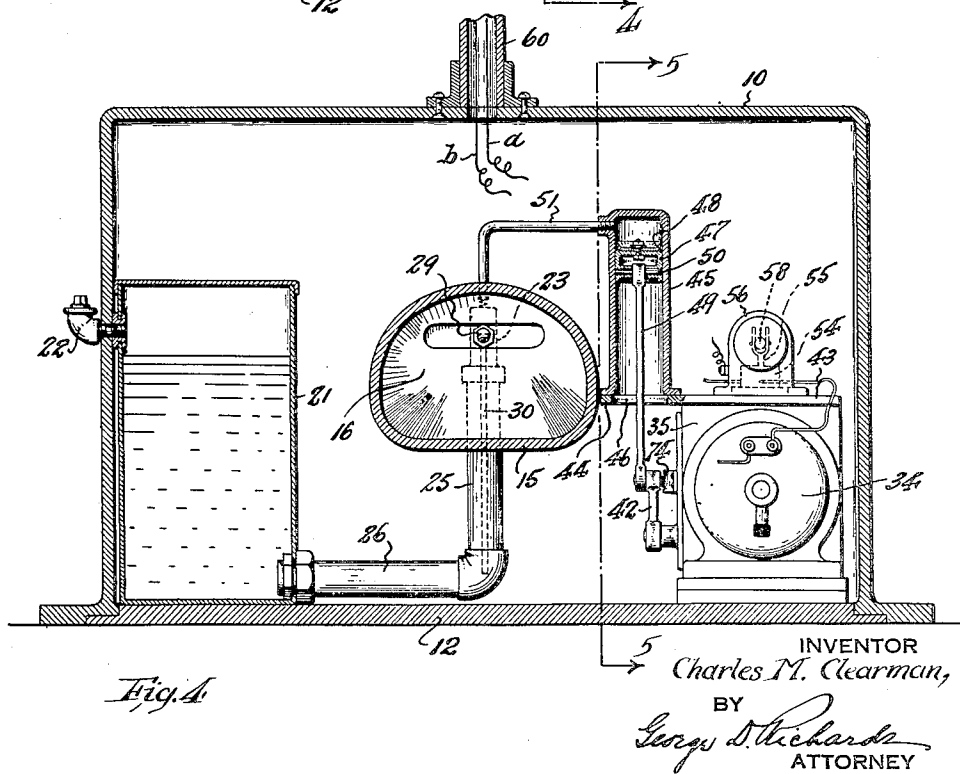
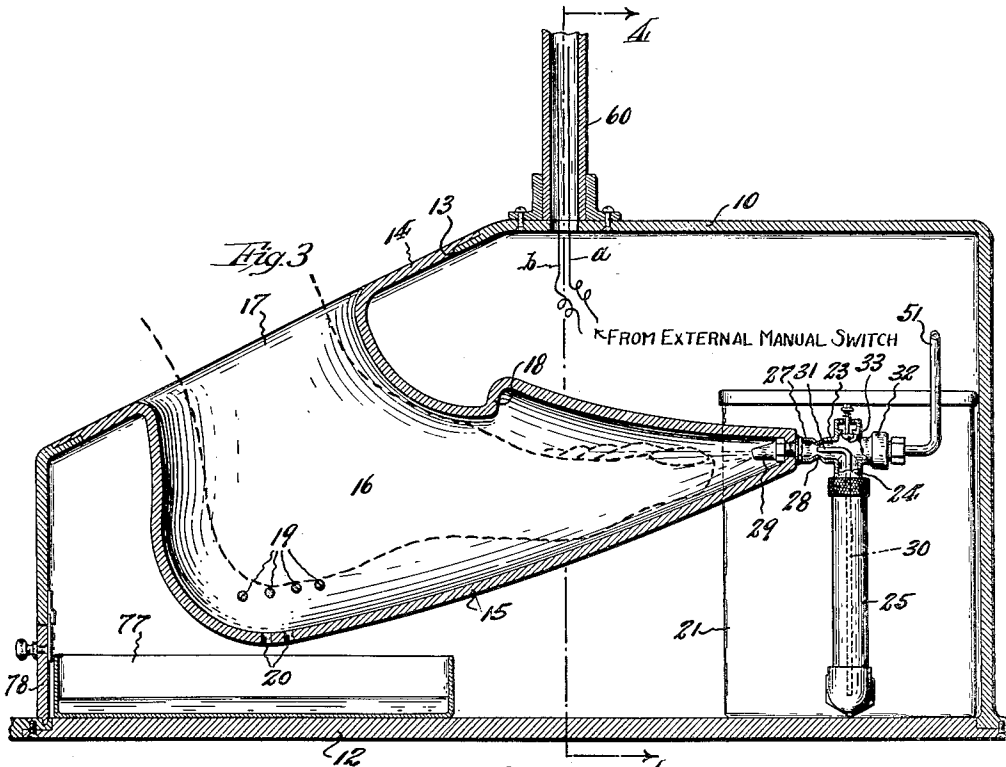
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FOOT TREATING APPARATUS

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8 Claims. (Cl. 128—261)

This invention relates to means for treating the feet; and the invention has reference, more particularly, to a novel mechanism for automatically applying a medicament to the feet of the user.

This invention has for its principal object to provide a novel apparatus, suitable for use in gymnasiums, golf-club locker or dressing rooms, hospitals, chiropodists' consulting rooms or in any other places where foot treatment, for ring worm of the foot commonly known as "athlete's foot", is desired to be carried out; the apparatus being of such character that the persons desiring the treatment may be enabled to self-administer the same. To this end the novel apparatus comprises a receptacle in which the foot may be inserted and means for automatically applying to the thus inserted foot, as by spraying thereon, a medicament suited to the particular ailment desired to be treated.

The invention has for a further object to provide a novel means for initiating and controlling the operation of the apparatus, whereby a predetermined or measured application of medicament is assured without undue waste; means being provided whereby the apparatus is subject to manual control for starting its operation but whereby its operation is automatically terminated after a given treatment is consummated. Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawings in which:

Fig. 1 is a front elevation of the novel foot treating apparatus according to this invention; and Fig. 2 is a side elevation of the same.

Fig. 3 is a longitudinal vertical section, taken on line 3—3 in Fig. 1, but drawn on an enlarged scale; Fig. 4 is a transverse vertical section, taken on the line 4—4 in Fig. 3; Fig. 5 is a longitudinal vertical section, taken on line 5—5 in Fig. 4; and Fig. 6 is a schematic view of the electric circuits and control devices which govern the operation of the apparatus.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to the drawings, the reference character 10 indicates the housing or casing of the apparatus, which is preferably provided at its upper forward end portion with a downwardly inclined top-wall portion 11, and which is fur-

ther provided with a removable bottom plate 12. Suitably secured to the inclined top-wall portion 11 of the housing or casing, across an opening 13 therein provided to receive the same, is a foot-plate 14 which supports a suitably shaped hollow boot 15 adapted to provide a receiving chamber 16 into which may be thrust the foot desired to be treated, said chamber 16 having an entrance opening 17 through said boot-plate 14. Preferably said boot-plate and boot are integrally formed by a metal casting, said casting tapering toward its inner or toe end, and being provided, intermediate said toe end and the entrance opening 17 and at its upper wall, with an inwardly projecting angular offset or shoulder 18, for purposes subsequently to be referred to. When the boot-plate 14 is fitted to and secured to the housing or casing top-wall portion 11, the boot 15 is disposed within the interior of said housing or casing 10. Affixed within the heel portion of the boot 15, are spaced transverse heel-rest bars 19, the same extending between the side walls of the boot, and at a level spaced above the bottom wall thereof. When assembled to and within the housing or casing 10, the boot 15 is disposed in an inclined position, with its bottom portion sloping downwardly from the toe end thereof toward the heel end thereof, and provided in said bottom portion, at the heel end, are one or more drainage openings 20.

Mounted within the housing or casing 10 is a container or reservoir 21 in which is stored a supply of the medicament solution which is desired to be applied to the foot under treatment. If desired, the reservoir 21 is provided with a filling connection or fitting 22 which extends through the wall of the housing or casing 10 for exterior projection therefrom.

Connected with the inner or toe end of the boot 15 is any suitable form of atomizer valve which is arranged, in any suitable manner, for communication with the content of the reservoir 21. Illustrative of one practical form of atomizer valve and communicating means between the same and the reservoir content, there is shown in the drawings, a valve casing 23 having a vertical branch 24 which is connected with the upper end of a stand-pipe member 25. An intercommunicating conduit 26 is connected between the lower end of the reservoir 21 and the lower end of said stand-pipe member 25, whereby a quantity of the medicament solution from the former is delivered into the latter. Extending forwardly from the valve casing 23 is a discharge branch 27, which is preferably provided with a

restricted Venturi-tube section 28. The free end of said discharge branch 27 is provided with a coupling nipple 28 engaged through the toe-end wall of said boot 15, the same being further provided, within the interior of the latter, with a discharge nozzle 29. Mounted within the valve casing 23 is a solution delivery tube 30, the lower end portion of which extends downwardly through the branch 24 into the column of medicament solution contained within the stand-pipe member 25. At its upper end, said tube 30 is provided with a laterally and forwardly turned discharge portion 31 which terminates within the Venturi-tube section 28 of the discharge branch 27. Extending rearwardly from the valve casing 23 is an air intake branch 32. Said valve casing 23 is further provided with an inwardly opening check-valve 33, which communicates with the atmosphere.

Means are provided for delivering air under pressure to the atomizer valve, thereby to operate the latter, and thereupon deliver into the boot 15 an application of the medicament solution for discharge upon the foot inserted thereinto for treatment. Preferably such air delivery means comprises an air compressor or pump having means for actuating the same. Illustrative of one form of such air electric motor 34 located within the housing or casing 10 to serve as a source of power. The compressor or pump is actuated through a power transmission, the same comprising a gear-box 35 through which extends a drive shaft 36. This drive shaft 36 is aligned with and coupled to the motor armature shaft 37, by any suitable form of coupling means 38, so as to be driven by the motor. Affixed on the drive shaft 36, within the gear-box 35, is a worm 39. Also mounted in and by said gear-box 35 is a transverse driven shaft 40 upon which is fixed a worm gear 41 which meshes with and is driven by said worm 39. Affixed upon an end of said driven shaft 40, which projects exteriorly from the gear-box 35, is a crank-arm 42. The gear-box 35 serves to enclose and house the worm and worm gear transmission, and is so arranged that it may be charged with a suitable lubricant, either oil or grease, whereby its smooth running with a minimum of friction is assured. The worm and worm gear transmission serves as a reduction gearing, whereby the air compressor or pump is driven at a desired speed. Supported upon the gear-box 35 is a platform 43, which is provided with a shelf-portion 44 arranged above and adapted to overhang the location of the crank-arm 42. The air compressor or pump comprises a cylinder 45 having an open lower end affixed to said shelf-portion 44 in registration with an opening 46 provided in the latter and aligned above the crank-arm 42. Reciprocable in the cylinder 45 is a plunger or piston 47 of suitable form, the same being preferably provided, at its inner end, with a flexible flanged washer 48. A connecting rod 49 is pivotally connected by its lower end to said crank-arm 42, and by its upper end to the wrist-pin 50 with which the plunger or piston 47 is provided. An air delivery conduit 51 is connected in communication with the upper end of the pump cylinder interior, and extends therefrom to the atomizer valve, being connected with the air intake branch 32 of the latter.

Means are provided for initiating and controlling the operation of the air compressor or pump by starting and stopping the motor whereby the same is actuated. This means is so devised that

the motor may be started by manipulatable means subject to actuation by the user of the apparatus, but is automatically stopped upon completion of an operative impulse or cycle of pump actuation, whereby the apparatus functions to provide a treatment of predetermined duration and quantity without undue waste, and whereby the operator, after starting the functioning of the apparatus, cannot inadvertently leave the apparatus in running condition with consequent waste. The means for this purpose are subject to more or less wide variation, and consequently may take various forms, either solely mechanical or electro-mechanical. One illustrative form of means calculated to furnish such desired control of the functioning of the apparatus, and showing a preferred electromechanical form thereof, comprises the following devices. Included in the main power supply circuit serving the motor 34, comprising the incoming line 52 and the outgoing line 53 is a main circuit make and break switch 54 of the toggle type, and of any suitable detail construction as well known to the electrical art. This switch is provided with an oscillatable lever 55 adapted to control the circuit make and break contacts of the same in such manner that when e. g. the lever 55 is swung to the left the circuit is interrupted and when swung to the right the circuit is closed. This main switch 54 may be suitably located anywhere within the housing or casing 10, but is preferably affixed upon the platform 43. Mounted adjacent to one side of said main switch 54 is a switch closing solenoid 56, and adjacent to the other side of said main switch is a switch opening solenoid 57. These solenoids 56—57 are arranged in opposed relation, a reciprocable armature bar 58 common to both extending therebetween. By a slot and pin connection 59, said main switch lever 55 is coupled to an intermediate portion of said armature bar 58.

The field winding of the switch closing solenoid 56 is connected in a shunt circuit comprising the ingoing line *a* leading from the main incoming circuit line 52 and the outgoing line *b* leading back to the main outgoing circuit line 53. Said shunt circuit is subject to the control of a manual switch means. Preferably this manual switch means is carried by a standard which is mounted on top of the housing or casing 10, to extend upwardly therefrom to a point conveniently accessible to the hand of the operator, when the latter stands in front of the apparatus in position to make use thereof; although it will be obvious that any other form or arrangement of means found expedient for mounting the manual switch devices may be employed. The standard, as shown, comprises a hollow or tubular column 60, terminating at its upper end in a forwardly and laterally projecting hand grip member 61. Within the hollow upper end of said column 60 are mounted a pair of suitably insulated spring contact elements 62 and 63, the same being normally spaced apart in opposed relation, to one of which, e. g. the element 62, is connected the ingoing line *a* and to the other of which, e. g. the element 63, is connected the outgoing line *b* passing through the solenoid 56, these lines extending from the interior of the housing or casing 10 through the interior of the column 60. Affixed to the column 60 is a casing 64 in which is slidably mounted a spring retracted push-pin 65, the inner end of which extends through the wall of said column to operatively engage one of said spring contact elements, as e. g. the contact element 63. At its outer end

said push-pin 64 is provided with an exteriorly projecting chamfered nosing 66. Mounted on fulcrum lugs 67, connected with the underside of said hand grip member 61, is a pivoted spring retracted hand-lever 68, provided at its inner end with a pivoted dog 69, which is stopped by a stop shoulder 70 against upward yielding movement relative to said hand lever 68, but which is downwardly yieldable against the tension of a positioning spring 71.

The field winding of the switch opening solenoid 57 is also connected in a shunt circuit comprising the ingoing line *x* leading from the main incoming circuit line 52 and the outgoing line *y* leading back to the main outgoing circuit line 53. This shunt circuit is subject to the control of an automatic switch means. Mounted in a suitable location upon the side of the gear-box 35 are a pair of suitably insulated spring contact elements 72 and 73, the same being normally spaced apart in opposed relation. Connected to one of said elements, e. g. the element 72, is the ingoing line *x* which passes through the switch opening solenoid 57, and connected to the other of said elements, e. g. the element 73, is the outgoing line *y* leading back to the main outgoing circuit line 53. Means operative by the revolution of the pump actuating crank-arm 42 is provided for effecting suitably timed shunt circuit closing engagement of said contact elements 72—73. This means comprises a depressible resilient or spring-blade push lever 74, which is affixed to the front of the gear-box 35, the same having at its free end portion a push-finger 75 to engage one of said contact elements, as e. g. the element 73. The push lever 74 is positioned so as to be operatively engaged by the crank-arm 42, when the latter passes through the top of its orbit, and has thereby completed the operative upward stroke of the plunger or piston 47 within the pump cylinder 45, and preferably said push-lever 74 is provided with a laterally and outwardly projected cam-nosing 76 engageable by said crank-arm under such circumstances.

Disposed within the housing or casing 10, and positioned beneath the drain openings 20 in the heel of the boot 15, is a removable drip-pan or catch-basin 77. The housing or casing 10 is preferably provided with a removable door 78 in its front wall, which, when opened, gives access to the interior of the housing or casing for the insertion or removal of the drip-pan or catch-basin 77 as may be required.

Having now described an illustrative embodiment of the novel foot treating apparatus, according to this invention, its operation in use will now be set forth.

The user, desiring to effect application of the medicament solution to his feet, takes position in front of the apparatus and inserts a foot into the boot 15. The insertion of the foot into the boot, positions the toes thereof within the toe end of the boot and opposed to the spray nozzle 29, with the heel of the foot resting upon the bars 19, whereby the major portion of the sole of the foot is spaced above the boot bottom, so as to prevent obstruction of the drain openings 20. When the foot is thus placed in the boot 15, the user grasps the hand-grip member 61, with the fingers around the hand-lever 68, and by squeezing action lifts upward the outer arm of the latter, thereby causing the pivoted dog 69 to move downwardly in passing engagement with the chamfered nosing 66 of the push-pin 65, thus thrusting the latter inwardly. The inward movement of the push-pin 65 causes the same to engage the contact element

63 and thereupon move the same into engagement with the contact element 62, thus closing the shunt circuit *a—b* through the main switch closing solenoid 56. The solenoid 56 is thereupon momentarily energized, and consequently attracts the armature bar 58, causing the latter to move from left to right. This movement of the armature bar 58 is transmitted to the main circuit switch arm 55, which is consequently swung to the right, thus closing the main switch 54, so that operating current is delivered through the main circuit 52—53 to the motor 34. Owing to the fact that the dog 69 passes downwardly beyond the push-pin nosing 66, the push-pin 65 will thereupon be retracted by its spring means, so that the contact elements 62—63 will again separate to interrupt the shunt circuit *a—b*, and consequently the solenoid 56 will only be energized long enough to close the main switch 54, even though the operator should retain grasp of the hand-lever 68. When the operator releases the hand-lever 68, its spring means will return the same to normal initial position, whereupon, the dog 69 in moving upwardly past the push-pin nosing 66 will yield thereto without causing inward movement of the push-pin 65 and consequent closing of the contact elements 62—63. It will thus be seen that the operator can only control the starting of the motor 34, subject to the stopping thereof by automatic means herebelow described. The advantage of this arrangement lies in the fact, that the operator cannot effect, by the initial manual control, any continuous running of the motor with consequent unnecessary and wasteful discharge of the medicament solution; nor can the operator leave the apparatus in a running condition.

By the operation of the motor 34 power is transmitted through the gearing 39—41 to the crank-arm 42, whereby the latter is revolved, to draw downward the plunger or piston 47 in the pump cylinder 45. On such downward movement of the plunger or piston, air is drawn into the cylinder 45, such air entering through the inwardly opening check-valve 33 of the atomizer valve 23 to pass through the conduit 51 into the cylinder interior above the plunger or piston. It may here be noted, that the check-valve 33, although shown in connection with the atomizer valve 23, need not necessarily be so located but may be connected anywhere in the conduit line 51 or with the cylinder itself if desired. Air having been thus delivered into the cylinder by the suction stroke of the plunger or piston 47, continued revolution of the crank-arm 42 thereupon effects the upward or compression stroke of the plunger or piston. On such upward stroke of the plunger or piston, the air in the cylinder is compressed and discharged through the conduit 51 and thence through the atomizer valve 23. Movement of the air through the atomizer valve 23, operates on the well-known atomizing principle, to take up and atomize the medicament solution from the stand-pipe member 25, whereby a fine spray or mist of the same is discharged through the nozzle 29 into the boot interior 16, and is thus sprayed over, around and between the toes of the foot inserted in the boot, thus adequately applying the medicament thereto. It may here be pointed out that the internal offset shoulder 18, provided in connection with the upper wall of the boot 15, serves to prevent outward discharge of the sprayed solution through the boot entranceway 17, and also to deflect downwardly any accumulation of the solution on the upper wall of the boot toe-portion, so that

all excess solution may eventually drain to the boot heel portion, and thence through the drain openings 20 into the drip-pan or catch-basin 77. As the plunger or piston 47 completes its upward
 5 air discharge stroke, the end of the crank-arm 42 will be carried in passing engagement with the cam-nosing 76 of the push-lever 74, thereby swinging the latter inwardly and carrying its
 10 push-finger 75 into flexing engagement with the contact element 73 whereby the latter is moved into momentary contact with the contact element 72. This closing of the contact elements
 15 72-73, closes the shunt circuit $x-y$ through the main switch opening solenoid 57, whereby the latter is energized. Energization of the solenoid 57 attracts the armature bar 58, causing the same
 20 to move from right to left. This movement of the armature bar 58 is transmitted to the main circuit switch arm 55, which is consequently swung to the left, thus opening the main switch
 25 54, so that flow of operating current to the motor 34 is interrupted, and said motor stops. As the motor comes to a stop, sufficient momentum remains to carry the crank-arm 42 out of engage-
 30 ment with the cam-nosing 76 of the push-lever 74, so that the latter, under its resilient tension swings back to normal position, thus permitting the contact elements 72-73 to again separate, thereby interrupting the shunt circuit $x-y$ and
 35 deenergizing the solenoid 57. Upon these occurrences, the mechanism is automatically stopped in normal initial position, ready for repetition of its operative cycle when the latter is again initiated. Under these circumstances, the
 40 user removes the treated foot from the boot 15, and inserts the other foot, thereupon repeating the above described operations, after which the apparatus may be left, ready for use by the next
 45 user. I am aware that many changes could be made in the above described constructions, and that apparently widely different embodiments of this invention could be made without departing from the scope thereof; consequently it is intended
 50 that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:—

50 1. In an apparatus of the kind described, a chambered boot having an entranceway, an atomizer means communicating with the interior of said boot at the toe end thereof, said boot having a heel rest spaced above its bottom, said boot
 55 having a transverse inwardly off-set shoulder in connection with its upper wall intermediate the entranceway and toe end thereof, said boot having drain means leading outwardly through its bottom wall, a catch basin below said drain
 60 means, means to supply a medicament substance to said atomizer means, and means to discharge air under pressure to said atomizer means.

65 2. In an apparatus of the kind described, a chambered boot having an entranceway, an atomizer means communicating with the interior of said boot at the toe end thereof, said boot having a heel rest spaced above its bottom, said boot having a transverse inwardly off-set
 70 shoulder in connection with its upper wall intermediate the entranceway and toe end thereof, said boot having drain means leading outwardly through its bottom wall, a catch basin below said drain means, means to supply a medicament substance to said atomizer means, an air pump
 75 means to deliver air under pressure to said

atomizer means, means for operating said air pump, manually controlled means for starting said pump operating means, and automatic means for stopping said pump operating means upon conclusion of a predetermined actuating
 5 cycle.

3. In an apparatus of the kind described, a chambered boot having an entranceway, an atomizer means communicating with the interior of said boot at the toe end thereof, means to supply a medicament substance to said atomizer means, an air pump means to deliver air under pressure to said atomizer means, said pump means comprising a cylinder having a plunger reciprocable therein, a revolvable crank-arm for re-
 15 ciprocating said pump plunger, an electric power motor, transmission means between said motor and crank-arm, manually controlled means for starting said motor and automatic means for stopping said motor upon conclusion of a
 20 predetermined operative cycle of said air pump means.

4. In an apparatus of the kind described, a chambered boot having an entranceway, an atomizer means communicating with the interior
 25 of said boot at the toe end thereof, means to supply a medicament substance to said atomizer means, an air pump means to deliver air under pressure to said atomizer means, said pump means comprising a cylinder having a plunger
 30 reciprocable therein, a revolvable crank arm for reciprocating said pump plunger, an electric power motor, transmission means between said motor and crank-arm, a main circuit leading from a source of electrical energy through said mo-
 35 tor, a main switch in said main circuit, electro-magnetic means for moving said main switch to main circuit closing condition, a shunt circuit serving said electro-magnetic means, a manually controlled circuit make and break in said shunt
 40 circuit, a second electro-magnetic means for moving said main switch to main circuit interrupting condition, a second shunt circuit serving said second electro-magnetic means, and automatically controlled circuit make and break means in
 45 said second shunt circuit operative upon conclusion of a predetermined cycle of air pump means actuation.

5. In apparatus of the kind described, a boot into which the foot may be inserted, an atom-
 50 izer means communicating with the interior of said boot, said boot having an entranceway out of line relative to the path of discharge from said atomizer means, means to supply a medicament substance to said atomizer means, an air pump
 55 means to deliver air under pressure to said atomizer means, an electric motor for actuating said air pump means, a main circuit serving said motor, manually controlled means for closing said main circuit to start said motor, and auto-
 60 matic means for interrupting said main circuit to stop said motor upon completion of a predetermined cycle of air pump means operation.

6. In apparatus of the kind described, a boot into which the foot may be inserted, an atomizer
 65 means communicating with the interior of said boot, means to supply a medicament substance to said atomizer means, an air pump means to deliver air under pressure to said atomizer means, said pump means comprising a cylinder having
 70 a plunger reciprocable therein, a revolvable crank-arm for reciprocating said pump plunger, an electric power motor, transmission means between said motor and crank-arm, a main circuit leading from a source of electrical energy
 75

through said motor, a main switch in said main circuit having an actuating lever, a main switch closing solenoid, a main switch opening solenoid, an armature bar common to both solenoids and operatively connected with said main switch actuating lever, energizing circuits for each solenoid, a manually controlled circuit make and break for the circuit of said main switch closing solenoid, and an automatically controlled circuit make and break for the circuit of said main switch opening solenoid.

7. In apparatus of the kind described, a boot into which the foot may be inserted, an atomizer means communicating with the interior of said boot, means to supply a medicament substance to said atomizer means, an air pump means to deliver air under pressure to said atomizer means, said pump means comprising a cylinder having a plunger reciprocable therein, a revolvable crank-arm for reciprocating said pump plunger, an electric power motor, transmission means between said motor and crank-arm, a main circuit leading from a source of electrical energy through said motor, a main switch in said main circuit having an actuating

lever, a main switch closing solenoid, a main switch opening solenoid, an armature bar common to both solenoids and operatively connected with said main switch actuating lever, energizing circuits for each solenoid, a manually controlled circuit make and break for the circuit of said main switch closing solenoid, an automatically controlled circuit make and break for the circuit of said main switch opening solenoid, and a push lever means operatively engageable by said crank-arm upon completion of a predetermined cycle of air pump operation to actuate said last named circuit make and break.

8. In an apparatus of the kind described, a boot into which the foot may be inserted, an atomizer means communicating with the interior of said boot at the toe end thereof, said boot having an entranceway out of line relative to the path of discharge from said atomizer means, means to supply a medicament substance to said atomizer means, an air pump means to deliver air under pressure to said atomizer means, means for actuating said pump, and means to control said pump actuating means.

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