

[54] **APPARATUS FOR IMMERSING LASTED BOOTS IN A LIQUID BATH**[72] Inventor: **Hendrik Joosten**, Montgomerylaan, Netherlands[73] Assignee: **Bata Shoe Company, Inc.**, Belcamp, Md.[22] Filed: **July 24, 1969**[21] Appl. No.: **844,535**[52] U.S. Cl. **118/425, 18/24**[51] Int. Cl. **B05c 3/10, B29c 13/00**[58] Field of Search **118/425, 238, 54; 18/24**[56] **References Cited****UNITED STATES PATENTS**

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[57] **ABSTRACT**

An apparatus for immersing lasted boots into a liquid bath in which the lasted boots carried by rod arrangements are moved uninterruptedly throughout a circular path above an immersion bath and upon reaching a predetermined location in the path each rod arrangement moves downwardly for immersing the lasted boot in an immersion bath after which the lasted boot is moved upwardly to the circular path for the completion of its travel therealong. Movement means are provided for supporting the rod arrangement during its movement into the bath, its immersion, and its return to the circular path. The rod arrangement includes a plurality of pivotally interconnected rods defining a polygon and each polygon is mounted for movement in a vertical plane with the mutual position of the last and the rod pivots being such that during downward and upward movement of the rod arrangement, the lasted boot is in a position inclined to the perpendicular and in a vertical position during immersion and means attached to one of the rods constituting each polygon bears against a rotatable disc which is a part of the movement means.

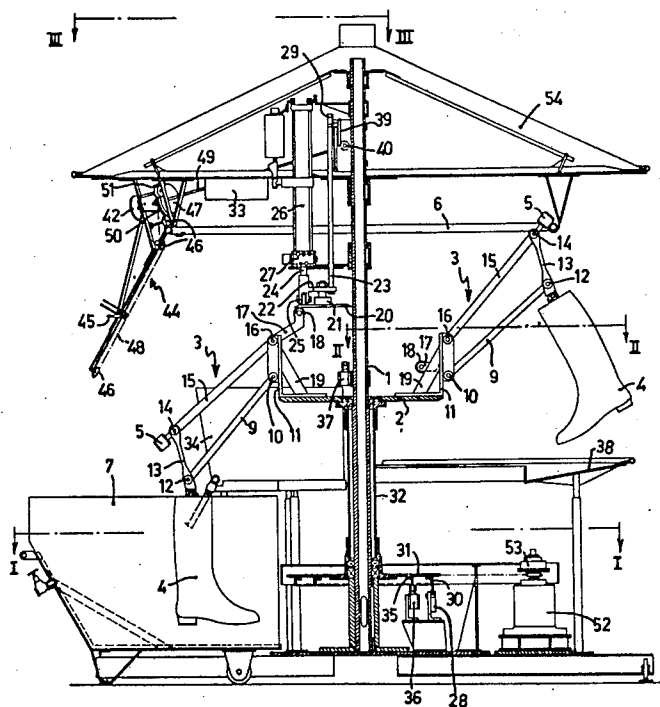
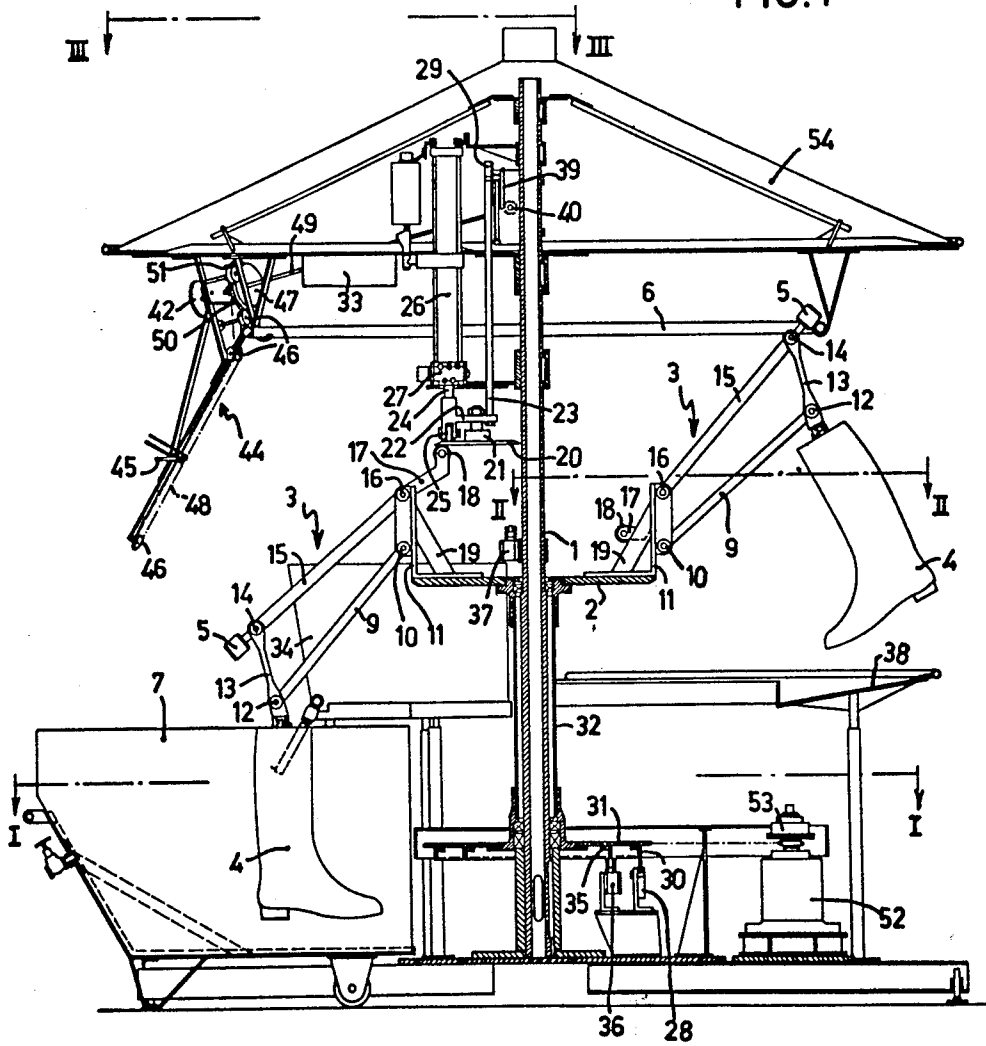
9 Claims, 3 Drawing Figures

FIG. 1



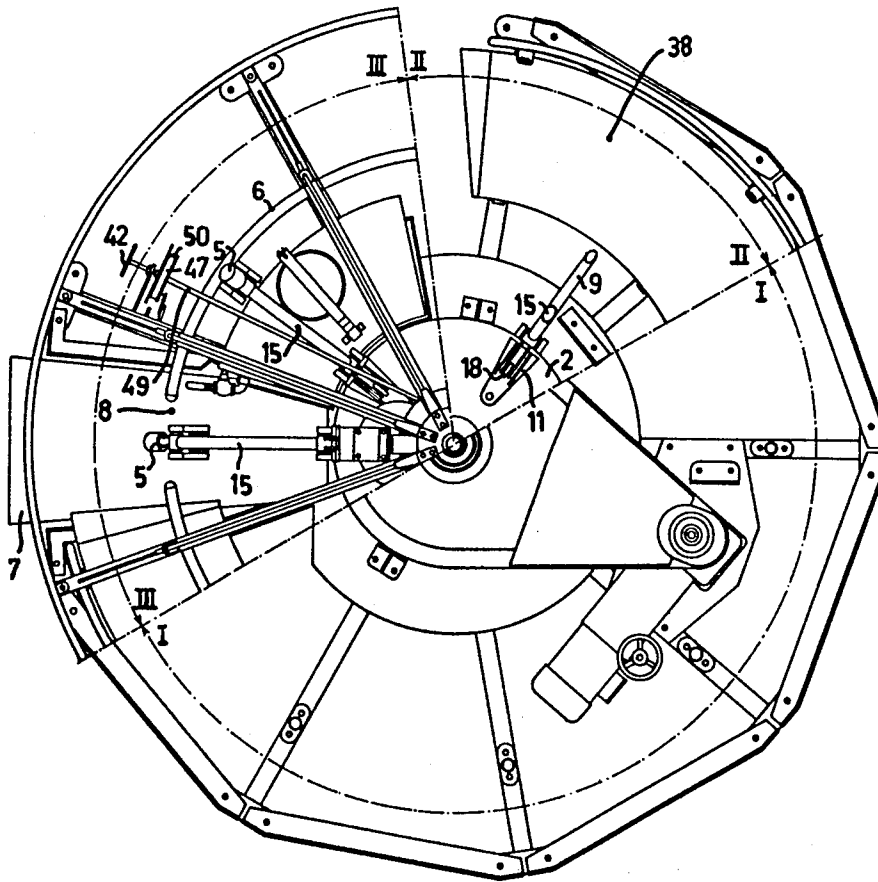
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FIG. 2



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APPARATUS FOR IMMERSING LASTED BOOTS IN A LIQUID BATH

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for immersing footwear and more particularly boots into a liquid bath for applying a coating thereto.

More specifically, the invention pertains to an immersion apparatus of the type including a vertical central shaft, a table rotatable about the shaft, a plurality of rod arrangements supported at the periphery of the table at equally spaced intervals, a supporting roll and an object carried by each rod arrangement, a circular guide track positioned in a horizontal plane about the shaft and spaced above the rotatable table with the guide track having an interruption therein, the supporting rolls normally rolling along the guide track, an immersion bath located below the table and the interruption in the guide track, the length of the interruption corresponding in peripheral length with the length of a portion of the guide track located between two adjacent supporting rolls, the objects one after the other being movable downwardly into the bath via the interruption in the track and thereafter upwardly from the bath without interruption of their rotary movement about the shaft, and movement means being operable to support the rod arrangement during its downward movement into the bath and following immersion to return the supporting roll onto the guide track.

In the above discussed immersion apparatus, the rod arrangement is displaceable parallel to itself and vertically in an upward and downward direction while the carrier for the object is a horizontal component which is arranged primarily for supporting cheese which is to be provided with a paraffin layer by immersion. The interruption in the guide track is effected since the guide track is provided with a downwardly displaceable sector which takes over the rotating roll at the lower side of the rod arrangement each time a rod arrangement and carrier reaches the sector. Manifestly, if the sector moves downwardly, the rod arrangement supported thereon and the carrier together with this object likewise moves downwardly with the object being immersed in the liquid bath. Following immersion, the sector elevates the rod arrangement and the carrier and object in order that the supporting roll can continue its movement along the guide track. Hence, it will be appreciated that the sector functions as the "movement means" above described.

SUMMARY OF THE INVENTION

It is an object of the present invention to adapt an immersing apparatus of the type here and above referred to for immersing footwear and more particularly boots which are to be provided with a coating of varnish.

More specifically, the present invention is directed to an apparatus for immersing lasted footwear, particularly boots in a bath of immersion liquid, comprising a vertical central shaft, a table rotatable about the shaft, a plurality of rod arrangements supported at the periphery of the table at equally spaced intervals, a supporting roll and a last carried by each rod arrangement, a circular guide track positioned in a horizontal plane about the shaft and spaced above the rotatable table, the guide track having a hiatus therein, the supporting rolls normally rolling along the guide track, an immersion bath located below the table and the hiatus in the guide track, the length of the hiatus corresponding in peripheral length with the length of a portion of the guide track located between two adjacent supporting rolls, the lasts one after the other being movable downwardly into the bath through the hiatus in the track and thereafter upwardly from the bath without interruption of their rotary movement about the shaft, movement means operable to support each rod arrangement during its downward movement into the bath and following immersion therein return the supporting roll onto the guide track after the upward movement thereof, each rod arrangement including a plurality of pivotally interconnected rods defining a

polygon, support means on the table to which each rod arrangement is pivotally mounted for movement in a vertical plane, the mutual position of the last and the rod pivots being such that during the downward and upward movements of the rod arrangement through the hiatus in the guide track, the lasted boot is in a position inclined to the perpendicular and in a vertical position during immersion in the bath and during immersion, a second roll attached to one of said rods bears against the lower side of a rotatable disc constituting a part of the movement means.

The foregoing arrangement insures that during immersion of the boots in the immersion liquid, the inclusion of air and waves or undulations in the bath are avoided and the varnish coating is applied precisely to the desired height of the boot and upon removal of the boot from the bath, the excess coating trickles downwardly quickly and uniformly by way of the toe cap of the boot with a uniform coating thickness remaining on the boot. During the immersion movement, no undesired torsion and bending strains develop in view of the fact that during the immersion, the rod arrangement coacts with the movement means via the second roll which bears against the lower side of the rotatable disc.

Further objects and advantages of the present invention will become more readily apparent to persons skilled in the art from the following detailed specification and the annexed drawings.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view partly in side elevation and partly in cross section illustrating the present immersion apparatus,

FIG. 2 is a composite view taken partly along line I—I, partly along line II—II and along line III—III of FIG. 1, and,

FIG. 3 is a view partly in elevation and partly in cross section of a detail of the assemblage.

DETAILED DESCRIPTION OF THE INVENTION

As illustrated in FIG. 1, the apparatus includes a stationary vertical central shaft 1 and a table 2 is located concentrically around the shaft 1 and is rotatable relative thereto. A plurality of rod arrangements denoted generally 3 are located at the periphery of the table 2 and the rod arrangements are disposed at equally spaced intervals throughout the periphery. While, in the present situation, 20 rod arrangements are illustrated, it is of course to be understood that a lesser or greater number of rod arrangements can be utilized within the scope of the invention.

Each of the rod arrangements 3 supports a last 4 for a boot and a supporting roll 5. A circular guide track is positioned in a horizontal plane around the shaft 1 and the supporting rolls 5 normally travel along the track. As will later be more fully described, the rod arrangement and the lasts are displaceable one after another in upward and downward movements without any interruption of their continuous rotary movement about the shaft 1. During the downward movement, the lasted boot enters an immersion bath 7 located below the table 2 and following immersion, the rod arrangement and lasted boot return to their original or initial position. The upward and downward movements are possible in view of the fact that at a location above the bath 7 the guide track is provided with a hiatus or gap 8. In the peripheral direction, the length of the hiatus or gap corresponds with a length of a portion of the guide track located between two adjacent supporting rolls 5. Immediately upon a roll 5 reaching the hiatus 8, the rod arrangement 3 moves downwardly in a vertical plane so that the lasted boot will enter the fluid in the bath 7. Prior to a detailed description of this particular operation, the details of the rod arrangement 3 will be set forth.

Each rod arrangement 3 includes a lowermost rod 9, an uppermost rod 15 and a rod 13 interconnecting the rods 9 and 15. More particularly, it will be noted that one end of the rod 9 is pivotally connected as at 10 to a support 11 carried by the table 2. The opposite end of the rod 9 is pivotally connected at

12 to the lower end of the rod 13 and the upper end of the rod 13 is pivotally connected to the rod 15 at 14. The rod 15 is further pivotally connected to the support 11 as indicated at 16. The pivot 16 is located vertically above the pivot 10. Moreover, the rod 15 is provided with an elongated portion 17 which extends or projects beyond the pivot 16 and a rotatable roll 18 is mounted at the free end of such elongated portion. The supporting roll 5 is also carried by the uppermost rod 15 at a point beyond the pivot 14. It should be noted that during the rolling movement of the roll 5 along the guide track 6, the periphery of the roll 18 is at the level of the lower side of a rotatable disc 20 when the disc 20 is in its lowermost position as will be hereinafter more fully described.

The mutual position of the last 4 and the rod arrangement 3 and of the rod pivots respectively are determined so that a lasted boot will be in a position inclined forwardly with respect to the vertical (see the right side of FIG. 1) when the lasted boot enters and leaves the path 7. When the lasted boot reaches the required depth of immersion in the bath 7 the lasted boot is vertically disposed (see the left side of FIG. 1). The advantages of this particular technique have previously been mentioned.

With reference again to the left half of FIG. 1, it will be seen that during immersion, the rod arrangement coacts with a rotatable disc 20 via the roll 18 which then bears against the lower side of the disc. The disc 20 is movable upwardly and downwardly by means to be later more fully described in such a manner that the disc 20 reaches its lowermost position immediately prior to the supporting roll 5 being released from the guide track 6. This means that when the guide track releases the supporting roll 5, the disc 20 will assume the supporting function. From such position, the disc rises or moves upwardly and the rod arrangement can then swing up to the position illustrated at the left side of FIG. 1. When the lasted boot is immersed in the bath, the disc 20 moves downwardly from its uppermost position and the pivotable rod arrangement is swung upwardly by means of pressure upon the roll 18 and as a consequence the roll 5 is returned onto the guide track 6.

Since, during immersion, the rotatable movement of the rod arrangements is continued without interruption, the disc 20 is pivotally mounted so as to avoid undesired friction and bending forces between the disc 20 and the roll 18. In the course of the immersion, the disc 20 is rotated about a bearing 21 by the roll 18. The bearing is mounted on a vertical guide rod 23 by a plate 22 and at the lower end of a piston rod 24, respectively. The lower end is provided with a ball bearing 25 which supports the disc 20 and during the rotary movement, the ball bearing rolls on the upper face of the disc 20.

The piston rod 24 together with its piston (not illustrated) reciprocates in a vertically disposed compressed air cylinder 26. The speed of the piston's movement in the cylinder 26 is precisely adjustable by a directly coupled oil cylinder provided with a closed piston and a by-pass with a controllable passage. The air cylinder 26 is controlled in its operation by means of a main four way slide valve 27 which valve in turn is controlled with air commands by command valves 28 and 29.

Command valve 28 is actuated by a ring 30 which is adjustably affixed to the lower end of a chain wheel 31 and the wheel 31 is coupled with the rotatable table 2 by a sleeve 32 located about the central shaft 1. Furthermore, the ring 30 is provided with a plurality of curves which correspond in number to the plurality of the rod arrangements which, as previously mentioned, are 20. Each time a rod arrangement 3 arrives at the hiatus 8 in the guide track 6 the valve 28 is operated and the valve 28 then switches the main slide valve 27 to a position in which the piston rod 24 retracts into the cylinder 26. Upon obtaining the required depth of immersion in the bath 7, the command valve 29 is actuated by the guide rod 23 so that this command valve, via the main valve 27, moves the piston rod to its extended initial position in which the rod arrangement 3 with the immersed lasted boot can continue its path of movement along the guide track 6 via the supporting roll 5.

An air reservoir 33 is mounted between the main slide valve 27 and the line connected to the bottom side of the air cylinder 26. By virtue of the air reservoir, the wave like action of the liquid in the bath at the reversal of the movement of the last is reduced so that no fluid waves are moved over the upper edge of the boot. It should be mentioned that the level of the liquid in the bath 7 is maintained precisely constant by an automatic replenishment thereof from a vacuum container 34 located above the bath.

It will be noted that the chain wheel 31 carries on its lower face and within the ring 30, a second ring 35 which is also provided with a plurality of curves corresponding in number to the plurality of rod arrangements 3. These curves serve for a periodic operation of a switch 36 for maintaining a relay circuit during about four-fifths of the time that each rod arrangement passes the hiatus or gap 8. During the remainder of the time this operation is assumed by a switch 37 which is maintained closed by the rotatable disc 20. By virtue of this measure, it is achieved that with a retarded movement, if any, of the piston rod 24, the driving of the apparatus awaits the restoration of the contact of the switch 37 by which the rod arrangement returns to its highest position and the supporting roll can continue its travel along the guide track 6.

A gutter or drain 38 disposed above the bath 7 serves to return any liquid which drips from the immersed boots to the bath 7.

The command valve 29, which is, as previously stated, actuated by the guide rod 23 is attached to a toothed rack 39 which is capable of adjustment by means of a toothed wheel or gear 40 and a mechanical coupling 41 as best illustrated in FIG. 3. This adjustment can be effected by manipulation of a hand wheel 42. Guide rods 43 are provided for guiding the toothed rack 39 and by means of a string or cord arrangement 44, a pointer 45 is coupled with the hand wheel 42 in such a fashion that there is a constant relation between the position of the valve 29 and the position of pointer 45 which is shifted in the longitudinal direction of the boot by the adjustment of the command valve. The pointer 45 is adjusted from a mark for the depth of immersion and in the present situation, this mark can be the ornamental tape of the boot. During the operation of the apparatus, the depth of immersion of any boot is precisely and quickly, namely approximately 1 second, adjustable notwithstanding the length of the upper portion of the boot and the same can be directly read on the boot immediately prior to the boot being immersed.

The string or cord arrangement is mounted on a stationary part of the frame of the apparatus and includes an endless string or cord 48 trained over guide discs 46 and a drum 47. The drum 47 is mounted on a rotatably supported rod 49 which carries the hand wheel 42 at one end thereof and acts upon the valve 29 via the coupling 41 at the other end. A cooperable rotatable snap wheel 50 is coupled with the drum 47 and the wheel is maintained in any adjustable position by means of a blade spring 51.

The chain wheel 31 is driven by means of a chain of low adjustable speed via a motor reducer provided with a variator 52 and an adjustable coupling 53. The apparatus is further provided with a suction hood 54 operably related to the upper end of the stationary central shaft 1.

This invention is not to be confined to any strict conformity to the showings in the drawings but changes or modifications may be made therein so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.

I claim:

1. An apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid, comprising a vertical central shaft; a table rotatable about the shaft; a plurality of rod arrangements supported at the periphery of the table at equally spaced intervals thereabout; a supporting roll and a last carried by each rod arrangement; a circular guide track positioned in a horizontal plane about the shaft and spaced above the rotatable table, said guide track having a hiatus therein; the supporting rolls normally travelling along said

guide track; an immersion bath located below the rotatable table and the hiatus in the guide track, the length of the hiatus corresponding in peripheral length with the length of a portion of the guide track located between two adjacent supporting rolls; said lasts one after another being movable downwardly into the bath through the hiatus in the guide track and thereafter upwardly from the bath without interruption of their rotary movement about the central shaft; movement means operable to support each rod arrangement during its downward movement into the bath, and following immersion of the lasted boot in the bath to return the supporting roll onto the guide track; each rod arrangement including a plurality of pivotally interconnected rods defining a polygon; support means on the rotatable table to which each rod arrangement is pivotally mounted for movement in a vertical plane, the mutual position of the last and the rod pivots being such that during the downward and upward movement of the rod arrangement through the hiatus in the guide track the lasted boot is in a position inclined to the perpendicular, and in a vertical position during immersion; a second roll attached to one of the rods of said rod arrangement; and a rotatable disc constituting a part of the movement means against which said second roll bears during the movement of the lasted boot for immersion to prevent undesired torsion and bending strains on said rod arrangement.

2. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 1 in which each polygon includes a first rod, means pivoting one end of the first rod to the support means on the rotatable table, a second rod pivoted at one end to the free end of the first rod, a third rod pivoted at one end to the free end of the second rod, means pivoting the free end of the third rod to the support means vertically above the pivot at the first rod to the support means, the supporting roll being carried by the third rod adjacent its pivot to the free end of the second rod, said third rod being provided with an elongated portion extending beyond the pivot of the free end of the third rod to the support means, and said second roll being mounted on the free end of said elongated portion.

3. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 1 in which the rotatable disc against which the second roll bears during movement for immersion is provided with a ball bearing adapted to roll on the upper surface of the disc, a vertically disposed compressed air cylinder located above said rotatable disc, said air cylinder having a piston and piston rod, said ball bearing being mounted at the lower end of said piston rod, an oil cylinder having a closed piston and a by-pass line provided a controllable passage directly coupled to the air cylinder for precisely adjusting the speed of reciprocation of the piston, a four-way slide valve controlling the air cylinder, and command valves controlling the four-way slide valve via air commands.

4. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 3 including a chain wheel, a sleeve located about the central shaft

for coupling the chain wheel to the rotatable table, a ring adjustably attached to the lower side of the chain wheel for operating one of the command valves, and said ring having a plurality of curves which correspond to the number of rod arrangements so that each time a rod arrangement reaches the hiatus in the guide track, said one command valve is actuated to move the slide valve to a position whereby the piston rod is retracted into the air cylinder.

5. The apparatus for immersing lasted footwear, particularly boots, in a bath of an immersion liquid as claimed in claim 4 in which the movement means includes a vertical guide rod to which said rotatable disc and piston rod are coupled so that upon the lasted boot reaching the required depth of immersion in the bath, another command valve is actuated to move the slide valve to a position whereby the piston rod is extended thus moving the rod arrangement upwardly through the hiatus in the track so that the rod arrangement can continue its travel along the track via the supporting roll.

6. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 5 including an air reservoir mounted between the slide valve and a line connected with the bottom of said air cylinder for reducing the wavy action of the liquid in the bath at the reversal of the movement of the lasted boot moving into and out of the bath.

7. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 5 including a toothed rack to which the command valve operated by the vertical guide rod is attached, a toothed wheel meshing with the rack and a hand wheel mechanically connected with the toothed wheel for adjusting such command valve, a pointer, and a rope arrangement coupling the pointer with the hand wheel for providing a constant relation between the position of said command valve and the position of the pointer which shifts in the longitudinal direction of the boot by the adjustment of said command valve.

8. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 4 including a second ring carried by the lower side of said chain wheel, said second ring having a plurality of curves which correspond to the number of rod arrangements, a switch maintaining a relay circuit during approximately four-fifths of the time that each rod arrangement passes said hiatus periodically operated by said curves, and a further switch maintained closed by said rotatable disc for effecting such operation during the remainder of the time.

9. The apparatus for immersing lasted footwear, particularly boots in a bath of an immersion liquid as claimed in claim 7 in which said rope arrangement comprises a closed length, guide discs and a drum over which said length is trained, a rotatably supported rod carrying at one end said hand wheel and being coupled at the other end with said command valve, said drum being mounted on said rotatably supported rod, a rotatable snap wheel attached to said drum and a blade spring for maintaining said snap wheel in its adjusted position.

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