The present invention relates to an automatic shoe cleaning device, which includes: a housing having a shoe inlet through which a foot with a shoe is inserted and a foot plate where the shoe is placed; a base frame disposed linearly movably inside the housing; a first brush assembly having a pair of side brushes polishing both sides of the shoe at both sides ahead of the base frame and a first spring supplying elastic force to the side brushes; and a second brush assembly having an upper brush polishing the top of the shoe behind the first brush assembly and a second spring supplying elastic force to the upper brush; and a shoe polish supply unit supplying shoe polish to the upper brush, in which as the upper brush moves backward and contacts the pair of side brushes, the shoe polish supplied to the upper brush is transferred to the pair of side brushes, whereas as the upper brush move forward to polish the shoe, the upper brush is separated from the pair of side brushes by the elastic force of the second spring, whereby it is possible to uniformly apply the shoe polish over the entire surface of the shoe and prevent the shoe polish from sticking to the pants.
AUTOMATIC SHOE CLEANING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

Pursuant to 35 U.S.C. §119(a), this application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2010-0035804, filed on Apr. 19, 2010, the contents of which are hereby incorporated by reference herein in their entirety.

FIELD OF THE DISCLOSURE

The present invention relates to an automatic shoe cleaning device that can improve cleanliness and luster of shoes.

DISCUSSION OF THE RELATED ART

In general, shoes are usually wetted or stained with soil or other dirties, under which the life span is reduced and vehicles a houses where the users usually stay or live are also stained. Further, the users wearing dirty shoes are likely to lose their dignity and make the others feel unpleasant, thereby resulting in undesired problem.

Therefore, it is required to keep the shoes from being wetted, and for this, it needs to protect the surface of the shoes with a shoe polish, such as glazes, which has a waterproof function. Further, it is required to uniformly apply a shoe polish and polish it well to luster in order to keep the shoes surface clean.

In generally, most people has a brush and a shoe polish in houses or offices and periodically polish their shoes to achieve the above; however it is difficult to always carry the brush and shoe polish for going out, such that it is difficult to keep the shoes clean for a long-time going out.Obviously, although it is possible to remove this problem, using a shoe-black in case of long-time going out, it is a little burdensome because it takes a relatively long time to wait for a turn and the cost is not cheap.

Therefore, automatic shoe cleaning devices that automatically polish shoes worn by users have been developed to solve these problems.

However, the automatic shoe cleaning devices of the related art have a problem that the shoe polish injected is dispersed and stains the users’ pants, because they have a structure of directly injecting a liquid shoe polish to the surface of the shoes.

In order to overcome this problem, the brushes are divided into a dust-brush and a polish-brush and the shoe polish is injected to the polish-brush. However, this case also has a problem the shoe polish is applied only to some portion and it is difficult to uniformly apply the shoe polish over the entire shoe.

Further, the automatic shoe cleaning devices of the related art has a problem that it is difficult to always discharge a predetermined amount of shoe polish, such that a too large or small amount shoe polish is applied to the shoe, thereby deteriorating the entire performance.

SUMMARY OF THE DISCLOSURE

It is an object of the present invention to provide an automatic shoe cleaning device that can uniformly apply shoe polish over the entire surface of a shoe.

Further, it is another object of the present invention to provide an automatic shoe cleaning device that has improved polishing performance by always supplying a predetermined amount of shoe polish.

Further, it is another object of the present invention to provide an automatic shoe cleaning device that can minimize shaking and breakdown even if it is used for a long time.

The technical problems are not limited to the foregoing technical problems. Other technical problems, which are not described, can clearly be understood by those skilled in the art from the following description.

According to an aspect of the present invention, an automatic shoe cleaning device, comprising: a housing having a shoe inlet through which a foot with a shoe is inserted and a foot plate where the shoe is placed; a base frame linearly movably disposed inside the housing; a first brush assembly having a pair of side brushes polishing both sides of the shoe at both sides ahead of the base frame and a first spring supplying elastic force to the side brushes; and a second brush assembly having an upper brush polishing the top of the shoe behind the first brush assembly and a second spring supplying elastic force to the upper brush; and a shoe polish supply unit supplying shoe polish to the upper brush, in which as the upper brush moves backward and contacts the pair of side brushes, the shoe polish supplied to the upper brush is transferred to the pair of side brushes, whereas as the upper brush moves forward to polish the shoe, the upper brush is separated from the pair of side brushes by the elastic force of the second spring.

The base frame is provided with a driving unit linearly moving the base frame, and the driving unit comprises: a lead screw rotatably disposed in the housing; a moving member fixed to the base frame and thread-fastened to the lead screw; and a driving motor connected to one end of the lead screw to rotate the lead screw.

The first brush assembly comprises: an operating rod having one end rotatably supported to the base frame by a first hinge shaft and the other end where the side brush is rotatably supported; a first spring disposed around the first hinge shaft to provide elastic force to the operating rod; and a second driving motor fixed to the operating rod and connected with the rotary shaft of the side brush.

The second brush assembly comprises: a hinge bracket fixed to the base frame; a rotary member rotatably connected to the hinge bracket by a second hinge shaft; a brush support panel rotatably supported to the rotary member by a third hinge shaft where the rotary shaft of the upper brush is rotatably mounted; a second spring fixed to the third hinge shaft to provide elastic force to the upper brush; and a driving motor disposed in the brush support panel and connected to the rotary shaft of the upper brush.

The shoe polish supply unit comprises: a case fixed to one side of the housing; a shoe polish cylinder filled with liquid shoe polish inside the case; the supply nozzle connected with the shoe polish cylinder through a supply hose and supplying the shoe polish to the upper brush; and an operating unit disposed in the case and discharging the shoe polish in the shoe polish cylinder by pressing the shoe polish cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention.
FIG. 2 is a side view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

FIG. 3 is a plan view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

FIG. 4 is a rear view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

FIG. 5 is a side view of a first brush assembly according to an embodiment of the present invention.

FIG. 6 is a side view of a second brush assembly according to an embodiment of the present invention.

FIGS. 7 to 9 are views illustrating the operation of the first brush assembly of an automatic shoe cleaning device according to an embodiment of the present invention.

FIG. 10 is a plan view illustrating the operation of an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

FIG. 11 is a horizontal cross-sectional view of a shoe polish supply unit according to an embodiment of the present invention.

FIG. 12 is a vertical cross-sectional view of a shoe polish supply unit according to an embodiment of the present invention.

FIG. 13 is a block diagram of an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

**DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings. The size and shape of components shown in the drawings may be exaggerated herein for clear and convenient description. Further, the terminologies specifically defined in consideration of the configuration and operation of the present invention may be differently understood by users or operators in accordance with their intention. These terminologies should be defined on the basis of the description throughout the specification.

FIG. 1 is a perspective view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention. FIG. 2 is a plan view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention. FIG. 3 is a side view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention, and FIG. 4 is a rear view showing an automatic shoe cleaning device according to an exemplary embodiment of the present invention.

An automatic shoe cleaning device according to an embodiment of the present invention includes: a housing 100 forming the outer frame and having a shoe inlet 110 at one side through which a foot with a shoe is inserted; a brush assembly 200 polishing the shoe while linearly reciprocating inside the housing 100; a shoe polish supply unit 300 supplying shoe polish to the brush assembly 200; and a controller 400 controlling the brush assembly 200 and the shoe polish supply unit 300.

The housing 100 is provided with a cover (not shown) at the top and has a foot plate support 122 where a foot plate 120, where the shoe is placed, is mounted. The foot plate support 122 is arranged at the center portion of the housing in the longitudinal direction of the housing 100.

A guide rail 132 is disposed at both sides of the foot plate support 122 to guide the brush assembly 200 such that a base frame 130 can linearly move.

The brush assembly 200 includes: the base frame 130 disposed to linearly move inside the housing 100; a first brush assembly 210 having a pair of side brushes 212, 214 mounted on the base frame 130 to polish the sides of the shoe; and a second brush assembly 250 having a top brush 252 mounted on a base frame 210 and polishing the top of the shoe.

Sliders 132 that are inserted in the guide rails 132 to slide along the guide rails 132 are provided on the bottom of the base frame 130. Further, the housing 100 is provided with a driving unit that linearly moves the base frame 130.

The driving unit 150 includes: a lead screw 152 of which both ends are rotatably supported inside the housing 100; a moving member 154 thread-engaged with the outer circumference of the lead screw 152 and fixed to the lower portion of the base frame 140; and a first driving motor connected to one end of the lead screw 152 to rotate the lead screw 152.

A support panel 160 is disposed in parallel under the foot plate support 122, and a first bracket 162 rotatably supporting one end of the lead screw 152 and a second bracket 164 rotatably supporting the other end of the lead screw 152 are disposed between the support panel 160 and the foot plate support 122.

Further, the first driving motor 156 is fixed to one side of the support panel 160 and connected to one end of the lead screw 152.

The lead screw 152 has a male thread on the outer circumference and the moving member 154 has a female thread on the inner circumference to be thread-engaged with the male thread. Therefore, as the lead screw 152 rotates, the moving member 154 linearly moves along the lead screw 152 and the base frame 130 fixed to the moving member 154 correspondingly linearly moves.

A shoe sensor 126 that detecting a shoe placed on the foot plate 120 and supplying a signal to the controller 400 is attached to the inner side of the housing 100. The shoe sensor 126 may be an optical sensor that detects a shoe, using light that is blocked when the shoe is placed on the foot plate.

Further, the housing 100 is provided with a front sensor 112 at the front which supplies a signal to the controller when the base frame 130 maximally moves forward and a rear sensor 114 at the rear which supplies a signal to the controller 400 when the base frame 130 maximally moves backward.

As described above, the driving unit 150 according to an embodiment of the present invention minimizes noise or vibration generated when the base frame 130 linearly reciprocates, because it is a lead screw type.

FIG. 5 is a side view showing a first brush assembly according to an embodiment of the present invention.

The first brush assembly 210 includes: an operating rod 218 rotatably supported by a first hinge shaft 216 vertically disposed to the base frame 130; side brushes 212, 214 rotatably supported at the end of the operating rod 218; and a second driving motor 222 fixed to the operating rod 218 and connected to a rotary shaft 220 of the side brushes 212, 214.

The side brushes 212, 214 are composed of a first side brush 212 polishing the left side of the shoe and a second
side brush 214 polishing the right side of the shoe, and disposed at the left and right sides, respectively, on the top of the base frame 130.

[0047] A first spring 224 is disposed on the first hinge shaft 216 to provide elastic force to the operating rod 218. The first spring 224 may be a coil spring wound around the first hinge shaft 216, with one end fixed to the operating rod 218 and the other end fixed to the base frame 130.

[0048] According to the first brush assembly 210, as the base frame 130 moves forward, the first brush 212 and the second brush 214 polish both sides of the shoe in close contact with the sides, respectively. In this operation, the brushes 212, 214 press the sides of the shoe by the elastic force of the first spring 224. The first side brush 212 and the second side brush 214 are in contact with each other, when the base frame 130 is at the rearmost position.

[0049] The second brush assembly 250 includes a hinge bracket 254 fixed to the top of the base frame 130; a rotary member 256 rotatably supported by the hinge bracket 254; and a brush support panel 258 rotatably supported by the rotary member 256 and having an upper brush 252 thereon.

[0050] The hinge bracket 254 is fixed to the top of a support vertically disposed on the top of the base frame to have a predetermined height from the top of the base frame 130.

[0051] Further, the rotary member 256 has one end rotatably connected to the hinge bracket 254 by a second hinge shaft 262 and the other end rotatably connected to the brush support panel 258 by a third hinge shaft 264.

[0052] The third hinge shaft 264 is provided with a second spring 268 to provide elastic force to the brush support panel 258. The second spring 268 is wound around the third hinge shaft 264 and has one end fixed to the rotary member 256 and the other end fixed to the brush support panel 258, thereby providing elastic force to the brush support panel 258.

[0053] A dust-brush 270 is fitted on the second hinge shaft 262 to brush away foreign substances and dusts on the upper brush 252 in contact with the upper brush 252.

[0054] The brush support panel 258 has one side rotatably supported by the rotary shaft 262 and the other side rotatably supported by the third hinge shaft 264, in which a third driving motor 290 connected to the rotary shaft of the upper brush 252 to rotate the upper brush is disposed at one side of the brush support panel.

[0055] A guide slot 272 is longitudinally formed on the rear of the brush support panel 258 in order for a supply nozzle of the shoe polish supply unit 300 to slide, which is described below.

[0056] A cleaning brush 282 that washes off the shoe polish on the supply nozzle 310 of the shoe polish supply unit 300 (described below) is fitted on one end portion of the rotary shaft 280 of the upper brush 252, as shown in FIG. 6.

[0057] That is, the cleaning brush 282 is fitted to the rotary shaft 280 to be freely rotate and locked to a locking rod on the top of the operating rod 218, such that it wash off the shoe polish on the supply nozzle 310 while rotating by a predetermined amount, when the base frame 130 moves forward or backward.

[0058] FIGS. 7 to 10 are views illustrating the operation of the automatic shoe cleaning device according to an embodiment of the present invention.

[0059] In the operation of the second brush assembly 250, when the base frame 130 is at the rearmost position, as shown in FIG. 2, the upper brush 252 is in contact with the pair of side brushes 212, 214. Accordingly, the shoe polish supplied to the upper brush 252 is supplied to the side brushes 212, 214, and as a result, the shoe polish can be supplied to all of the upper brush 252 and the side brushes 212, 214.

[0060] In this state, as the base frame 130 moves forward, as shown in FIGS. 7 and 10, the brush panel 258 is rotated and separated from the upper brush 252 by the elastic force of the second spring 268. Further, as the upper brush 252 moves up on the top of the shoe, as seen in FIG. 8, the brush support panel 258 is rotated by the rotary member 256 and the upper brush 252 correspondingly makes primary rotation.

[0061] Further, as the base frame 130 further moves forward, as shown in FIG. 9, the rotary member 256 secondarily rotate around the brush support panel 258. As described above, since the upper brush 252 is secondarily rotated by the rotary member 256, the base frame 130 can further move backward, and accordingly, it can be placed at the accurate desired position on the top of the shoe.

[0062] Further, since the shoe polish supplied to the upper brush 252 is transferred to the side brushes 212, 214 and uniformly distributed in all the brushes, the shoe polish can be applied to the top and sides of the shoe without sticking to other things, such as pants, except for the shoe.

[0063] FIGS. 11 and 12 are cross-sectional views of the shoe polish supply unit according to an embodiment of the present invention.

[0064] The shoe polish supply unit 300 includes: a case fixed to one side of the housing 100; a shoe polish cylinder 320 filled with shoe polish 322 inside the case 302; a supply nozzle 310 connected to the shoe polish cylinder 320 through a supply hose 330 and supplying the shoe polish to the upper brush 252; and an operating unit 350 discharging the shoe polish by pushing the shoe polish cylinder 320.

[0065] The case 302 has a rectangular shape with a cover 304 on the top and through which a shoe polish outlet 324 of the shoe polish cylinder 320 protrudes outside, and a slot 306 is longitudinally formed in the cover 304 such that a guide pin 354 of a push member 352 of the operating unit 350 slides, which is described below.

[0066] In the shoe cylinder 320, a piston 326 is linearly movably disposed at one side and the shoe polish outlet 324 through which the shoe polish is discharged by the force pushing the piston 326 is formed at the other side.

[0067] The operating unit 350 includes a fourth driving motor 360 fixed to one side of the case 302, a lead screw 362 connected to the driving shaft of the fourth driving motor 360, and a push member 352 thread-fastened to the lead screw 362 and pushing the piston 326.

[0068] The lead screw 362 is provided with a rotation angle sensor 364, 366 detecting the rotation angle of the lead screw 362 and controlling the operation of the fourth driving motor 360. The rotation angle sensor is fixed to the lead screw 362 and composed of the gear ring 364 having teeth on the outer circumference and the sensor 366 detecting the rotation angle of the lead screw 362 by sensing the number of teeth of the gear ring 364 and supplying a signal to the controller 400.

[0069] The supply nozzle 310, as shown in FIG. 4, is disposed to be slidably along the guide slot 272 formed in the rear of the brush support panel 258. Further, a guide bar 274 is longitudinally disposed in the brush support panel 258 and the support nozzle 310 is slidably fitted on the guide bar 274. Further, a spring 276 is disposed between one side of the supply nozzle 310 and the end of the brush support panel 258, and the other side of the supply nozzle 310 and a wire mounting portion 280 formed in the housing is connected by a wire 278.

[0070] In the operation of the supply nozzle 310, the wire 278 is maximally pulled and the supply nozzle 310 is positioned at one end of the brush support panel 258 when the base frame 130 is positioned at the rearmost position, and as the base frame 130 moves forward, the distance between the
wire mounting portion 280 and the supply nozzle 310 reduces and the supply nozzle 310 is moved along the guide slot 272 by the elastic force of the spring 276, such that the shoe polish is uniformly supplied to the upper brush 252.

[0071] As described above, since the supply nozzle 310 is linearly moved by the wire 276 and the spring 276, an independent device for linearly moving the supply nozzle 310 is not needed.

[0072] The operation of the automatic shoe cleaning device according to an embodiment of the present invention, having the above configuration, is described hereafter.

[0073] FIG. 13 is a block diagram of a control unit according to an embodiment of the present invention.

[0074] First, the upper brush 252 is in contact with the two side brushes 212, 214 by the pulling force of the wire 276, when the base frame 130 is at the rearmost position. In this state, the supply nozzle 310 is positioned at one end.

[0075] In this state, as the foot plate 120 is moved up to polish the shoe, the shoe sensor 126 detects it and supplies a signal to the controller 400. Accordingly, the controller 400 moves forward the base frame 130 by operating the first driving motor 156. Further, it operates the second driving motor to rotate the two side brushes 212, 214 and also operates the third driving motor 290 to rotate the upper brush 252. Further, it operates the fourth driving motor 360 to supply the shoe polish to the upper brush 252.

[0076] Accordingly, the shoe polish supplied to the upper brush 252 is transferred to the side brushes 212, 214, such that the side brushes polish the sides of the shoe while rotating and the upper brush 252 polishes the top of the shoe while rotating.

[0077] Further, when the base frame 130 maximally moves forward, the front sensor 112 detects it and supplies a signal to the controller 400, and the controller 400 reverses the first driving motor 156 to move backward the base frame 130. Further, when the base frame 130 maximally moves backward, the rear sensor 114 detects it and supplies a signal to the controller 400, and the controller 400 normally operates the first driving motor 156 to move forward the base frame 130.

[0078] The device polishes the shoe by repeating the operations.

[0079] According to the automatic shoe cleaning device of the present invention, since the shoe polish is supplied to the upper brush, and the side brushes and the upper brush are in contact with each other when moving backward such that the shoe polish on the upper brush can be transferred to the side brushes. Therefore, it is possible to uniformly apply the shoe polish over the entire surface of the shoe and prevent the shoe polish from sticking to the pants etc.

[0080] Further, since the rotary member is connected to the hinge bracket fixed to the base frame by a hinge and the brush panel with the upper brush is connected to the rotary member by a hinge, the upper brush makes double rotation and the distance between the side brushes and the upper brush can be increased, such that it is possible to improving the performance of the shoe cleaning device.

[0081] Further, since the base frame is linearly moved inside the housing by the lead screw, the base frame can make stable linear movement and it is possible to prevent the base frame from shaking in use.

[0082] Further, since the operating unit of the shoe supply unit pushes the piston in the shoe polish cylinder filled with the shoe polish, using the lead screw and the push member, it is possible to accurately control the supply amount of shoe polish.

[0083] Although embodiments according to the present invention were described above, those are provided only for examples, and the present invention may be modified in various ways within equivalent ranges by those skilled in the art. Therefore, a true scope of the present invention will be defined by the appended claims.

What is claimed is:

1. An automatic shoe cleaning device, comprising:
a housing having a shoe inlet through which a foot with a shoe is inserted and a foot plate where the shoe is placed;
a base frame linearly movably disposed inside the housing;
a first brush assembly having a pair of side brushes polishing both sides of the shoe at both sides ahead of the base frame and a first spring supplying elastic force to the side brushes; and
a second brush assembly having an upper brush polishing the top of the shoe behind the first brush assembly and a second spring supplying elastic force to the upper brush; and
a shoe polish supply unit supplying shoe polish to the upper brush,
wherein the upper brush moves backward and contacts the pair of side brushes, the shoe polish supplied to the upper brush is transferred to the pair of side brushes, whereas the upper brush move forward to polish the shoe, the upper brush is separated from the pair of side brushes by the elastic force of the second spring.

2. The automatic shoe cleaning device according to claim 1, wherein the base frame is provided with a driving unit linearly moving the base frame, and the driving unit includes:
a lead screw rotatably disposed in the housing;
a moving member fixed to the base frame and thread-fastened to the lead screw; and
a driving motor connected to one end of the lead screw to rotate the lead screw.

3. The automatic shoe cleaning device according to claim 2, wherein a shoe sensor detecting a shoe placed on the foot plate and supplies an electric signal to a controller is disposed in the housing.

4. The automatic shoe cleaning device according to claim 3, wherein the shoe sensor is an optical sensor attached to a side of the housing.

5. The automatic shoe cleaning device according to claim 1, wherein the housing is provided with a front sensor detecting that the base frame maximally moves forward and supplying a signal to the controller and a rear sensor detecting that the base frame maximally moves backward and supplying a signal to the controller.

6. The automatic shoe cleaning device according to claim 2, wherein guide rails are longitudinally formed at both sides of the housing and sliders that are inserted in the guide rails to move along the guide rail are formed on the bottom of the base frame.

7. The automatic shoe cleaning device according to claim 1, wherein the first brush assembly includes:
an operating rod having one end rotatably supported to the base frame by a first hinge shaft and the other end where the side brush is rotatably supported;
a first spring disposed around the first hinge shaft to provide elastic force to the operating rod; and
a second driving motor fixed to the operating rod and connected with the rotary shaft of the side brush.

8. The automatic shoe cleaning device according to claim 1, wherein the second brush assembly includes:
   a hinge bracket fixed to the base frame;
   a rotary member rotatably connected to the hinge bracket by a second hinge shaft;
   a brush support panel rotatably supported to the rotary member by a third hinge shaft and where the rotary shaft of the upper brush is rotatably mounted;
   a second spring fixed to the third hinge shaft to provide elastic force to the upper brush; and
   a driving motor disposed in the brush support panel and connected to the rotary shaft of the upper brush.

9. The automatic shoe cleaning device according to claim 8, wherein the second brush assembly further includes a dust-brush fitted on the first hinge shaft and removing dusts sticking the upper brush while being in contact with the upper brush.

10. The automatic shoe cleaning device according to claim 8, wherein a polish-brush washing off the shoe polish on a supply nozzle of the shoe polish supply unit is rotatably fitted on the rotary shaft of the upper brush, and
    a locking rod where the polish-brush is locked is disposed above the base frame.

11. The automatic shoe cleaning device according to claim 8, wherein the shoe polish supply unit includes:
    a case fixed to one side of the housing;
    a shoe polish cylinder filled with liquid shoe polish inside the case;
    the supply nozzle connected with the shoe polish cylinder through a supply hose and supplying the shoe polish to the upper brush; and
    an operating unit disposed in the case and discharging the shoe polish in the shoe polish cylinder by pressing the shoe polish cylinder.

12. The automatic shoe cleaning device according to claim 11, wherein the supply nozzle is disposed in the brush support panel to linearly move in the longitudinal direction of the brush,
    a wire is connected between the supply nozzle and one side of the housing, and
    a spring is disposed between the supply nozzle and the brush support panel, such that the supply nozzle linearly moves when the base frame moves.

13. The automatic shoe cleaning device according to claim 11, wherein the operating unit includes:
    a fourth driving motor fixed to one side of the case; a lead screw connected with the driving shaft of the fourth driving motor; and
    a push member thread-fastened to the lead screw to move forward and backward and push a piston of the shoe polish cylinder, when the lead screw rotates.

14. The automatic shoe cleaning device according to claim 13, wherein a rotation angle sensor detecting rotation angle of the lead screw and controlling the rotation angle of the fourth driving motor is disposed at one side of the lead screw.

15. The automatic shoe cleaning device according to claim 14, wherein the rotation angle sensor includes:
    a gear ring fixed to the lead screw to rotate with the lead screw and having teeth formed at a predetermined distance on the outer circumference; and
    a sensor disposed to face the teeth of the gear ring and detecting the rotation angle of the lead screw by sensing the number of teeth.

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