

Air Blowing System With Aromatizing Function

The present invention relates to an air blowing system such as an air cleaner which has a structure of detachably mounting a container such as a perfume container within the blower system.

Various types of air blowing systems are generally known. One of these known air blowing systems is an air cleaner for cleaning contaminated air. When the air cleaner is located within a small room or a motorcar interior, it rapidly purifies the contaminated air to provide considerably increased comfort to a person or persons in the room. Recently, an air cleaner having a perfume container has been proposed not only to purify the air in the room, but also to aromatize the air for providing a further improved pleasant atmosphere. However, the perfume in the perfume container must be replaced after a predetermined time period since the perfume deteriorates with time. Thus, it becomes important to facilitate the replacement of the perfume as far as possible. Throughout the disclosure, the air blowing system will be described in the form of an air

cleaner having a perfume container.

Referring now to Fig. 6 of the accompanying drawings, there is shown an aromatic smell generating portion in an air cleaner constructed according to the prior art and described as in Japanese Utility Model Laid-Open No. Hei 2-20939. The aromatic smell generating portion comprises a frame 60 including, at one end, an electromagnetic valve 61 fixedly mounted thereon. The electromagnetic valve 61 is energized by an electric current supplied from a drive circuit (not shown) through a conductor 61a. The other end of the frame 60 fixedly supports the base end 62a of a leaf spring 62. The other or tip end 62b of the leaf spring 62 includes a magnetic member 63 and a closure member 64 for a perfume container 65, these members being located on the opposite sides of the leaf spring 62. The tip end 62b of the leaf spring 62 extends between the electromagnetic valve 61 and the perfume container 65 and is biased to cause the closure member 64 to close the opening of the perfume container 65 under the action of its own resiliency. The perfume container 65 contains a perfume 66.

On operation, the electromagnetic valve 61 is energized by the electric current from the drive circuit through the conductor 61a. The electromagnetic valve 61 then attracts the magnetic member 63 against the resiliency of the leaf spring 62 in a direction as shown by arrow 67. As a

result, the perfume container 65 will be opened to emit the aromatic smell from the perfume 66. When the perfume 66 should be replaced by a new one since it deteriorates, the leaf spring 62 is manually lifted and the perfume container 65 is removed. Thereafter, the leaf spring 62 is again lifted to mount the perfume container 66 filled with a new perfume 66. In such a manner, the perfume 66 can again emit an aromatic smell when the electromagnetic valve 61 is re-energized through the drive circuit.

Referring next to Fig. 7, there is shown a motorcar deodorizing system constructed according to the prior art and described as in Japanese Utility Model Laid-Open No. Hei 2-45813. The motorcar deodorizing system comprises a container 71 containing a deodorant 72. The top opening 71a of the container 71 is externally threads 71b. A cap 73 is screwed over the threads 71b to close the container 71. The cap 73 includes a fixing and supporting portion 73a integrally formed thereon and having a hook 73b formed thereon at its tip end. The cap 73 also includes a connecting nozzle tube 73c formed therein, the nozzle tube 73c receiving a nozzle 75. The other end of the nozzle 75 is mounted in an air passage of an air conditioner which is located in a direction as shown by arrow 76. The cap 73 further includes a deodorant emitting port 73d formed therein at a position adjacent to the top opening 71a of the

container 71. The top of the cap 73 supports an electromagnetic valve 74 including a valve body 74a which is lifted and lowered to open and close the deodorant emitting port 73d on energization of the electromagnetic valve 74.

On operation, the electromagnetic valve 74 is energized by the output of a drive circuit (not shown) to move the valve body 74a. When the valve body 74a is lifted, the deodorant emitting port 73d is opened to discharge the deodorant component 72 from the container 71 through the nozzle tube and nozzle 73c, 75 to the air passage of the air conditioner. When the deodorant has been consumed, the container 74 is unscrewed from the cap 73. The container 74 is refilled with a deodorant 72 and rescrewed into the cap 73.

In such air blowing systems of the prior art, the replacement or replenishment of the container is troublesome. If the container containing the perfume or deodorant is located in a relatively confined space, such replacement or replenishment further becomes difficult.

It is therefore an object of the present invention to provide an air blowing system which can more easily perform the replacement or replenishment of a perfume or deodorant container without a particular procedure even though it may be located in a relatively confined space.

Another object of the present invention is to provide

a structure capable of detachably mounting the container in the air blowing system in a very simple manner.

To this end, the present invention provides an air blowing system with an aromatizing function, comprising fan means for producing a flow of air, a perfume container containing a perfume to be emitted into the flow of air, guide means for holding the perfume container, fixing means for mounting the perfume container on the guide means, valve means for opening and closing the opening of the perfume container to control the amount of perfume diffused into the flow of air, and electromagnetic solenoid means for controlling the valve means.

When the perfume container is removed, the valve means engages the guide means at one end. When the perfume container is again mounted in the air blowing system, the end of the perfume container engages the valve means to separate it from the guide means and the container can then be mounted in place. Such a mounting operation is very simple and easy.

The fixing means may include a grasping portion of resilient material for grasping the perfume container, fitting portions formed on the opposite ends of the grasping portion and adapted to engage the guide means, and

at least one set of projections formed integrally in the grasping portion and extending away from the fitting portions.

In such an arrangement, the opposite ends of the projections can be grasped such as by operator's fingers to open the fitting portions under the action of the resilient portion when the perfume container is to be removed. After the fixing means has been removed out of the guide means, the perfume container can be removed from the fixing means.

When the fixing means is to be fitted over the guide means, it can easily be made under the resiliency of the grasping portion simply by positioning the fitting portions and forcing them into the guide means.

The invention will be further described by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a side cross-sectional view of one embodiment of an air cleaner constructed in accordance with the present invention.

Fig. 2 is a top plan view of the air cleaner shown in Fig. 1, with the top closure thereof being omitted.

Fig. 3 is a top plan view of the aromatic smell generator portion used in the air cleaner shown in Figs. 1 and 2.

Fig. 4 is a front view of the aromatic smell generator shown in Fig. 3.

Fig. 5 is a side cross-sectional view of the aromatic smell generator shown in Figs. 3 and 4.

Fig. 6 is a plan view of an aromatic smell generator portion in an air cleaner constructed in accordance with the prior art.

Fig. 7 is a cross-sectional view of a motorcar deodorizing system constructed in accordance with the prior art.

Fig. 1 is a side cross-sectional view of one embodiment of an air cleaner constructed in accordance with the present invention while Fig. 2 is a top plan view of the air cleaner shown in Fig. 1, with the top closure thereof being removed. Referring to Figs. 1 and 2, the air cleaner 1 functions to draw in the contaminated air from a room or motorcar and then to discharge purified air. The air cleaner 1 comprises an outer shell including a main body 2, a closure member 3 and a punched metal cover 4. The main body and closure member 2, 3 define a box-like housing which has a top intake port 3a and a side exhaust port 3b. The punched metal cover 4 is in the form of a metallic perforated cover for closing the intake port 3a of the closure member 3. The punched metal cover 4 engages at its peripheral edge into a circumferential groove 3c formed in

the closure member 3, with several inwardly turned parts of the punched metal cover 4 being fixedly passed through corresponding through-holes 3d which are formed in the closure member 3.

An axial fan 5 is mounted in the housing and adapted to produce a flow of air through the interior of the air cleaner 1. The axial fan 5 comprises a fan member 5a and a drive motor 5b, all of which are assembled into a unit. Such a unit is fixed to the housing by a cover 6. Activated charcoal 7 for deodorization is located upstream of the axial fan 5. The activated charcoal 7 has a honeycomb configuration, with the outer periphery thereof being protected by a sponge 7a. The air blowing system further comprises a dust collector portion 8 for purifying the intake air, which comprises a lower case 9 and an upper case 10. The lower and upper cases 9, 10 are fixed to each other in a so-called snap-fit manner. The dust collector 8 has discharge electrode plates 11 each including a discharge wire 11a located in the dust collector 8 at the upper part. A high voltage of about 6 kV from the positive electrode 12a of a high-voltage power source 12 is applied to the discharge electrode plates 11. On the other hand, a grounding electrode plate 13 is located spaced away from each of the discharge electrode plates 11 and parallel to the associated discharge electrode plate 11. Each of the

grounding electrode plate 13 is connected to the associated grounding electrode of the high-voltage power source 12 by means of a spring as in the positive electrode 12a.

Furthermore, springs 14 maintain the electrical connection between the discharge electrode plates 11 and the electrical connection between the grounding electrode plates 13, respectively.

The air blowing system further comprises a control portion consisting of two control substrates 15 and 16, on each of which various electronic parts are mounted. One of the control substrates 15 includes a connector 17 for connecting the air blowing system to an external power source. The high-voltage power source 12 and other electronic parts are connected to the external power source through the connector 17 and connecting line 12b. These control substrates are protected by a protection cover 18 which is mounted on the main body 2 through screws 19. The control substrate 15 is electrically connected to the punched metal cover 4 through an electrically conductive spring 20 so that the punched metal cover 4 will be grounded. The conductive spring 20 is fixedly mounted on the protection cover 18 through screws 21. A fixing lever 22 is fixedly mounted on the closure member 3 through screws 23. The fixing lever 22 includes its convex end 22a inserted into an aperture 18a in the protection cover 18.

An aromatic smell generator portion 24 is disposed downstream of the dust collector 8 and also downstream of the axial fan 5. The aromatic smell producing portion 24 includes a perfume container 26 sealingly receiving porous beads 25 each containing a perfume. The perfume container 26 is guided by a guide portion 2a formed in the main body 2 and held by a clip 27 formed as fixing means. The end opening of the perfume container 26 is closed by a cap 28 having a screen-like or perforated bottom for holding the beads within the perfume container 26 while permitting only the perfume to pass therethrough. The cap 28 has an end opening which can be sealingly closed by a valve body 30 formed integrally with an electromagnetic valve 29 for controlling the discharge of the perfume and adapted to be biased against the sealing face of the cap 28 under the action of a spring 29a when the electromagnetic valve is in the de-energized state. When the valve body 30 is reciprocated as the electromagnetic valve 29 is energized or de-energized through the control substrate 15, the diffusion of the perfume can be controlled. The electromagnetic valve 29 is fixedly mounted on the main body 2 through screws 31. The air cleaner 1 is fixedly mounted on a mounting board 35 through a screw 32 fixed to the main body 2 and a butterfly nut 34.

Figs. 3 to 5 show the details of the aromatic smell

generator portion 24. The guide portion 2a formed in the main body 2 comprises a bottom face 2b for positioning the perfume container 26 containing the beads 25 in its elevational direction and two column-like transverse guides 2c for positioning the perfume container 26 in its transverse direction. Thus, the guide portion 2a defines a holder portion for receiving the perfume container 26. Each of the transverse guides 2c includes two ribbed portions 2d forming guides for insertion of the clip 27, projections 2e snap-fitted into apertures 27b of a clip 27 described hereinafter to form an engagement portion brought into engagement with the fixing means, a grooved portion 2f for guiding the ribbed portion 28a of the cap 28, and a stopper 2g for preventing the valve body 30 from moving when the perfume container and cap 28 are not mounted in the air blowing system. The cap 28 includes a sealing face 28b for engaging the valve body 30 to sealingly close the perfume container 26. The same description may be applied to the electromagnetic valve 29 and spring 29a.

Referring to Fig. 5, the clip 27 includes a fitting portion 27a having apertures 27b formed therethrough to receive the projections 2e of the transverse guides 2c, lever portions 27c formed as projecting portions for facilitating the outward deformation of the fitting portions 27a to engage or disengage the clip 27 with the guide

portion 2a, and a resilient and flexible portion 27d resiliently flexible when the clip 27 is engaged or disengaged by the transverse guide 2c.

On operation, the axial fan 5 is energized and at the same time a high voltage of about 6 kV is applied from the high-voltage power source 12 to the dust collector 8. The energizing of the axial fan 5 creates a flow of air passing through the air blowing system. Thus, an external flow of air enters the air blowing system through the intake port 3a of the dust collector 8 after relatively large dust particles in the external flow of air have been removed by the perforated punched metal cover 4 above the closure member 3. The external flow of air is then subjected to corona discharge produced between the discharge wires 11a of the discharge electrode plates 11 and the grounding electrode plates 13 so that fine dust and/or particles contained in the flow of air will be charged into plus polarity and attracted by the grounding electrode plates 13. At the same time, ozone is also secondarily created. The flow of air then moves to the side opening of the dust collector 8 and passes through the honeycomb activated charcoal 7 to be deodorized therein. The ozone is decomposed under the catalytic action of the activated charcoal 7 while the unnecessary gas components are attracted by the activated charcoal 7. Thereafter, the flow

of air passes through the axial fan 5 and is discharged out of the air blowing system through the exhaust port 3b on the side of the closure member 3 and also through the perforated punched metal portion 4, which is positioned forwardly above the axial fan 5.

At this time, if the electromagnetic valve 29 is energized by applying the voltage from the drive circuit in the control substrate 15 to the electromagnetic valve 29, the valve body 30 is moved away from the sealing face 28b of the cap 28 against the action of the spring 29a to open the perfume container 26, so that the aromatic smell will be emitted from the aromatic smell generator 26 and diffused into the flow of air flowing through the air blowing system under the actuation of the axial fan 5. The flow of air containing the aromatic smell is finally discharged from the air blowing system into the interior of the room in which the air blowing system is situated.

The mounting and demounting of the perfume container 26 or cap 28 are accomplished in such a manner as shown in Fig. 5. If the perfume container 26 is to be removed, the levers 27c of the clip 27 are manually grasped and displaced inwardly as shown by arrow 41. Thus, the resilient portion 27d of the clip 27 is flexed to deform the fitting portion 27a outwardly, so that the projections 2e of the transverse guides 2c are disengaged from the apertures 27b of the

fitting portion 27a. As a result, the clip 27 can be removed from the guide portion 2a. The perfume container 26 and cap 28 can be also removed from the guide portion 2a by moving them upwardly, opposite to the direction shown by arrow 43 in Fig. 4. At this time, the electromagnetic valve 29 is brought into engagement with the stopper 2g on the transverse guide 2c under the action of the spring 29a, as shown in Fig. 3. Such a condition will be maintained until the perfume container re-filled with a new perfume is mounted in the guide portion.

When the perfume container 26 is to be set, the perfume container 26 and cap 28 are inserted into the guide portion 2a from the upward direction, as shown by arrow 43 in Fig. 4. Since the transverse guides 2c in the main body 2 have a height about one-half of the height of the valve body 30, the container inserting means is moved upwardly above one of the transverse guides 2c so as not to interfere with the valve body 30. After being engaged by the transverse guide 2c on the main body 2, the container inserting means is moved toward the electromagnetic valve 29. When the concave and convex portions 2f, 28a are substantially aligned with each other, they are fitted over one another so that the container inserting means will be inserted into final engagement with the bottom face 2b of the main body 2. During such a procedure, the valve body 30

is separated from the stopper 2g at a point of time when the valve body 30 is engaged by the sealing face 28b to maintain the sealing state therebetween. After the container has been received by the guide portion 2a, the clip 27 is inserted between the convex portions 2d from the upward direction and the lever portions 27c of the clip 27 are flexed inwardly in the direction of arrow 41 as in the removal step. Under the influence of the resilient portion 27d, the projections 2e are fitted into the apertures 27b of the fitting portion 27a. It is of course possible that the clip 27 can be fitted simply by urging it along the guide from the upward direction if the upper parts of the projections 2e are slanted as shown in Fig. 5.

Although the present invention has been described as to the air cleaner, the present invention may be applied to any other air blowing system such as an air conditioner, blower or the like with similar advantages. Moreover, the perfume container may be replaced by any other detachable container such as a deodorant container or the like.

As will be apparent from the foregoing, the present invention utilizes a so-called snap-fit structure which comprises a guide portion located downstream of the fan for producing the flow of air and adapted to receive the container and a fixing means for fixing the container to the guide portion, the fixing means including an openable

fitting portion and actuating and resilient portions for opening and closing the fitting portion, thereby causing the fitting portion to engage the guide portion. Therefore, the replacement of the container may be facilitated even if the air blowing system is disposed within a relatively confined space.

Furthermore, the air blowing system of the present invention may comprise a guide portion receiving the perfume container, a fixing means for fixing the perfume container to the guide portion, an electromagnetic valve for controlling the amount of the perfume discharged, the electromagnetic valve including a valve body urged against the perfume container to close it under the action of a spring when the electromagnetic valve is in its de-energized state, and a stopper portion on the guide portion for engaging the valve body when the perfume container is removed. Therefore, the perfume container can easily be mounted or demounted in the air blowing system.



CLAIMS

1. An air blowing system with an aromatizing function, comprising fan means for producing a flow of air, a perfume container for containing a perfume to be emitted into the flow of air, guide means for holding the perfume container, fixing means for mounting the perfume container on the guide means, valve means for opening and closing the opening of the perfume container to control the amount of the perfume diffused into the flow of air, and electromagnetic solenoid means for controlling the valve means, whereby the valve means is engageable with the guide means at one end when the perfume container is removed.

2. An air blowing system as defined in claim 1, wherein said fixing means includes a grasping portion of a resilient material for grasping the perfume container, fitting portions formed on the opposite ends of the grasping portion and adapted to engage the guide means, and at least one set of projections formed integrally in the grasping portion and extending away from the fitting portions, whereby when an external force is applied to the opposite ends of said projections to move them toward each other, said grasping portion can be flexed outwardly to release the engagement between said guide portion and said grasping



portion.

3. An air blowing system constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 5 of the accompanying drawings.

4. A vehicle including an air blowing system in accordance with any one of the preceding claims.