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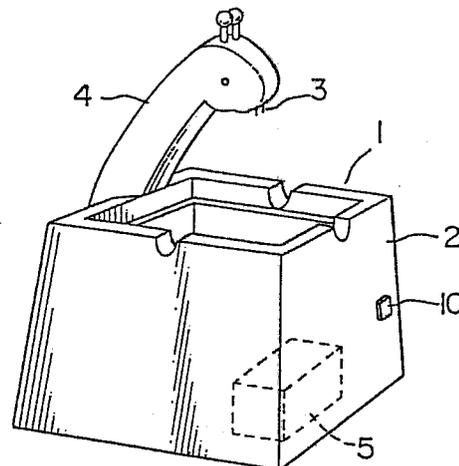
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64 **Ashtray.**

57 An ashtray having a small electrode (3) and a large electrode (13). A high voltage is applied between the two electrodes (3, 13) so that air is caused to flow from the small electrode (3) to the large electrode (13) and that the ionized particles of the smoke adhere to the large electrode (13). An auxiliary electrode (12) is provided to connect electrically to the large electrode.

FIG. 1



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## Description

## ASHTRAY

The present invention relates to an ashtray, particularly to an ashtray which catches smoke by attraction.

In some known ashtrays, a filter and a fan are provided. However, in many of these known ashtrays, most of the particles of the smoke of tobacco are not caught but scatter around because the diameter of each of the particles is as small as 0.3  $\mu\text{m}$  or less.

The present invention was made in order to provide an ashtray which efficiently catches the smoke of tobacco put thereon, to keep the smoke from scattering around.

Accordingly, it is an object of the present invention to provide an ashtray comprising a small electrode; a large electrode; and a mechanism for applying a high voltage between both the electrodes.

It is another object of the present invention to provide an ashtray comprising an ash reception plate; a small electrode provided over the ash reception plate at a distance therefrom; an auxiliary electrode opposed to the small electrode; a large electrode electrically coupled to the auxiliary electrode; and a mechanism for applying a high voltage between the small electrode and the auxiliary electrode and between the small electrode and the large electrode.

It is still another object of the present invention to provide an ashtray comprising an ash reception plate; a cylindrical member extending upward through the ash reception plate; a cover provided over the cylindrical member at a prescribed distance therefrom and covering the upper portion of the ash reception plate; a small electrode facing or communicating with the interior of the cylindrical member; a large electrode; and a mechanism for applying a high voltage between the small electrode and the large electrode.

It is still further object of the present invention to provide an ashtray comprising a base having an upper opening; an ash reception plate mounted detachably on the bottom surface of said base; a cover pivoted rotatably on said base for closing the upper opening of said base; a guide member engaged detachably with said cover; a small electrode provided on said guide member so as to face the upper surface of said ash reception plate; a frame electrode provided on said guide member adjacent said small electrode; a plate electrode provided on said guide plate so as to face a side surface of said ash reception plate; and a mechanism for applying a high voltage between said electrodes.

A further object and characteristics of the present invention will now be explained with reference to the attached drawings, which are given by way of example

FIG. 1 shows a perspective view of an ashtray which is an embodiment of the present invention;

FIG. 2 shows a front view of the ashtray;

FIG. 3 shows a plan view of the ashtray;

FIG. 4 shows a circuit diagram of a high-voltage power supply;

FIG. 5 shows a perspective view of an ashtray which is another embodiment of the present invention;

FIG. 6 shows a front view of the ashtray shown in FIG. 5;

FIG. 7 shows a plan view of the ashtray shown in FIG. 5;

FIG. 8 shows a perspective view of an ashtray which is still another embodiment of the present invention;

FIG. 9 shows a front view of the ashtray shown in FIG. 8;

FIG. 10 shows a plan view of the ashtray shown in FIG. 8;

FIG. 11 shows a front view of an ashtray which is still another embodiment of the present invention;

FIG. 12 shows a longitudinally sectional view of an ashtray which is still another embodiment of the present invention;

FIG. 13 shows a plan view of the ashtray shown in FIG. 12;

FIG. 14 shows an explanatory view of an ashtray which is still another embodiment of the present invention;

FIG. 15 shows a longitudinally sectional side view of an ashtray which is still another embodiment of the present invention;

FIG. 16 shows a longitudinal sectional front view of the ashtray shown in FIG. 15; and

FIG. 17 shows an explanatory perspective view thereof.

FIGS. 1, 2 and 3 show an ashtray which is a first embodiment of the present invention and has an ash reception plate 1 and a base 2 therefor. The ash reception plate 1 constituting a large electrode is made of an electroconductive material such as a metal plate (large electrode). Needle-like electrodes 3 constituting small electrodes are provided over the ash reception plate 1 at a distance therefrom and held by an arm 4 on the base 2. A high voltage from a high-voltage power supply 5 provided in the base 2 is applied between the ash reception plate 1 and the needle-like electrodes 3 through an insulated electric wire not shown in the drawings.

FIG. 4 shows the high-voltage power supply 5 in which a DC voltage of 12 V is converted into a high-frequency signal by an oscillation circuit 6; the high-frequency signal is applied to the primary coil of a boosting transformer 8 through a feedback circuit 7; and an AC voltage of 5.0 kV from the secondary coil of the transformer 8 is rectified by a voltage doubler rectifier 9 to produce a DC output voltage of 6.5 kV, for example. A commercial AC voltage may be used instead of the DC voltage of 12 V. The AC voltage from the secondary coil of the boosting transformer 8 may be directly applied between the

electrodes 1 and 3 instead of the DC output voltage of 6.5 kV.

Shown at 10 in FIGS. 1, 2 and 3 is a push-button power switch provided in a circuit through which the DC voltage of 12 V is applied to the oscillation circuit 6. When the transparent push button of the switch 10 is pressed, a lamp inside the push button is lit so that it is possible to confirm by eyesight whether the switch 10 is turned on or off.

When the switch 10 is pressed and the high voltage is applied between the ash reception plate (large electrode) 1 and the needle-like electrode (small electrodes) 3, air is caused to flow from the needle-like electrodes 3 toward the ash reception plate 1 so that the smoke of tobacco put on the ash reception plate 1 is made to flow toward the ash reception plate 1 and the ionized particles of the smoke adhere to the surface of the ash reception plate 1 due to an electrostatic force. Therefore, the smoke of the tobacco does not scatter around the ash reception plate 1. The purpose is thus surely attained.

FIGS. 5, 6 and 7 show an ashtray which is a second embodiment. In the ashtray, a cover 11 constituting a large electrode made of an electroconductive material is provided so that the cover surrounds needle-like electrodes (small electrodes) 3. A high voltage is applied between the cover 11 and the needle-like electrodes 3 as in the first preferred embodiment. As a result, the smoke of tobacco on an ash reception plate 1 once goes up and is then caught on the cover 11 by attraction so that the smoke is efficiently prevented from scattering around.

FIGS. 8, 9 and 10 show an ashtray which is a third preferred embodiment. In the ashtray, a frame-like electrode 12 constituting an auxiliary electrode, whose cross section is oblong or circular, is provided beside needle-like electrodes 3 at a distance therefrom. A plate electrode 13 constituting a large electrode bent as U-shape or as arc is integrally coupled to the frame-like electrode 12 so that the flat or curved surface of the plate electrode 13 faces the side surface of an ash reception plate 1. A high voltage from a high-voltage power supply 5 provided in a base 2 is applied between the needle-like electrodes 3 and the frame-like electrode 12 or the plate electrode 13 through an insulated electric wire not shown in the drawings.

When the high voltage is applied between both the electrodes 3 and 12 and between the electrodes 3 and 13 by pressing a switch 10 in the third embodiment, a flow of ions from the needle-like electrodes 3 toward the central portion of the frame-like electrode 12 is caused and the flow further proceeds along the plate electrode 13. The smoke of tobacco put on an ash reception plate 1 is caused to flow from the ash reception plate 1 toward the plate electrode 13 along with the flow of the ions so that the ionized particles of the smoke are caught on the surface of the plate electrode 13 by an electrostatic force. The smoke of the tobacco is thus prevented from scattering around the ash reception plate 1. Therefore, the purpose is surely attained.

FIG. 11 shows an ashtray which is a fourth

embodiment. In the ashtray, parallel plate electrodes 14 are provided as auxiliary electrodes at vertical distances from one another instead of the frame-like electrode 12 provided in the third preferred embodiment. The parallel plate electrodes 14 are hung by nonelectroconductive members (not shown in the drawings) from an arm 4 and connected to a plate electrode 13 through electroconductive members (not shown in the drawing). It is preferable to place needle-like electrodes 3 at the average height of the parallel plate electrodes 14. The same effect is produced by the fourth preferred embodiment as the above-described embodiments.

FIGS. 12 and 13 show an ashtray which is a fifth preferred embodiment. In the ashtray, an annular electrode 15 is provided as an auxiliary electrode to face needle-like electrodes 3 and located in the middle of a space surrounded by a cover 11 as in the second preferred embodiment. The annular electrode 15 is supported by electroconductive members 16 on the cover 11. The same effect is produced by the fifth embodiment as the above-described preferred embodiments.

FIG. 14 shows an ashtray which is a sixth embodiment. In the ashtray, a cylindrical member 17 extending upward through an ash reception plate 1 is provided. A cover 18 is provided over the cylindrical member 17 at a prescribed distance therefrom and covers the ash reception plate 1. Needle-like electrodes 3 are located under the cylindrical member 17 to face the interior thereof. A plate electrode 13 is located under the ash reception plate 1. The smoke of tobacco goes up from the ash reception plate 1 and is then transferred below the ash reception plate 1 through the cylindrical member 17 and caught on the plate electrode 13 by attraction.

In each of the above-described embodiments, the needle-like electrodes 3 may be made up of either a single electrode or a plurality of electrodes spaced apart one another. The electrodes 3 may also be shaped as a ball, a rod, a spicule or saw teeth. The frame-like electrode 12 may be reticulate. The plate electrode 13 may have projections and recesses or be reticulate.

In a seventh embodiment, as shown in Figs. 15 and 16, an insulating ash reception plate 1 is mounted detachably on the bottom surface of a box-shaped base 2 having an upper opening, and a cover 23 comprising a horizontal plate 23a for closing the upper opening of said base 2 and a vertical plate 23b is pivoted rotatably on the rear portion of said box-shaped base 2 at the substantial central portion of said vertical plate 23b. A DC power supply 5 of several kV is fixed on the back of said vertical plate 23b, a cathode terminal 5a of the power supply 5 is provided on the lower surface of the horizontal plate 23a of said cover 23 and an anode terminal 5b is provided on the front surface of the vertical plate 23b.

Guide plates 27 extending in the lower direction are formed at both sides of the horizontal plate 23a of said cover 23. An insulating guide plate 28 is engaged slidably with the cover 23 along the guide plates 27. A small electrode, such a needle-like

electrode 3 is provided detachably on said insulating guide plate 28 so as to face the upper surface of said ash reception plate 1. So that a needle-like electrode 3 is brought into contact with said cathode electrode 5a of said power supply 5.

An annular or rectangular frame electrode 12 is provided at a portion backwards of the needle-like electrode 3 on the intermediate lower surface of said guide plate 28 and a plate electrode 13 extending in the lower direction is connected to said annular frame electrode, so that in the state that the guide plate 28 is mounted on the opening and closing cover 23 said plate electrode 13 is brought into contact with the anode terminal 5b of said power supply 5 and faced to a side surface of said ash tray 1.

Further, an opening 22 communicating with an upper portion of said ash reception plate 1 is provided on a lower back portion of the base 2.

A timer (not shown) is provided for maintaining ON state of a power switch 10 through a predetermined time, such as five minutes when the power switch 10 is turned on. The power switch 10 is automatically turned off after the predetermined time has passed. Reference numeral 24 denotes a lamp for indicating the ON state of the power switch 10, 25 a battery case and 26 batteries.

In this embodiment, such means may be provided that the power switch 10 is automatically turned on when said cover 23 is opened and turned off when said cover 23 is closed.

As said high-voltage power supply 5, a commercial AC voltage with AC adaptor 29 may be used instead of the DC voltage of 12V.

In this embodiment, when the cover 23 is opened and the switch 10 is pressed and the high voltage is applied between the frame electrode 12 or the plate electrode 13 and the needle-like electrode 3, ion is caused to flow from the needle-like electrodes 3 toward the plate electrode 13 through the center of the frame electrode 12 as shown in Fig. 17 so that the smoke of tobacco put on the ash reception plate 1 is risen from the ash reception plate 1, flows along said ion flow and said plate electrode 13 and discharged from the lower opening 22, while the ionized particles of the smoke adhere to the surface of the plate electrode 13 due to an electrostatic force. Therefore, the smoke of the tobacco does not scatter around the ash reception plate 1. The purpose is thus surely attained.

Each of the above-described ashtrays provided in accordance with the present invention has a large advantage that the smoke of tobacco is efficiently attracted and caught without using a fan and expendables such as a filter.

## Claims

1. An ashtray comprising a small electrode (3); a large electrode (13); and a mechanism (5) for applying a high voltage between both said electrodes (3, 13).

2. An ashtray according to claim 1, in which

the large electrode (13) is an ash reception plate (1).

3. An ashtray comprising an ash reception plate; a small electrode (3) provided over said ash reception plate (1) at a distance therefrom; an auxiliary electrode (12, 15) opposed to said small electrode (3); a large electrode (13) electrically coupled to said auxiliary electrode (12, 15); and a mechanism (5) for applying a high voltage between said small electrode (3) and said auxiliary electrode (12, 15) and between said small electrode (3) and said large electrode (13).

4. An ashtray according to claim 3, in which the large electrode (13) is a plate having a curved surface located beside the ash reception plate (1).

5. An ashtray according to claim 3 or 4, in which the auxiliary electrode is a frame-like electrode (12).

6. An ashtray according to claim 3 or 4, in which the auxiliary electrode consists of parallel plate electrodes (14).

7. An ashtray according to claim 1, 3, 4, 5 or 6 in which the large electrode (13) is a cylindrical member (11) surrounding the small electrode (3).

8. An ashtray comprising an ash reception plate (1); a cylindrical member (17) extending upward through said ash reception plate (1); a cover (18) provided over said cylindrical member (17) at a prescribed distance therefrom and covering the upper portion of said ash reception plate (1); a small electrode (3) facing or communicating with the interior of said cylindrical member (17); a large electrode (13); and a mechanism (5) for applying a high voltage between said small electrode (3) and said large electrode (13).

9. An ashtray according to claim 8, in which the small electrode (3) and the large electrode (13) are located under the ash reception plate (1).

10. An ashtray comprising a base (2) having an upper opening; an ash reception plate (1) mounted detachably on the bottom surface of said base (2); a cover (23) pivoted rotatably on said base (2) for closing the upper opening of said base (2); a guide member (28) engaged detachably with said cover (23); a small electrode (3) provided on said guide member (28) so as to face the upper surface of said ash reception plate (1); a frame electrode (12) provided on said guide member (28) adjacent said small electrode (3); a plate electrode (13) provided on said guide member (28) so as to face a side surface of said ash reception plate (1); and a mechanism (5) for applying a high voltage between said electrodes (3, 12, 13).

11. An ashtray according to claim 10, in which the plate electrode (13) is connected to said frame electrode (12).

12. An ashtray according to claim 10 or 11, in which the small electrode (3) is a needle-like electrode.

13. An ashtray according to claim 10, 11 or 12 in which the frame electrode (12) is annular or rectangular.

14. An ashtray according to claim 1, 2, 10, 11, 12 or 13 in which the small electrode (3) is opposed to the or an ash reception plate (1).

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FIG. 2

FIG. 1

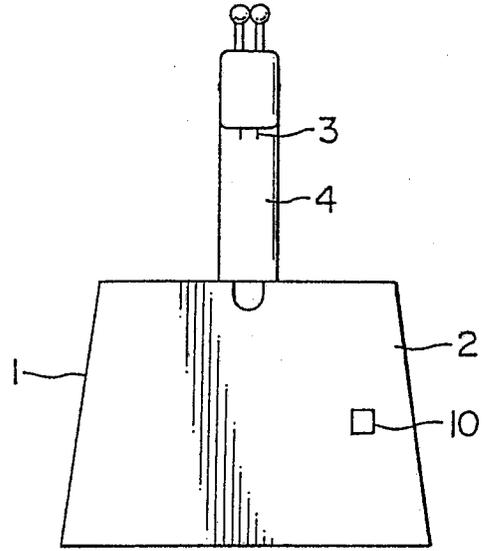
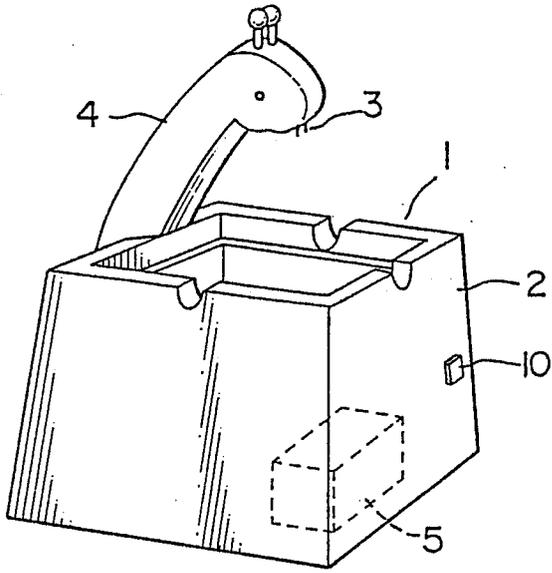


FIG. 3

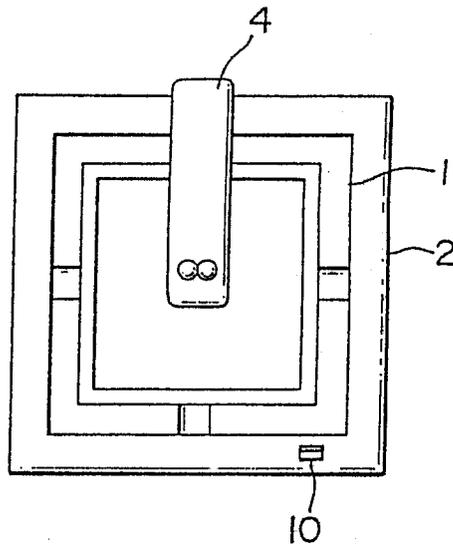


FIG. 4

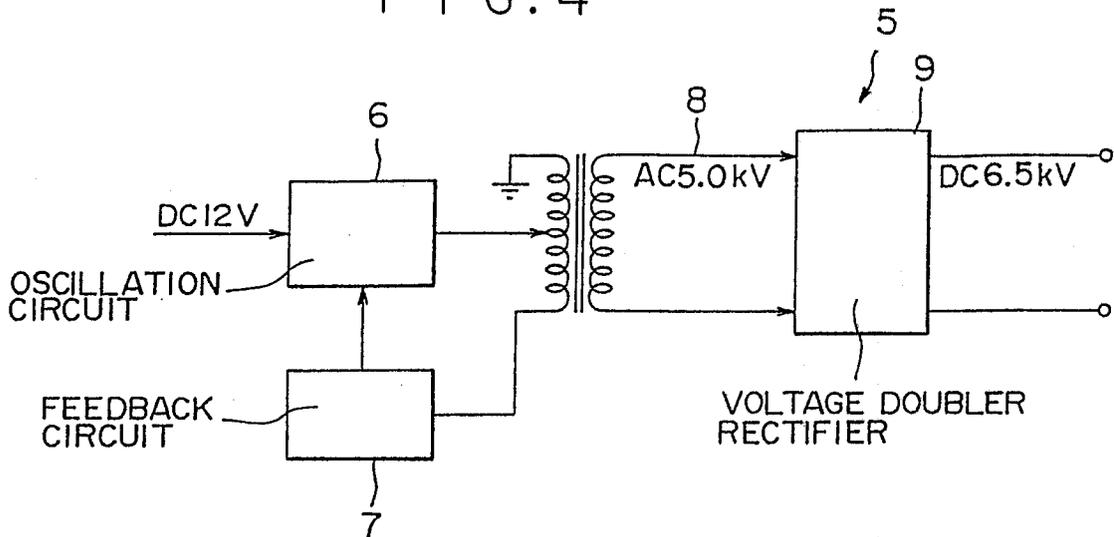


FIG. 5

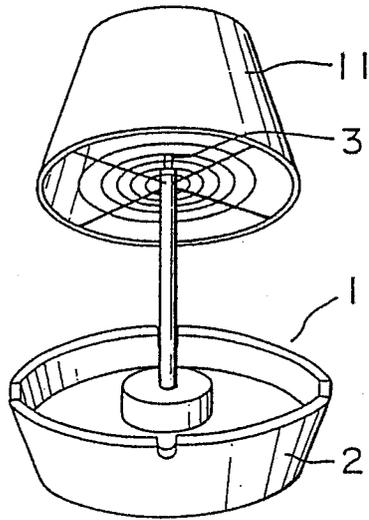


FIG. 8

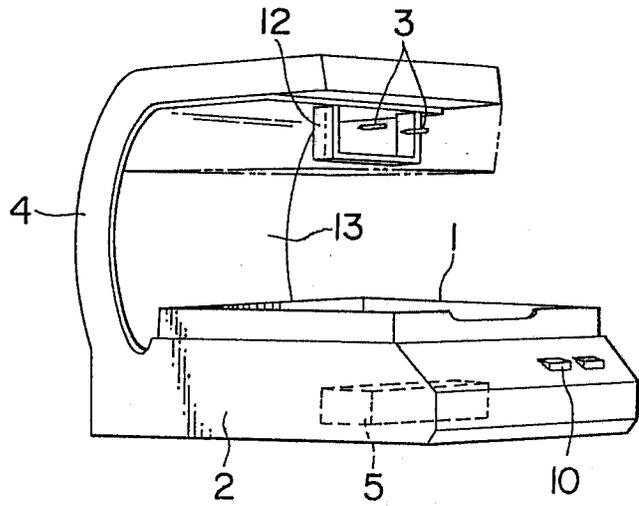


FIG. 6

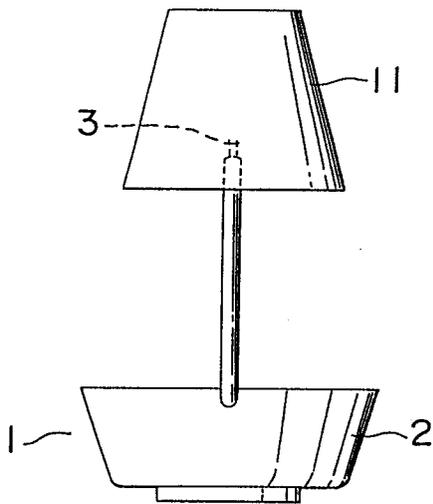


FIG. 9

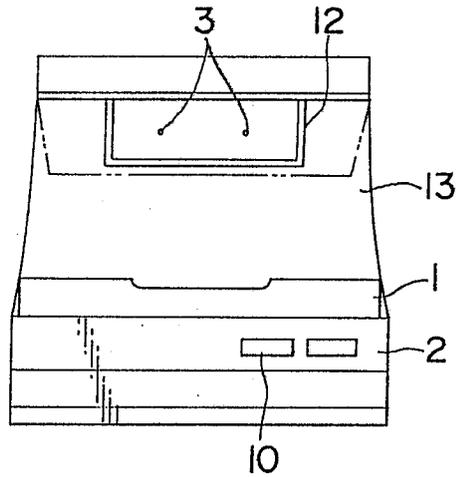


FIG. 7

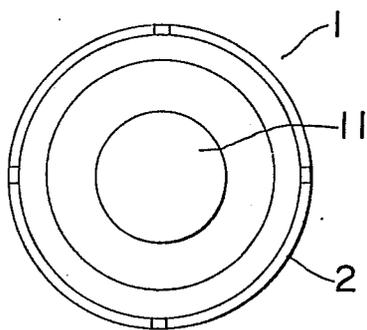
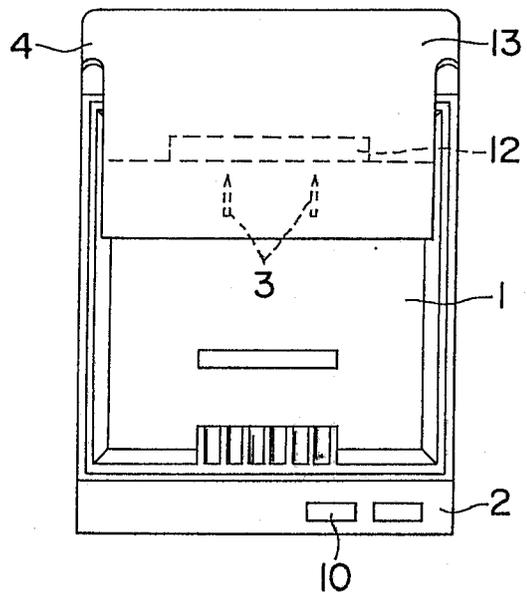


FIG. 10



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FIG. 11

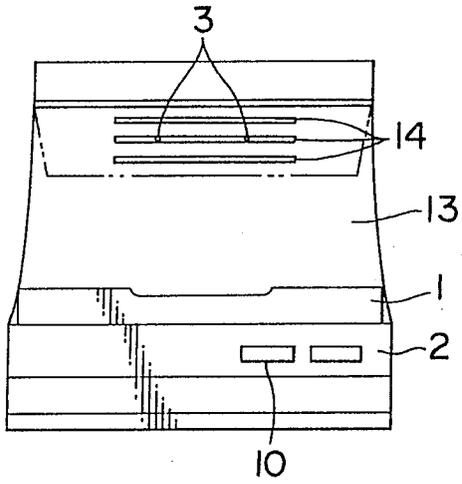


FIG. 12

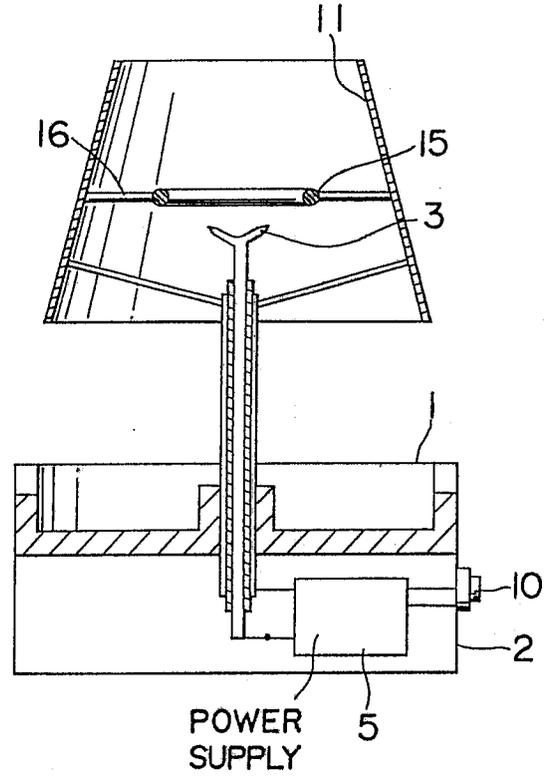


FIG. 13

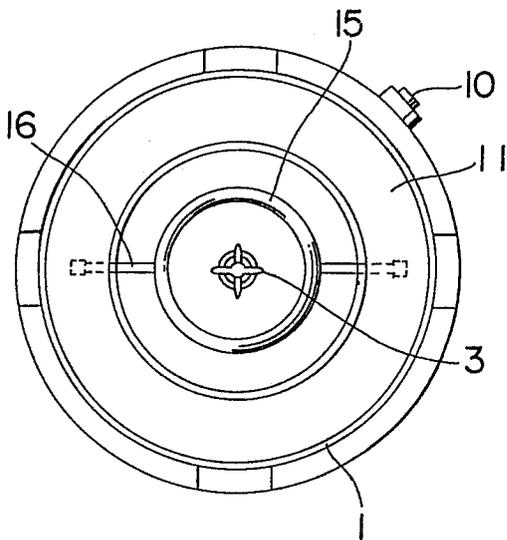


FIG. 14

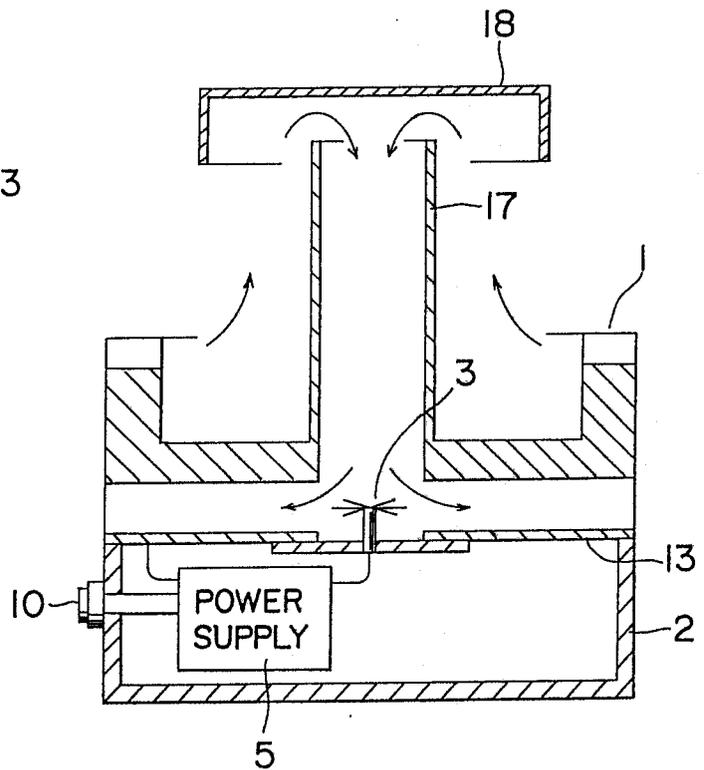


FIG. 15

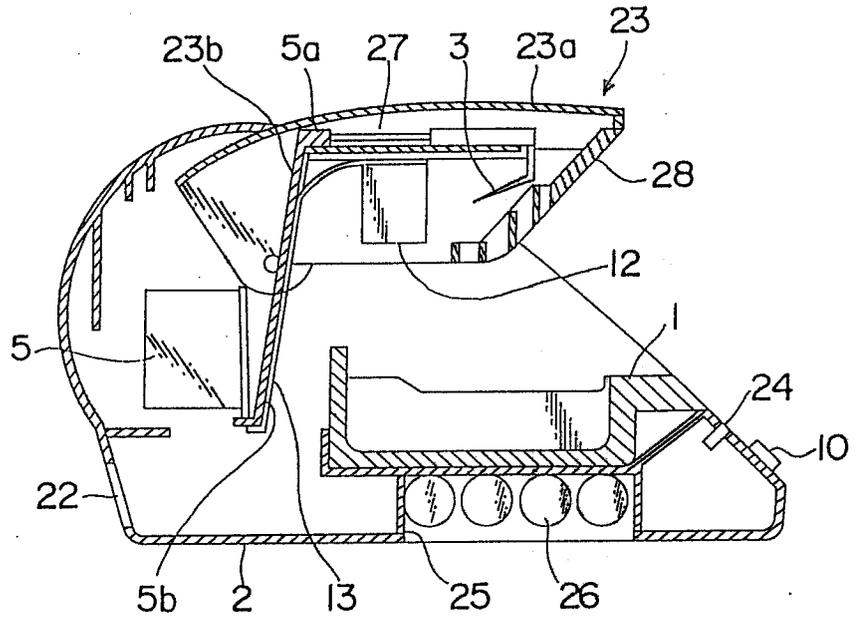


FIG. 16

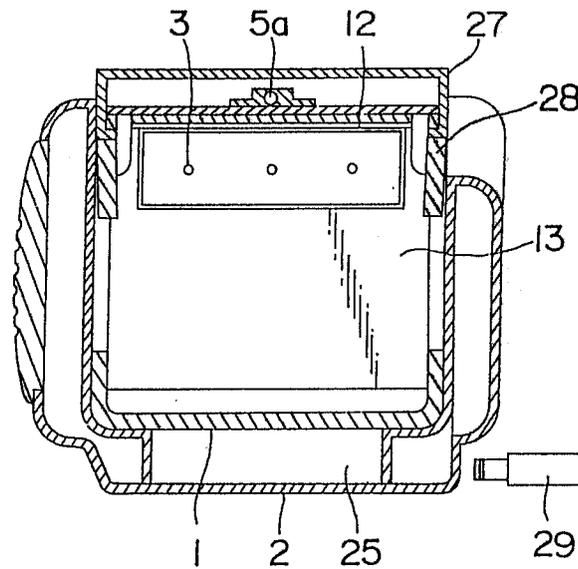
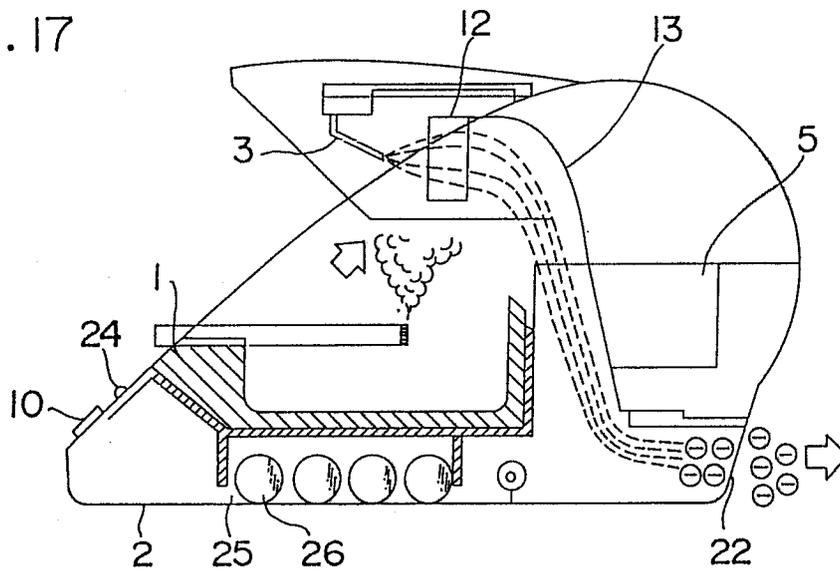


FIG. 17





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-2 132 410 (BOSCH) * Whole document * ---	1-2	A 24 F 19/00 B 03 C 3/32
A	FR-A-2 583 657 (ATELIERS R.MINGRET) * Figures 1-2; page 5, line 24; page 7, line 27 * ---	1-2	
A	US-A-3 807 148 (FIKE) * Column 6, lines 35-44 * ---	1	
A	US-A-4 177 045 (OREL) * Figure 3; column 5, lines 14-58 * -----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 24 F B 03 C
Place of search		Date of completion of the search	Examiner
THE HAGUE		31-05-1988	RIEGEL R. E.
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