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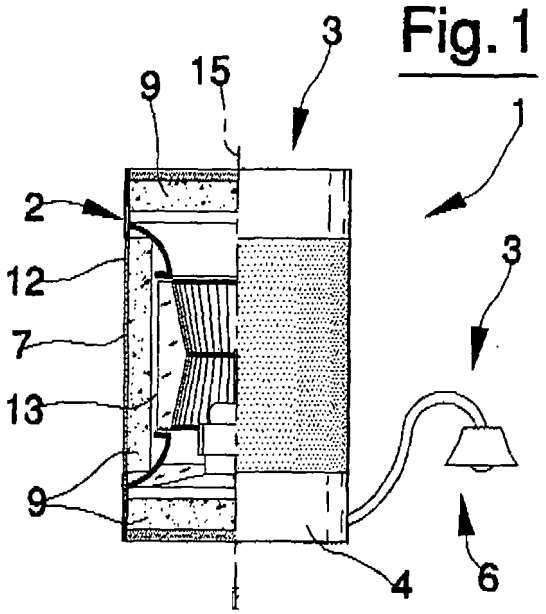
(54) Multipurpose domestic appliance

(57) A domestic appliance (1) comprises a combination of at least one independent unit (2) for recirculating and treating a flow (5) of air extracted from and returned to a room intended for human occupancy, and at least one second functional unit (6) associated with the first unit (2) and combining with the latter to form a self-contained functional structure (4) for the domestic appliance (1) shared by both the units (2,6), said one or more functional units (6) comprising either at least one other independent air treatment and recirculation unit (2) or at least one light fixture (3) for illuminating the room in which the domestic appliance (1) is installed. An independent unit (2) for recirculating and treating an air flow (5) also forms part of the invention.

Fig. 1



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Description

[0001] This invention relates to a domestic appliance for combined air treatment and illumination in a confined room, especially in a room intended for human occupancy.

[0002] It is known that rooms intended for human occupancy such as houses, offices or other structures regularly occupied by human beings may be furnished with self-contained domestic appliances, also known as purifiers, through which the ambient air of a room is circulated in closed-cycle fashion, to be purified by removal of the contaminating agents and then returned to the room.

[0003] This function may also be performed by certain types of kitchen hoods. In fact, some hoods, in addition to their basic function (which, as is well known, is that of extracting air from the room in which they are installed and expelling it to the outside environment) perform an accessory function of treating the air in a manner very much the same as that performed by the above mentioned domestic appliances. There are also filtering hoods which are designed to treat the air by purifying and recirculating it continuously in the room without expelling it to the outside environment.

[0004] Purifiers of this kind are single-purpose appliances in the form of cabinets housing a structural, generally box-shaped casing, a fan unit and batteries of filters associated with the fan unit. The fan and filter battery assembly must be suitably rated for the volume of air in the room to be treated, which means that these appliances are usually of considerable size, difficult to fit into the furnishing scheme of a room, and therefore made as self-contained units to be kept separate from the rest of the furniture of the rooms where they are installed and to be preferably placed on the floor.

[0005] As regards hoods, on the other hand, it should first of all be stressed that, irrespective of their functional capabilities (air extraction or recirculation in the case of hoods of the first type mentioned above, or only air treatment and recirculation in the case of hoods of the second type) their place in a room is strictly dependent on the position of the cooking appliances installed in the same room. In other words, whatever its typical function, a hood is bound to be installed over a cooking appliance: for this reason, the place of the hood within the furnishing scheme of a room is invariably determined by the place of the cooking appliance in that room.

[0006] Many extractor and/or recirculating hoods available today have fan units with squirrel cage impellers, with double inlet, associated with tangential or centrifugal scroll casings. These fan units offer excellent functional performance, allowing the treatment of large air flows and the achievement of low noise emissions.

[0007] On account of the structure of these fan units, the hoods in which they are used are bound by strict dimensional constraints, meaning that they cannot be made smaller than certain minimum values depending mainly on the relatively large size of the motors that drive the fan units.

[0008] In short, prior art purifiers and hoods share the disadvantage of relatively large size which — where high efficiency in terms of large air flows must be accompanied by low noise levels during operation - cannot be reduced below a certain minimum level.

[0009] As a result, both purifiers and hoods in prior art are self-contained bulky domestic appliances intrinsically unable to be combined with other types of appliances to form complex systems.

[0010] Moreover, it should be noticed that prior art hoods are normally also equipped with lights.

[0011] Owing to their very nature, however, these lights cannot be compared to functionally self-contained domestic appliances and are, rather, minor accessories of limited technical potential designed solely to illuminate the work space immediately below the hood and being totally dependent on the requirements of the cooking appliance and hood.

[0012] The main aim of this invention is therefore to provide a domestic appliance built in a single structure capable of performing in an equally effective manner at least two functions, that is to say, purification of the ambient air and illumination in the room where the domestic appliance is installed.

[0013] Another aim of the invention is to permit the provision of a domestic appliance of this kind in which the potential of each of the typical functions of the appliance can, without limiting or conditioning the other, be varied selectively in accordance with the requirements of the room in which the appliance is installed.

[0014] Yet another aim of the invention is to provide a domestic appliance where a very high level of air treatment efficiency - both in terms of large volumes of treated air and in terms of low noise - can be achieved in a structure that is considerably smaller in size than known domestic appliances used for the same purpose and offering the same level of performance and efficiency.

[0015] A further aim of the invention is to permit the provision of a domestic appliance whose intrinsic technical capabilities are such as not to condition or appreciably interfere with its exterior appearance, thus enabling the appliance: on the one hand, to extend its range of possible applications and, on the other, to allow designers the fullest freedom of creative expression as to the outward appearance of the end product.

[0016] Another aim of the invention is to provide a domestic appliance which can be harmoniously integrated, without difficulty, in the furnishing scheme of the room in which it is to be installed.

[0017] Another aim of the invention is to permit the provision of a domestic appliance that is not constrained to any specific location in the room where it is to be installed.

[0018] The technical characteristics of the invention, with reference to the above aim, can be easily inferred from the appended claims, in particular claim 1 or claim

22, and also from any of the claims that depend, whether directly or indirectly, on claim 1 or claim 22.

[0019] The advantages of the invention are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate preferred embodiments of the invention provided merely by way of example and without restricting the scope of the inventive concept, and in which:

- Figures 1 and 2 are, respectively, a perspective view and a plan view, both having some parts cut away, of a domestic appliance according to the invention illustrated as a whole;
- Figures 3 and 4 are cutaway perspective and plan views of the domestic appliance according to the invention;
- Figure 5 shows a first embodiment of the invention, with some parts cut away in order to better illustrate others, in a first possible installation condition;
- Figures 6 and 7 show a second embodiment of the invention, with some parts cut away in order to better illustrate others, in a second installation condition;
- Figures 8 and 9 show a third embodiment of the invention, with some parts cut away in order to better illustrate others, in a third installation condition.

[0020] With reference to Figure 1, the numeral 1 denotes a multipurpose domestic appliance designed to purify the air in a confined room such as, for example a room intended for human occupancy, and at the same time to illuminate the room in which the domestic appliance 1 itself is installed.

[0021] More specifically, the domestic appliance 1 is equipped with a first independent unit 2 for recirculating and treating a flow of air 5 extracted from and returned to the room, and one or more second functional units 6 associated with the first unit 2 and combining with the first unit 2 to form a structure 4 for a domestic appliance 1 shared by both the units 2 and 6.

[0022] The second functional unit 6 may comprise either one or more other independent air treatment and recirculation units 2 (for example, see Figures 8 and 9) or one or more light fixtures 3 for illuminating the room in which the domestic appliance 1 is installed (for example, see Figures 1 and 2 and 5 to 9).

[0023] The domestic appliance 1 may therefore have a multiplicity of different forms that can be obtained without any limitations by combining independent units 2 with each other creatively to form assemblies of any desired complexity.

[0024] Figure 5 shows a first embodiment of the invention where the domestic appliance 1 is in the form of an air treatment unit 2 combined with a second functional unit 6 which, in this particular case, consists of a light fixture 3 for illuminating the room. In this configuration, the domestic appliance 1 may be hung from a ceiling 19, the housing structure 4 including, for this purpose, suitable cables or chains 18.

[0025] Figures 6 and 7 show a domestic appliance 1 with a configuration similar to that of Figure 5 but in the form of a projecting fixture mounted on a vertical wall 20. In this case, the structure 4 comprises a wall mounting plate 21 and a bracket 22 that supports the appliance 1.

[0026] Figures 8 and 9 show another embodiment of the domestic appliance 1 where the first independent air recirculation and treatment unit 2 is integrated, in a single body, by a plurality of second functional units 6, which may consist of other similar air treatment units 2 and/or other light fixtures 3, in any combination. In this case, the structure 4 comprises, for example, a central upright 23 that collectively supports the first independent unit 2 and all the functional units 6 associated with it. The central upright 23 may be either floor mounted or it may be hung from a ceiling like a conventional chandelier.

[0027] As regards the air treatment units, Figures 2, 3 and 4 show that the domestic appliance 1 essentially comprises at least one independent air recirculation and treatment unit 2 which in turn comprises a tubular cylindrical casing 7, mechanical ventilation means 8 housed in the casing 7 and air filtering means 9 associated with the casing 7, which operate in conjunction with each other to create and maintain an active air flow 5 that is extracted from the room, moved by the mechanical ventilation means 8, made to flow along the casing 7, through the filtering means 9 and then out again into the room from which it was first extracted.

[0028] More specifically, the tubular casing 7 comprises two ambient air inlet sections 10, associated with respective opposite axial openings 11 of the tubular casing 7, and an air flow 5 outlet section 12 running through the casing 7 and associated with the cylindrical lateral surface of the casing 7 at a location substantially half way between the two inlet sections 10.

[0029] The filtering means 9 are associated with the inlet sections 10 and outlet section 12. There are three filtering stages, two of which are associated, respectively, with each of the two inlet sections 10 and the third with the outlet section 12.

[0030] The mechanical ventilation means 8 comprise a power-driven impeller 13 housed in, and coaxial with, the tubular casing 7. The impeller 13 includes a double squirrel-cage impeller 14 adapted to receive the air flow 5, which enters the casing 7 in an axial direction 15, and to discharge it from the casing 7 in a radial direction 16.

[0031] The mechanical ventilation means 8 include a motor 17, housed in the casing 7 and used to drive the impeller 14.

[0032] Thanks to the special way the double squirrel-cage impeller 14 is mounted in the casing 7 and to the paths which the air flow 5 is made to follow, the mechanical ventilation means 8 provide air treatment units 2 capable of treating large air volumes, while keeping noise at very low levels and allowing the units 2 to be considerably reduced in size.

[0033] In other words, the independent air recirculation and treatment units 2 are small enough to be combined

in multiple operating configurations in a wide variety of different ways to fit in any furnishing scheme, the examples illustrated in the drawing being just a few of the many possibilities offered.

[0034] It should also be noticed that the air recirculation and treatment units 2 may be identical or they may differ in terms of size of the casing 7 and rating of the individual units 2.

[0035] Thanks to these characteristics, the invention offers an extremely wide range of possible configurations. Thus, the domestic appliance 1 can be used as an air purifier that can be installed anywhere in a room and made to fit with the furniture of the room.

[0036] The configurations can be adapted to meet a wide range of capacity requirements: thus, it is sufficient to combine two or more casings 7, that is to say, a plurality of air treatment units 2, to obtain operating capacities corresponding to multiples of the basic capacity of one unit.

[0037] The appliance 1 can also be associated with a cooking appliance and used as a filtering hood. Obviously, if the capacity requirement is high, it is sufficient to combine a number of treatment units 2 to make up the required performance capacity. It should also be mentioned that combining two or r more treatment units means that the individual units can be selectively turned on or off so as to adjust operation according to different ambient conditions.

[0038] The light fixture, too, can be made in an extremely wide range of designs in terms not only of how it is combined with the air treatment unit 2 but also of the lighting and technical specifications that can be implemented to illuminate different rooms. The invention contemplates the use of any type of lamp such as, purely by way of example, incandescent, halogen or neon lamps or even LEDs.

[0039] It will be understood that the invention described, useful in many industrial applications, may be modified and adapted in several ways without thereby departing from the scope of the inventive concept and that all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A domestic appliance **characterised in that** it comprises a combination of at least one independent unit (2) for recirculating and treating a flow (5) of air extracted from and returned to a room intended for human occupancy, and at least one second functional unit (6) associated with the first unit (2) and combining with the latter to form a self-contained functional structure (4) for the domestic appliance (1) shared by both the units (2, 6), said one or more functional units (6) comprising either at least one other independent air treatment and recirculation unit (2) or at least one light fixture (3) for illuminating the room in which the domestic appliance (1) is installed.

2. The domestic appliance according to claim 1, **characterised in that** it comprises a plurality of the independent air recirculation and treatment units (2), collectively associated with each other, it being possible to selectively turn said independent air recirculation and treatment units (2) on or off in such a way as to adapt the performance of the domestic appliance (1) accordingly.

3. The domestic appliance according to claim 2, **characterised in that** the independent air recirculation and treatment units (2) are identical.

4. The domestic appliance according to one of the foregoing claims, **characterised in that** each of the one or more independent air recirculation and treatment units (2) comprises a tubular casing (7), mechanical ventilation means (8) housed in the casing (7) and air filtering means (9) associated with the casing (7), an air flow (5) extracted from the room, moved by the mechanical ventilation means (8) and made to flow along the casing (7), being intercepted by the filtering means (9) before being discharged into the room again.

5. The domestic appliance according to claim 4, **characterised in that** the tubular casing (7) comprises at least one ambient air inlet section (10) located at an axial opening (11) of the casing (7).

6. The domestic appliance according to claim 5, **characterised in that** the casing (7) comprises two ambient air inlet sections (10), associated with respective axial openings (11) of the casing (7), and at least one outlet section (12) through which the air flow (5) flows out of the casing (7) and being associated with the lateral surface of the casing (7).

7. The domestic appliance according to claim 6, **characterised in that** the filtering means (9) are located near at least one of the inlet (10) and/or outlet (12) sections of the casing (7).

8. The domestic appliance according to one of the foregoing claims from 4 to 7, **characterised in that** the filtering means (9) include at least two filtering stages, associated, respectively, with each of the one or more inlet sections (10) and with the outlet section (12).

9. The domestic appliance according to one of the foregoing claims from 4 to 9, **characterised in that** the mechanical ventilation means (8) comprise a power-driven impeller (13) housed in and coaxial with the tubular casing (7).

10. The domestic appliance according to claim 9, **characterised in that** the impeller (13) has the form of a double inlet squirrel cage and is adapted to receive an air flow (5) entering the casing (7) in an axial direction (15), and to discharge it from the casing (7) in a radial direction (16).

11. The domestic appliance according to claim 10, **characterised in that** the mechanical ventilation means (8) include a motor (17), housed in the casing (7) and used to drive the impeller (14).

12. The domestic appliance according to one of the foregoing claims from 1 to 11, **characterised in that** it comprises a structure (4) designed to enable the domestic appliance (1) to be hung from a ceiling.

13. The domestic appliance according to one of the foregoing claims from 1 to 11, **characterised in that** it comprises a structure (4) designed to enable the domestic appliance (1) to be mounted on a vertical wall.

14. The domestic appliance according to one of the foregoing claims from 1 to 11, **characterised in that** it comprises a structure (4) designed to enable the domestic appliance (1) to be mounted on a horizontal surface.

15. The domestic appliance according to claim 14, **characterised in that** it is made in such a way as to be mounted on a floor.

16. The domestic appliance according to any of the foregoing claims, **characterised in that** it can be associated with a cooking appliance.

17. The domestic appliance according to one of the foregoing claims, **characterised in that** the light fixture (6) comprises at least one incandescent lamp.

18. The domestic appliance according to one of the foregoing claims from 1 to 16, **characterised in that** the light fixture (6) comprises at least one halogen lamp.

19. The domestic appliance according to one of the foregoing claims from 1 to 16, **characterised in that** the light fixture (6) comprises at least one neon lamp.

20. The domestic appliance according to one of the foregoing claims from 1 to 16, **characterised in that** the light fixture (6) comprises at least one LED.

21. The domestic appliance according to one of the foregoing claims, **characterised in that** the tubular casing (7) is cylindrical in shape.

22. An independent unit for recirculating and treating a flow (5) of air extracted from and returned to a room intended for human occupancy, **characterised in that** it comprises: at least one cylindrical tubular casing (7) with at least one ambient air inlet section (10) and at least outlet section (12), where each of the one or more inlet sections (10) is associated with a respective axial opening (11) of the casing (7) and each of the one or more outlet sections (12) is associated with the lateral surface of the casing (7); mechanical ventilation means (8) housed in the casing (7); and air filtering means (9) associated with the casing (7), an air flow (5) extracted from the room, and moved by the mechanical ventilation means (8) and made to flow along the casing (7) in an axial direction (15) being intercepted by the filtering means (9) before being discharged from the casing (7) into the room again in a radial direction (16).

23. The independent unit according to claim 22, **characterised in that** the filtering means (9) are located near at least one of the inlet (10) and/or outlet (12) sections of the casing (7).

24. The independent unit according to claims 22 and 23, **characterised in that** the filtering means (9) include at least two filtering stages, associated, respectively, with each of the one or more inlet sections (10) and with the outlet section (12).

25. The independent unit according to claims 22 to 24, **characterised in that** the mechanical ventilation means (8) comprise a power-driven impeller (13) housed in and coaxial with the tubular casing (7).

26. The independent unit according to one of the foregoing claims from 22 to 25, **characterised in that** the impeller (13) has the form of a double inlet squirrel cage and is adapted to receive an air flow (5) entering the casing (7) in an axial direction (15), and to discharge it from the casing (7) in a radial direction (16).

27. The independent unit according to claim 26, **characterised in that** the mechanical ventilation means (8) include a motor (17), housed in the casing (7) and used to drive the impeller (14).

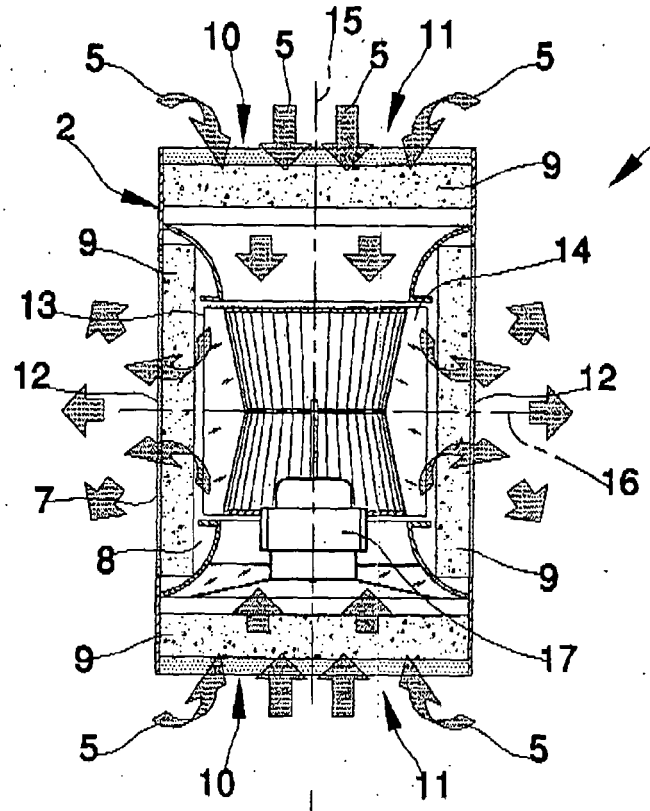


Fig. 3

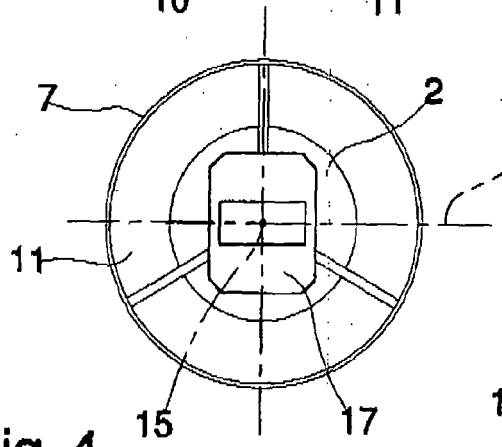


Fig. 4

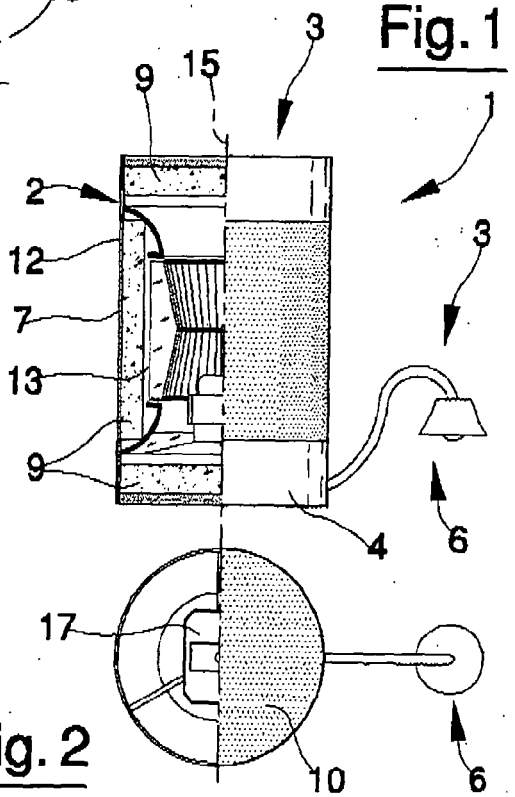


Fig. 1

Fig. 2

Fig. 5

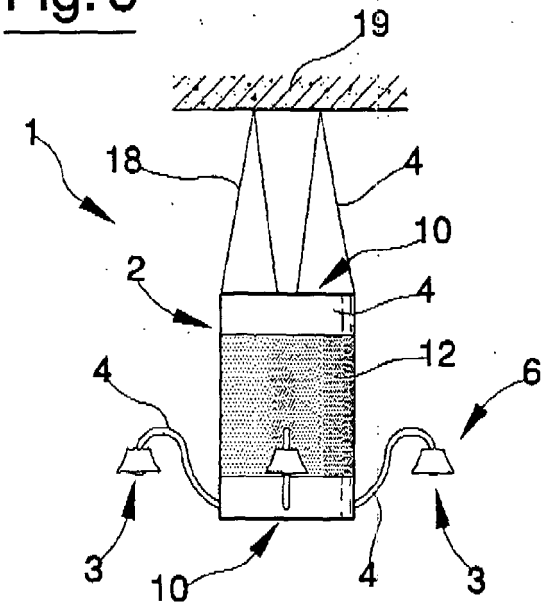
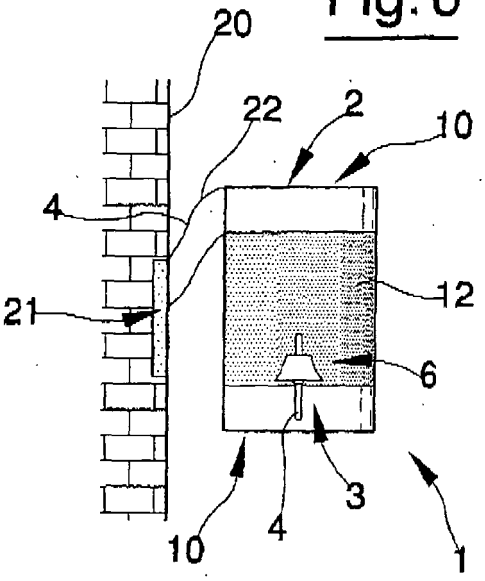


Fig. 6



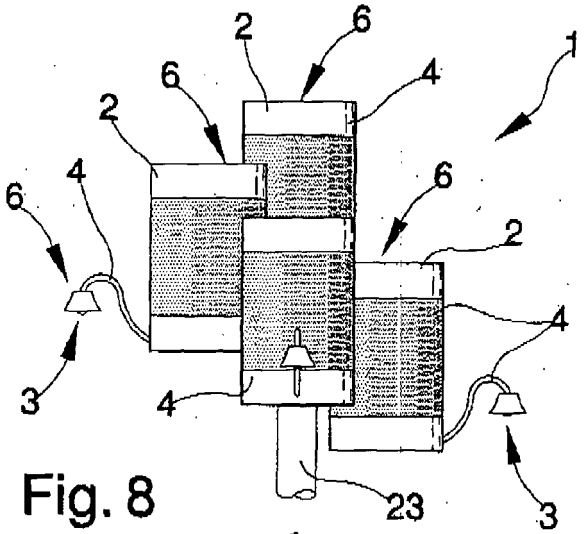


Fig. 8

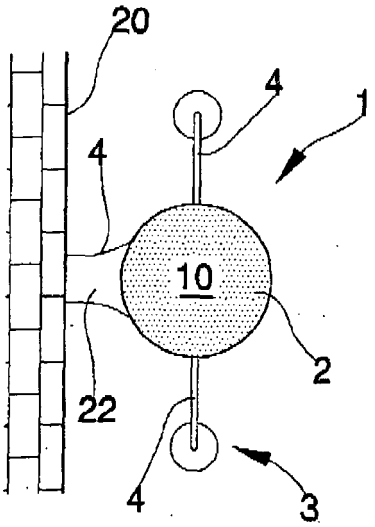


Fig. 7

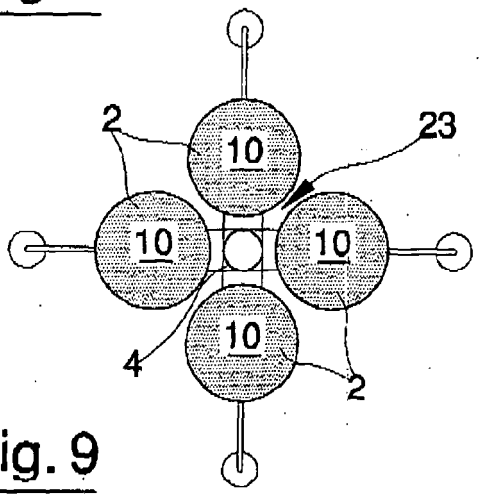


Fig. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 9475

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 August 2006	González-Granda, C

CATEGORY OF CITED DOCUMENTS

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