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(11) **EP 0 925 744 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
30.06.1999 Bulletin 1999/26

(51) Int. Cl.<sup>6</sup>: **A47B 61/00**, A47B 61/04

(21) Application number: **98123389.3**

(22) Date of filing: **09.12.1998**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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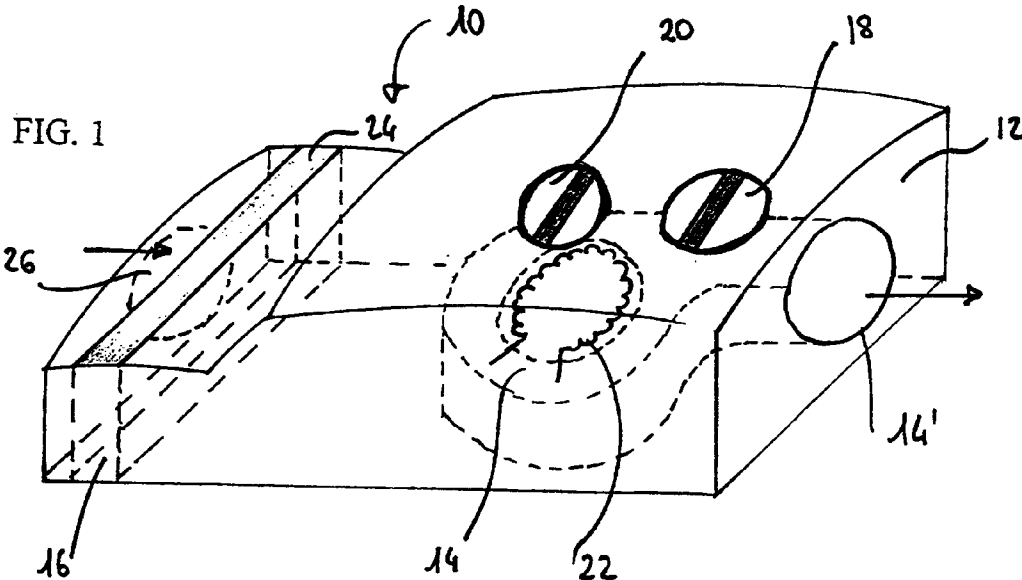
(30) Priority: **12.12.1997 IT MI972750**

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(54) **Thermoventilating sanitising device for shoe-racks and wardrobes**

(57) A thermoventilating sanitising device (10) for the treatment and forced air circulation in shoe-racks and wardrobes (42, 58, 60, 70, 72) comprises a containing envelope (12, 12') defining a space wherein there are housed at least an electric motor (14) connected to a fan, an electric resistance (22) operatively connected to said motor (14), and a thermostat (20), at least a filter

(16) and at least a first aperture obtained on said envelope in correspondence of the outlet (14') of said motor for conveying an air flow in the space or spaces of said closets, said flow generated by motor (14) passing through said at least one filter (16).



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## Description

[0001] The present invention relates to a thermoventilating sanitising device for shoe-racks and wardrobes. More particularly, the present invention relates to a thermoventilating sanitising device suitable to realise in the inside of said shoe-racks and said wardrobes the circulation of a flow of temperate and sanitised air, that can dry shoes or clothes and eliminate the bacterial load and bad smells.

[0002] As is known, especially in houses, because of the often limited space, shoes are not always arranged in the best place for their optimum preservation. Also if it is possible to have at disposal a specific closet for use as a container or shoe-rack, great drawbacks may take place. The shoe-rack, in fact, is sometimes placed in unsuitable rooms, such as for instance entrance halls, corridors, spaces under the staircase, store-rooms wherein the closet is not sufficiently aerated. On the other hand, it is not possible to keep open or half-open the doors of the closet, as bad smells would diffuse in the air. The lack of a correct aeration may easily cause the formation of moulds or bacterial loads on the shoes, especially if the latter are put in the closet when they are still humid or even wet

[0003] Let aside the deterioration which the shoes undergo in these conditions, a relevant drawback concerns directly the health aspect, as the user puts on shoes that might cause disease of the foot skin.

[0004] A like drawback happens for clothes used in the rain or for sport- and work activities. Generally, after the use clothes are put in wardrobes where they remain sometimes for a long time before their subsequent use; the humidity contained in the same ins not easily eliminated in these closed spaces and, in the same way as for the shoes, it easily creates moulds and bad smells, that are difficult to eliminate.

[0005] Object of this invention is to obviate the above drawbacks.

[0006] More particularly, object of this invention is to provide a sanitising device for shoe-racks and wardrobes in general, suitable to ensure the optimum ventilation of the rooms wherein the shoes and clothes are put, to prevent the formation of mould on the same.

[0007] A further object of the present invention is to provide a thermoventilating sanitising device, suitable to be installed in shoe-racks and wardrobes or resting on the shelves or the bottom of said closets.

[0008] A further object of the present invention is to provide a sanitising device which, besides preventing the bacterial loads, also allows to diffuse in the closet space a deodorising/perfuming flow, as well as a humidifying flow to maintain the optimum humidity level required.

[0009] A further object of the invention is to provide users with a sanitising device suitable to ensure a high level of resistance and reliability in the time, and also such as to be easily and economically realised.

[0010] According to the present invention, these and still other objects which shall be obvious thanks to the following description are achieved by a thermoventilating sanitising device for shoe-racks and wardrobes comprising a containing envelope defining a space wherein there are housed at least an electric motor connected to a fan, an electric resistance operatively connected to said motor and a thermostat, at least a filter and at least a first aperture obtained in the same envelope in correspondence of the outlet of said motor for the conveying of an air flow into the space or spaces of said closets, said flow generated by the motor passing through said at least one filter.

[0011] The thermoventilating sanitising device of the present invention may be fixed to the walls of the shoe-racks or the wardrobe or may rest on the bottom or a shelf of said shoe-rack or wardrobe. The construction and functional characteristics of the thermoventilating sanitising device of the present invention shall be better understood thanks to the following description, wherein reference is made to the attached drawings which represent some preferred non limiting embodiment and wherein:

Figure 1 shows the schematic perspective view of the thermoventilating sanitising device of the present invention;

Figure 2 shows a block diagram of the main components of the device of Figure 1;

Figure 3 shows a block diagram of the wiring of the components of the device of Figure 1;

Figure 4 shows the schematic perspective view of a second embodiment of the thermoventilating sanitising device of the present invention;

Figure 5 shows a block diagram of the main components of the device of the present invention shown in Figure 4;

Figure 6 shows a block diagram of the wiring of the components of the device shown in Figures 4 and 5;

Figures 7-14 show schematically some possible positionings of the thermoventilating sanitising device of the present invention in closets such as shoe-racks, wardrobes and the like.

[0012] With reference to the above mentioned figures, the thermoventilating sanitising device of the present invention, indicated as a whole by 10, comprises an envelope or containing body 12, from plastic or other suitable material, wherein there are housed and connected by known means an electric motor 14, preferably connected to a winding-fan, and at least a filter 16.

**[0013]** The containing body 12 may have any shape and size, such as for instance a parallelepiped shape. To said containing body 12 means 18 are connected which activate said motor, and which are constituted by a conventional switch with two or more operating positions, and a thermostat 20, with a graded scale, connected to an electric resistance 22 advantageously placed upstream of said motor 14 or integrated in the same. Filter 16 may be an activated carbon filter, of the mat type or granular, constituted by a compact and extractable body, connected to envelope 12 through the insertion in a corresponding slit 24.

**[0014]** There may be used one or more activated carbon filters 16 or and preferably an activated carbon filter may be associated to another type of filter of the absolute bactericide type of class "H" to "U".

**[0015]** Such types of filters are commercially available, and produced and sold by the company General Filter Italia S.p.A.

**[0016]** The outlet of motor 14, indicated by 14', comes to or slightly protrudes from the bottom of envelope 12 in the form of a union, having for instance a circular shape, for a possible connection to tubular elements which will be illustrated later on.

**[0017]** According to a preferred embodiment, thermostat 20 is designed for the adjustment of temperature in a range of from 5°C and 40°C. The centrifugal motor 14 preferably has a capacity of 8/120 m<sup>3</sup>/h, with a pressure of between 60 and 100 Pascal. The containing envelope 12 is provided, by side of said motor 14, with at least an air suction intake 26, advantageously located upstream of filter 16. Said envelope may be provided with extensions (not shown) for a possible stable connection with the shoe-rack or the closet. Alternatively, when the thermoventilating sanitising device of the present invention is located outside the closet, for instance in correspondence of the upper front of the same (as shown schematically in Figures 7 and 8), end 14' of motor 14 and the air suction intake 26 comprise as many self-centring mouths to be inserted in corresponding holes obtained in the closet.

**[0018]** Figures 4-6 show a variant embodiment of the thermoventilating sanitising device of the present invention. According to this embodiment, the thermoventilating sanitising device comprises a motor 14 with a resistance 22, at least a filter 16, a thermostat 20, a timer-clock 20', a germicide lamp 30 or a like germicide means, an electroemanator, said timer-clock, germicide lamp and electroemanator being located upstream of motor 14 in the containing envelope, indicated as a whole by 12'. The electroemanator is advantageously housed in the electric outlet schematised by 32, formed on one of the faces of envelope 12 or 12'.

**[0019]** The activations of motor 14 and the associated resistance 22, of lamp 30, the electroemanator, the thermostat 20 and electric feed are controlled by the timer-clock 20' or by a microprocessor electronic card. Air intake from outside is realised through one or more con-

ventional ducts 34 obtained on envelope 12' upstream of filter 16. The same envelope is preferably provided, in the upper part, with a suction mouth 36, located for instance in alignment with the electroemanator.

**[0020]** In correspondence of mouth 36 there are advantageously provided scenting substances, for instance in the form of granules contained in a bag, suitable to deodorise the air flow in addition to, or as replacement of the electroemanator if the latter is not activated. Said scenting substances are preferably arranged in a small removable container, not shown, fitted-in or positioned with other known means in correspondence of mouth 36.

**[0021]** A vessel 40 of any shape and size is possibly placed and connected with known means to envelope 12'. Said vessel is suitable to contain water or a spongy element impregnated with water, to humidify the air flow, if in the closet or the shoe-rack a minimum percentage of humidity should be required. Said humidification is required, in particular, for the correct preservation of the shoes whose leather might crack should it be systematically invested by warm and dry air.

**[0022]** Envelope 40, preferably made from microporous material, is located close by the centrifugal motor 14 and between the germicide lamp (30) and said motor, or anyhow in correspondence of a side of envelope 12'; the latter is correspondingly provided, in such position, with an aperture (not shown) for the inlet of water in envelope 40 or the removal of the same. Envelope 12 or 12' may be from plastic material or any other suitable material such as for instance metal. Motor 14 may be connected to a source of external electric energy or may be self-fed by rechargeable accumulators, for instance Ni-Cd accumulators.

**[0023]** Figures 7-14 schematically show some embodiments of the thermoventilating sanitising device of the present invention.

**[0024]** In particular Figures 7 and 8 schematically show a shoe-rack 42 with tiltable front doors provided with the thermoventilating sanitising device 10 of the present invention, installed on the upper surface 44 of the closet. Said device 10 is connected, by way of example, to said upper surface 44 by means of a couple of unions 46 protruding from the outlet of the centrifugal motor 14, respectively the air suction intake 26 obtained on the lower surface of envelope 12 or 12'.

**[0025]** Mouths 46, from plastic material or other suitable material fit in corresponding calibrated shoe holes 48 obtained on said upper surface 44 of the shoe-rack 42. It must be noticed that, in this embodiment, the only operation required on closet 42 is limited to the creation of said holes 48.

**[0026]** Figure 8 shows another embodiment of the thermoventilating sanitising device 10 of the present invention installed on the upper surface 44 of the closet and provided with tubular elements 50 or 52 to distribute capillary the air flow in the inside of the connected spaces and stresses mouth 46 protruding from motor 4.

The tubular elements 50 or 52, from plastic material or other suitable material, not necessarily rigid, are connected to union 46 with any means, for instance pressure fitting-in, bayonet, threading or the like. Through conventional elbow or T connections, the tubular elements 50, 52 may be arranged according to different paths and oriented in the space or spaces of the shoe-rack 42. Said tubular elements are provided with a plurality of holes or slits 54, 56 for the outlet of the air flow generated by motor 14.

[0027] Figure 9 schematically shows the sanitising unit 10 fixed to an inner side surface of a closet 58, for instance of the column type, and equipped with the tubular elements 50, 52.

[0028] In this embodiment, device 10 is connected by conventional screws and squares or the like, to one of the internal wall of the closet.

[0029] Figure 10 shows schematically the same fixing of device 10 of the preceding figure, in a closet 60 formed by a plurality of columns approached and fastened to each other. In this case, closet 60 is obviously provided with holes along the shoulder for the passage of one or more tubular elements 62.

[0030] Figures 11 and 12 show a wardrobe 70, provided with a thermoventilating sanitising device 10 of the present invention, fixed to an internal side wall, respectively resting on the bottom of said closet.

[0031] Figures 13 and 14 show a shoe-rack 72 provided with a thermoventilating sanitising device 10 of the present invention resting on the bottom surface of said shoe-rack, respectively inserted in shoe-holding strips 74 of the shoe-rack and placed between shoes 76.

[0032] The utilisation of the thermoventilating sanitising device 10 of the present invention can be easily inferred from what has been expounded above in both embodiments of Figures 1-3 and 4-6.

[0033] With reference to the embodiment of Figures 1-3, the activation of motor 14 and the associated resistance 22 draws air from the space of the closet wherein it is installed, through hole 26. The air passes through the activated carbon filter 16 or possibly the absolute bactericide filter, warms up thanks to resistance 22 and is expelled through mouth 14' of motor 14 to return then in the space or spaces of the closet.

[0034] The activation of the motor is through the conventional switch 18, while by means of thermostat 20 it is possible to adjust the temperature of air exiting motor 14, said thermostat being connected with resistance 22.

[0035] With reference to the embodiment of Figures 4-6, the working is identical, i.e. the air drawn from the closet space by motor 14, passes through the activated carbon filter (or filters) 16, is warmed up by resistance 22 and reintroduced by said motor into the closet space. Additionally, when they are activated, either simultaneously or separately, the germicide lamp 30, which removes the possible bacterial loads present in the air flow and the electroemanator located in the electric

intake 32, which disperses in the air flow scented substances start working.

[0036] Thanks to the presence of mouth 36 on envelope 12', the perfuming action of the air increases, as in said mouth or near it, deodorising substance in the form of granules or the like may be placed.

[0037] If it should be desired to enrich the air flow circulating in the closet space with a percentage of controlled humidity, to prevent cracks in the shoes, in the case of shoe-racks, a vessel 40 is positioned in envelope 12' and filled with a liquid, possibly water, entering in such a way as to impregnate a spongy adsorbing element located in said envelope, the latter being preferably made from microporous material.

[0038] As can be noticed from the above, the advantages achieved by the device of the present invention are evident.

[0039] The thermoventilating sanitising device of the present invention can be easily applied to closets such as shoe-racks or wardrobes, and allows to ventilate adequately the space or spaces of said closets, realising the drying of shoes or clothes contained therein.

[0040] The activated carbon filter prevents the dispersion of bad smells in the environment, the absolute bactericide filter allows to keep back the possible bacteria, while the germicide lamp and the electroemanator allow to eliminate possible bacterial loads respectively deodorise the circulating air flow.

[0041] Even though the present invention has been described hereabove with reference to some embodiments solely reported by way of non limiting example, many modifications and variants will be apparent to those skilled in the art and in the light of the above description. For instance, outlet 14' of motor 14 may define a bidirectional duct, i.e. a first length wherefrom air exits the motor and diffuses in the closet, and a second adjoining length wherethrough air is sucked and returns thereafter into envelope 12 or 12'; in this case, there should obviously be provided a duct of any type which, connecting with said second length, develops in the envelope, debouching upstream of filter or filters 16.

[0042] Besides, instead of the germicide lamp 30 or in addition to it, a high tension ionising barrier or a ioniser or chemical-mechanical germicide filter may be used. The wirings of the various components may be realised with any system whatever and their activation, either simultaneous or independent, may be obtained with conventional switches, remote controls or microprocessor electronic cards.

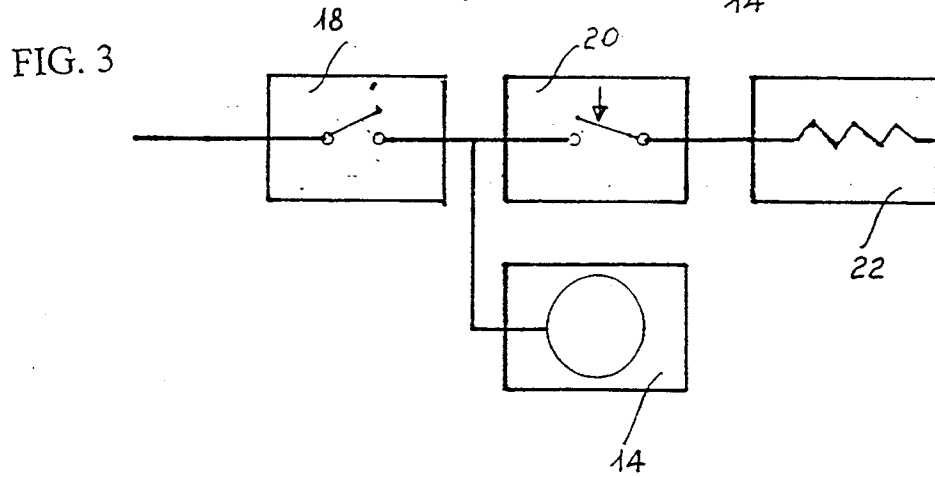
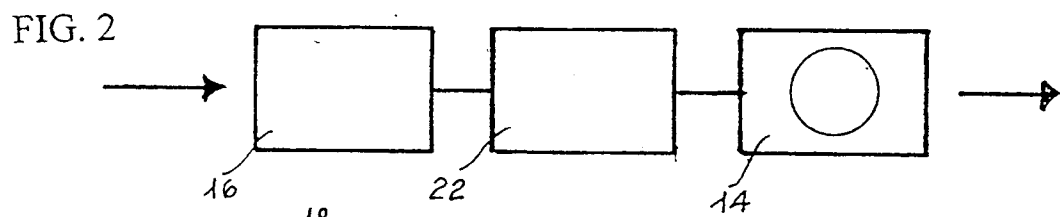
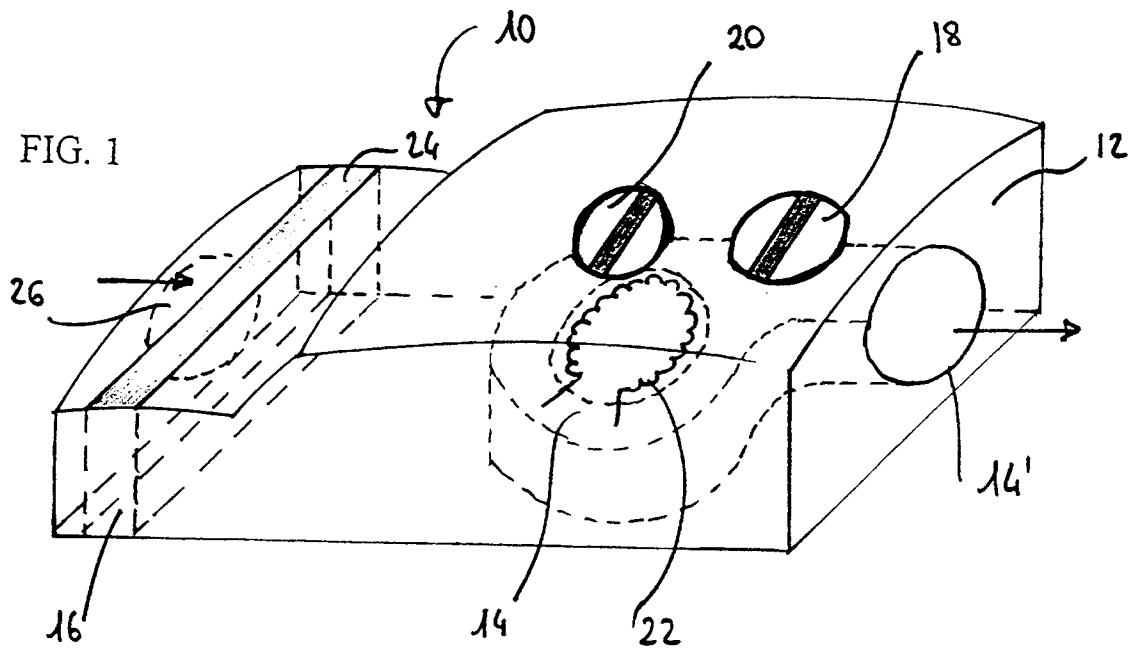
[0043] Besides, it is to be expected that, in the presence of a plurality of closets 42, 58, 60, 70 and 72, aligned with each other, as many electroventilating sanitising devices be applied on said closets, preferably sequentially connected to each other; in this case, which concerns at the same time all of the closets traditionally present in the dressing rooms, the activation controls 18, 20, 21' may be placed on one only of said devices, for instance, the first one, or on a control board

or panels connected to it.

**[0044]** Its is therefore implicit that the present invention intends to cover and comprise all the variants and modifications that fall within the spirit and the scope of the following claims.

## Claims

1. A thermoventilating sanitising device for shoe-racks and wardrobes (42, 58, 70, 72) for the treatment and forced air circulation in the same, comprising a containing envelope (12, 12') defining a space wherein there are housed at least an electric motor (14) connected to a fan, an electric resistance (22) operatively connected to said motor (14) and to a thermostat (20), at least a filter (16) and at least a first aperture obtained on said envelope in correspondence of outlet (14') of said motor for conveying an air flow into the space or spaces of said closets, said flow generated by motor (14) passing through said at least one filter (16). 10
2. The device according to claim 1, wherein the containing envelope (12, 12') has one or more second apertures (26, 34) obtained upstream of said at least one filter (16) for the drawing in said envelope of air extracted from the closet. 25
3. The device according to claims 1 and 2, wherein outlet (14') of motor 14) comprises a bidirectional duct with a first length for the outlet of air and a second adjoining length for sucking air in envelope (12, 12'), and debouching upstream of said at least one filter (16). 30
4. The device according to any of the preceding claims, wherein filter (16) is of the activated carbon type, in the form of mat of granules, and is located in envelope (12, 12') between said first apertures (26) and second aperture formed in correspondence of outlet (14') of motor (14). 35
5. The device according to claim 4, wherein the activated carbon filter (16) is coupled to a second filter of the absolute bactericide filter of class H to U. 40
6. The device according to any of the preceding claims, wherein between said at least one filter (16) and motor (14) a germicide lamp (30) is provided. 45
7. The device according to any of the preceding claims, wherein in envelope (12, 12') an electroem- anator is provided, which is positioned in an electric intake (32) upstream of mouth (14') of motor (14). 50
8. The device according to any of the preceding claims, wherein said envelope (12, 12') has a paral- lelepiped shape. 55
9. The device according to any of the preceding claims, wherein a vessel (40) containing water or a spongy element impregnated with water is posi- tioned in envelope (12, 12') between the germicide lamp (30) and motor (14).
10. The device according to any of the preceding claims, wherein said envelope (12, 12') is provided with a suction mouth (36) formed in alignment with said electroeminator, wherein a mobile container or drawer is housed.
11. The device according to any of the preceding claims, wherein sleeves (46) for the connection to wardrobes or shoe-racks (42, 58, 60) and/or tubular elements (50, 52) which develop in the inside of the space or spaces of said closets are connected to the apertures (26, 34) of the containing envelope (12, 12'), said tubular elements (50, 52) being pro- vided with a plurality of holes or slits (54, 57) for the outlet of the air flow.
12. The device according to any of the preceding claims, wherein the activations of motor (14) and the associated electric resistance (22), the lamp (30), the electroeminator located in the electric outlet (32), the thermostat (20) and the electric feeding are controlled by a timer-clock (20').
13. The device according to any of the preceding claims 1-11, wherein at least motor (14), resistance (22), the germicide lamp (30), the electroeminator, the thermostat (20) and the electric feeding are activated and controlled by a microprocessor elec- tronic card.
14. Use of the device according to any of the preceding claims in wardrobes in a fixed position on the upper, side or bottom surface of said closet.
15. Use of the device according to any of the preceding claims 1-13 in wardrobes, resting on the bottom or a shelf.
16. Use of the device according to any of the preceding claims 1-13 in shoe-racks in a fixed position on the walls, resting on the bottom surface or inserted between the shoes in the shoe-holding strips.



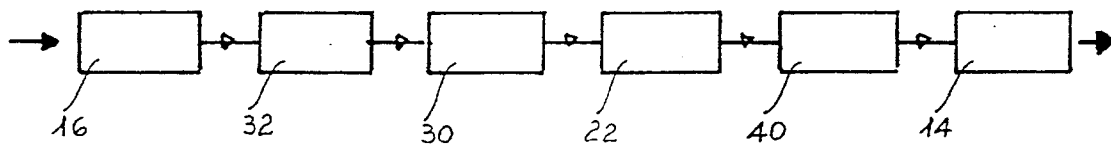
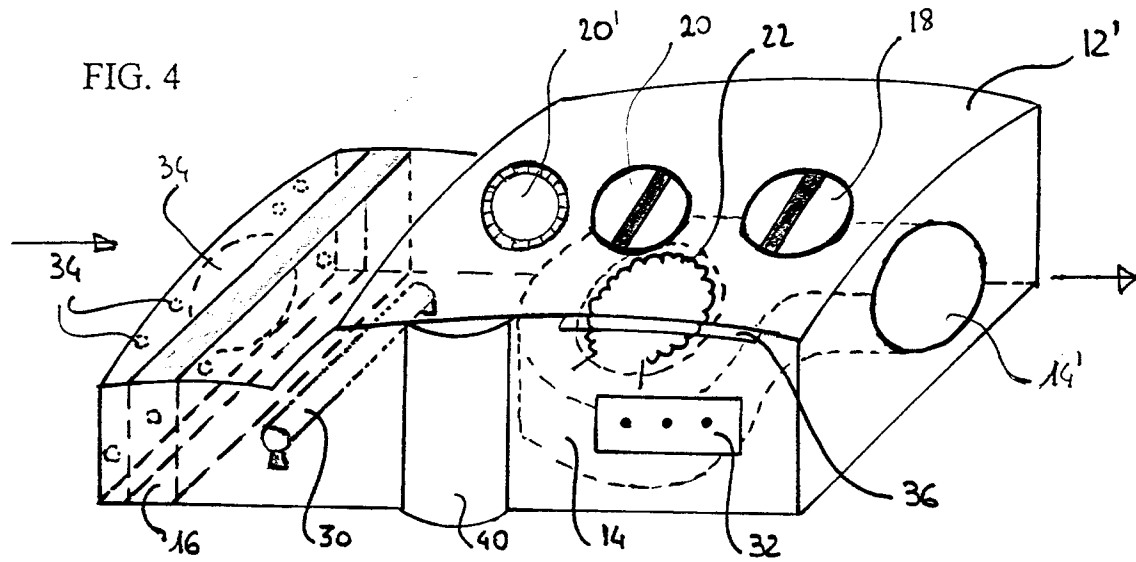


FIG. 5

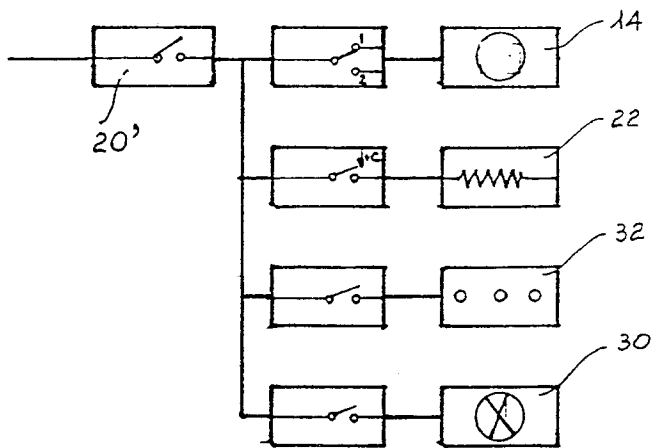


FIG. 6

FIG. 7

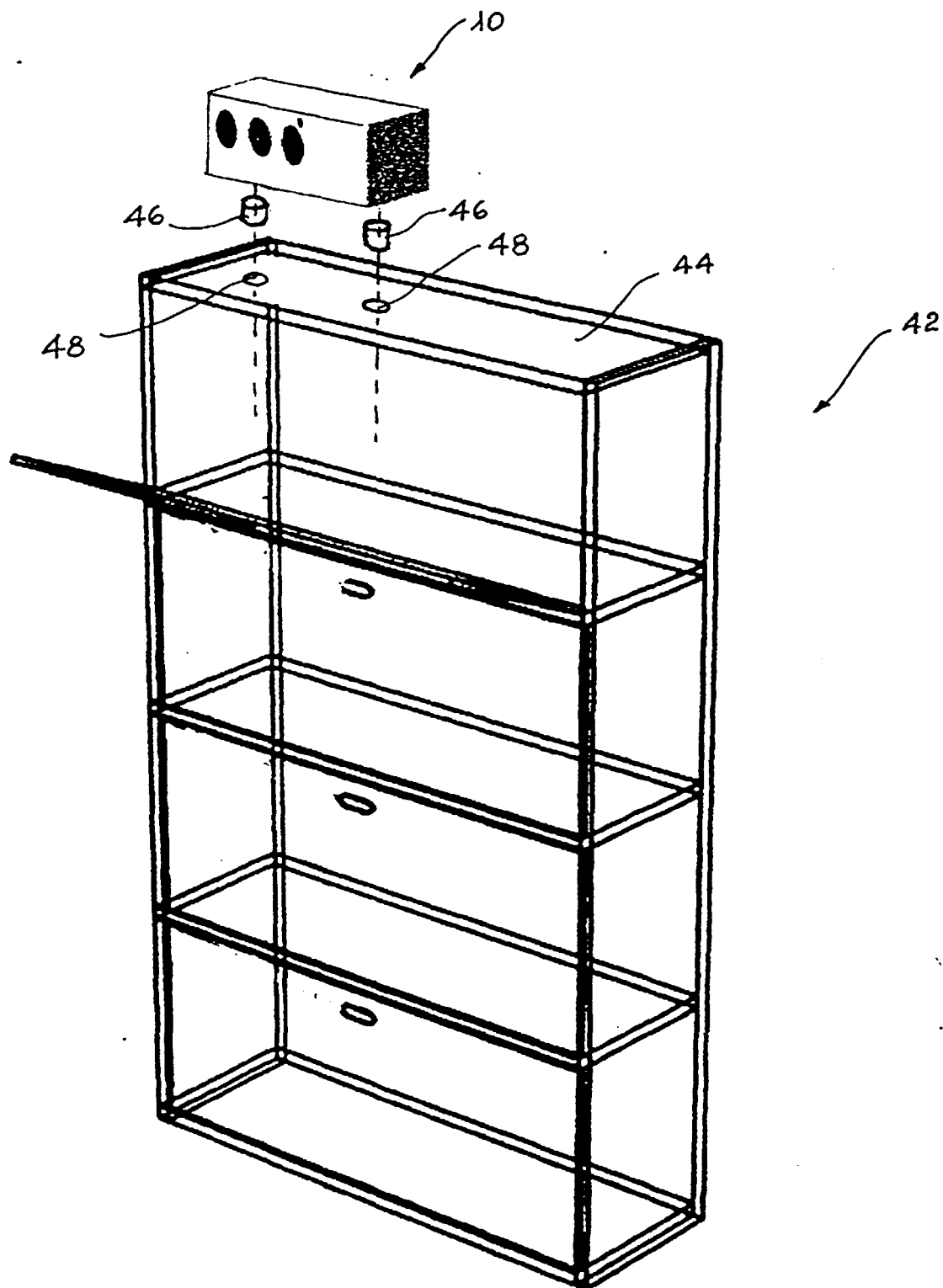




FIG. 8

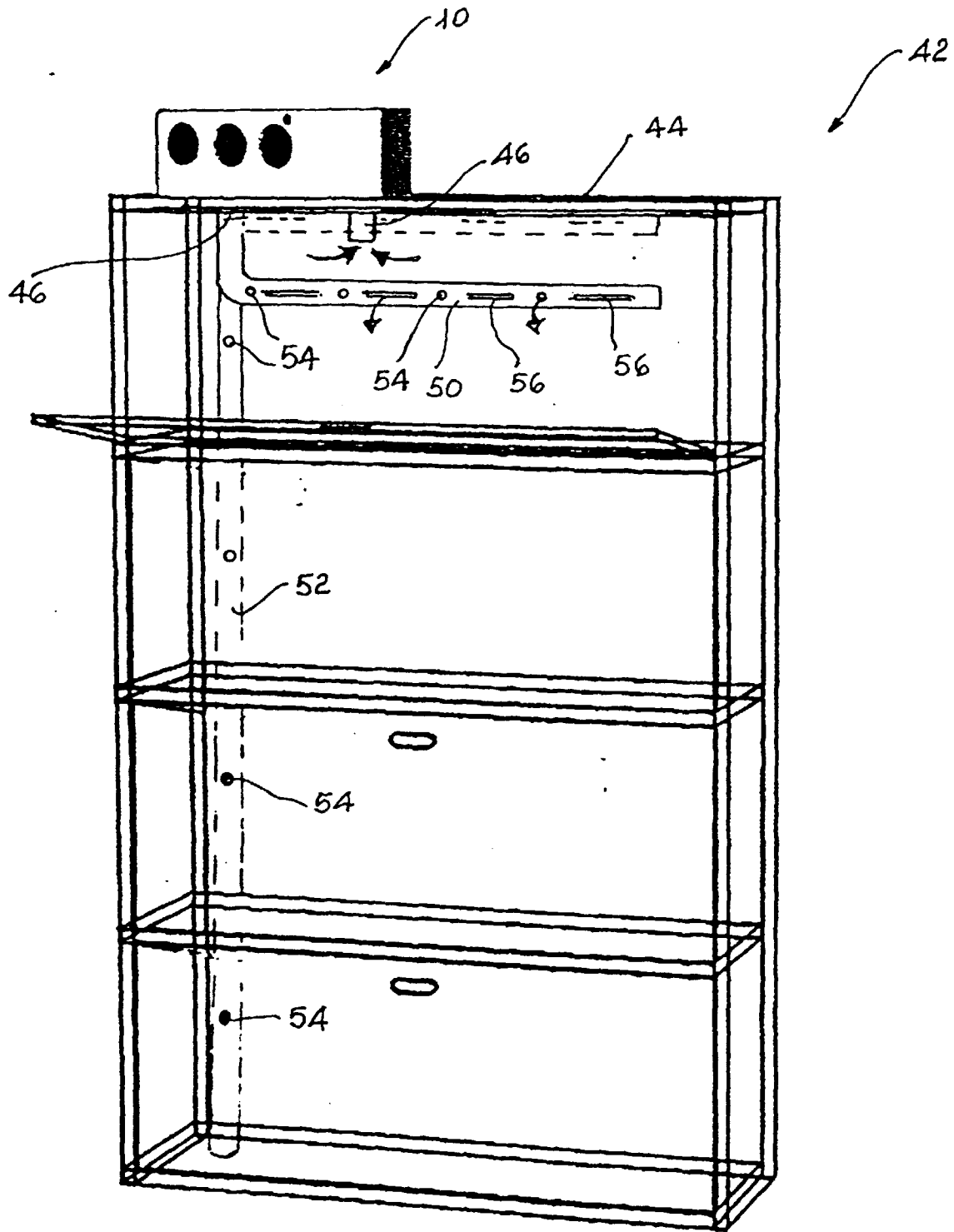


FIG. 9

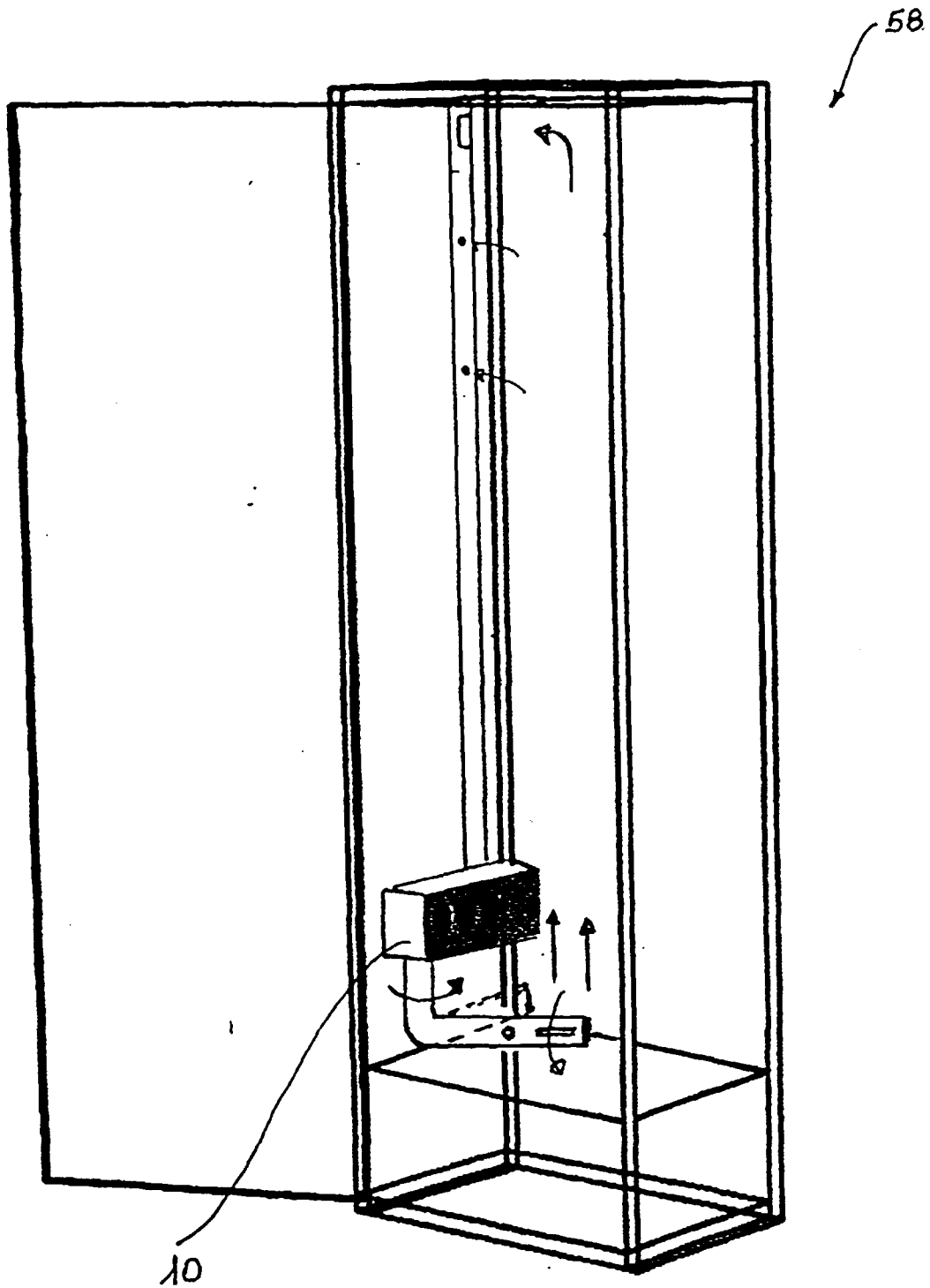
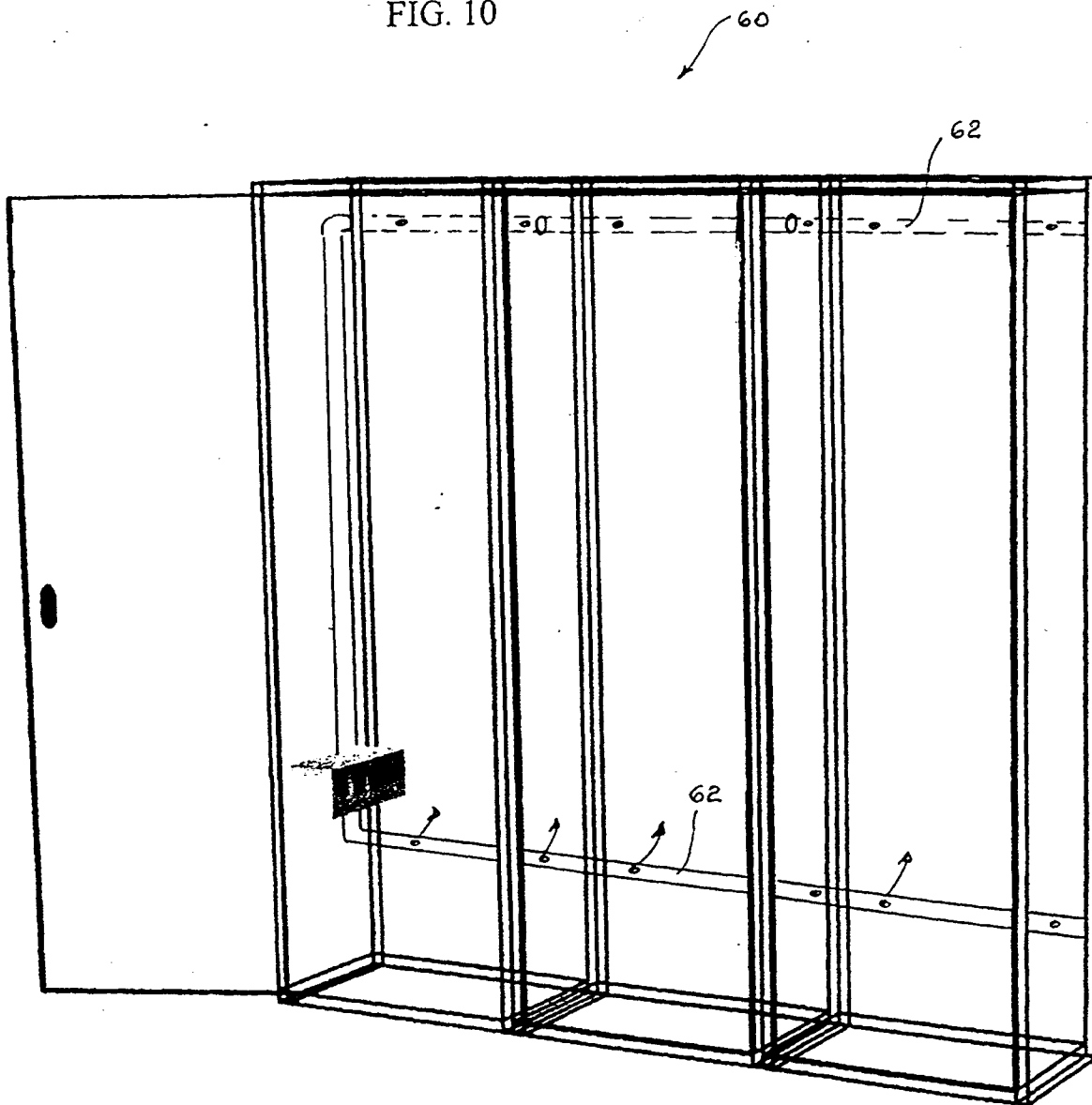


FIG. 10



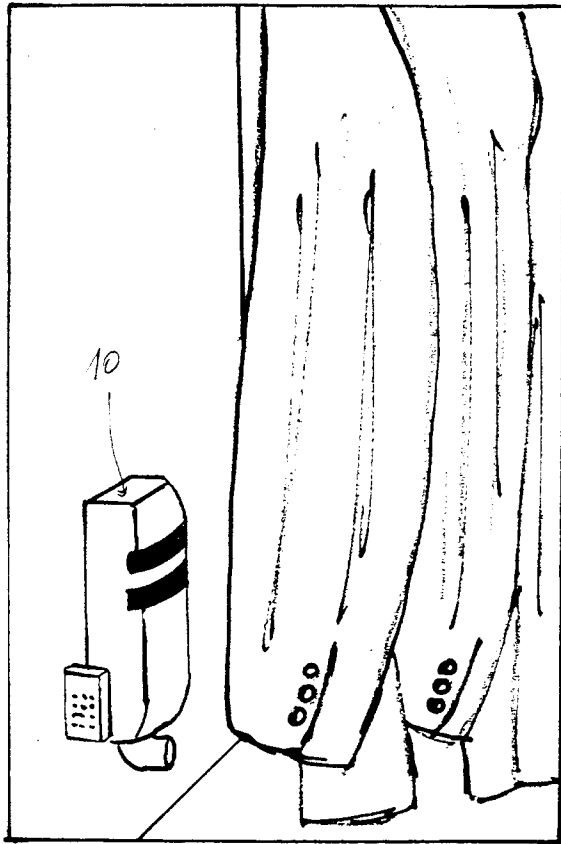


FIG. 11

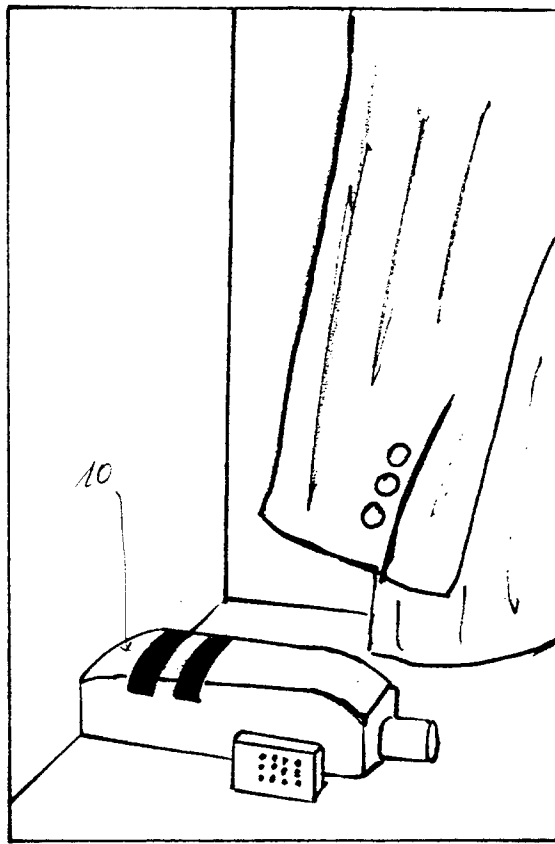


FIG. 12

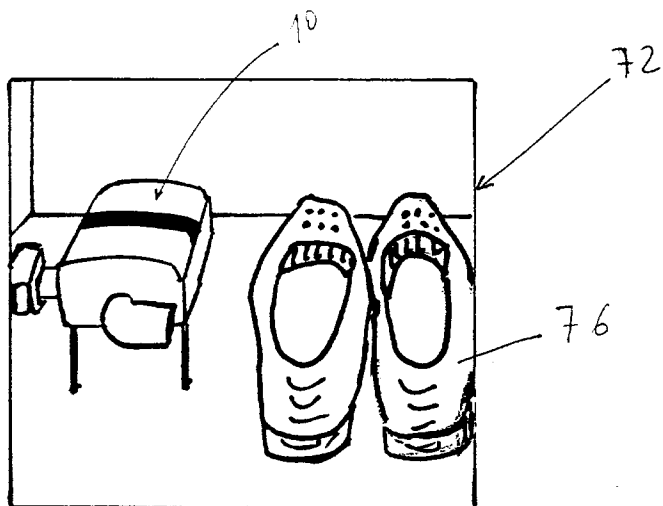


FIG. 13

