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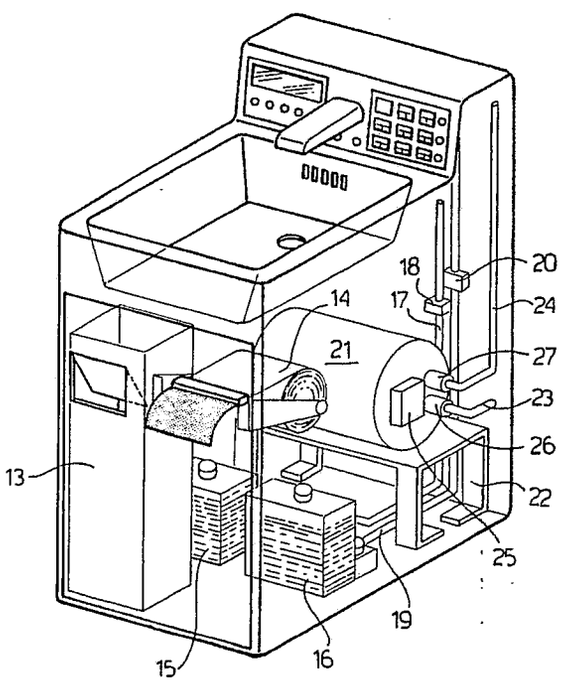
(54) Automatic hand cleaning device and relevant process.

(57) The proposed device comprises a control block (2), having keys (2a) for setting the washing programme and the relevant times, as well as the temperature and the quantity of water delivered; a delivery spout (3); a pair of photoelectric cells (5); luminous indicators (6); a slot (12) for dispensing the paper; a roll of paper (14), whose sliding is operated by a motor; two containers (15, 16) for the detergent and the disinfectant, connected by means of ducts (17, 19), each provided with a pump (18, 20) to the spout (3); a boiler (21), provided with a thermostat (25) and connected to pipes (23, 24) for the water feed and outlet, each pipe (24) being provided with a solenoid valve (26, 27), the outlet pipe (24) being connected to the spout (3); a container (13) for collecting the paper used for drying, having an opening (10) closed with a swing door (11); a washing tank (7) provided with a drain (8).

In addition, the relevant operative process is described.

FIG. 1b



EP 0 396 039 A1

AUTOMATIC HAND CLEANING DEVICE AND RELEVANT PROCESS

The present invention refers to the field of devices for washing, disinfecting and drying the hands.

Many apparatuses of this type are known, each of which is capable of carrying out singly one of the functions mentioned: there exist detergent and/or disinfectant dispensers, taps for delivering rinsing water, possibly operated by means of photoelectric cells, manually operated or automatic driers, using air or dispensing paper. The main disadvantage connected with the said apparatuses lies in the fact that, in order to obtain a complete washing/disinfecting/rinsing/drying cycle, it is necessary to install many different apparatuses, which therefore cannot be programmed harmoniously following a precise sequence.

The main aim of the present invention is therefore to realize a single device which carries out all the functions described above, according to an automatic programme or one which is set each time, allowing at the same time a check on the consumption of materials used (soap, disinfectant, paper) and the signalling of their depletion.

A second aim is to realize a device which, in one of its embodiments, can be adapted for already existing sanitary installations.

An additional aim is to realize a device capable of disinfecting itself automatically at predetermined intervals, so as to guarantee a continuing perfect hygiene.

The last aim is to realize a device which is easy to construct and to maintain, consisting of blocks assembled in a simple manner, all accessible and easy to substitute.

The above aims have been achieved by realizing a device according to the enclosed claims from 1 to 4, whose function is described in the enclosed claims from 5 to 9. The self-disinfecting process is described in the enclosed claims 10 and 11.

The present invention will now be explained more clearly with reference to the enclosed drawings, in which:

figure 1a shows an axonometric view of the device according to the present invention as a whole, in a first embodiment;

figure 1b shows a transparent view of the device in figure 1a;

figure 2a shows an axonometric view of the device according to the present invention as a whole, in a second embodiment;

figure 2b shows a transparent view of the device in figure 2a.

With reference to figure 1a, the device object of the present invention is seen, comprising a body 1, having a parallelepiped shape with a part projecting upwards, inside which a control block 2 is located, consisting of a plurality of control keys 2a, a delivery spout 3, which can be a two- or three-way type, a display 4, a pair of photoelectric cells 5, and a plurality of indicators 6. In the upper part of the body 1 a tank 7 is located, enclosed inside the body 1, which has a drain 8 on its lower surface. In the front part of the body 1 there is a door 9, in which an opening 10 is located, closed with a swing door 11, into which the paper used for drying the hands is thrown, and a slot 12 for dispensing the paper for drying.

With reference now to figure 1b, it can be seen how the opening 10 is part of a container 13 for collecting the used paper and other waste; a roll 14 of paper can also be seen connected to the slot 12. An electric motor, not shown in the drawings, is connected to the axis of the roll 14. On the bottom of the device two containers 15 and 16 are positioned, which contain liquid detergent and disinfectant, also liquid, respectively, or any other liquid substance which it may be desired to use. A duct 17 is connected to the container 15, and carries the detergent to the delivery spout 3; duct 17 is equipped with a small pump 18 for feeding spout 3. Similarly, a duct 19, equipped with a pump 20, is connected to the container 16.

Behind the containers 15 and 16 an electric boiler 21 is located, which rests on a support 22. At the inlet to the boiler 21 a pipe 23 is located, for feeding cold water; at the outlet from the boiler 21 a second pipe 24 is located, for the outlet of hot water. The boiler 21 is also provided with a thermostat 25, while the pipes 23 and 24 are each provided with a solenoid valve, 26 and 27 respectively.

The operation of the device is as follows; first of all it is switched on (this is shown by one of the indicators 6 or by a message such as "Machine working" appearing on the display 4), and then the programme is set by acting on the control block 2, in which the keys 2a are located which govern the following functions:

- switching on/off the device;
- operating the device manually or automatically;
- regulating the quantities of detergent and disinfectant;
- regulating the quantity of water;
- regulating the temperature of water (cold water can also be obtained by disconnecting the boiler);
- setting the times of the duration of the various phases and of the wait between one phase and the next;
- regulating the length of the dispensed strip of paper;
- regulating the self-disinfecting programme (which

will be explained later).

The complete standard operating cycle of the described device is as follows:

- bringing the hands under the spout 3; this is detected by the photoelectric cells 5 and revealed by one of the indicators 6;
- appearance of a message such as "Start of washing cycle" on the display 4;
- dispensing of a predetermined quantity of detergent, obtained by operation of pump 18 for a set time;
- an interval of time available for soaping, during which a message such as "Wait" appears on the display 4;
- delivery of a predetermined quantity of water for rinsing, at a set temperature, obtained by means of operation of the solenoid valves 26 and 27 located on the pipes 23 and 24, during which a message such as "First rinse" appears on the display 4;
- dispensing of a predetermined quantity of disinfectant, obtained by means of the operation of the pump 20 for a set time;
- interval of time available for distributing the disinfectant on the hands, during which a message such as "Wait" appears on the display 4;
- delivery of a predetermined quantity of water for rinsing, at the set temperature, obtained by means of the operation of the solenoid valves 26 and 27, located on the pipes 23 and 24, during which a message such as "Second rinse" appears on the display 4;
- operation of the motor for sliding the roll 14 and dispensing a predetermined quantity of paper;
- interval of time necessary for re-initialization of the device for the beginning of a new washing/disinfecting cycle, shown by the switching on of one of the indicators 6 and the appearing of a message such as "Wait - machine loading" on the display 4.

It is obvious how devices of the type described can be realized which foresee the carrying out of the washing and first rinsing phases only, the disinfecting phase and the second rinse being excluded or not foreseen.

The display 4 is used also to show the number of complete cycles carried out by the device, as well as a partial number of cycles, capable of being set to zero by means of a pushbotton not shown in the drawings. In this way information can be obtained concerning the consumption of the materials (detergent, disinfectant, water) and they can be replenished. The depletion of the stock of detergent, disinfectant or paper is signalled by the switching on of one of the indicators 6.

The device described up to this point also forsees the possibility of carrying out a self-disinfecting action; once the moment for carrying out such a programme (for example during the night) and its duration have been programmed by means of the control block 2, the boiler 21 is activated at the moment scheduled and heats the water up to a temperature of 80-90 ° C. The water which is heated in this way is then made to circulate inside the pipes and made to come out of the spout 3, thus guaranteeing the internal cleaning of the pipes.

With reference now to figure 2a and 2b, another embodiment can be seen of the device which is the object of the present invention. The parts which make up this embodiment are completely analogous to those already described with reference to figures 1a and 1b and are indicated with the same identifying numbers. The only difference lies in the fact that, in this case, no washing tank is foreseen, since this type of embodiment is suitable for applying to an existing wash basin, provided with a delivery spout, the pipes 17, 19 and 24 being able to be connected to the said spout or to a second delivery spout, to be installed at the side of the existing one.

In this way, a device has been realized for cleaning the hands, which meets the aforesaid aims, since it allows the different phases of washing, rinsing, disinfecting and drying to be carried out; it can also signal the consumption of the materials used. In addition, the device can be applied, in one of its embodiments, to existing sanitary installations; it is also capable of self-disinfecting and consists of block units which are easy to replace and maintain.

Claims

1. An automatic device for cleaning the hands, characterized in that it comprises:
- a control block (2) , provided with keys (2a), for setting the washing programme and the relevant times, as well as the temperature and the quantity of water delivered;
- a delivery spout (3);
- a pair of photoelectric cells (5);
- luminous indicators (6);
- a slot (12) for dispensing the paper;
- a roll (14) of paper, whose sliding is operated by a motor;
- a container (15) for the detergent, connected by means of a duct (17), provided with a pump (18) to the spout (3);
- a boiler (21), provided with a thermostat (25) and connected to pipes (23, 24) for the feeding and outlet of the water, each provided with a solenoid valve (26, 27), the water outlet pipe (24) being connected to the spout (3).

2. A device according to claim 1, characterized in that it comprises also a second container (16) for the liquid disinfectant, connected to the spout (3)

by means of a duct (19) provided with a pump (20).

3. A device according to claim 1 or 2, characterized in that it also comprises a container (13) for collecting the paper used for drying, provided with an opening (10) closed by a swing door (11).

4. A device according to any one of the previous claims, characterized in that it also comprises a washing tank (7) provided with a drain (8).

5. An automatic process for cleaning the hands, characterized in that it comprises the following phases:
- setting the characteristic parameters of the process on a control block (2) by means of keys (2a): the quantity of detergent dispensed, the waiting or "contact" time, the quantity of water delivered, the temperature of the rinsing water, the duration of the rinsing operations, the length of the paper dispensed;
- automatic starting of the process, as a result of the hands being brought near to the delivery spout (3), signalled by a pair of photoelectric cells (5);
- dispensing of a preset quantity of detergent through the spout (3), connected to the detergent container (15) by means of a duct (17), and obtained by means of the operation of a pump (18);
- delivery of first rinsing water at the preselected temperature through the spout (3), connected by a pipe (24) to the boiler (21), connected in its turn to a feed pipe (23), the said delivery being obtained by means of the opening of the solenoid valves (26, 27) for predetermined periods of time;
- dispensing of the desired quantity of drying paper, obtained by means of the operation of a motor which causes the rotation of the axis of a roll (14) of paper;
- re-initialization of the device, signalled by the switching on of an indicator (6).

6. A process according to claim 5, characterized in that it also comprises the phases of:
- setting the quantity of disinfectant dispensed on the control block (2);
- dispensing the set quantity of disinfectant after the delivery of the first rinsing water, through the spout (3), connected by means of a duct (19) to the disinfectant container (16), obtained by means of the operation of a pump (20);
- subsequent delivery of second rinsing water at the preselected temperature through the delivery spout (3), connected by means of a pipe (24) to the boiler (21), connected in its turn to a feed pipe (23), the said delivery being obtained by means of the opening of the solenoid valves (26, 27) for predetermined periods of time.

7. A process according to claim 5 or 6, characterized in that the carrying out of all the working phases or part of the working phases is signalled on the display (4).

8. A process according to any one of the claims from 5 to 7, characterized in that it provedes for the visualization of the total and partial number of washing cycles carried out, obtained by means of the display (4).

9. A process according to any one of the claims from 5 to 8, characterized in that it foresees the indication of the depletion of the stocks of expendable materials, obtained by means of the indicators (6).

10. A process of periodic self-disinfecting of a device for cleaning the hands according to any one of the claims from 1 to 4, characterized in that it comprises the following phases:
- programming the periods of the self-disinfection process and the opening times of the solenoid valves (26, 27) carried out by means of the control block (2);
- automatic starting of the boiler (21), at the preselected moment, followed by the opening of the solenoid valve (26) for a determined time, followed by the heating of the water up to a suitable temperature;
- the opening of the solenoid valve (27) for a determined time and the outlet of the heated water from the spout (3).

11. A process according to claim 10, characterized in that the water is heated up to a temperature of 80-90 ° C.

FIG. 1b

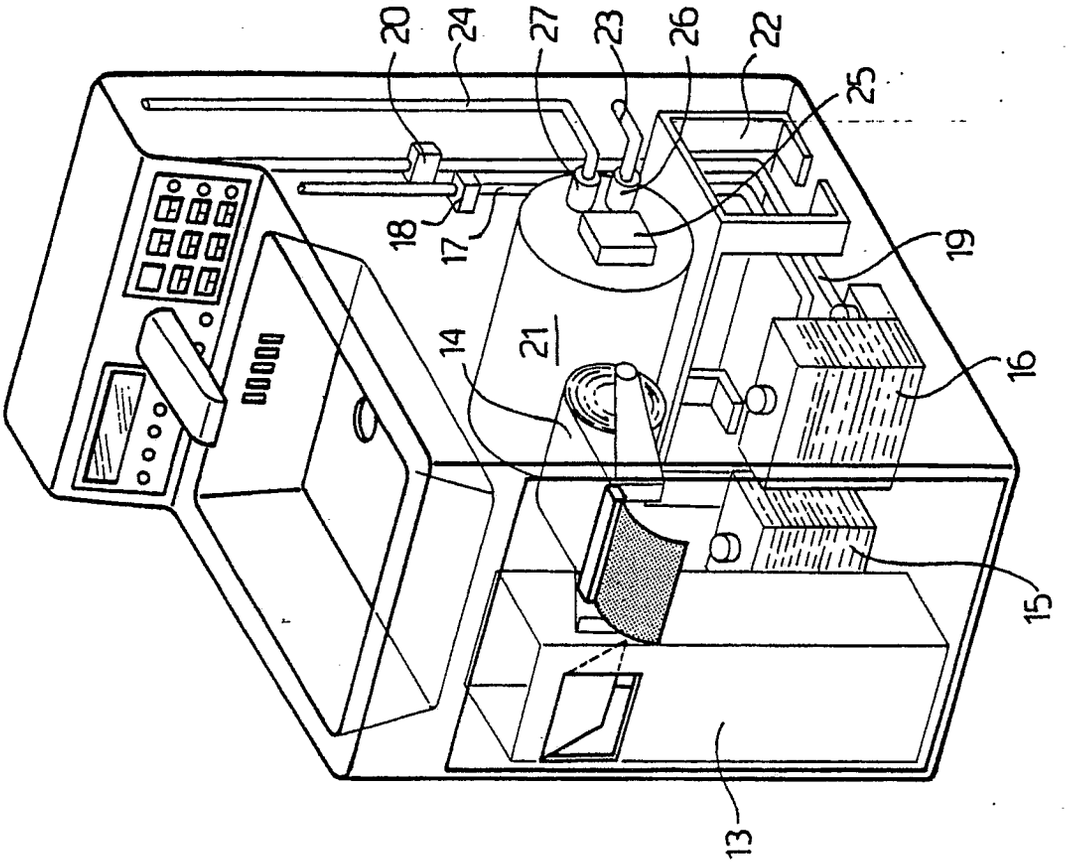
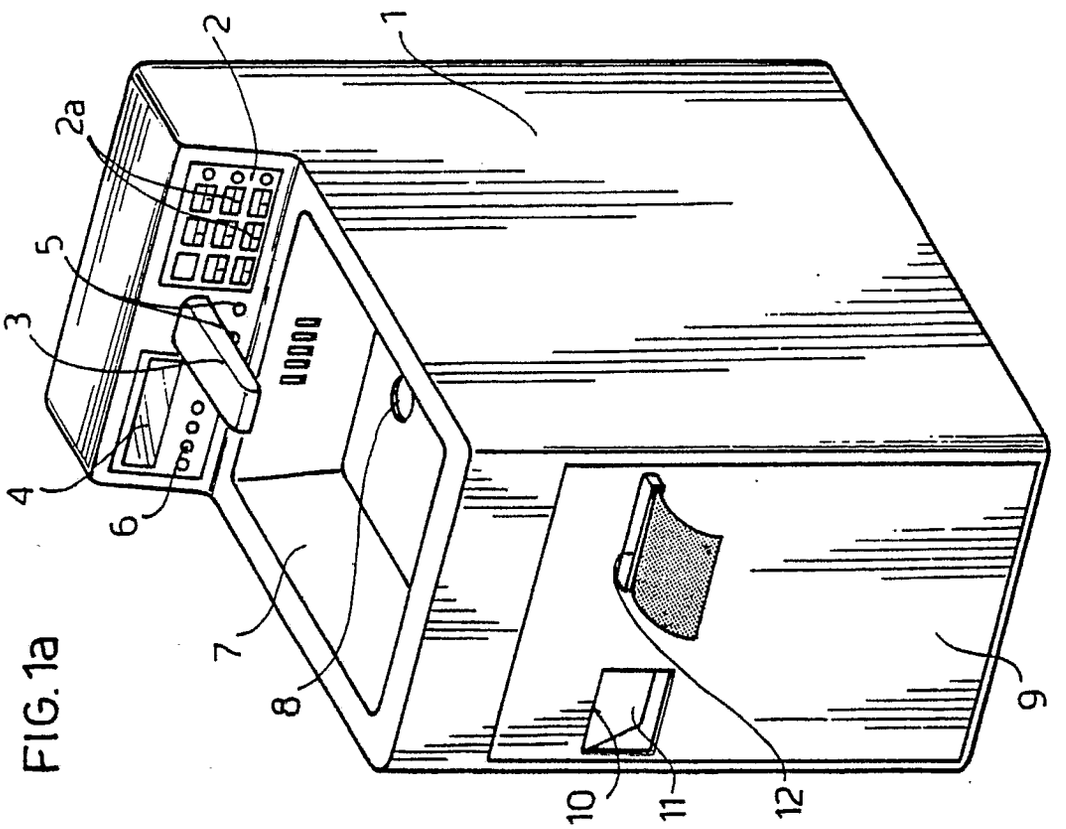


FIG. 1a



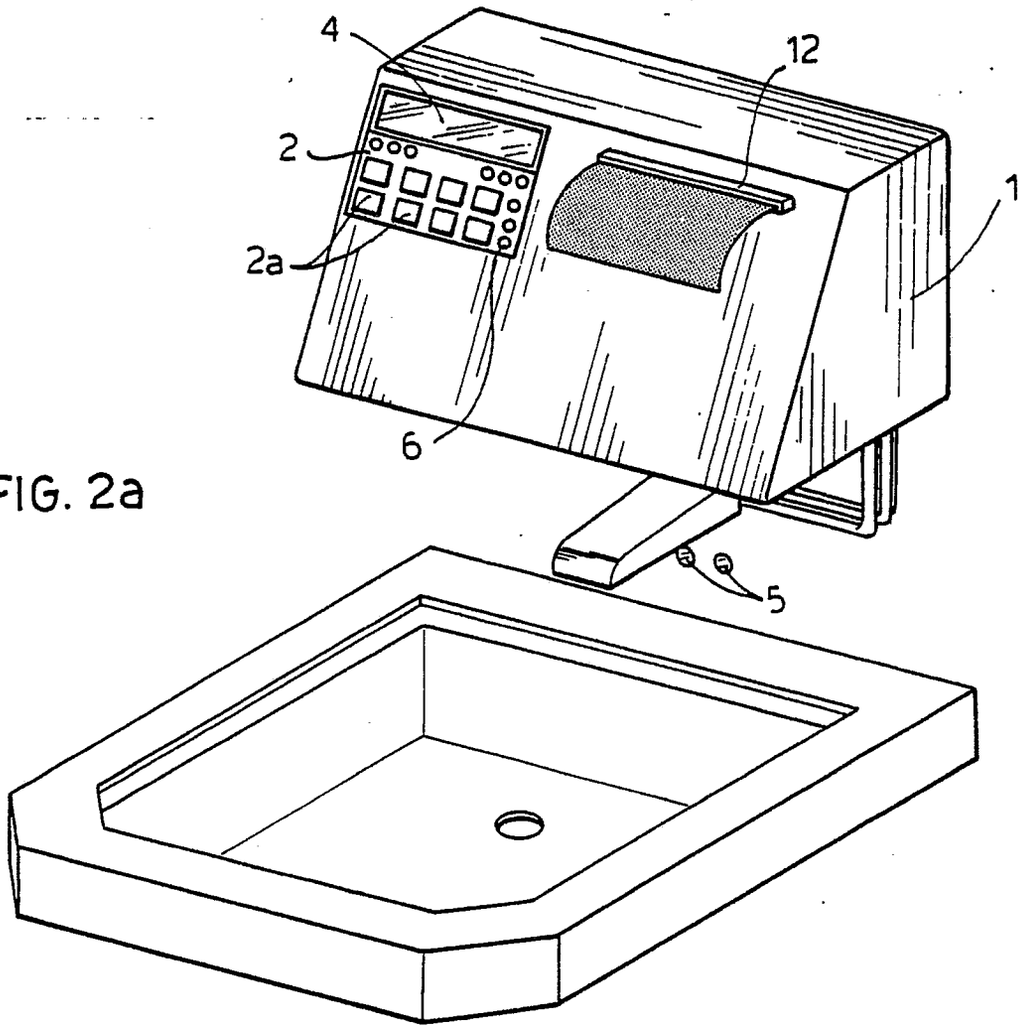


FIG. 2a

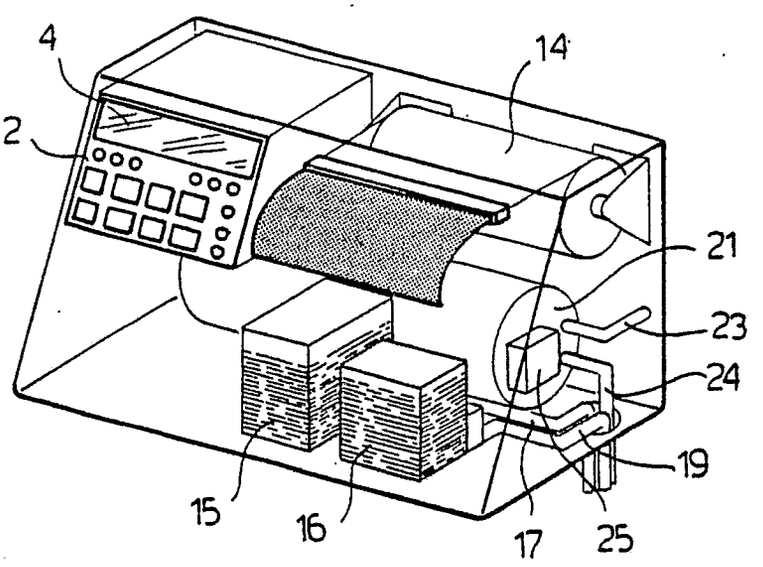


FIG. 2b

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EUROPEAN SEARCH REPORT

Application Number

EP 90 10 8047

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.5)
A	US-A-4 606 085 (DAVIES) * Column 3, lines 42-68; column 4, lines 1-56; column 5, lines 28-67; column 6, lines 1-15; figure 1 *	1,4,5,7	A 47 K 1/00 A 47 K 1/02
A	EP-A-0 180 236 (TOTO) * Page 21, lines 13-27; page 22, lines 1-27; page 23, lines 1-5; page 24, lines 15-27; page 25, lines 1-27; page 26, lines 1-27; page 27, lines 1-7; figures 21-27 *	1,4,7	
A	US-A-4 145 769 (MACFARLANE) * Column 4, lines 62-68; column 5, lines 1-5,26-67; column 6, lines 17-28; column 7, lines 13-43; column 8, lines 5-68; figures 1-6 *	1,4,5,7	
A	US-A-3 918 987 (KOPFER) * Column 3, lines 1-68; column 4, lines 1-10,28-68; column 5, lines 1-14; figures 1,2,7 *	1,2,5,7	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-3 011 303 (SCHMITT) * Page 7, lines 11-18; figure 1 *	3	A 47 K A 61 B E 03 C E 03 D
A	FR-A-2 595 108 (BALOUTCH)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06-06-1990	BARBAS A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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