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(54) **Safety unit for the controlled closure of ventilation ducts**

(57) A unit (1) for the controlled closure of ventilation ducts (2) of the type that passes from the inside of an enclosed space (3) to the outside and comprises appropriate protective grilles (4, 5) on the openings. The internal space (3) in turn comprises a flow control cock (7) on the fuel supply pipe (7a). The unit (1) comprises a kit (8)

for flow control and closure of the duct (2) controlled by the cock (7). The kit (8) is in the configuration for closing the duct (2) when the cock (7) is in the condition for closing the pipe (7a) and therefore the flow of fuel is blocked, and in the configuration for opening the duct (2) when the cock (7) is in the condition for opening the pipe (7a) and the flow of fuel is allowed.

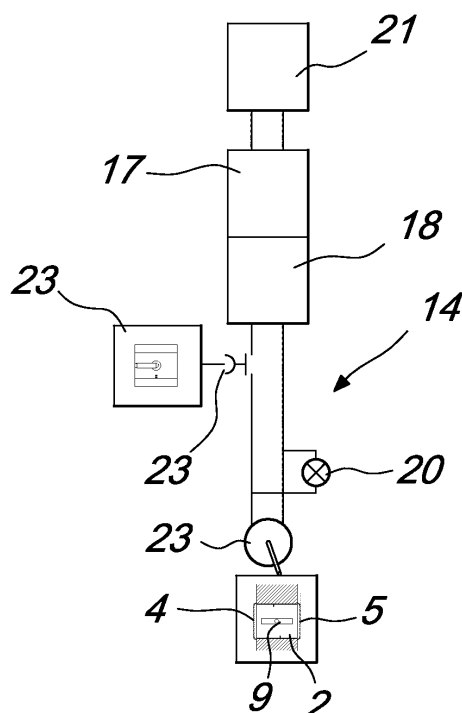


Fig. 5

Description

[0001] The present invention relates to a safety unit for the controlled closure of ventilation ducts, suitable in particular for installation in the ventilation ducts that are necessary in the presence of open flames inside enclosed spaces.

[0002] Italian Law 46/90, and the equivalent laws that exist in practically all the countries of the world, requires all the systems related to buildings for civil use, as well as the ones related to buildings for industry, commerce, services and other uses, to fulfill certain safety requirements. After Law 46/90, a Testo Unico per la Sicurezza (Consolidated Safety Law) was introduced in Italy which comprises even more complex provisions than the above cited law: in other countries, too, a similar development in regulations is occurring for making the living and working environments of people ever safer.

[0003] The heating system (the combustion boiler or even a simple combustion water heater, if they are not of the "sealed" type) and the kitchen (cookers obviously have a certain number of open flames) require correct air exchange, which is regulated in Italy by the Uni Cig-7129 standard and by the aforementioned Law 46-1990: according to these provisions, each system for air exchange, especially in enclosed spaces like the kitchen, must be done according to best practice. The regulations provide for the presence of a ventilation opening: as is known, every flame is fed by oxygen, and therefore if there is no adequate air reentry duct a depletion of oxygen and an increase in burnt gases (for example carbon monoxide) occur. It is, therefore, compulsory to provide in the kitchen (in general, in the enclosed space in which the combustion takes place) a hole whose dimensions are preset for each kW of thermal energy released by the burners installed (the minimum is in any case 100cm²) and it is preferable that the hole be provided near the floor and protected by grilles or nets. Similar provisions can be found in other European countries and in many countries outside Europe: although the present description refers to the statutory provisions in force in Italy, it is obvious that the concepts can be transposed similarly to many other countries, too.

[0004] This opening, by facilitating the exchange of air between the internal space and the external one, entails a considerable loss of heat.

[0005] Moreover, the ventilation opening must be larger if the cooking top does not have the flame safety device that blocks gas emission when the flame is extinguished by accident.

[0006] Italian Law 09/01/1991 no. 10 on energy saving requires the heating system design to be modeled according to criteria that are adapted to lead to a good operation of the system and requires the adoption of all possible solutions for ensuring the lowest possible loss of heat toward the outside space (obviously, the energy saving is imposed/recommended by the statutory provisions of various countries and thus this concept, too, even

though it is analyzed for the Italian territory, is valid for many other countries).

[0007] There is, therefore, an obvious conflict between the need to minimize the loss of heat and the presence of the ventilation duct.

[0008] Moreover, this problem is felt strongly also by the user, who often blocks the duct in order to minimize heat loss (during periods in which the external environment is particularly cold), creating a situation of potential danger.

[0009] The aim of the present invention is to obviate the above drawbacks and meet the mentioned requirements, by providing a safety unit for the controlled closure of ventilation ducts that minimizes the loss of heat while maintaining the ventilation prescribed by the law in the presence of open flames.

[0010] Within this aim, an object of the present invention is to teach the user to close the cock that receives the gas when the corresponding user devices are not in use and thus increase the safety of the management of the user devices.

[0011] Another object of the present invention is to prevent the user from being able to block the ventilation duct in order to reduce the loss of heat.

[0012] Another object of the present invention is to provide a device which is simple, relatively easy to provide in practice, safe to use, effective in operation and of relatively low cost.

[0013] This aim and these and other objects which will become better apparent hereinafter are achieved by the present safety unit for the controlled closure of ventilation ducts of the type that passes from the inside of an enclosed space to the outside and comprises appropriate protective grilles on its openings, the internal space in turn comprising a flow control cock on the fuel supply pipe, **characterized in that** it comprises a kit for flow control and closure of said duct controlled by said cock, said kit being in the configuration for closing the duct when the cock is in the condition for closing the pipe and therefore the flow of fuel is blocked, and in the configuration for opening the duct when the cock is in the condition for opening the pipe and the flow of fuel is allowed.

[0014] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a safety unit for the controlled closure of ventilation ducts, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic perspective view of a kitchen in which a unit according to the invention is installed, with the gas cock in the open condition;

Figure 2 is a schematic perspective view of a kitchen in which the unit according to the invention is installed, with the gas cock in the closed condition;

Figure 3 is a functional block diagram of the unit according to the invention;

Figure 4 is a constructive diagram of the unit accord-

ing to the invention in a fully mechanical version;
Figure 5 is a simplified electrical diagram of the unit according to the invention.

[0015] With reference to the figures, a safety unit for the controlled closure of ventilation ducts is generally designated by the reference numeral 1.

[0016] The safety unit 1 is adapted to be installed in all ventilation ducts 2 that pass from the inside of an enclosed space 3 to the outside, the ducts 2 being provided with adapted protective grilles 4 and 5 on their openings; the grilles 4 and 5 prevent a user from inserting a hand in the duct 2 and remaining stuck in it. Obviously, the grilles 4 and 5 also prevent the entry of foreign objects and animals.

[0017] The unit 1 also provides for the presence of a gas-using device in which there is an open flame in the enclosed space 3 (combustion boilers of the sealed type are therefore excluded): the figure shows the case of a cooking range 6. Any other type of user device is in any case to be considered suitable for association with the unit 1 according to the invention: for example, the association is envisaged for boilers (not of the sealed type), water heaters, gas-fired ovens, open flame nozzles (of the Bunsen burner type) and other similar applications.

[0018] The supply of the gas to the cooking range 6 is provided through a supply pipe 7a controlled by a cock 7.

[0019] The safety unit 1, according to the invention, comprises a kit for flow control and closure 8 of the duct 2 controlled by the cock 7.

[0020] The unit 1 is in the configuration for closing the duct 2 when the cock 7 is in the condition for closing the pipe 7a and therefore the flow of fuel is blocked; it is, on the other hand, in the configuration for opening the duct 2 when the cock 7 is in the condition for opening the pipe 7a and the flow of fuel is allowed.

[0021] The kit 8 for flow control and closure of the duct 2 comprises a movable wall 9, a movement element (10 in the mechanical version and 11 in the electrical version) associated with the wall 9 and adapted elastic means 12.

[0022] The wall 9 can be oriented, by the action of the element (10 or 11, depending on the version), from a first inactive configuration, in which the duct 2 is open, to a second configuration for obstructing the duct 2 by forcing the elastic means 12.

[0023] The movement element 10 (with reference to the mechanical version shown in Figure 4) comprises a translating member 13, a first end of which is associated with the wall 9 and the second opposite end of which is associated with the cock 7.

[0024] A rotation of the cock 7 produces a translational motion of the second end associated therewith and a consequent translational motion of the first end associated with the wall 9, which also is subjected to movement and in particular to the rotation from the configuration for closing the duct 2 (imposed by the elastic action of the elastic means 12) to the open configuration, therefore also due to the movement of the cock 7.

[0025] According to a preferred but not exclusive embodiment of particular interest in practice and in application, the translating member 13 is of the type of a wire, which can preferably slide within a respective sheath.

[0026] In this case, a rotation of the cock 7, from the configuration for closing the fuel pipe 7a to the open configuration, causes a translational motion of the wire, by way of traction applied to its second end associated with the cock 7, with a consequent movement of the wall 9 in the configuration for opening the duct 2: in practice, the wire, as a consequence of this rotation, is slack and the elastic means 12 apply their traction to the wall 9, keeping it in the configuration for opening the duct 2.

[0027] The opposite rotation of the cock 7, for closing, will instead cause the application of a traction applied to the wire, with consequent movement of the wall 9 into the configuration for closing the duct 2 by forcing of the elastic means 12.

[0028] The elastic means 12 maintain the wall 9 in conditions for "normal opening of the duct": a failure, such as a breaking of the wire, ensures in any case the safety of the home because the duct 2 is open for any position of the cock 7 (which at this point, because of the failure, is disconnected from the wall 9, which is kept in position only by the action of the elastic means 12).

[0029] Obviously, the embodiment in which the elastic means 12 tend to keep the wall 9 in the configuration for closing the duct 2 and such condition is altered as a consequence of traction applied to the translating member 13 by the cock 7 is to be considered equivalent and thus within the scope of the appended claims. This second embodiment is not, however, inherently safe.

[0030] According to a first possible embodiment, the wire can be constituted by a stem with a single beginning, which is substantially rigid and provided with adapted joints for connection between the segments that constitute it: with each change of direction there is a joint that allows mutual articulation between the two adjacent segments associated with such joint.

[0031] According to a second possible embodiment of unquestionable interest in practice and in application, the wire can be constituted by a plurality of mutually braided starts: in this case the wire is flexible and particularly resistant to tensile stresses and has a behavior similar to that of braided metal wires used normally in the mechanical sector (consider the brake cables of cycles or motorcycles).

[0032] With reference to an electric version of the unit 1 according to the invention, it comprises a circuit 14 provided with a switching element 15 that is connected thereto and is designed to supply power to the flow control and closure kit 8.

[0033] The circuit 14 is open when the cock 7 is open and is closed when the cock 7 is closed; the movement element 11 is constituted by a motor that is powered through the electric circuit 14 that leads to the cock 7.

[0034] The wall 9, according to a preferred embodiment, is a plate that is pivoted to the internal surfaces of

the duct along an axis that is substantially parallel to such surfaces.

[0035] As an alternative, it is possible to provide the wall 9 as a set of laminae that can rotate with respect to mutually parallel axes and are partially superimposed when they all lie on a same plane to close the duct 2.

[0036] It is appropriate to note that it is possible to install a sensor 16 for detecting the configuration of the wall 9; when the wall 9 is in the configuration for opening the duct 2, the sensor can enable the supply of electric power to adapted forced aspiration devices: in this manner the exchange of air between the inside and the outside is facilitated, preventing the buildup of combusted gases.

[0037] According to a particular systems solution, it is appropriate to note that the electric circuit 14 can comprise a voltage transformer 17 so as to keep the voltage of the unit 1 at low values (in the field termed "very low voltage") in order to reduce the risk of injury; downstream of the transformer 17, in a preferred solution a battery is installed. From a constructive point of view, such battery is inserted in an uninterrupted power supply 18 that comprises a rectifier (a device that converts alternating current to direct current), the actual battery and an inverter (a device that converts direct current into alternating current). If the motor 11 is supplied by direct current, the inverter is not present in the uninterrupted power supply 18.

[0038] The box-like body 19 by means of which it is possible to install the kit 8 comprises a compartment (not illustrated in the figure) for containing the motor 11 and an indicator light 20 that is visible from the outside in order to indicate the correct supply of electric power: actually, the indicator light 20 is on whenever the electric circuit 14 is closed and thus the cock 7 is in the closed position and no gas is supplied to the user devices. If the uninterrupted power supply 18 is not present and without an electric supply from the mains 21, the unit 1 is inoperative, the duct 2 remains open with any configuration of the cock 7 and therefore the indicator light 20 is always off.

[0039] The operation of the invention is as follows.

[0040] When the user has to use devices that need the supply of gas (START condition, in the figure), he/she checks 23 the condition of the cock 7 by rotating it optionally into the open configuration 23, opening the circuit 14, with a corresponding rotation of the wall 9 by way of the action of the elastic means 12, which are no longer hindered by the motor 11. This entails the opening 25 of the duct 2, with consequent free flow of air from the enclosed space 3 to the outside. In this case the indicator light 20 is off (step 24).

[0041] When the user does not need the devices cited above, he/she must turn the cock 7 in the closed configuration 26, which also corresponds to the closure of the circuit 14 with consequent lighting 27 of the indicator light 20 and supply of the motor 11, which turns the wall 9 in order to close 28 the duct 2.

[0042] Under these conditions, heat exchange with the external environment is minimized, improving the efficiency of the heating system.

[0043] Secondly, the unit 1 according to the invention is intended to get the user accustomed to closing the cock 7 whenever he/she is not using devices supplied by gas, contributing to the increase in safety of his/her own home.

[0044] It has thus been shown that the invention achieves the intended aim and objects.

[0045] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0046] All the details may further be replaced with other technically equivalent ones.

[0047] In the exemplary embodiments shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0048] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0049] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements without thereby abandoning the protective scope of the appended claims.

[0050] The disclosures in Italian Patent Application No. BO2009A000259 from which this application claims priority are incorporated herein by reference.

[0051] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A safety unit for the controlled closure of ventilation ducts (2) of the type that passes from the inside of an enclosed space (3) to the outside and comprising appropriate protective grilles (4, 5) on their openings, the internal space (3) in turn comprising a flow control cock (7) on the fuel supply pipe (7a), **characterized in that** it comprises a kit (8) for flow control and closure of said duct (2) controlled by said cock (7), said kit (8) being in the configuration for closing the duct (2) when the cock (7) is in the condition for closing the pipe (7a) and therefore the flow of fuel is blocked, and in the configuration for opening the duct (2) when the cock (7) is in the condition for opening the pipe (7a) and the flow of fuel is allowed.
2. The unit according to claim 1, **characterized in that** said kit (8) for flow control and closure of said duct

(2) comprises a movable wall (9), a movement element (10, 11) associated with said wall (9), and adapted elastic means (12), said wall (9) being orientable, by way of the action of said element (10, 11), from a first inactive configuration, in which the duct (2) is open, to a second configuration for obstruction of said duct (2) by forcing of said elastic means (12).

3. The unit according to claim 1, **characterized in that** said movement element (10) comprises a translating member (13), a first end of which is associated with said wall (9) and the second opposite end of which is associated with said cock (7), a rotation of said cock (7) producing a translational motion of the second end associated therewith and a consequent translational motion of the first end associated with the wall (9), which also is moved by the movement of the cock (7). 10

4. The unit according to claim 3, **characterized in that** said translating member (13) is of the type of a wire, which can preferably slide within a respective sheath, a rotation of said cock (7), from the configuration for closing the fuel pipe (7a) to the open configuration, producing a translational motion of the wire, by way of traction applied to its second end associated with said cock (7), with consequent movement of said wall (9) into the configuration for opening the duct (2) by way of the action of said elastic means (12), the opposite rotation of said cock (7), during closure, determining a traction applied to said wire, with consequent movement of the wall (9) in the configuration for closing the duct (2) with external forcing of said elastic means (12). 20
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5. The unit according to claim 4, **characterized in that** said wire is a stem with a single beginning, is substantially rigid and is provided with adapted connecting joints between the segments that constitute it. 40

6. The unit according to claim 4, **characterized in that** said wire is constituted by a plurality of mutually braided beginnings, being thus flexible and particularly resistant to tensile stresses. 45

7. The unit according to claim 1, **characterized in that** it comprises an element (15) for interrupting an electric circuit (14) that is connected thereto and is designed to supply power to said flow control and closure kit (8), the circuit (14) being open when the cock (7) is open and being closed when the cock (7) is closed, said movement element (11) consisting of a motor that is powered through said electric circuit (14) that leads to said cock (7). 50
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8. The unit according to one or more of the preceding claims, **characterized in that** said wall is a plate (9)

that is pivoted to the internal surfaces of the duct (2) along an axis that is substantially parallel to said surfaces.

9. The unit according to one or more of the preceding claims, **characterized in that** said wall (9) is constituted by a plurality of laminae that can rotate with respect to mutually parallel axes and are partially superimposed when they all lie on a same plane. 5

10. The unit according to one or more of the preceding claims, **characterized in that** it comprises a sensor (16) for detecting the configuration of said wall (9), when said wall (9) is in the configuration for opening the duct (2), said sensor (16) enabling the supply of electric power to appropriately provided forced aspiration devices. 10
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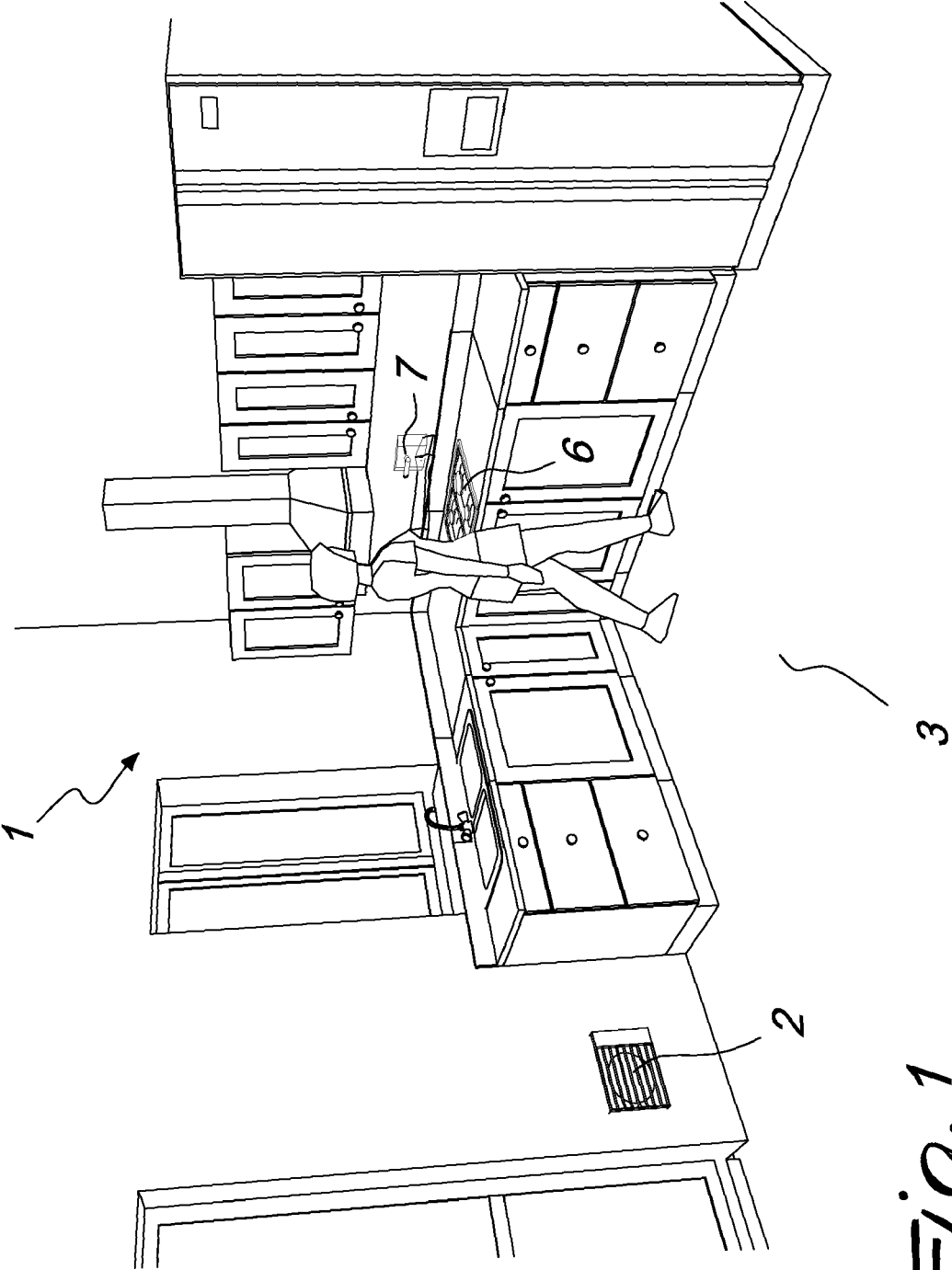


Fig. 1

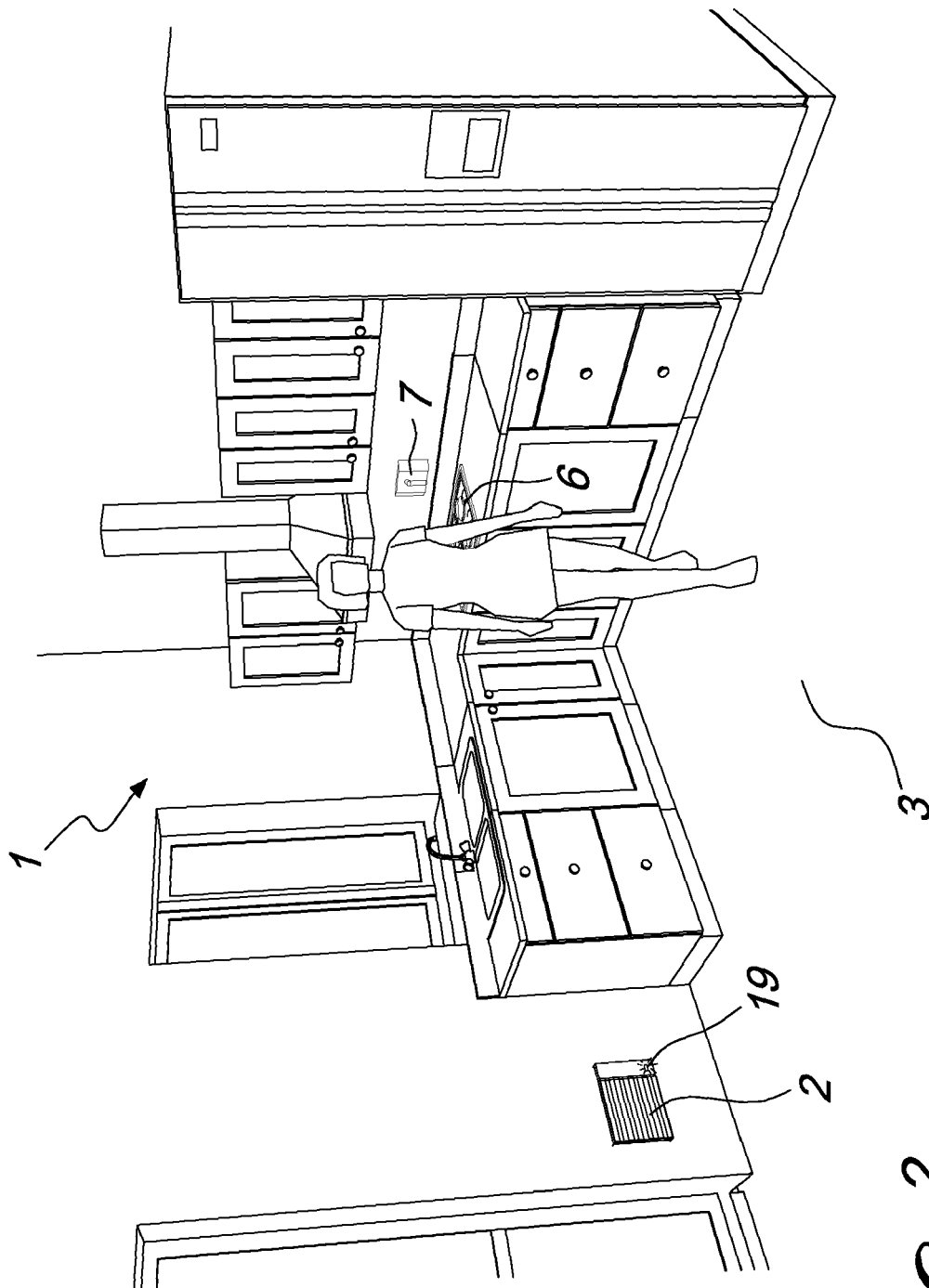


Fig. 2

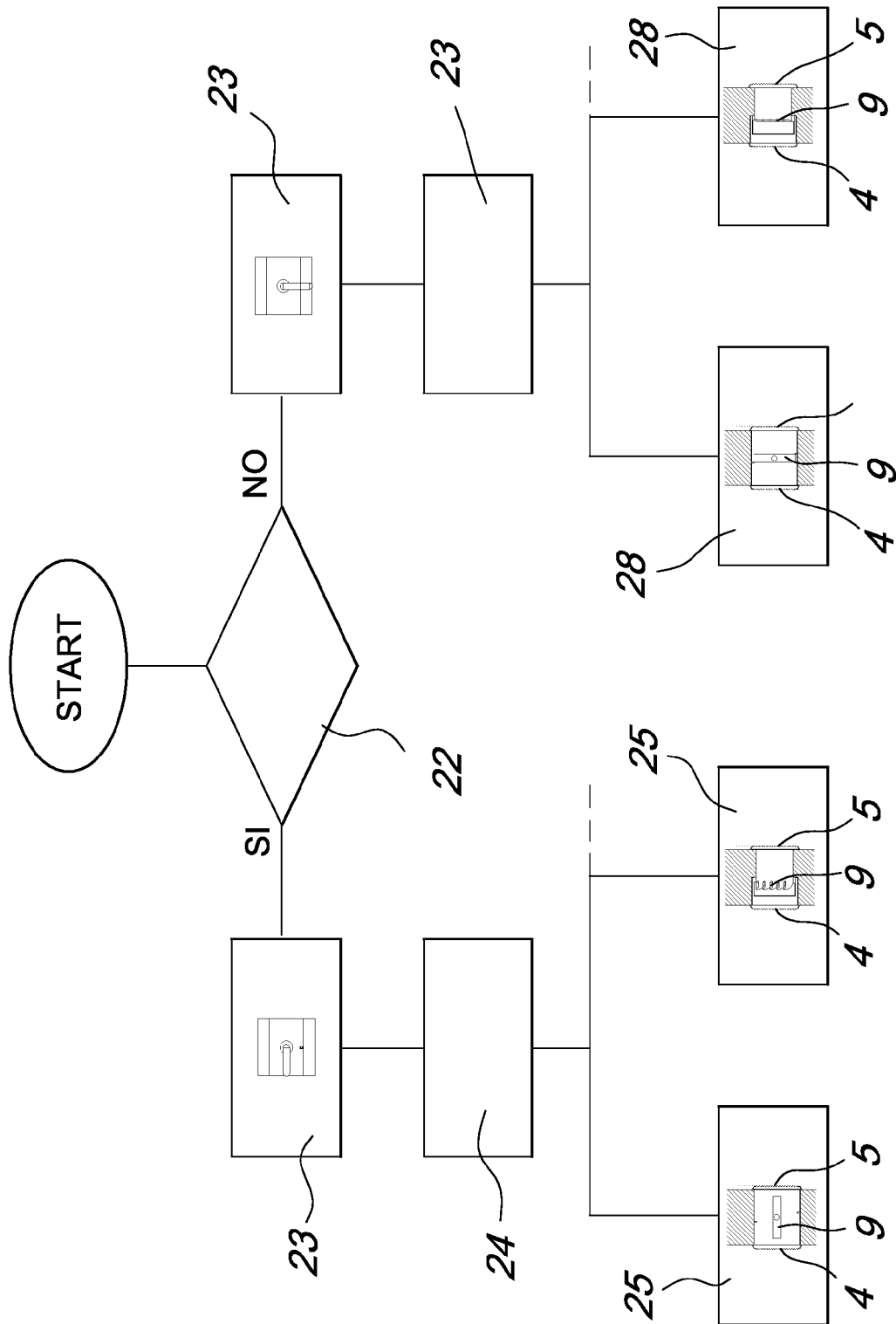


Fig. 3

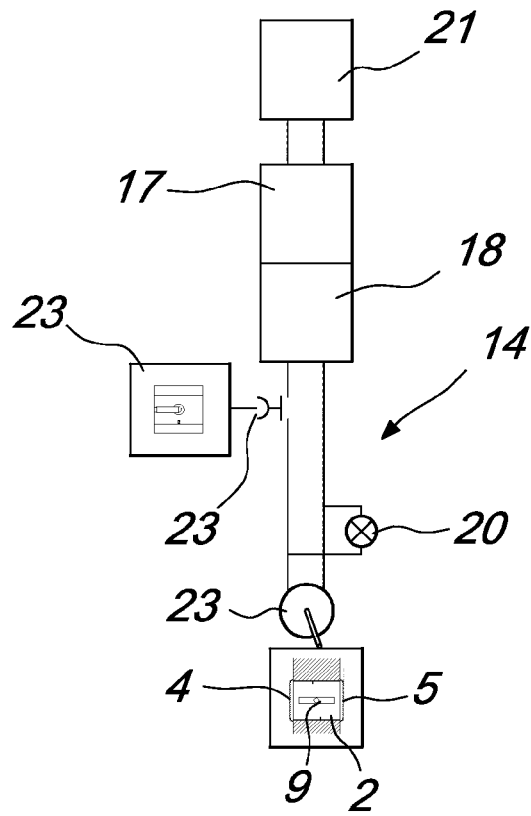


Fig. 5

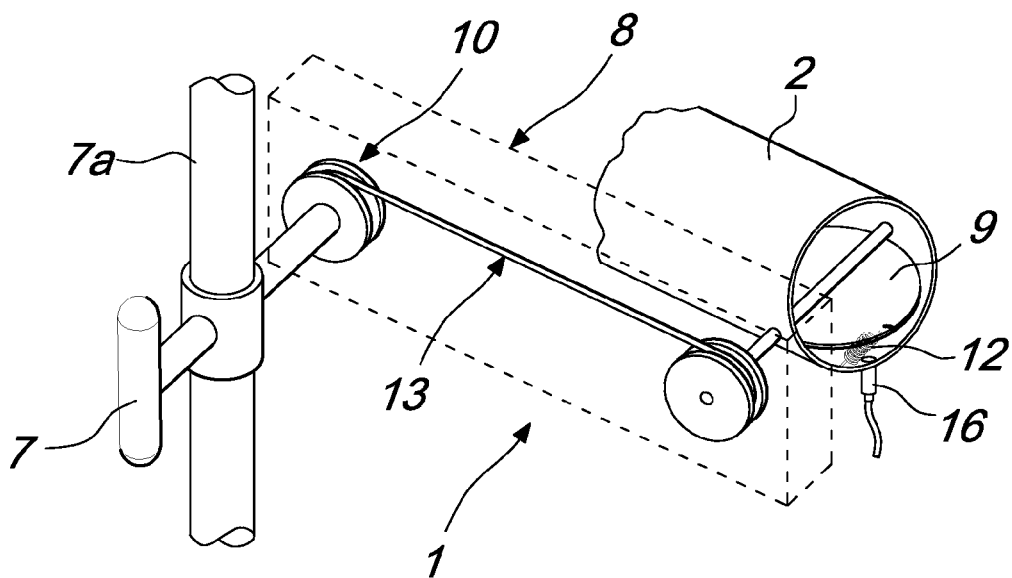


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9353

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2006 005960 A1 (BERBEL ABLUFTTECHNIK GMBH [DE]) 9 August 2007 (2007-08-09) * abstract *	1-10	INV. F24F11/00 F24F11/02
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			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 August 2010	Examiner Valenza, Davide
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ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 9353

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REFERENCES CITED IN THE DESCRIPTION

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