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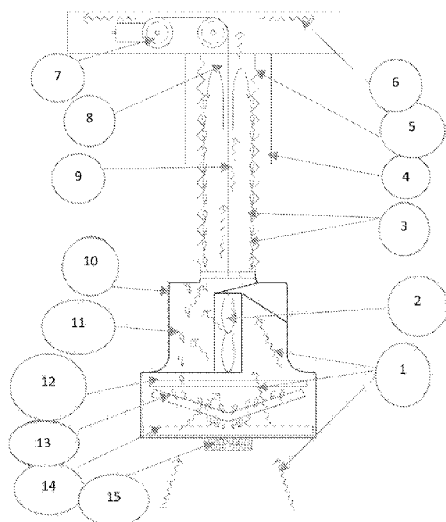


Fig.5

(57) Abstract: The invention provides a moving kitchen hood device located above the cooking area which efficiently and safely evacuates the fumes with all its gaseous and liquid components. The device can be easily disassembled and cleaned, while some parts may be disposable.



IMPROVED KITCHEN HOOD

Field of the Invention

The present invention relates to a moving kitchen hood apparatus located above the cooking area, having improved performance, safety features, easy
5 maintenance and cleaning.

Background of the Invention

A kitchen hood is a device located above the stove to ventilate the area above the cooking area, to capture the hot air carrying contaminations, including
10 odors and particles of steam, grease and smoke. The air is then transferred through an exhaust duct to the external environment or returned back to the kitchen after being filtering. Most of kitchen hoods include powerful blower, and a large funnel-shaped covering canopy, beside additional functional and control elements. The hoods are usually located above the stove in a
15 relatively high distance from the cooking area and require strong sucking means, the large amount of the processed air resulting in high noise and less efficient ventilation. There were attempts to improve the hood performance, including US20080135042, which reduces the required airflow through the hood by employing an arched interior hood surface. US6647978 provides
20 telescope movement of the hood elements to their operative and non-operative positions. JP2004211911 provides a hood allowing condense and catch oil mist on an easily removable filter. JP2005030728 provides a hood which is positioned on a cooking table only during the cooking activity, while being stored in the cooking table when not used, ensuring a free space
25 and line of vision when not used, as well as simplified cleaning. US 20070261693 relates to a hood being installed on a cooker hob, on the surface of a support unit, the hood including a flame shield element, and anti-grease filters, and a glass panel rising perpendicularly from said element and conducting the fumes into a special discharge duct. The disclosed solutions
30 address only a part of the known problems, or they are technically too

complex. WO 2015/071898 addressed the problem of the reduced free space around the cooking area, as well as the need to increase the efficiency of the evacuation process and to reduce the associated noise, by providing a split hood; the split hood divided the ventilation power of the system to several smaller independent units which, in addition, were flexibly drawn nearer to the cooking area when needed. The present invention further improves the split hood. It is therefore an object of the invention to enable an easy disassembly, cleaning, and replacing consumable parts of the hood.

It is another object of this invention to provide a compact hood, not taking much space around the cooking area, exhibiting an improved evacuation efficiency and low noise, while having a simple maintenance.

It is still another object of this invention to provide a compact hood, which requires a relatively low energy output for its efficient functioning.

It is a further object of this invention to provide a compact hood, comprising a simple and light sucking means with low energy demand.

It is a still further object of the invention to provide a comfortable and easily manageable hood, for different requirements and conditions.

Other objects and advantages of present invention will appear as description proceeds.

Summary of the Invention

The present invention provides an autonomous kitchen hood unit for evacuating the cooking fumes comprising, beside the air, gaseous and liquid components from above a cooking area, the area being defined by the upper surface of an electrical or gas stove, said unit comprising i) an inlet through which said fumes enter the evacuation unit; ii) a rectifying screen situated above said inlet for collecting said liquid components or said gaseous

components after condensation from said fumes; iii) a blower situated above said screen for creating a suction force to draw said fumes with surrounding air into said inlet; iv) a duct for transferring said air, at least partially rid of said components, either back to the kitchen or through an exhaust system out of the building; and v) lifting means for lowering said inlet nearer to said cooking area and for lifting said inlet farther from said cooking area, comprising a cable or other means connecting the hood unit with ceiling, and in a preferred embodiment a spring configured to absorb at least part of the potential energy of the hood unit during its downward movement, and to return at least part of said energy to the hood unit during its upward movement. Said duct or its inner part are preferably disposable. Said hood unit is easily disassembled and cleaned. In a preferred embodiment, the hood unit of the invention is an autonomous hood unit, wherein said blower is a radial blower embedded in said hood unit and integrated with said inlet, rectifying screen, and said duct; so that the lifting means lift and lower also the blower. An important feature of the hood according to the invention is its configuration enabling to minimize sucking clean air into the hood, in other words enabling to maximize the volume ratio of the air with cooking fumes to the uncontaminated air drawn from the space outside the cooking area, so that the gas sucked into the hood inlet has maximal concentration of the contaminants. The hood unit of the invention is configured to be easily disassembled and cleaned. Moreover, the hood unit is occasionally self-cleaned when said gaseous components consist mainly of water steam, as the steam condenses in relatively clean water which washes the inner parts of the hood unit as it flows to the collector. Occasionally, clean water or water with cleaning agents may be boiled under the hood unit to enable self-cleaning. In one embodiment, said inlet has a surface which is less than the surface of said cooking area; in other embodiment the inlet has a surface which is greater than or equal to the surface of said cooking area. Said screen comprises at least one polymeric or metal inclined surface. Said screen comprises at least one inclined surface along which drops originating from

said gaseous or liquid components flow, and a collector in which said drops are stored. In one embodiment, said inclined surface comprises a plastic or metal plate. In a preferred embodiment, the inclined surface comprises a plastic or metal network member. In one embodiment, the screen comprises

5 two nonparallel members, an optional upper member and a lower member comprising said inclined surface, through which said fumes can ascend, and a liquid collector to which the liquid removed from said fumes arrives from said members by gravity, the members comprising at least one metal or polymer network layer. In one embodiment, said upper member comprises a

10 horizontally situated planar member, for example a network layer, and said lower member comprises a trench or a depression from which said liquid flows by gravitation to said collector. The shape of said inclined surface or said lower member may comprise two planes or pyramid or cone, wherein the intersection of said two planes or the apex of said pyramid or cone form said

15 trench or depression. Said metal or polymer networks comprise holes which do not put resistance to the ascending fumes but capture drops of said liquid. Said inclined surface serves as a guiding, rectifying, element to direct the returned liquid or condensed gas from the cooking fumes into the drain. In a preferred embodiment, said blower is a radial blower. Said blower is

20 preferably embedded in said hood unit so that the rotation axis of its blades is situated horizontally. The cross-section area of said duct is less than the area of said inlet. The duct comprises an extendable tube. The duct is easily accessible for disassembly, periodical cleaning, and maintenance; in a preferred embodiment, the duct is disposable or comprises a disposable inner

25 tube. The lifting means preferably comprise a motor. In a preferred embodiment, the lifting means also enable manually moving the unit in the vertical direction. In a preferred embodiment of the invention, the lifting means comprise means for employing gravity for downward movement and the spring force for the upward movement. The lifting means may further

30 comprise a means for horizontally changing the position of the unit above the cooking area. In one embodiment, the hood unit is automatically lowered

nearer to the cooking area and the blower is activated when heat starts to be produced in said cooking area. The hood unit of the invention may comprise sensors for detecting overheat or for detecting an obstacle in the movement path. The duct is preferably enclosed within an esthetically acceptable protective tube; electrical wires feeding the blower or eventual lights or other electrical components are preferably integrated in said protective tube, as well as the cable. In one embodiment, the blower is fed from a battery.

The invention relates to composite hood comprising at least two hood units described above. The units are operated independently of each other. The hood units are attached to a common box embedded in the ceiling or positioned between the ceiling and the cooking area; in one embodiment said box comprises the lifting means for all the hood units, optionally additional sucking means supporting said radial blowers, and optionally regulation means for optimally managing the stove and the hood. The hood of the invention evacuates the cooking fumes from above a cooking area defined by the upper surface of an electrical or gas stove accommodating a number of electrical hot plates, such as resistive or induction plates, or a number of gas burners, wherein at least some of the evacuation units are automatically activated when at least some of plates or burner work, the evacuation units which are active are lowered nearer to the working electrical hot plates, nearer to the working burners, or nearer to the working point on the electrical inductive plate (active cooking sites) and/or are shifted to be above the active cooking sites; while said lifting means precisely and optimally adjust the position of the units above said the cooking sites. The hood of the invention preferably comprises sensors for detecting overheat or obstacles in the path of the hood units, and means for at least one action selected from the group consisting of starting an alarm, stopping heating elements, stopping the movement of the hood units, lifting the hood units, stopping the blowers, and extinguishing flames. The hood of the invention further preferably comprises control means configured to store and transfer data and

signals, and to regulate the work of the stove and the hood. The control means may comprise the communication with cloud or a mobile device such as smartphone, tablet, or local hub, and they may comprise activities selected from the group consisting of processing data from sensors, processing data
5 from a camera, increasing safety of the cooking process, and increasing the efficiency of the energy consumption; whereby ensuring healthy kitchen ambience, lowering the energy consumption, and reducing noise level, compared to a non-composite hood. The hood of the invention preferably comprises a control unit which is configured to regulate the temperature of
10 the heated pot to follow a predetermined time/temperature regimen or cooking temperature-time profiles and cycles, possibly downloaded from the internet, cloud, or from the memory storage, so as to prevent overflowing or overcooking the cooked pot contents.

Brief Description of the Drawings

The above and other characteristics and advantages of the invention will be more readily apparent through the following examples, and with reference to the appended drawings, wherein:

Fig. 1. shows a kitchen hood apparatus unit according to one embodiment of
20 the invention, with an extendable pipe, comprising air inlet direction (1), hood main unit (2), light signal (3), and extendable pipe (4);

Fig. 2. shows a kitchen hood set arrangement according to one embodiment of the invention, comprising a top box including shield to protect the moving duct, and several hood units 4 with light signals 5 attached to
25 the common top box base (1), having extendable pipe (3), and being surrounded by protective tube (2);

Fig. 3. shows kitchen hood arrangements according to one embodiment of the invention, comprising individual hood units attached in a common holding base positioned at different heights between the ceiling and
30 the cooking area, the units possibly having a transparent enclosure and a lightening surrounding;

Fig. 4. shows another hood arrangement according to one embodiment of the invention, comprising hood unit 4 provided with a protective frame 1 with control panel 3, and removable control unit 2 attached to it;

Fig. 5. is a schematic view of a kitchen hood according to one embodiment of the invention, showing a cleaning system, including condensing cycle for filtering and self-cleaning; the condensing cycle removes oil and grease vapor from the air, which is sucked into the hood unit of the invention and released back to the environ as clean and dry air, either being recycled inside the kitchen or being led through an exhaust duct out of the building;

Fig. 6. is a top view and a side view of the motor system in a hood according to one embodiment of the invention; a spiral spring (4) absorbs potential energy of the hood unit moving down and releases it back when moving up, contributing to smooth operation and reducing the power required from the motor for the lifting stage;

Fig. 7. is a cross-section view of a hood unit according to one embodiment of the invention, showing the inner parts and the orientation of the radial blower, the specific blower orientation prevents the twisting move (rotation) of the hung hood unit; further shown is a rectifying screen (3), acting as a collector for collecting the oil from the cooking vapor, constructed of two parts: a flat filter and a conically shaped mesh filter made up of one or more layers of metal mesh;

Fig. 8. shows a metal or plastic duct pipe, preferably extendible and optionally disposable, for implementing in as kitchen hood unit according to one embodiment of the invention;

Fig. 9. schematically illustrates extendable pipe, comprising a spring 2, and integrated electrical wires 3, with electrical connectors 1 at both ends to be employed in a hood unit according to one embodiment of the invention;

Fig. 10. illustrates a sensor system incorporated in hood unit according to one embodiment of the invention including magnet 2 fixed at the

travel limit, and sensor 1 within a flexible housing 6 and 7, part 7 being attached to the cable; the sensor stops the motor electrically when sensing the magnet; the housing is designed to stop the movement mechanically to prevent the hood from moving out of the travel limit; when magnet 2 reaches the travel limit, the sensor 1 detects the magnet and sends a signal to the control unit to stop the motor; for safety, the system includes a second back up option to stop the movement: if motor continues to move the cable 4, which is connected to the lower part of the magnet housing 6 with body 5, spring 3 will be compressed between immobile upper housing 7 and lower housing 6, thereby pulling up the lower magnet housing 6; and

Fig. 11. schematically demonstrates the integrated system control of the kitchen hood with the cooker, including communication among the system parts in a hood system according to one embodiment of the invention, comprising integrated control unit of the kitchen hood with a stove, remote control unit such as smart phone fire hazard control, and the means for following the cooking cycles and regimens, possibly including time-temperature predetermined profiles, and preventing overflow of the cooking liquids.

Detailed Description of the Invention

It has now been found that a movable kitchen hood unit comprising a cleanable or disposable air duct, a spring spiral for absorbing kinetic energy of the unit's downward movement, and advantageously a radial blower, provides an efficient and comfortable evacuation of the cooking fumes from the cooking area.

The kitchen hood of the present invention is structured to approach close to the cooking area, suck the contaminated hot air above the cooking area, direct it into an optionally disposable pipe duct having small cross section. The moisture contained in the hot air is condensed, transmitting it's latent

heat through the pipe walls and the relatively dried and cleaned air is either returned to the kitchen environment or moved through an exhaust system to the outside environs. The hood can reduce or eliminate the air contaminants without need for installing a conventional filter to filter the air. The fumes
5 produce condensed liquid drops that drip down toward a trap. The contaminant condensation from the sucked air may generate a grease layer over the time; the new kitchen hood addresses this potential problem and enables to easily disassemble and clean or replace the air duct. As such, the new kitchen apparatus of the present invention represents significant
10 improvement over prior kitchen hood apparatuses, providing efficient solution for cleaning the hood elements from grease and reducing the fire hazard. The present invention further provides sophisticated movement system to lift and lower the kitchen hood unit, resulting in smooth and secure movement of the hood unit up and down, and minimizing the effect of
15 the blower centrifugal force on twisting the hood unit around the vertical axis. The moving hood unit of the invention reduces the danger to human subjects, either hood users or incidental dwellers, being wounded by wide hood parts sticking around, while also protecting against overheating and fire hazard via attaching sensors to the moving hood unit, or to other parts of
20 the system, which detect objects in the path of the movement, and detect overheat or flame; emergency reactions include one or more steps selected from lifting the hood unit, stopping the blower, stopping the stove heating element, or distinguishing the flame.

25 The hood unit according to the invention stores the energy of the downward movement for its later release when the hood is lifted. One or more springs contribute to storing the kinetic energy of the downward movement, and eventually also to balancing the weight of the hood unit or units. Another advantage of the hood unit according to the present invention is an easy
30 replacement and cleaning of the hood elements, particularly the pipe ducts; in one embodiment the ducts are easily washed, in another embodiment the

ducts are disposable and are easily replaced, so also minimizing the risk of fire. An important feature of the hood unit, in one embodiment of the invention, is a contaminants screen, obviating the use of filtration media, for removing the aerosol particles from the cooking fumes, including solids and liquids; preferably, comprising metal net with sufficiently small holes to allows the sucked contaminated air flow through the screen up to the pipe duct, while preventing the condensed liquid from dropping back to the cooking area by guiding it to collecting drainage container. The pipes used as air ducts or for wire accommodation are preferably surrounded by a cylindrical coat, which protects and hides the moving parts and heated elements from direct touch, and adds an esthetic value to the hood appearance. In one embodiment, the hood units of the invention are connected to a common base, either built in the ceiling or located under the ceiling; the base may comprise a control panel. Control units or elements may be attached to each of the hood units. As part of the control system, sensors are employed, including sensors integrating the movement path, connected to mechanical stoppers, which still more increase the safety of the whole moving system. Another part of the hood control system of the present invention, in one preferred embodiment, is employing mobile devices, such as smartphone and applications associated with it.

In one embodiment of the invention, the kitchen hood control system is integrated with the cooker controller for synchronizing the hood with the cooker, and it communicates with devices such as stove, and optionally other appliances such as air conditioning system, water system, alert systems, digital data system including recording the activities, whereas the integrated kitchen control system may communicate with cloud for transmitting data, transfer alerts, including alerts for the needed service, and store data.

In another embodiment of the invention, the hood system is equipped with camera and heat sensors integrated either in the hood units or close to them,

or in the stove for regulating the heat and temperature of the cooking device to control the heating and cooking and protect the system from overheating, or overcooking, or overflowing of the cooked food, and from fire hazard. The kitchen hood system of the invention is preferably provided with lights
5 ensuring the safe and pleasant illumination of the working area, as well as signaling important stages or situations, either associated with cooking or with alerts, enabling to the user get instantly updated about the hood system status; various colors, advantageously also employing LED elements add to the hood esthetic appearance, and its safe and easy operation.

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Most of the kitchen hood apparatuses suffer from widely known phenomena of accumulating grease which results in bad smell, and also becomes a fire hazard. The kitchen hood must be inspected regularly, to determine whether cleaning is needed before a dangerous amount of grease has accumulated.

15 The cleaning process usually requires the assistance of specialists providing the service. The need exists for simple kitchen hood apparatus that has self-cleaning abilities or which can be easily disassembled for cleaning and replacement of consumable or disposable parts. The invention addresses the need. The invention relates to a moving hood apparatus including an
20 extendable pipe or wire, capable of moving downward towards the cooking area and back to its high position when not being in use. The close distance of the hood unit from the cooking area substantially reduces energetic requirements and system noise, and reduces the volume of the processed air. The sucked air containing a concentrated moisture is guided upward into the
25 pipe duct through an oil-removing screen, "one direction filter", located in the inlet part of the hood unit, allowing the moisture air moving upward and preventing the condensed drops from falling back to the cooking area. The condensed liquid drips down along the pipe by gravity back to the upper side of the screen, rectifying screen, which prevents the liquid from dripping back
30 to the cooking area and guides the condensed drops into a collecting container located below. The clean air remained in the pipe duct is then led

through an exhaust system out of the kitchen or returned back to the kitchen environment. In some embodiments, carbon filter is employed to remove odors from the air returned to the kitchen. The rectifying screen is an element that allows the sucked air go through or around but prevents the liquid go through. The screen has members which may comprise one or several layers, for example metal or polymer networks. The members may exhibit, for example, a planar shape with mild slope, or another two-dimensional shape with a slope, the slope leading the condensed liquid to a collector which may comprise a detachable vessel located below. The drainage vessel is easily detached for emptying and cleaning purpose. The air ducts of the hood units according to the invention may be disposable and are regularly replaced, in one embodiment; in another embodiment, the ducts are easily released and cleaned; in a still another embodiment, the ducts are cleaned in situ by a self-cleaning process at any time when water is boiled, or by periodically boiling clean water or a mixture of water and cleaning agents under the kitchen hood; the hood unit sucks the water steam or the mixture of water steam with the agent and washes the inner parts of the unit, whereas the condensed liquid removes the contaminants into the drainage container.

The hood apparatus of the present invention includes, in a preferred embodiment of the invention, a radial blower adopted for sucking the relatively small air amount with high pressure drop required due to the small pipe duct cross section. However, the use of a radial blower in a hung device may show serious problems, as the rotation of the rotating parts of the blower may cause twisting or rotating the whole hung device around the vertical axis, particularly when turning the blower on and off; the invention overcomes the problem by embedding the blower in the hood unit of the invention in a special position, minimizing the effect. Preferably, the hood unit of the invention comprises a radial blower embedded in such a position that the blower rotation axis is situated horizontally. Another advantage of

the hood unit of the invention is a smart motion mechanism; it changes the vertical position of the hood unit, while comprising spiral spring (preferably constant force spring) attached to the motor and to be compressed by downward movement of the hood unit, whereby storing the energy, which is released when the unit moves upward. Additional linear coil spring maybe integrated between the hung hood unit and the top mounting to balance the hood unit weight. The two springs reduce, independently, the power required from the motor and increase the motor efficiency. In one embodiment, limit sensors are integrated in the moving system and provide signals to the control unit to indicate the limit movement points which are reached. Mechanical adjustable stoppers are attached to provide backup to the control unit in case of controller failure; overcurrent detectors may also stop the movements.

The hood unit of the invention is preferably provided with the means which reduce the risk of accidental collision between the moving hood and any potential obstacle positioned within the travel length of the hood apparatus. Such obstacle may be, for example, a high device left on the cooking area, or user's body. The means comprise sensors detecting the objects in the hood's movement path. The sensor may comprise proximity sensor, or camera, or other means. Optical and/or thermal sensors may further increase the safety of the cooking process. A heat sensor, integrated in the hood system, may provide an alert, or may automatically move the units upward, or shut the blower down, or reduce the power of the stove heating element, and may also start an extinguishing action.

The invention aims at providing a kitchen hood which is easily disassembled, cleaned, while replacing its consumable or disposable parts, in particular the air ducts requiring the removal of oil and grease and other contaminants deposits. The invention provides an improved kitchen hood system which is flexible and relatively simple, and requires simpler maintenance. The hood

can be easily and flexibly controlled with any available communication means, including smart phones, together with the associated cooking and ventilation equipment of the kitchen as further explained.

5 Description of the Preferred Embodiments

Referring to Fig. 1, a single moving hood apparatus attached to extendable pipe is presented in high and low position. The kitchen hood unit 2 has the air entrance 1, a light signal 3 showing the status of the hood such as on/off, fan intensity work, communicating etc., shield 4 protects the user from touching the moving parts. Fig. 2 represents a set of the hood units 4
10 combined by common top box 1. The extendable pipe 3 is protected by pipe shield 2. Fig. 3 represents a moving kitchen hood in several arrangements, showing a few possible shapes of the top box attached directly to the ceiling or positioned at different locations below the ceiling, comprising up to four
15 hood units. One of the options shows a hood unit hung on wire that is attached to the motor without having extendable pipe, the air being cleaned and returned back to the kitchen environment. Another options shows a hood unit connected to an extendable pipe. The upper box is either connected to the ceiling or lowered to be positioned between the ceiling and the cooking
20 area. Fig. 4 illustrates one embodiment exhibiting a protective frame 1 surrounding the set of hood units, control panel 3 with detachable unit 2. Fig. 5 demonstrates another significant improvement provided by the invention. Contaminated hot air coming from cooking area enter the kitchen hood from the front lower surface 14, flowing through the rectifying screen comprising
25 inclined surface 13 and optional planar element 12, and towards blower 2 of which rotation axis is positioned horizontally, to extendable pipe duct 5, the hot air 9 is then cooled while moving up and the fume is condensed into liquid drops 3. The planar element 12 supports the condensation filtering cycle system and may serve as humidity and/or odor trap. The inclined
30 surface 13 is preferably a network screen allowing the air flow upward and capturing the returned condensed liquid drops, and guiding them to the

collecting drain. The inclined surface may comprise any shape, including cone or pyramid. The hot air flows towards the pipe duct through the screen or bypassing it. The screened air 6 then moves out of the hood apparatus and is either returned to the room or led through an exhaust out. The condensed drops 3 slide down towards the depression or trench in part 13 of the rectifying screen that guides the liquid to drainage container 15. The same condensation cycle may be employed for periodical self-cleaning of the kitchen hood apparatus. An optional moving system includes motor 7 with wire 8 controlling the height of the hood (detailed in Fig 6).

Fig. 6 shows top and side view of a motor, such as the one mentioned in Fig. 5, being a part of the hood height change mechanism. Motor 1 with gear 2 is attached to wheel 3 for winding and releasing the wire holding the hood; a spiral spring preferable of a constant force, 4, is attached to the motor shaft.

When descending, the hood potential and/or kinetic energy accumulates in the spring. Fig. 7 shows a cross-section view of rectifying screen and radial blower in a hood unit according to one embodiment of the invention, which releases the air back to the kitchen surroundings, including blower 1, flat screen part 2, conical screen part 3 that leads the returning condensed liquid into drainage container 6 positioned in the front air entrance surface 5. The

air is released from opening 4 to the kitchen surroundings. Fig. 8 shows extendable pipe ducts in one embodiment, when pipe material can be metal or plastic; the pipe may end with adaptors for quick connecting and disconnecting. Fig. 9 is a drawing illustrating an extendable duct pipe, for one embodiment of the hood unit of the invention, with a linear coil spring and with electrical wires 2 and 3 integrated in the duct wall. Both ends of the electric wire are provided with a connector 1 for quick connecting and disconnecting the pipe for cleaning or replacing. The spring (preferably tension spring suitable for pulling force) is integrated into the pipe duct wall to balance the hood and the tube weight, pulling the pipe to its short length. The pipe is attached at its upper side, for example to the ceiling box. When

the hood moves down, the hood weight pulls the pipe and stretches the spring, which absorbs and stores the energy proportionally to the extension, releasing it when the hood moves up and shrinking the pipe to its shortest length.

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Fig. 10 shows a limit sensor for a hood unit of the invention, with a flexible housing allowing the motor stop after receiving an alert signal. The unit, according to one embodiment of the invention, includes a magnet 2 attached to the housing. The flexible housing comprises upper part 7, lower part 6, spring 3, and sensor 1 located at the travel limit point, the sensor being designed to stop the motor electrically when reaching the travel limit; for safety reason, the housing of the magnet sensor is designed to stop the movement mechanically and to absorb the energy by the internal spring; when magnet unit 2 arrives to the travel limit stop, the sensor 1 detects it and sends signal to stop the motor; in case the motor does not stop due to system failure, upper magnet housing 7 is mechanically stopped, lower magnet house 6 is pulled up by cable 4 which is attached to the cable by component 5, the spring 3 is then compressed between the stopped upper housing 7 and the lower housing 6 which is pulled up, the spring compression results in an increased current consumed by the motor; the increased current is detected by the control unit and the motor is stopped. Fig. 11 illustrates a kitchen hood controlling system 2 which is integrated with the controller 1 of the cooking device, in accordance with one embodiment of the invention, in the form of a communication block diagram, comprising cooker elements 3, sensors 6 and 9 integrateted in the hood system, and sensor 5 attached to the cooking element, representing heat sensors and camera. The heat sensors control the temperature of the cooked content, while camera 9 with a suitable software application protects the food from overcooking, overflow, and also follows pre-programed cooking time profile cycles adopted to a variety of cooking options being stored in the data storage system, such as tablet, smart phone, or being downloaded from the cloud. The overflow is prevented by

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limiting the stove or pot temperature to remain below the overflow temperature defined by the user or by a suitable controlling means. The communication between the kitchen hood control means 1 and the stove control means 2 enables the coordination and amangement of the two
5 synchronized systems. The usually employed metal cartridge filters are quite expensive, and their cleaning and reusing, particularly when accumulated grease and oil are concerned, is both time consuming and difficult. The rectifying screen in a hood unit of the invention is easily accessible and treatable. Drawing the hood unit of the invention nearer to the cooking area
10 reduces the amount of clean air from the kitchen which dilues the contaminated cooking fumes, substantially increasing the evacuation efficiency in terms of the processed air volumes and total energy. Moreover, the contaminants are less diluted and therefore better removed. It must be noted that usual kitchen hoods are rated by their sucking power or the
15 sucked air volume per minute, whereas aiming at as high power as possible; however, the hood according to the invention aims at high ratio of the sucked fumes volume and the volume of the sucked surrounding clean air. Compared to most of the existing hoods, the hood of the present invention reduces energy losses and reduces the noise level, while increasing the fumes
20 filtering effitency. By sucking the air as close to the cooking area as possible, high relative humidity is kept and the dewpoint more easily attained, whereby assisting the desired condensation process.

The easily cleanable, or self-cleaning, system employed in the invention,
25 combined with the option of easy disassembly, cleaning and/or replacing consumable and/or disposable parts, such as pipe ducts, reduces the risk of fire, and reduces the cost of the maintenance needed. The kitchen hood apparatus comprises one or more moving hood units, whereas each single kitchen hood unit is easily disassembled for periodically cleaning and
30 maintenance. The kitchen hood apparatus is attached to a motor system to lift the units up or down, preferable employing gravity force when moving

downward by employing spring force when moving upward. The kitchen hood apparatus may be attached to extendable or fixed pipe being used as condensing duct to cool the hot air evacuated from the top cooking area. The hood apparatus may be attached to extendable pipe, telescopic pipe, or wire, or to a combination thereof, whereas being protected by a shield to prevent accidental touch of moving parts, or hot parts, while providing the desired esthetics.

The kitchen hood apparatus may include travel limits, adjustable mechanically by mechanical limits, optionally with overcurrent detection to prevent the units from moving out of the predetermined limits even if the electrical control fails. The limits may be defined by two mechanical stoppers equipped with sensors to detect magnet or other means whenever the hood reaches it's travel limit.

While this invention has been described in terms of some specific examples, many modifications and variations are possible. It is therefore understood that within the scope of the appended claims, the invention may be realized otherwise than as specifically described.

CLAIMS

1. A kitchen hood unit for evacuating the cooking fumes comprising gaseous and liquid components from above a cooking area beside the air, the area being defined by the upper surface of an electrical or gas stove, said unit comprising
 - i) an inlet through which said fumes enter the evacuation unit;
 - ii) a rectifying screen situated above said inlet for collecting said liquid components or said gaseous components after condensation from said fumes;
 - iii) a blower situated above said screen for creating a suction force to draw said fumes with surrounding air into said inlet;
 - iv) a duct for transferring said air, at least partially rid of said gaseous or liquid components, either back to the kitchen or through an exhaust system out of the building; and
 - v) lifting means for lowering said inlet nearer to said cooking area and for lifting said inlet farther from said cooking area, comprising a cable connecting the hood unit with ceiling, and a spring configured to absorb at least part of the potential energy of the hood unit during its downward movement, and to return at least part of said energy to the hood unit during its upward movement; said hood unit being easily disassembled and cleaned, and said duct optionally being disposable.
2. The hood unit of claim 1, being an autonomous hood unit, wherein said blower is a radial blower embedded in said hood unit and integrated with said inlet, rectifying screen, and said duct.
3. The hood unit of claim 1, configured to maximize the volume ratio of the air with fumes/the clean air in said fumes with said surrounding air being drawn into said inlet.
4. The hood unit of claim 1, being easily disassembled and cleaned or occasionally self-cleaned when said gaseous components consist mainly of water steam, which after condensation washes the inner parts of the

hood unit.

5. The hood unit of claim 1, wherein said screen comprises at least one polymeric or metal inclined surface.
6. The hood unit of claim 5, wherein said screen comprises two nonparallel network members, an upper member and a lower member comprising said inclined surface, through which said fumes can ascend, and a liquid collector to which the liquid removed from said fumes arrives from said members by gravity, each member comprising at least one metal or polymer network layer.
7. The hood unit of claim 6, wherein said upper member comprises a horizontally situated planar network layer, and wherein said lower member comprises a depression or a trench from which said liquid flows to said collector.
8. The hood unit of claim 7, wherein the shape of said surface comprises one possibility selected from the group consisting of two planes, pyramid, and cone, wherein the intersection of said two planes or the apex of said pyramid or cone form said depression or trench.
9. The hood unit of claim 5, wherein said metal or polymer surface comprises holes which do not put resistance to the ascending fumes but capture drops of said liquid.
10. The hood unit of claim 1, wherein said radial blower is embedded in said hood unit so that the rotation axis of its blades is situated horizontally.
11. The hood unit of claim 1, wherein said duct has a cross-section of which area is less than the area of said inlet.
12. The hood unit of claim 1, wherein said duct comprises an extendable tube.
13. The hood unit of claim 1, wherein the lifting means comprise a motor.
14. The hood unit of claim 1, wherein the lifting means comprise means for manually moving the unit in the vertical direction.

15. The hood unit of claim 1, wherein the lifting means comprise means for employing gravity for downward movement and the spring force for the upward movement.
16. The hood unit of claim 1, further comprising means for horizontally changing the position of the unit above the cooking area.
17. The hood unit of claim 1, wherein the blower is automatically activated and the hood unit moved down when heat starts to be produced in said cooking area.
18. The hood unit of claim 1, further comprising sensors for detecting overheat or for detecting an obstacle in the movement path.
19. The hood unit of claim 1, wherein said duct, said spring, said cable, and electrical wires are integrated within a protective tube.
20. A composite hood comprising at least two units according to claim 1, being operated independently of each other.
21. The hood of claim 20, wherein the hood units are attached to a common box embedded in the ceiling or positioned between the ceiling and the cooking area, said box comprising the lifting means for all the hood units, optionally additional sucking means supporting said radial blowers, and optionally regulation means for optimally managing the stove and the hood.
22. The hood of claim 20, for evacuating the cooking fumes from above a cooking area defined by the upper surface of an electrical or gas stove accommodating a number of electrical hot plates, a number of gas burners, or an electrical induction plate, wherein at least some of the evacuation units are automatically activated when at least some of plates or burner work, the evacuation units which are active being lowered nearer to the working electrical hot plates, nearer to the working burners, or nearer to the working point on the electrical or inductive plate (active cooking sites) and/or being shifted to be above the active cooking sites; while said lifting means precisely and optimally adjust the position of the units above said the cooking sites.

23. The hood of claim 20, further comprising sensors for detecting overheat or obstacles in the path of the hood units, and means for at least one action selected from the group consisting of starting an alarm, stopping heating elements, stopping the movement of the hood units, lifting the hood units, stopping the blowers, and extinguishing flames.
24. The hood of claim 20, further comprising control means configured to store and transfer data and signals, and to regulate the work of the stove and the hood.
25. The hood of claim 24, wherein the control means comprise the means for communicating with a mobile device selected from smartphone, tablet, local hub, router, or cloud.
26. The composite hood of claim 24, wherein the control means comprise activities selected from the group consisting of processing data from sensors, processing data from a camera, increasing safety of the cooking process, and increasing the efficiency of the energy consumption; whereby ensuring healthy kitchen ambience, lowering the energy consumption, and reducing noise level, compared to a non-composite hood.
27. The hood of claim 24 wherein the control unit regulates the temperature of the heated pot, to follow a predetermined cooking temperature regimens or cycles downloaded from means selected from internet, cloud, memory storage, thereby preventing the cooked content from overflowing.

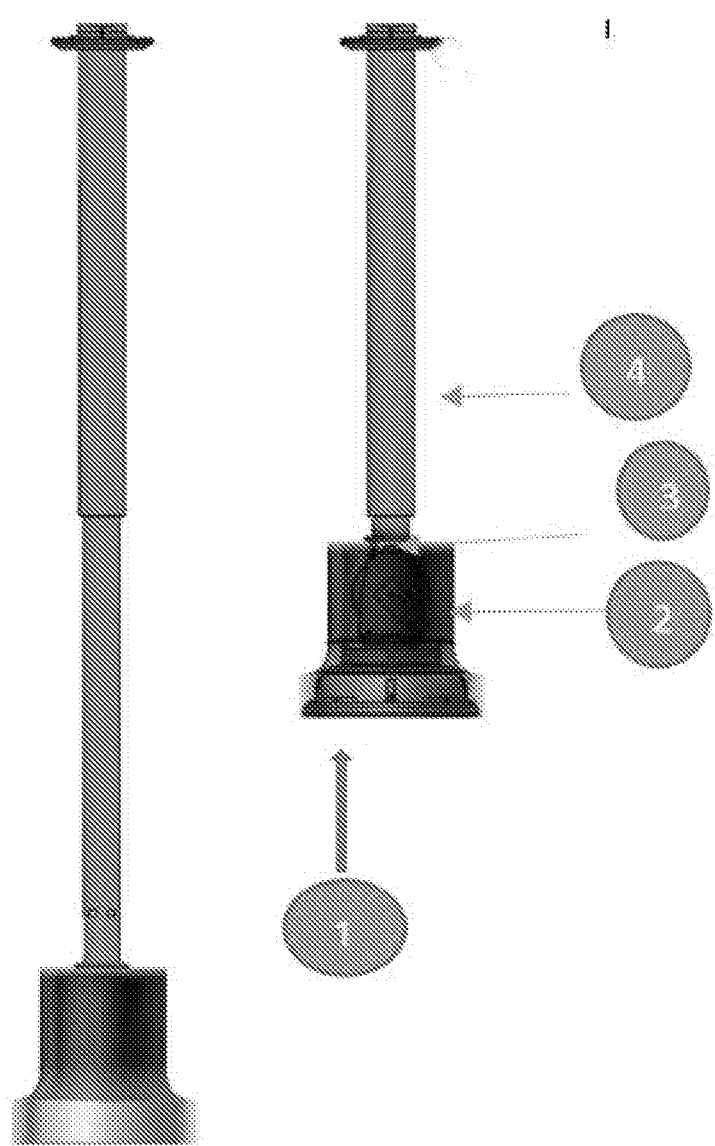


Fig.1

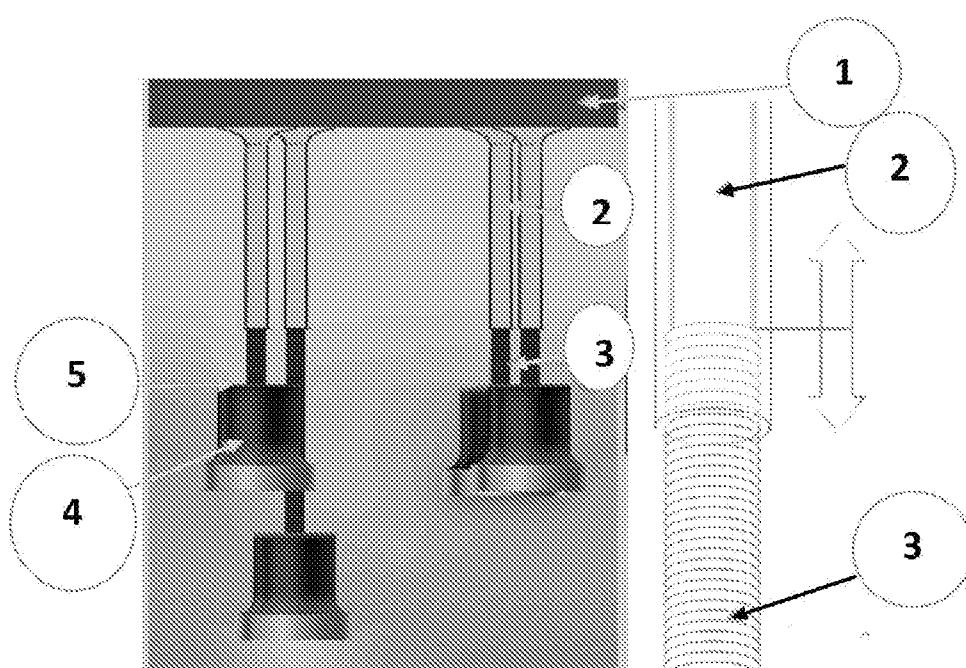
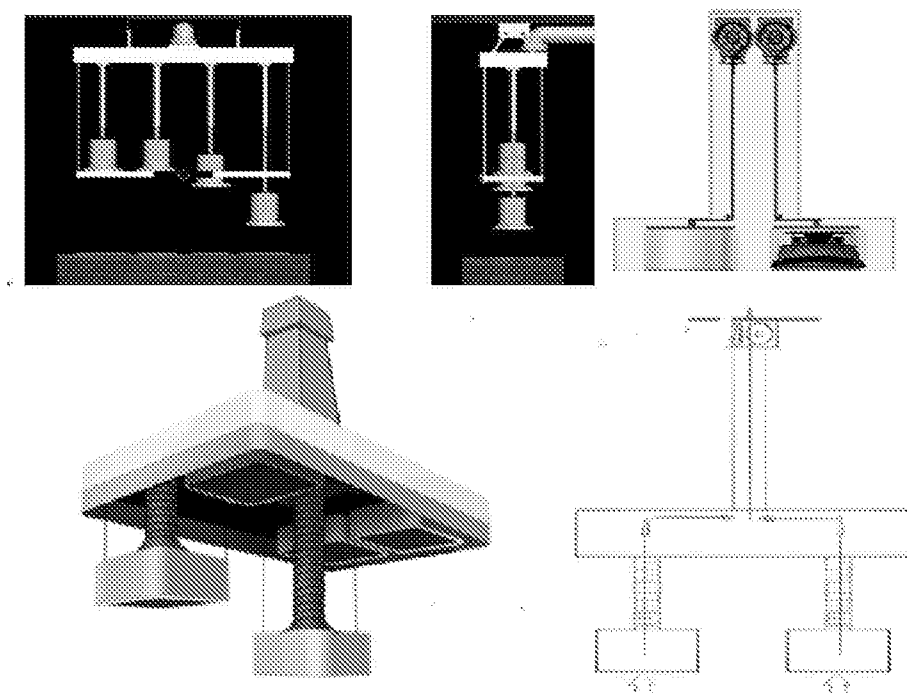


Fig.2

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**Fig.3**

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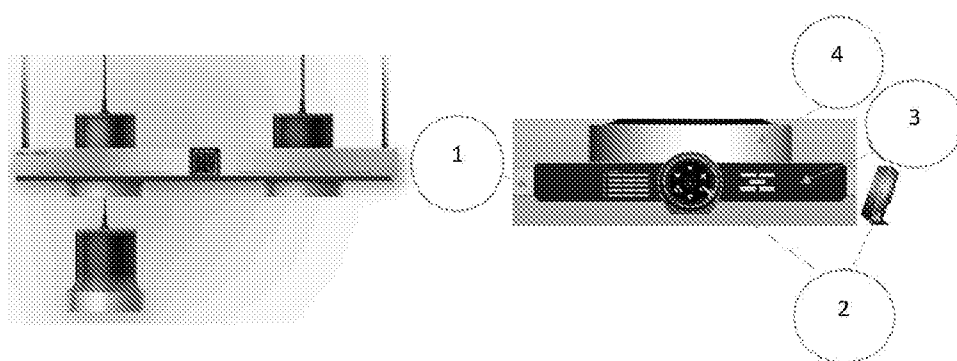


Fig.4

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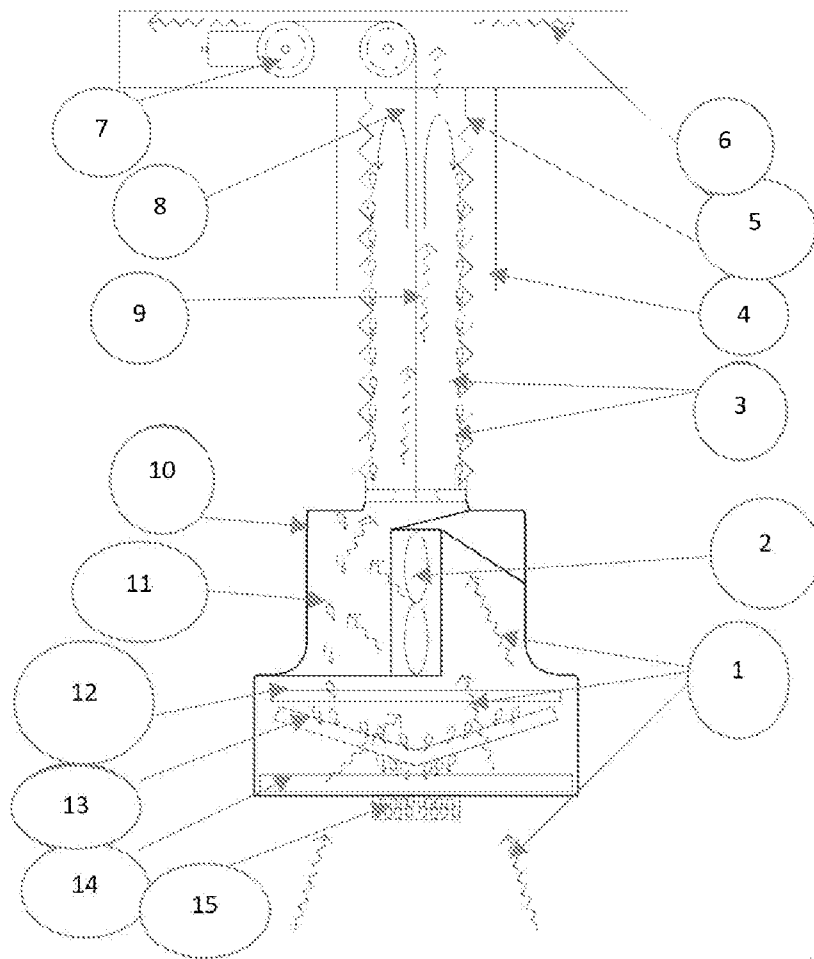


Fig.5

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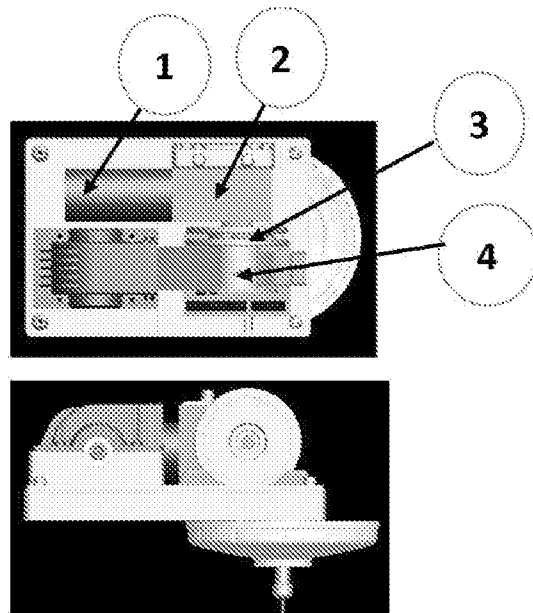


Fig.6

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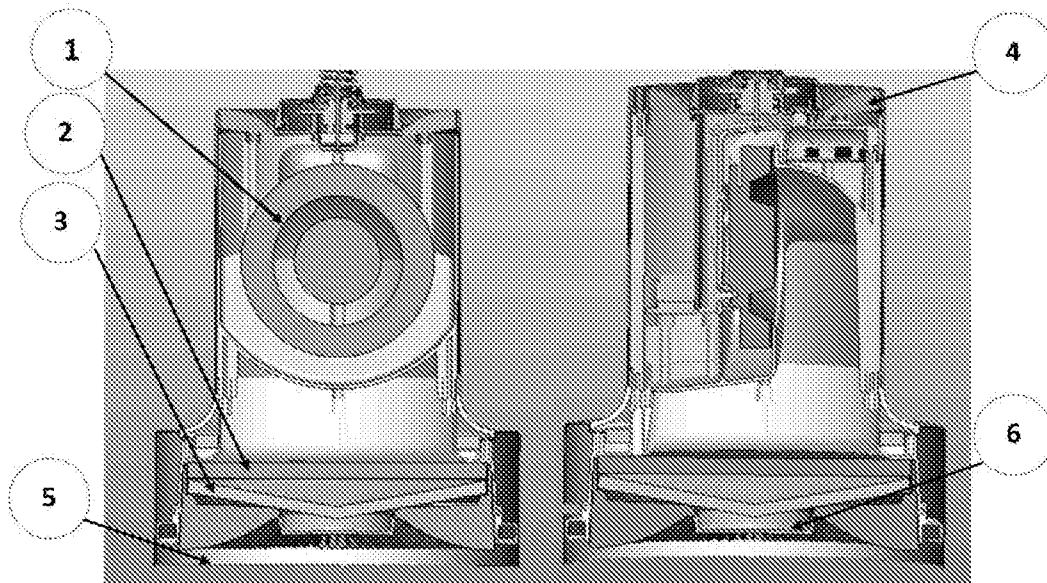


Fig.7

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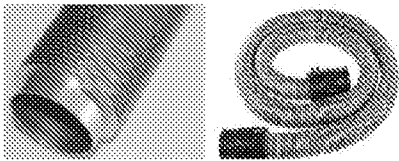


Fig.8

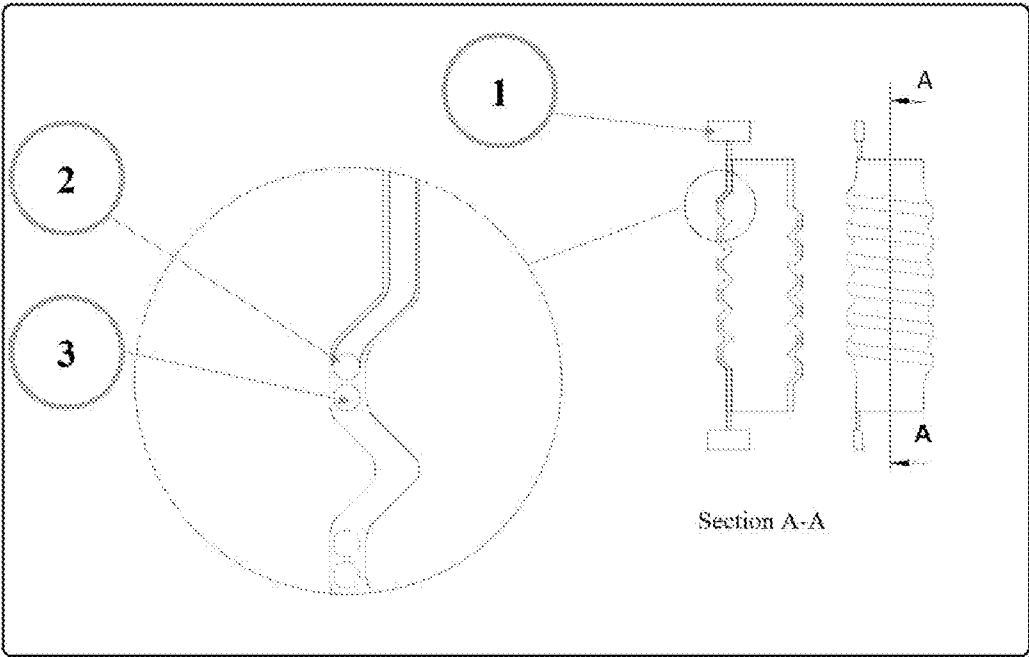


Fig.9

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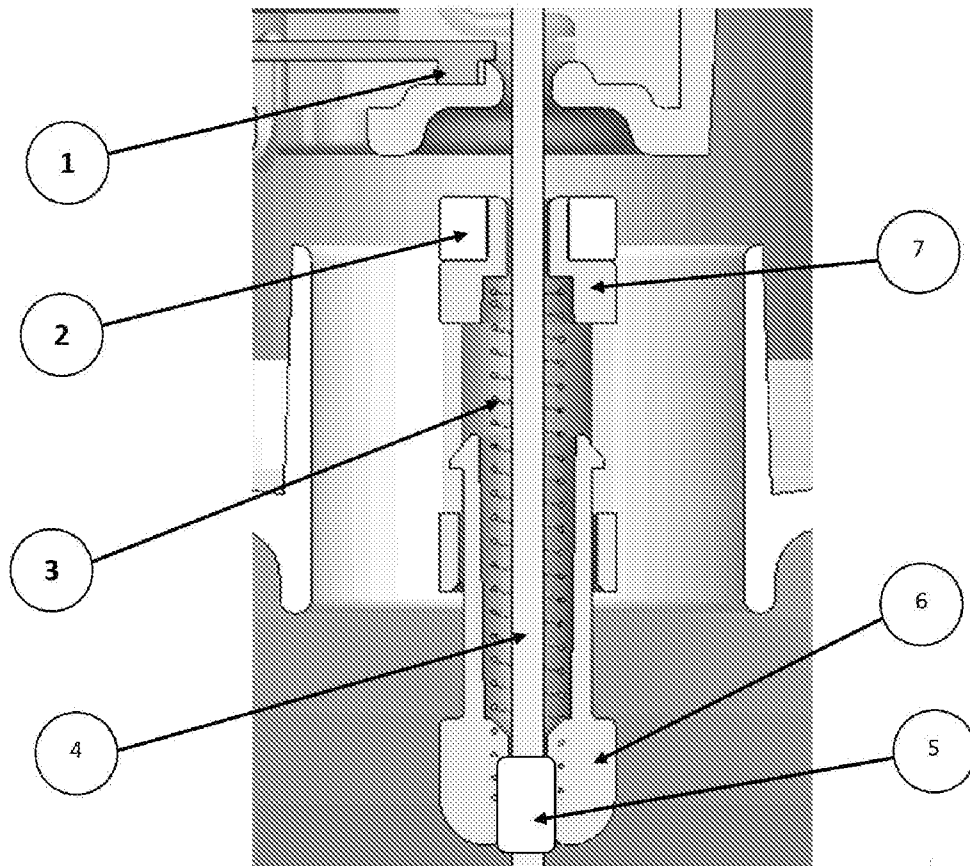
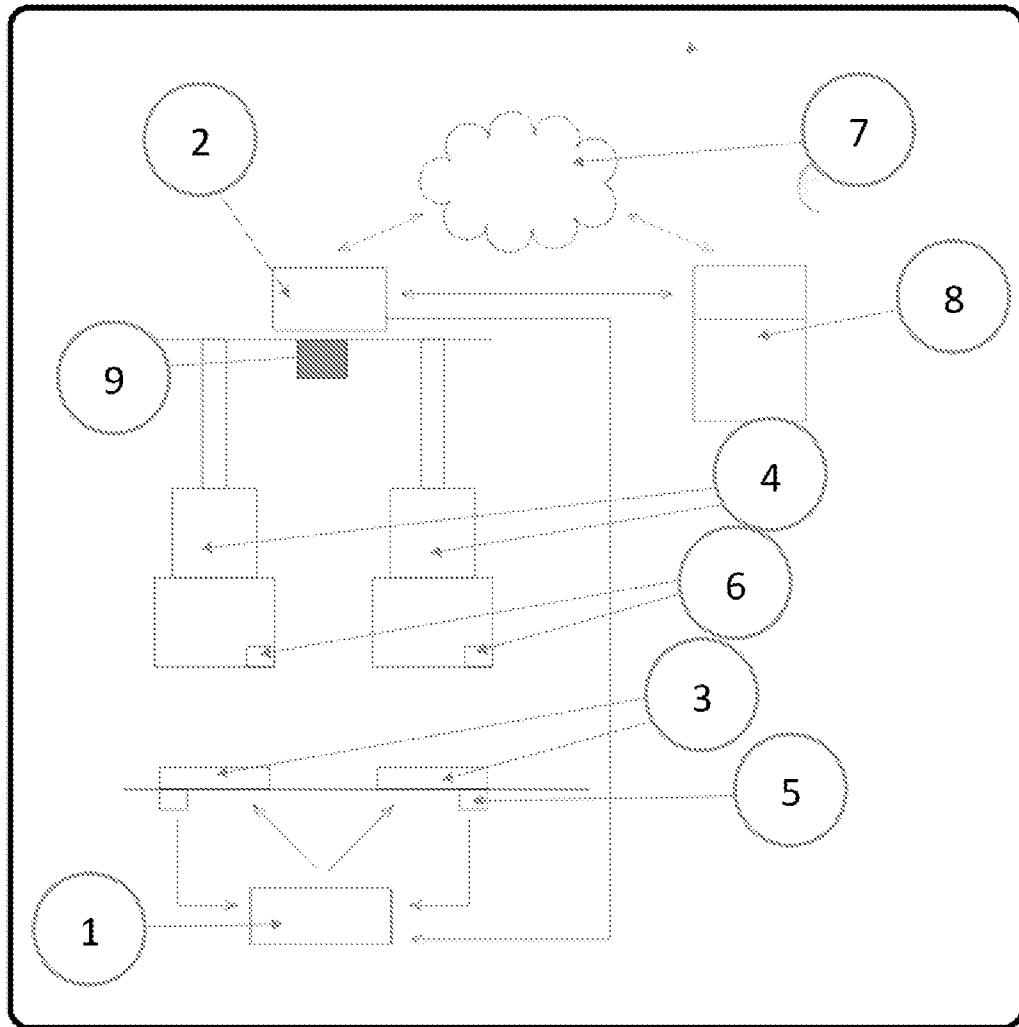


Fig.10

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**Fig.11**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL2017/051333

A. CLASSIFICATION OF SUBJECT MATTER

IPC (2018.01) F24C 15/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (2018.01) F24C 15/20, F24F 7/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases consulted: Esp@cenet, Google Patents, Orbit

Search terms used: kitchen, stove, hood, inlet, rectifier, rectify, duct, blower, fan, filter, lifting means, disassemble

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2015071898 A1 DAHAN Yuval Yoni 21 May 2015 (2015/05/21) Whole document	1-27
Y	US 2006278216 A1 GAGAS John 14 Dec 2006 (2006/12/14) Paragraphs 45, 49, 63, 76, 83 and Figures 4, 5.	1-27
A	CN 102087034 A XIANGHUA WEI 08 Jun 2011 (2011/06/08) See Figures 1 and 2 with reference to descending nozzle 12 and rectifying filter and cups for collecting dripping liquids (oil)	1
A	WO 2006123861 A1 SEO SUN JA 23 Nov 2006 (2006/11/23) See Figure 7 and description thereof of multiple hoods with varying heights	1
A	WO 2011063969 A1 FABER S.P.A. 03 Jun 2011 (2011/06/03) See Figures 7, 8 and 10 with reference to mechanism for lowering and raising hoods	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

14 Mar 2018

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2017/051333

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		EP 2504628 B1	03 May 2017
		IT MI20092078 A1	27 May 2011