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(54) **ANTI-BURGLARY SYSTEM**

ANTI-EINBRUCHSSYSTEM

SYSTÈME ANTI-EFFRACTION

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Description

[0001] The present invention relates to an anti-burglar system for closed compartments, limited on all sides by delimiting walls. The system comprises one or more burglary sensors placed at at least one of the delimiting walls, dispensing means inside the compartment of a fast-curing foam and detecting and/or processing means of the signals generated by the sensors configured for generating an activation signal of the dispensing means. The foam dispensing means comprise at least two tanks of a first and a second substance, which substances generate a fast-curing foam when mixed together. Means are included for the propulsion of liquids output from said tanks and the outlets of the two tanks are connected to a mixing chamber from which at least one dispenser is branched which opens inside said closed compartment.

[0002] Security systems currently exist which preserve the valuables inside a compartment of a deposit safe, immobilizing them through the use of very strong foams or resins which are poured inside the compartment, react in contact with the air and form solid compounds which entirely occupy the compartment and make it impossible to withdraw the valuables, at least in a short and acceptable time for the burglars.

[0003] Such systems are currently used, for example, in armoured trucks, where the value transported and the risk of robbery require a particularly high level of security.

[0004] The foam dispensing means typically comprise two tanks of a first and a second substance, which substances generate a fast-curing foam when mixed together. The outlets of the two tanks are therefore connected to a mixing chamber from which at least one dispenser is branched which opens inside the closed compartment.

[0005] The two independent tanks keep the substances separate from each other, which substances remain in the liquid phase until mixing. The chemical reaction of the foam formation is instead irreversible, making the valuables inaccessible once the compartment is filled with solidified foam.

[0006] Such a system is described for example by document GB 2091925 A, concerning a protection process and an installation of a space or volume, for example a safe or a security chamber. An attempt to break into a safe causes the abrupt and irreversible formation of a coherent medium such as a curable foam starting from components contained separately in tanks connected with a mixing and an ejection head under the control of a collector.

[0007] The curable foam is typically a polyurethane foam obtained by mixing one or more polyols with one or more isocyanates.

[0008] However, once installed in the anti-burglar system, such components do not remain unchanged over time but undergo chemical modifications such as to require their periodic replacement by means of emptying the tanks and subsequent filling with new liquids.

[0009] Since an on-site transfer can be difficult, it is currently preferred to act on the hydraulic system, disconnecting the old tanks and replacing them with tanks full of new liquids. The old tanks are then transported to an operations centre, where they are emptied and refilled. Such an operation requires the intervention of specialized personnel, with an increase in timing and maintenance costs. Other related systems are disclosed in documents WO2013/175033, WO2014/102365 and EP0623902

[0010] Therefore, there is an unmet need for a system which, with simple systems, allows a quick but effective replacement of liquids, without the need for specialized personnel.

[0011] The present invention aims at solving this technical problem by means of an anti-burglar system as described at the beginning, in which said tanks are comprised in respective removable units, a box being included which is provided with housing seats of said removable units, automated means for connecting each tank to said propulsion means and to said mixing chamber also being included, which connecting means are housed in said box.

[0012] It is thereby possible to easily remove the tanks from the system and possibly replace them, since these are comprised in units inserted in special housings, from which they can be easily extracted. This also allows unskilled personnel to carry out the replacement, reducing maintenance time and costs. The presence of means for automated connection means that the user only has to worry about having correctly inserted the new units comprising the tanks and not manually restoring the connections thereof to the rest of the system.

[0013] It is possible to include two separate tanks or a single tank comprising two separate chambers therein.

[0014] In an exemplary embodiment, said connecting means comprise an outlet connector for each tank consisting of a first outlet element connected to the tank and a second outlet element connected to the mixing chamber, the elements of which are movable relative to each other from a distanced condition to a coupling condition in which they are cooperating with each other to ensure the hydraulic connection.

[0015] Thereby the hydraulic connection in output from the tanks can remain interrupted as long as the two outlet connector elements remain separated from each other, and is actuated only when the two connectors are coupled to each other by a relative driving movement. Once connected, the liquid is free to flow towards the mixing chamber.

[0016] In a further exemplary embodiment, said first outlet element consists of an opening made in the wall of the tank and provided with an occlusion membrane, and said second outlet element can be moved in the direction of penetration in said opening and is provided with a breaking and penetrating end of the membrane hydraulically connected to a conduit leading to said mixing chamber.

[0017] As long as the membrane remains intact the

liquid is confined inside the tank. When the second outlet element is moved towards the opening, the membrane is torn by the breaking end and the liquid is put in hydraulic communication with the mixing chamber, to which it is free to flow.

[0018] According to an embodiment, said second outlet element is moved by a fluid cylinder.

[0019] By adjusting the inlet of the fluid cylinder it is thus possible to move the second outlet element and cause the coupling of the outlet connector by penetrating the second outlet element in said opening.

[0020] According to an exemplary embodiment, said fluid cylinder is provided with a hollow stem, said second outlet element consisting of said stem.

[0021] Thereby the connection is made by the simple penetration of the end of the stem in the opening, after which the liquid can flow inside the fluid cylinder, in particular inside the stem thereof, up to a connection conduit with the mixing chamber.

[0022] In a further exemplary embodiment, the propulsion means comprise a pressurized gas, each tank being connectable by said connecting means to a respective supply conduit of said gas from a pressurized gas tank closed by closing means, the opening of the closing means being controlled by said activation signal.

[0023] Alternatively or in combination, it is possible to include other propulsion means such as electric pumps or electric compressors.

[0024] According to a further exemplary embodiment, said connecting means comprise an inlet connector for each tank consisting of a first inlet element connected to the tank and a second inlet element connected to said supply conduit, which elements are relatively movable from each other from a distanced condition to a coupling condition in which they cooperate with each other to ensure the pneumatic connection.

[0025] Therefore, in addition to ensuring the outlet connection from the tanks, the connecting means put the inlet of the tanks in communication with the pressurized gas supply conduit, which by entering the tanks pushes the liquid out of them.

[0026] In an embodiment said inlet connector consists of a pneumatic quick coupling connector, in which the first inlet element is fixed and the second inlet element is movable towards the coupling condition with the first inlet element.

[0027] In a further embodiment the second inlet element is constrained to said stem, so that it is movable from said fluid cylinder.

[0028] This allows to include a single cylinder to drive both the inlet and outlet connection with respect to the tank.

[0029] According to a further embodiment the fluid cylinder is a pneumatic cylinder driven by said pressurized gas.

[0030] This is very advantageous because the propulsion gas of the liquids is used to drive the pneumatic cylinder. When the activation signal commands the opening of the closing means, the pressurized gas drives the pneumatic cylinders to make the connection at both the outlet and inlet of the tanks. The gas then enters the tanks and pushes the liquids outside them towards the mixing chamber and consequently towards the dispenser.

[0031] In an exemplary embodiment, said removable units are shaped differently from each other and said housing seats are each shaped correspondingly to a respective removable unit, such that each removable unit is insertable only in the respective housing seat.

[0032] This avoids the incorrect insertion of the units containing the tanks in the system by an inexperienced user, for example by inserting two tanks with the same liquid, which would not react in case of need.

[0033] According to an exemplary embodiment, each removable unit is provided with automatically connectable electrical contacts with corresponding contacts at the end of the insertion in the respective housing seat.

[0034] Thereby, the user inserts the removable units in the corresponding housing seats and automatically activates the electrical connections for each tank. The removable units are thus correctly positioned so as to be ready for the actuation of the connecting means.

[0035] In an embodiment the sensors are shaped in a plurality of branches, which branches are arranged so that the distance therebetween is always less than a predetermined maximum distance, such as not to allow openings larger than those which allow the withdrawal of the valuables stored in the compartment.

[0036] This allows to ensure a total coverage of the compartment, without lim iting it to the control of opening the armoured door, so as to detect even the most violent attacks to the walls of the compartment itself.

[0037] According to an exemplary embodiment, the detecting and/or processing means comprise control means adapted to verify that the variation of one of the physical parameters measured by the sensor is actually due to an action of modification, opening, cutting or breaking of one or more of the walls of the closed compartment, said control means consisting of sensors of further different physical parameters.

[0038] The presence of a plurality of different types of sensors allows to have a greater precision in the detection of the attempted burglary, avoiding false positives and the inconveniences which these can cause.

[0039] In a further embodiment, remote alarm means are included, which alarm means are activatable by said detecting and/or processing means.

[0040] This allows to immediately notify law enforcement, the owners of the valuables, surveillance, etc. during the foam dispensing itself, so as to allow for timely intervention.

[0041] The present invention is applicable to any type of armoured value compartment, such as a safe, an armoured truck, a security chamber, etc.

[0042] These and other features and advantages of the present invention will become clearer from the following description of some exemplary embodiments il-

lustrated in the accompanying drawings in which:

fig. 1 illustrates a diagram of the system known in the state of the art;
fig. 2 illustrates an external view of an exemplary embodiment of the present invention;
fig. 3 illustrates an assembled view of the system on a safe;
fig. 4 illustrates an external view of the containment box of the system;
fig. 5 illustrates a sectional view of the safe;
fig. 6 illustrates a view of the system;
fig. 7 illustrates a view of the system in a disengaged condition of the removable units;
fig. 8 illustrates a detailed view of the automated connecting means;
fig. 9 illustrates the removable units comprising the tanks;
fig. 10 illustrates a diagram of the removable unit.

[0043] Figure 1 illustrates an anti-burglary system known in the state of the art, included in a safe 10. The safe 10 is internally provided with a closed compartment 11 for housing valuables 17. The closed armoured compartment 11 is limited by delimiting walls 110.

[0044] The system comprises one or more burglary sensors 2 placed at at least one of the delimiting walls 110 and a processing unit 3, adapted to manage the system, which receives the signals generated by the sensors 2 and processes them for generating an activation signal of foam dispensing means inside the closed compartment 11.

[0045] The foam dispensing means comprise a first tank 42 and a second tank 43 containing, respectively, a first and a second substance which, when mixed together, generate the fast-curing foam. The foam can be a two-component polyurethane foam. The liquids can consist of polyols and isocyanates or other suitable liquids known to those skilled in the art. The outlets of the tanks 42 and 43 are connected by respective conduits 44 and 45 to a mixing chamber 46, from which at least one dispenser 47 branches out which opens inside the closed compartment 11.

[0046] Figures 2 to-10 illustrate an embodiment of the system according to the present invention.

[0047] Each tank 42 and 43 is connected to liquid propulsion means. Such means comprise for each tank 42 and 43 a respective supply conduit for a pressurized gas coming from a pressurized gas tank 80 closed by closing means, preferably a solenoid valve 41. The opening of the closing means is controlled by the processing unit 3 by sending the activation signal. The propellant gas is preferably an inert gas, for example nitrogen. The propellant gas can alternatively be nitrous oxide, carbon dioxide, helium, or other inert gas.

[0048] At the opening of the solenoid valve 41, the pressurized inert gas exits the tank 80 and enters, through the appropriate conduits, the two tanks 42 and 43. By virtue of the pressure exerted by the inert gas, the two substances exit from their tanks 42 and 43, and are pushed into the conduits 44 and 45 up to the mixing chamber 46, in which they create a mixture which is poured into the closed compartment 11 through one or more dispensers 46, creating a low-density product, but extremely rigid and resistant to shocks and perforations, so that it is impossible to take the valuables 17 stored inside the closed compartment 11.

[0049] Figure 2 illustrates an exemplary embodiment of the present invention, in which the system is comprised in a box 5. The box 5 is provided with housing seats 52 and 53 of two respective removable units 72 and 73 comprising the tanks 42 and 43, respectively. The housing seats 52 and 53 are open to the outside in a wall of the box, so that the removable units 72 and 73 can be inserted in the housing seats 52 and 53 or removed therefrom by a user acting from the outside of the box 5.

[0050] Figure 3 illustrates the box 5 assembled on the safe 10. In the example in the figure, the box 5 is placed above, but it can be placed on any side of the safe 10, even below it.

[0051] The box 5, illustrated in detail in figures 4 and 5, is parallelepipedshaped, preferably in ballistic material 3 mm thick, with a lower face in contact with the safe 10. The box 5 is constrained to the safe 10 by means of internal fasteners 50, illustrated in figure 5, in particular consisting of internal rods so that nothing is visible from the outside. Figure 5 further shows the dispenser 47 placed inside the closed compartment 11 of the safe 10. The foam is dispensed in the upper central area so as to cover the entire area to be protected. The dispenser 47 can advantageously be of the static mixer type, i.e., consisting of a spout comprising loops and internal walls such as to define a winding exit path, so as to complete the mixing of the substances during the exit.

[0052] Insertion openings of the removable units 42 and 43 are included on one side of the box 5. It is possible to include a protective bulkhead in a position superimposed at least on the openings.

[0053] Automated connecting means of each tank 42 and 43 to the propulsion means and to the mixing chamber 41 are housed in the box 5.

[0054] The connecting means comprise for each tank 42 and 43 an outlet connector consisting of a first outlet element connected to the tank 42 or 43 and a second outlet element connected to the mixing chamber 46.

[0055] The first outlet element consists of an opening 60 made in the wall of the tank 42 or 43 and provided with an occlusion membrane 61. The occlusion membrane 61 is thick enough to contain the liquid in the tank 42 or 43. Such a thickness can be small, since the liquids in inactive condition of the system are not pressurized inside the tanks 42 or 43. The occlusion membrane can be of any suitable material, for example polyethylene.

[0056] The second outlet element is movable in the direction of penetration in said opening 60 and is provided with a breaking and penetrating end of the membrane 61

hydraulically connected to a conduit leading to the mixing chamber 46.

[0057] In the embodiment illustrated in the figures, the second outlet element consists of the hollow stem 64 of a pneumatic cylinder 63, whose end 65 is positioned facing the opening 60 and is movable from a distanced position to an insertion position in the opening 60. The end 65 is cut at 45° so as to form said breaking and penetrating end of the membrane.

[0058] The second outlet element can alternatively consist of an independent connecting terminal, comprising the breaking and penetrating end of the membrane and connected to a conduit leading to the mixing chamber, moved by a pneumatic cylinder with a full stem.

[0059] It is also possible to alternatively include further means of moving the output connectors from the distanced condition to the coupled condition, for example hydraulic cylinders or electrical actuators.

[0060] The propulsion means preferably comprise a pressurized gas, each tank 42 and 43 being connectable by means of said connecting means to a respective supply conduit 81 of said gas coming from a pressurized gas tank 80. The pressurized gas tank 80 is closed by a solenoid valve 82 whose opening is controlled by said activation signal.

[0061] The connecting means further comprise for each tank 42 and 43 an inlet connector consisting of a first inlet element 67 connected to the tank 42 or 43 and a second inlet element 68 connected to the pressurized gas supply conduit 81. The first inlet element 67 and the second inlet element 68 are movable relative to each other from a distanced condition to a coupling condition in which they cooperate to ensure the pneumatic connection between the liquid tanks 42 and 43 and the pressurized gas tank 80.

[0062] For this purpose, the inlet connector consists of a pneumatic quick coupling connector. The first inlet element 67 is fixed to the tank 42 or 43. The second inlet element 68 is movable towards the coupling condition with the first inlet element 67 being constrained to the stem 64 of the pneumatic cylinder 63 by a bracket 66.

[0063] The position of the bracket 66 is such that, during the movement of the stem 64 towards the opening 60, the penetrating end 65 encounters the membrane 61 before the two inlet elements 67 and 68 forming the inlet connector enter the coupling condition. This allows to establish a hydraulic connection for the outlet connector, i.e., between the tank 42 or 43 and the mixing chamber 46, prior to the pneumatic connection for the inlet connector, i.e., between the tank 42 or 43 and the pressurized gas tank 80. Thereby, the outlet of the tank 42 or 43 is released before sending the pressurized liquid.

[0064] However, it is possible to include different pneumatic cylinders 63 for moving the inlet connectors and the inlet connectors, for a total of four pneumatic cylinders. Alternatively, a single pneumatic cylinder 63 can be included with one or more connecting brackets to the two inlet connectors and the two inlet connectors.

[0065] The pneumatic cylinder 63 is driven by said pressurized gas, being connected to a conduit deriving from the pressurized gas tank 83.

[0066] However, it is possible to include an independent source of pressurized gas for actuating the pneumatic cylinders 63, such as a separate tank or a compressor. In this case it is possible to use hydraulic cylinders, for example oleodynamic cylinders.

[0067] Alternatively or in combination, the cylinder can be electrically operated, by elastic means such as a spring or the like or by an explosive charge.

[0068] In an exemplary embodiment, said removable units are shaped differently from each other and said housing seats are each shaped correspondingly to a respective removable unit, such that each removable unit is insertable only in the respective housing seat.

[0069] This avoids the incorrect insertion of the units containing the tanks in the system by an inexperienced user, for example by inserting two tanks with the same liquid, which would not react in case of need.

[0070] According to an exemplary embodiment, each removable unit is provided with automatically connectable electrical contacts with corresponding contacts at the end of the insertion in the respective housing seat.

[0071] Thereby, the user inserts the removable units in the corresponding housing seats and automatically activates the electrical connections for each tank. The removable units are thus correctly positioned so as to be ready for the actuation of the connecting means.

[0072] Also in this case, it is also possible to alternatively include further means for moving the inlet connectors from the distanced condition to the coupled condition, for example electrical actuators.

[0073] It is also possible to include non-gas propulsion means for the tanks 42 and 43, for example by means of pistons driven by electric actuators or fluid cylinders, electric pumps or electric compressors.

[0074] Figure 9 illustrates an external view of the removable units 72 and 73, comprising the tanks 42 and 43, respectively. Each removable unit 72 or 73 consists of a box-like element having a wall provided with a plurality of connecting elements. Such elements comprise: the first output element, i.e., the opening 60 provided with an occlusion membrane 61; the first inlet element 67; electrical contacts 9.

[0075] The removable unit 72 or 73 comprises therein the tank 42 or 43 and means for regulating the temperature of the liquids inside the tanks, which liquids must in fact be kept in a predefined temperature range in order to operate optimally upon need. Such means are electrically powered and connected to the rest of the system by means of the electrical contacts 9, which are automatically connected in the inserted condition of the removable unit 72 or 73 inside the housing seat 52 or 53 with the corresponding contacts included inside the box 5.

[0076] The temperature adjustment means comprise a temperature sensor 90, for example a thermocouple, and heating means 91, for example electrical resistors

arranged on the surface of the tank, so as to create a feedback thermostat system.

[0077] The inlet connector is connected with an internal conduit which opens into the bottom of the tank 42 or 43. The tank 42 or 43 is provided with a piston 48 sliding therein so as to form two separate chambers, a chamber filled with liquid and a chamber adapted to be filled by the pressurized gas. Connecting the tank 42 or 43 to the pressurized gas tank 80 causes the internal piston 48 to move in the direction of the opening 60, pushing the liquid out of the tank 42 or 43 and towards the mixing chamber 46.

[0078] It is possible to include already pressurized tanks 42 and 43, for example by virtue of the presence of pressurized gas included in the special chamber inside the tank 42 or 43. This makes the presence of an external pressurized gas tank 80 superfluous. In this case the occlusion membrane of the opening 60 is sized to resist pressure, alternatively the outlet connector is of the type for pressurized liquids.

[0079] The system further includes alarm means which can be activated by said detecting and/or processing means. The remote alarm means preferably comprise a modem and can advantageously use the telecommunication connections included locally, or use separate channels, such as satellite transmission.

[0080] The system can be connected to the power supply mains and comprises one or more buffer batteries to be able to be operated even in the absence of external power supply.

[0081] The system in operating condition waits for fault signals generated by the sensors 2.

[0082] Upon detection of such signals generated by the sensors, the processing unit 3 performs a processing to verify whether the received signals are actually indicative of a burglary.

[0083] If the processing determines that the detected signals are actually related to a burglary, an alarm signal is generated, which is sent to the foam dispensing means.

[0084] At the same time as generating this internal alarm signal, a remote alarm signal is generated and sent.

[0085] In the system, the alarm signal sent to the foam dispensing means activates the opening of the solenoid valve 41.

[0086] The opening of the solenoid valve 41 causes the propellant inert gas, which is pressurized in the tank 80, to be driven.

[0087] Through the conduits 83, the propellant gas drives the 63 cylinders and for each moves the stem 64 in the direction of the openings 60 of the tanks 42 and 43. The stem 64 also moves the second inlet element 68 in the direction of the first inlet element 67.

[0088] The breaking and penetrating end of the membrane 65 pierces the membrane 61 and enters the opening 60, putting in communication through the hollow stem 64 the liquid tank 42 or 43 with the mixing chamber 46. Immediately afterwards, the two elements of the inlet connector are connected and the pressurized gas begins to enter the tank 42 or 43, pushing all the liquid towards the outlet.

[0089] The liquid flows along the conduits 44 and 45 up to the mixing chamber 46.

[0090] The substances are then mixed 56 in the mixing chamber 46.

[0091] The formed mixture is then expelled from the dispenser 47, always under the thrust effect of the propellant gas, to carry out the foam dispensing in the compartment 11. The foam then solidifies, making the valuables 17 stored in the compartment 11 inaccessible.

[0092] In an embodiment variant not shown in the figure, the propellant gas tank 80 is replaced by two pistons placed movable inside the tanks 42 and 43 for pushing the substances into the mixing chamber 46. The pistons are driven by one or two electric or pneumatic actuators, which are activated by the alarm signal 52. Upon activation, the actuators move the pistons from a first position of maximum distance from the outlet of the respective tank to a final position of maximum proximity to such an outlet, causing the substances to flow out of the tanks 42 and 43.

[0093] It is possible to include a single sensor 2 or a plurality of sensors adapted to detect the variations of some physical parameters related to the interior of the compartment 11 and/or its walls 110, which physical parameters are indicative of modification, opening, cutting or breaking of one or more of the walls 110 of the compartment 11 and/or part thereof. The sensors 2 can also detect the inclination of the safe 10 or an impact on its walls 110.

[0094] Preferably the sensor 2 consists of an electric cable, to which an electrical signal is fed by means of a signal generator. The electrical signal is read by the processing unit 3, which verifies the variations of the physical parameters of the signal fed to the electric cable inside the electrical system consisting of the sensor 2 and the processing unit 3.

[0095] There are different ways of verifying the parameters of the electrical signal which are monitored: these parameters can be monitored separately or in combination with each other, for example a parameter can be the current intensity inside the cable, or, in the case of oscillating signal, the variations of the signal frequency are detected.

[0096] Inside the processing unit 3, the signals from the sensor 2 are loaded into a memory and then compared with reference values by a comparator which, in the event of differences between the analyzed data, generates the activation signal.

[0097] An embodiment variant envisages that no nominal threshold values are stored, but that dynamic thresholds are used: at the start of the system the processing unit 3 automatically determines the values of the physical parameters of interest of the signal inside the sensor 2 and verifies temporal variations of said parameters, a timer which cyclically runs the measurement, storage and

comparison between the last value of the parameter recorded with that previously recorded is included.

[0098] This possible embodiment variant is particularly useful if, as described above, a control is envisaged on the variations of the physical parameters recorded: in fact, the control can be the comparison of the magnitude of the variation with respect to a unit of time, the measurement of the gradient, i.e., the ratio between variation of the physical parameter and time interval allows to analyse the signals sent by the sensors qualifying them as possible alarms due to burglary attempts.

[0099] The activation signal is then generated following any attempt to break into the compartment 11: in fact, the sensor 2 transforms such structural modification attempts, i.e., modification, opening, cutting or breaking of one or more walls of the armoured compartment which cause changes of the cable in one or more points, in variations of one or more of the aforesaid electrical parameters which are in turn identified by the comparator and transformed into activation signals.

[0100] The activation signal is then sent to the foam dispensing means inside the compartment 11.

[0101] The sensors 2 are preferably shaped in a plurality of branches, which branches are arranged so that the distance therebetween is always less than a predetermined maximum distance, such as not to allow openings larger than those which allow the withdrawal of the valuables stored in the compartment.

[0102] Alternatively or in combination with what is described, the sensors can be hydraulic or pneumatic or fibre optic.

[0103] In an improvement, the processing means comprise control means adapted to verify that the variation of one of the physical parameters measured by the sensor is actually due to an action of modification, opening, cutting or breaking of one or more of the walls of the closed compartment, said control means consisting of sensors of further different physical parameters.

[0104] Sensors which detect the temperature of the walls or photosensitive sensors which capture the amount of light inside the closed compartment can be used for this purpose: in these cases the control means include control units for the signals coming from the sensors, memories to store nominal values and comparator means which compare the nominal values with those measured and which, in the event of differences between the analyzed data, generate an activation signal.

[0105] When several different sensors are included, the processing unit 3 receives the signals generated by the comparator means which compare the signals of the different sensors with the relative nominal values, the anti-burglar system being activated on the basis of predetermined combinations of the presence of the different activation signals generated by the individual comparators associated with the different sensors. This allows to avoid false alarm conditions and/or to always ensure the detection of dangerous conditions.

Claims

1. Anti-burglary system for closed compartments (11), limited on all sides by delimiting walls (110), comprising one or more burglary sensors (2) placed at at least one of the delimiting walls (110), means for dispensing a quick-curing foam inside the compartment and means for detecting and/or processing (3) the signals generated by the sensors (2) configured to generate an activation signal of the dispensing means, wherein the foam dispensing means comprise at least two tanks (42, 43) of a first and a second substance, which substances generate a quick-curing foam if mixed together, propulsion means of the liquids output from said tanks being included, and the outlets of the two tanks (42, 43) being connected to a mixing chamber (46) from which at least one dispenser (47) branches out which opens inside said closed compartment (11),
characterized in that
said tanks (42, 43) are comprised in respective removable units (72, 73), a box (5) provided with housing seats (52, 53) of said removable units (72, 73) being included, automated connecting means of each tank (42, 43) to said propulsion means and to said mixing chamber (46) being included, which connecting means are housed in said box (5).

2. System according to claim 1, wherein said connecting means comprise for each tank (42, 43) an outlet connector consisting of a first outlet element connected to the tank (42, 43) and a second outlet element connected to the mixing chamber (46), which elements are movable relative to each other from a distanced condition to a coupling condition in which they are cooperating with each other to ensure the hydraulic connection.

3. System according to claim 2, wherein said first outlet element consists of an opening (60) made in the wall of the tank (42, 43) and provided with an occlusion membrane (61), and said second outlet element is movable in the direction of penetration in said opening (60) and is provided with a breaking and penetrating end of the membrane hydraulically connected to a conduit leading to said mixing chamber (46).

4. System according to claim 3, wherein said second outlet element is moved by a fluid cylinder (63).

5. System according to claim 4, wherein said fluid cylinder is provided with a hollow stem (64), said second outlet element consisting of said stem (64).

6. System according to claim 5, wherein the propulsion means comprise a pressurized gas, each tank (42, 43) being connectable by said connecting means to a respective supply conduit (81) of said gas coming

from a pressurized gas tank (80) closed by closing means (41), the opening of the closing means (41) being controlled by said activation signal.

7. System according to claim 6, wherein said connecting means comprise for each tank (42, 43) an inlet connector consisting of a first inlet element (67) connected to the tank (42, 43) and a second inlet element (68) connected to said supply conduit (81), which elements (67, 68) are movable relative to each other from a distanced condition to a coupling condition in which they cooperate with each other to ensure the pneumatic connection.

8. System according to claim 7, wherein said inlet connector consists of a pneumatic quick coupling connector, wherein the first inlet element (67) is fixed and the second inlet element (68) is movable towards the coupling condition with the first inlet element (67).

9. System according to claim 8, wherein the second inlet element (68) is constrained to said stem (64), such that it is movable from said fluid cylinder (63).

10. System according to one or more of claims 6 to 9, wherein the fluid cylinder (63) is a pneumatic cylinder driven by said pressurized gas.

Patentansprüche

1. Einbruchsicherungssystem für geschlossene Fächer (11), allseitig begrenzt durch Begrenzungswände (110), umfassend einen oder mehrere Einbruchsensoren (2), die an mindestens einer der Begrenzungswände (110) platziert sind, Einrichtungen zum Abgeben eines schnell aushärtenden Schaums innerhalb des Fachs und Einrichtungen zum Erfassen und/oder Verarbeiten (3) der von den Sensoren (2) erzeugten Signale, die konfiguriert sind, um ein Aktivierungssignal der Abgabeeinrichtungen zu erzeugen, wobei die Schaumabgabeeinrichtungen mindestens zwei Behälter (42, 43) einer ersten und einer zweiten Substanz umfassen, wobei die Substanzen einen schnell aushärtenden Schaum erzeugen, wenn sie miteinander vermischt werden, wobei Antriebseinrichtungen der aus den Behältern ausgegebenen Flüssigkeiten beinhaltet sind und die Auslässe der beiden Behälter (42, 43) mit einer Mischkammer (46) verbunden sind, von der mindestens ein Spender (47) abzweigt, der sich innerhalb des geschlossenen Fachs (11) öffnet,
dadurch gekennzeichnet, dass
die Behälter (42, 43) in jeweiligen abnehmbaren Einheiten (72, 73) enthalten sind, wobei ein Kasten (5) beinhaltet ist, der mit Gehäusesitzen (52, 53) der abnehmbaren Einheiten (72, 73) versehen ist, wobei automatisierte Verbindungseinrichtungen von jedem Behälter (42, 43) mit den Antriebseinrichtungen und mit der Mischkammer (46) beinhaltet sind, wobei die Verbindungseinrichtungen in dem Kasten (5) untergebracht sind.

2. System nach Anspruch 1, wobei die Verbindungseinrichtungen für jeden Behälter (42, 43) einen Auslassanschluss umfassen, der aus einem ersten Auslasselement, das mit dem Behälter (42, 43) verbunden ist, und einem zweiten Auslasselement, das mit der Mischkammer (46) verbunden ist, besteht, wobei die Elemente in Bezug aufeinander von einem beabstandeten Zustand in einen Kopplungszustand bewegbar sind, in dem sie miteinander zusammenwirken, um die hydraulische Verbindung sicherzustellen.

3. System nach Anspruch 2, wobei das erste Auslasselement aus einer Öffnung (60) besteht, die in der Wand des Behälter (42, 43) gefertigt und mit einer Okklusionsmembran (61) versehen ist, und das zweite Auslasselement in der Richtung des Eindringens in die Öffnung (60) beweglich ist und mit einem brechenden und durchdringenden Ende der Membran versehen ist, das hydraulisch mit einer Leitung verbunden ist, die zu der Mischkammer (46) führt.

4. System nach Anspruch 3, wobei das zweite Auslasselement durch einen Fluidzylinder (63) bewegt wird.

5. System nach Anspruch 4, wobei der Fluidzylinder mit einem hohlen Schaft (64) versehen ist, wobei das zweite Auslasselement aus dem Schaft (64) besteht.

6. System nach Anspruch 5, wobei die Antriebseinrichtungen ein unter Druck stehendes Gas umfassen, wobei jeder Behälter (42, 43) durch die Verbindungseinrichtungen mit einer jeweiligen Zufuhrleitung (81) des Gases verbindbar ist, die von einem unter Druck stehenden Gastank (80) kommt, der durch Verschlusseinrichtungen (41) verschlossen ist, wobei das Öffnen der Verschlusseinrichtungen (41) durch das Aktivierungssignal gesteuert wird.

7. System nach Anspruch 6, wobei die Verbindungseinrichtungen für jeden Behälter (42, 43) einen Einlassverbinder umfassen, der aus einem ersten Einlasselement (67), das mit dem Behälter (42, 43) verbunden ist, und einem zweiten Einlasselement (68), das mit der Zufuhrleitung (81) verbunden ist, besteht, wobei die Elemente (67, 68) in Bezug aufeinander von einem beabstandeten Zustand in einen Kopplungszustand bewegbar sind, in dem sie miteinander zusammenwirken, um die pneumatische Verbindung sicherzustellen.

8. System nach Anspruch 7, wobei der Einlassverbinder aus einem pneumatischen Schnellkupplungsverbinder besteht, wobei das erste Einlasselement (67) feststehend ist und das zweite Einlasselement (68) in Richtung des Kupplungszustands mit dem ersten Einlasselement (67) bewegbar ist.

9. System nach Anspruch 8, wobei das zweite Einlasselement (68) auf den Schaft (64) beschränkt ist, sodass es von dem Fluidzylinder (63) bewegbar ist.

10. System nach einem oder mehreren der Ansprüche 6 bis 9, wobei der Fluidzylinder (63) ein Pneumatikzylinder ist, der durch das unter Druck stehende Gas angetrieben wird.

Revendications

1. Système anti-effraction pour compartiments fermés (11), limité de tous côtés par des parois de délimitation (110), comprenant un ou plusieurs capteurs d'effraction (2) placés au niveau d'au moins une des parois de délimitation (110), des moyens de distribution d'une mousse à durcissement rapide à l'intérieur du compartiment et des moyens de détection et/ou de traitement (3) des signaux générés par les capteurs (2) configurés pour générer un signal d'activation des moyens de distribution, dans lequel les moyens de distribution de mousse comprennent au moins deux réservoirs (42, 43) d'une première et d'une seconde substance, substances qui génèrent une mousse à durcissement rapide si elles sont mélangées, des moyens de propulsion des liquides en sortie desdits réservoirs étant inclus, et les sorties des deux réservoirs (42, 43) étant connectées à une chambre de mélange (46) à partir de laquelle au moins un distributeur (47) se ramifie qui s'ouvre à l'intérieur dudit compartiment fermé (11),
caractérisé en ce que
lesdits réservoirs (42, 43) sont compris dans des unités amovibles respectives (72, 73), un boîtier (5) pourvu de sièges de logement (52, 53) desdites unités amovibles (72, 73) étant inclus, des moyens de connexion automatisés de chaque réservoir (42, 43) auxdits moyens de propulsion et à ladite chambre de mélange (46) étant inclus, moyens de connexion qui sont logés dans ledit boîtier (5).

2. Système selon la revendication 1, dans lequel lesdits moyens de connexion comprennent pour chaque réservoir (42, 43) un connecteur de sortie constitué d'un premier élément de sortie connecté au réservoir (42, 43) et d'un second élément de sortie connecté à la chambre de mélange (46), éléments qui sont mobiles l'un par rapport à l'autre d'un état espacé à un état d'accouplement dans lequel ils coopèrent l'un avec l'autre pour assurer la connexion hydraulique.

3. Système selon la revendication 2, dans lequel ledit premier élément de sortie consiste en une ouverture (60) pratiquée dans la paroi du réservoir (42, 43) et pourvue d'une membrane d'occlusion (61), et ledit second élément de sortie est mobile dans la direction de pénétration dans ladite ouverture (60) et est pourvu d'une extrémité de rupture et de pénétration de la membrane reliée hydrauliquement à un conduit menant à ladite chambre de mélange (46).

4. Système selon la revendication 3, dans lequel ledit second élément de sortie est déplacé par un cylindre de fluide (63).

5. Système selon la revendication 4, dans lequel ledit cylindre de fluide est pourvu d'une tige creuse (64), ledit second élément de sortie étant constitué de ladite tige (64).

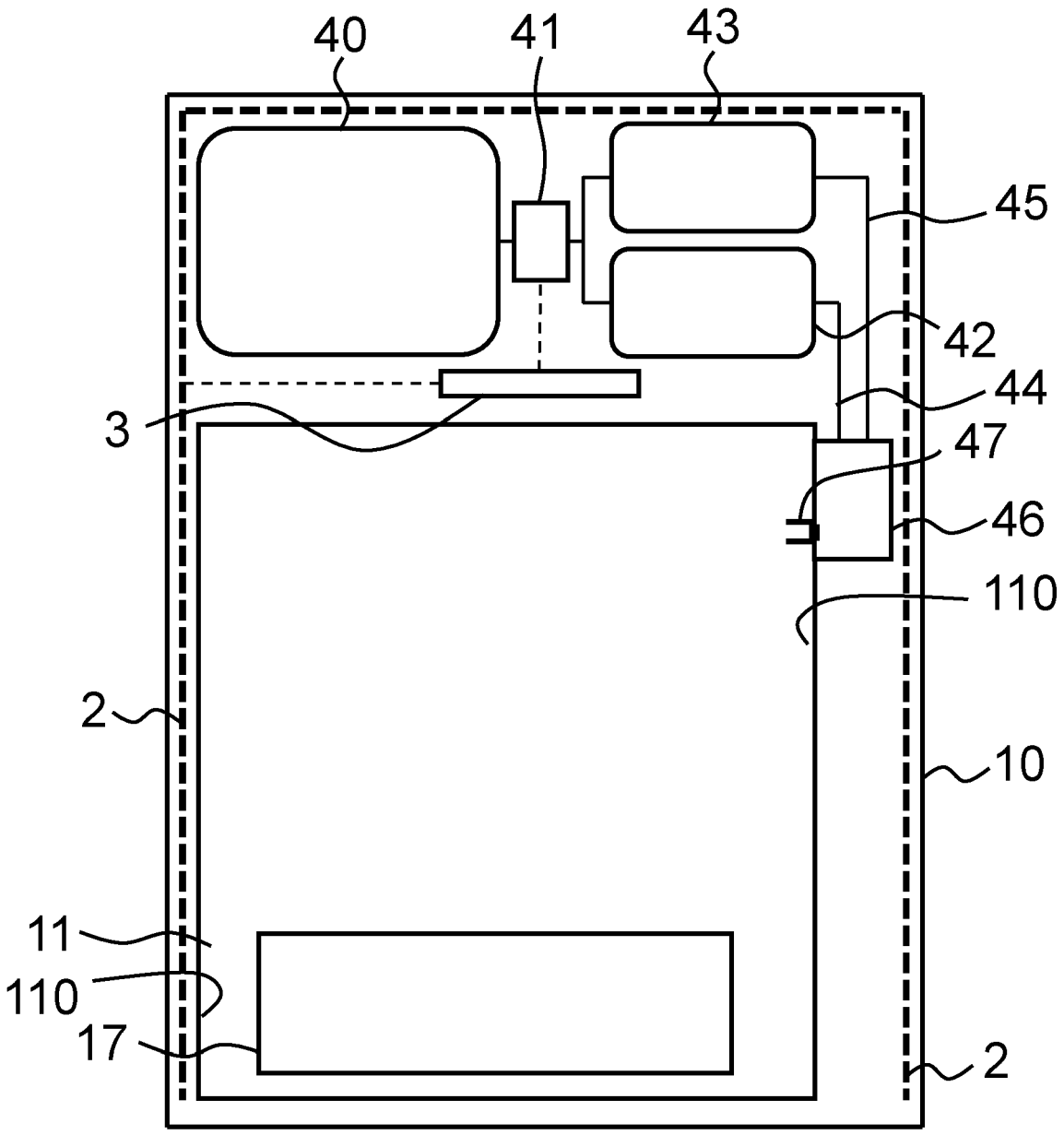
6. Système selon la revendication 5, dans lequel les moyens de propulsion comprennent un gaz sous pression, chaque réservoir (42, 43) pouvant être connecté par lesdits moyens de connexion à un conduit d'alimentation respectif (81) dudit gaz provenant d'un réservoir de gaz sous pression (80) fermé par des moyens de fermeture (41), l'ouverture des moyens de fermeture (41) étant commandée par ledit signal d'activation.

7. Système selon la revendication 6, dans lequel lesdits moyens de connexion comprennent pour chaque réservoir (42, 43) un connecteur d'entrée constitué d'un premier élément d'entrée (67) connecté au réservoir (42, 43) et d'un second élément d'entrée (68) connecté audit conduit d'alimentation (81), éléments (67, 68) qui sont mobiles l'un par rapport à l'autre d'un état espacé à un état d'accouplement dans lequel ils coopèrent l'un avec l'autre pour assurer le raccord pneumatique.

8. Système selon la revendication 7, dans lequel ledit connecteur d'entrée consiste en un connecteur d'accouplement rapide pneumatique, dans lequel le premier élément d'entrée (67) est fixe et le second élément d'entrée (68) est mobile vers l'état d'accouplement avec le premier élément d'entrée (67).

9. Système selon la revendication 8, dans lequel le second élément d'entrée (68) est contraint à ladite tige (64), de manière à être mobile depuis ledit cylindre de fluide (63).

10. Système selon l'une ou plusieurs des revendications 6 à 9, dans lequel le cylindre de fluide (63) est un cylindre pneumatique entraîné par ledit gaz sous pression.



PRIOR ART

Fig. 1

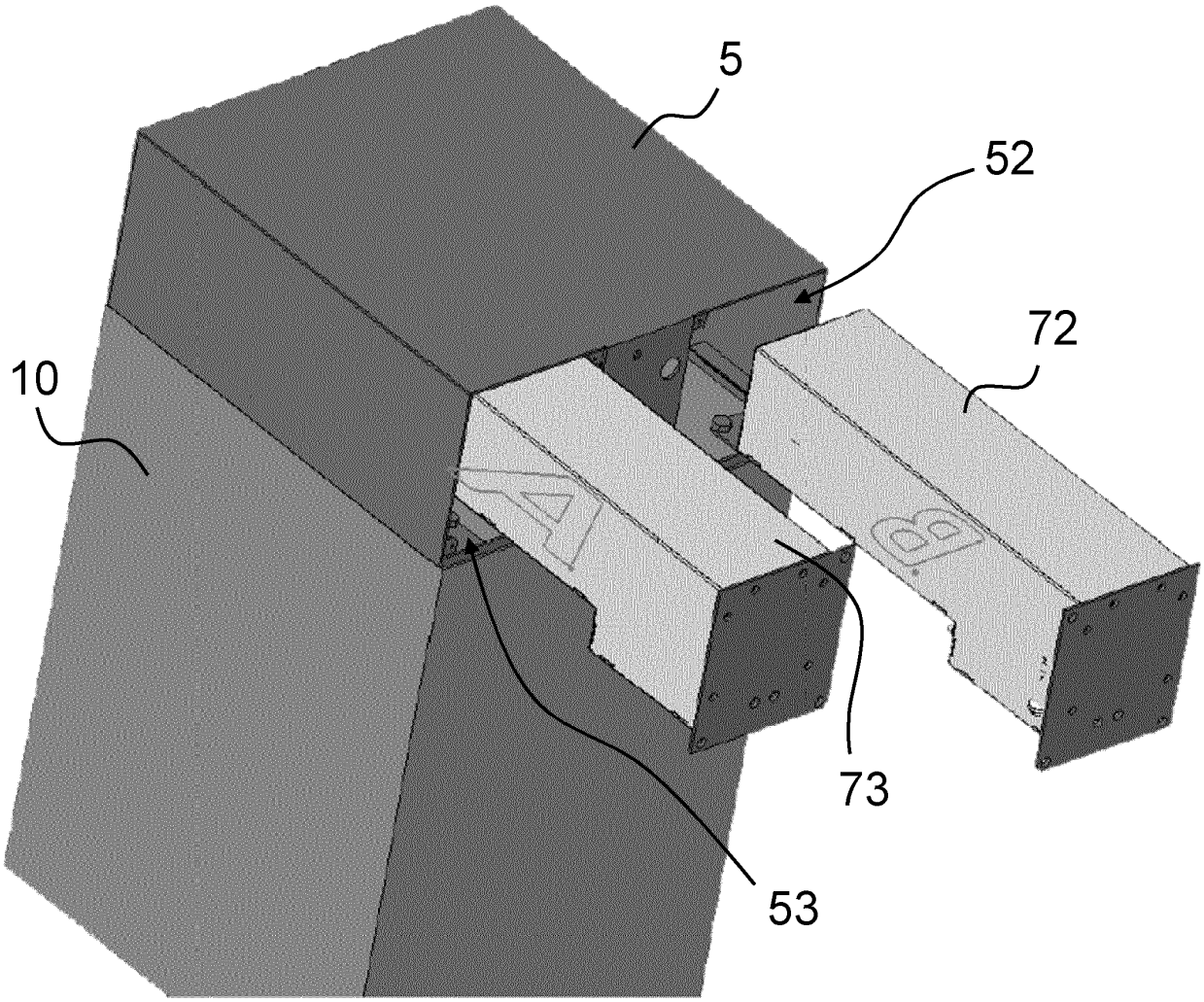


Fig. 2

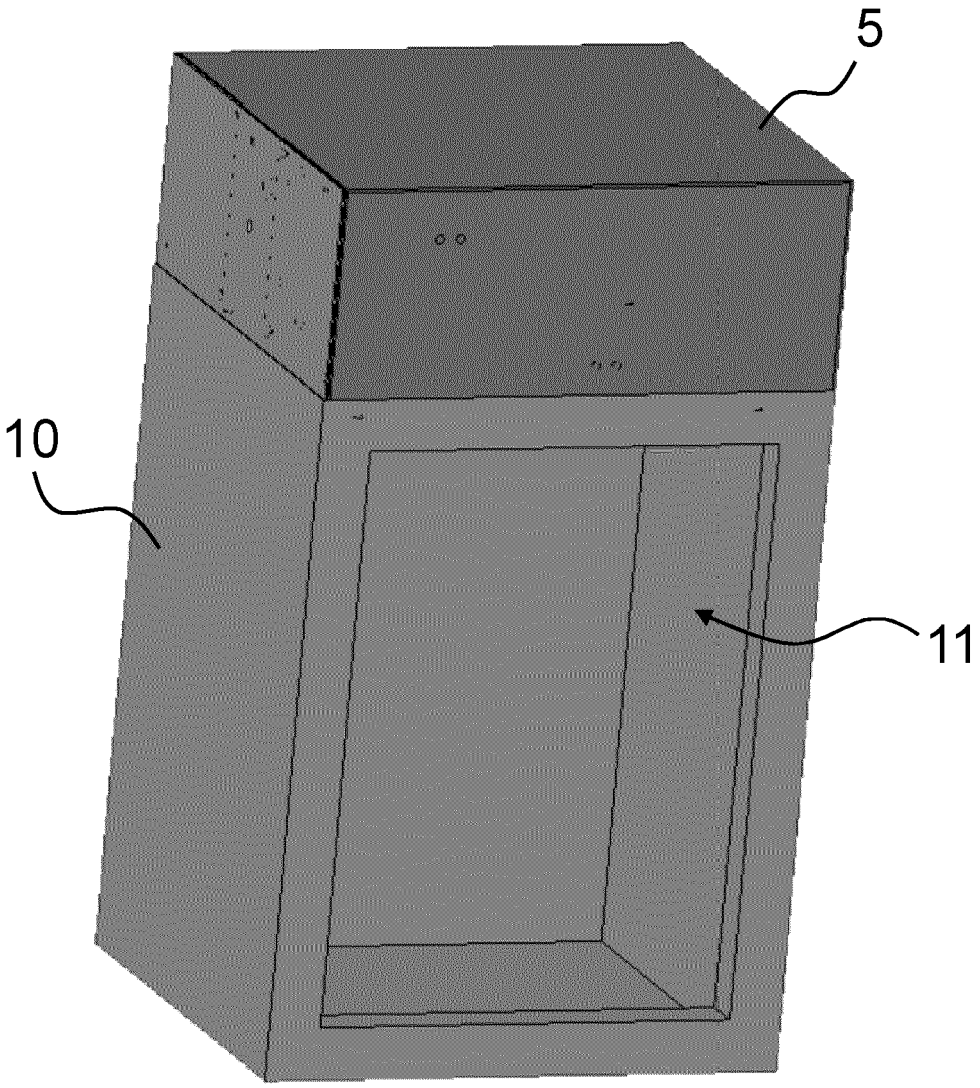


Fig. 3

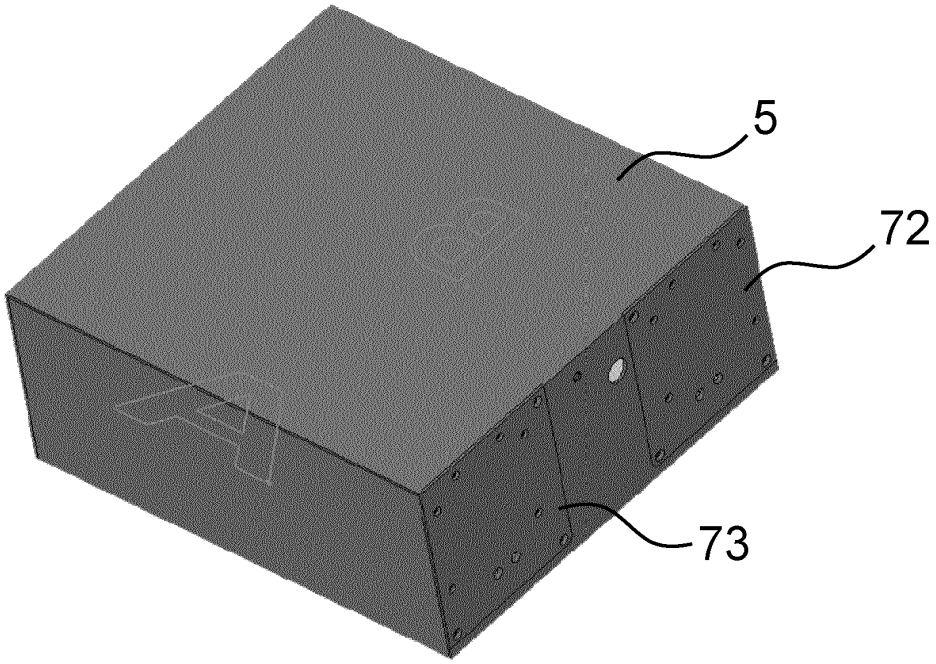


Fig. 4

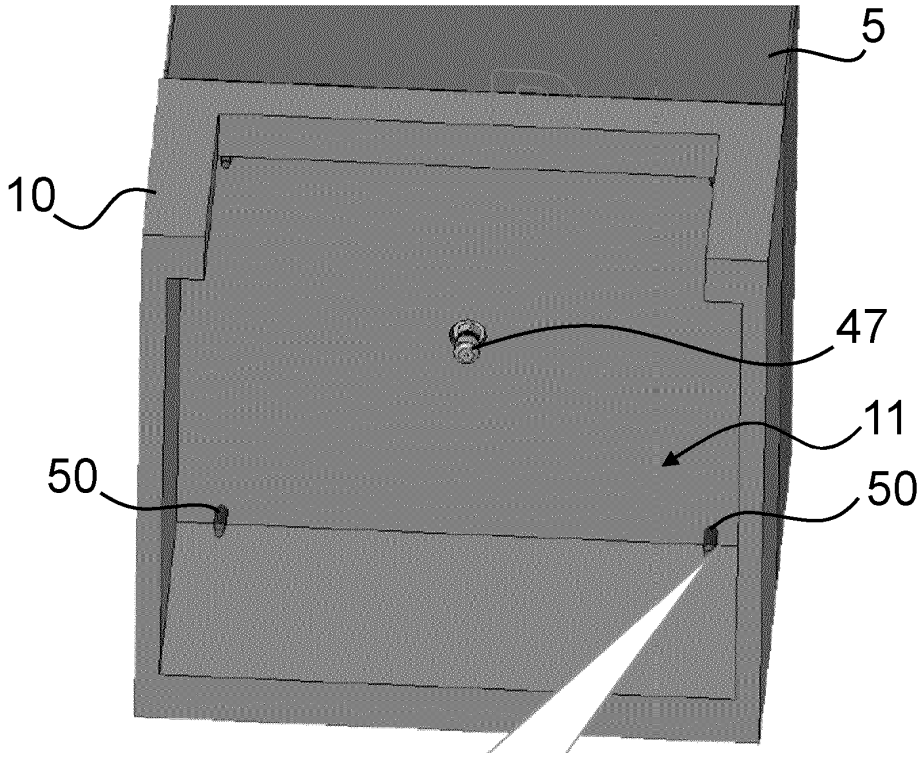


Fig. 5

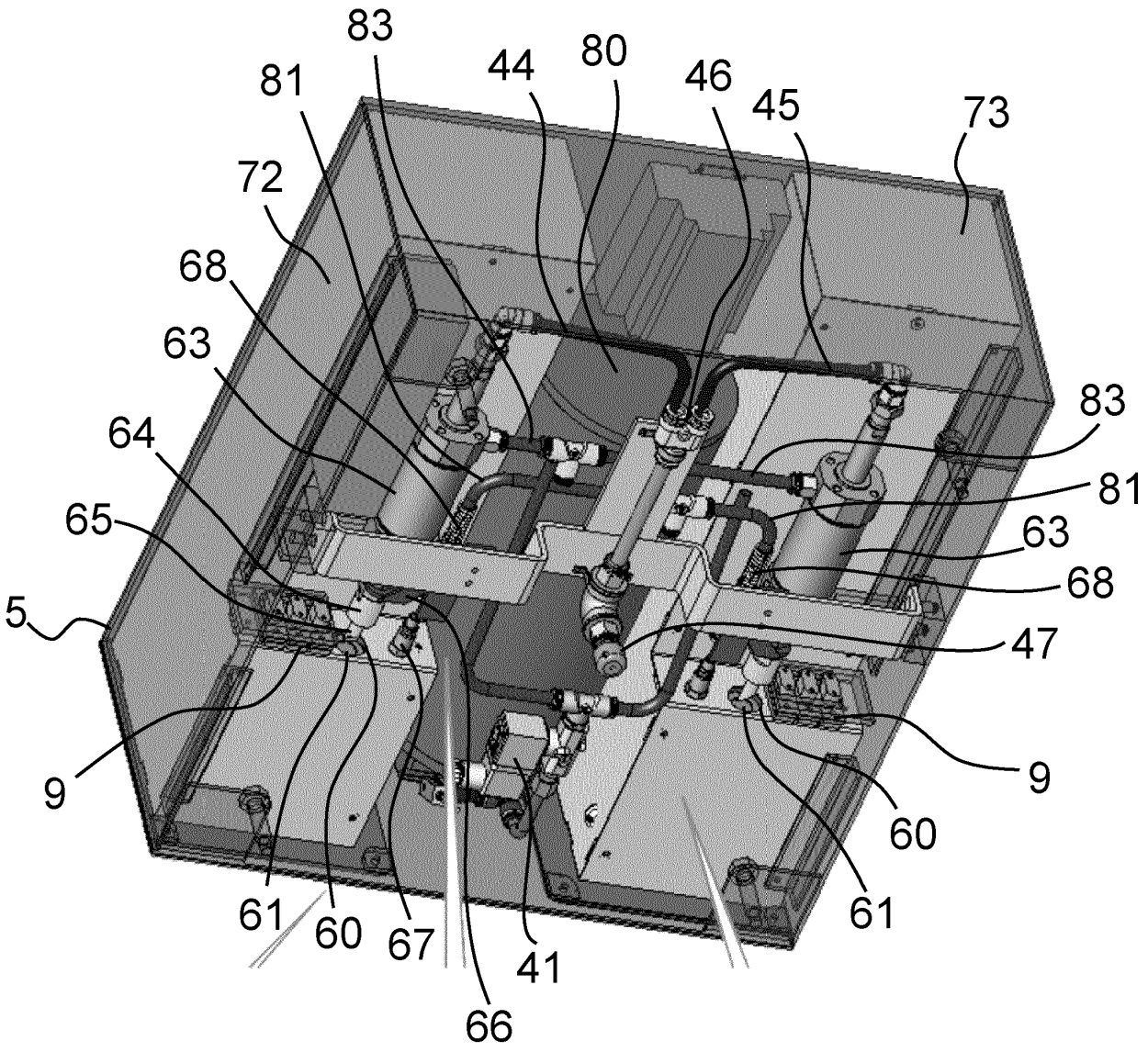

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Fig. 6

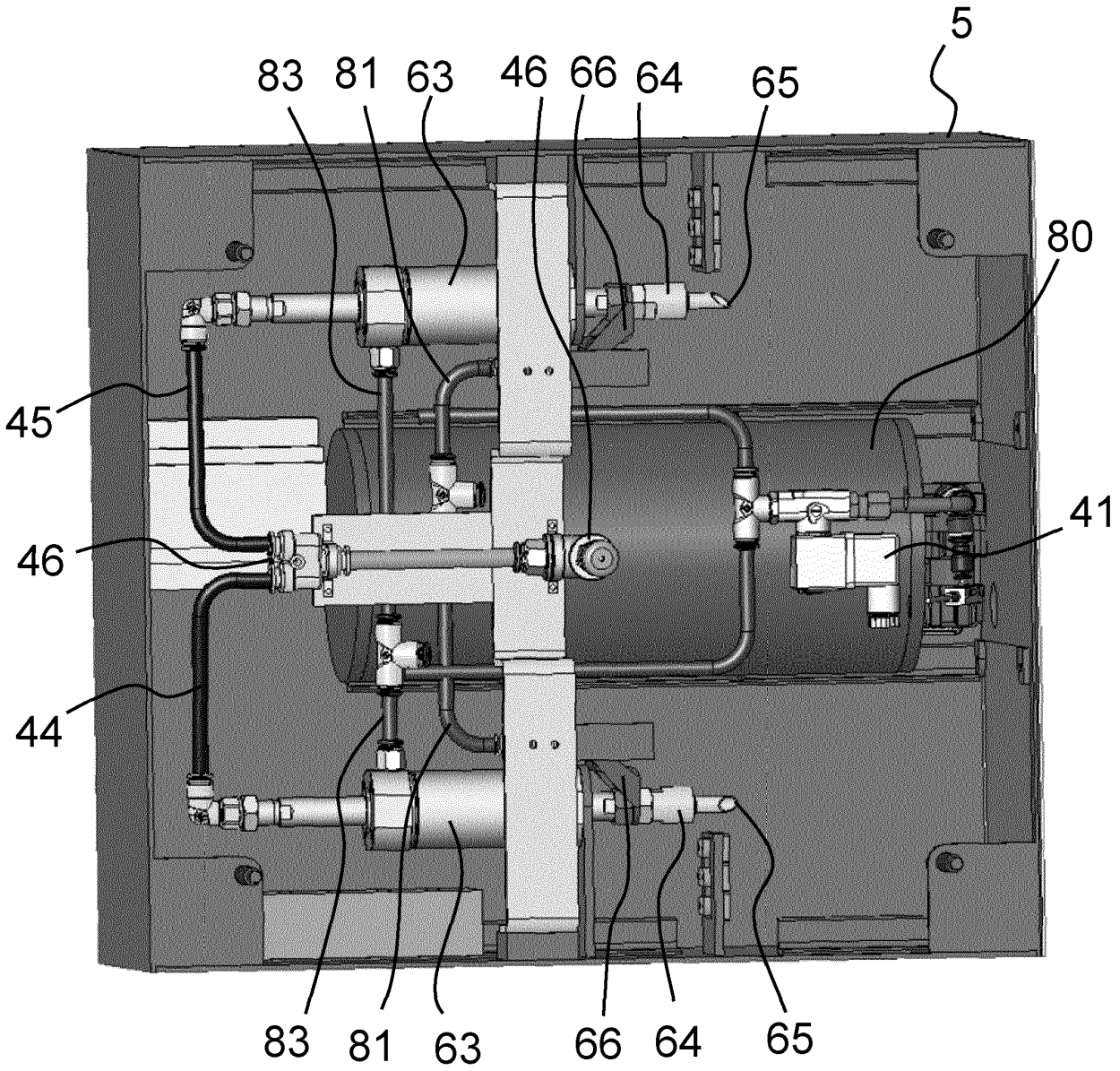


Fig. 7

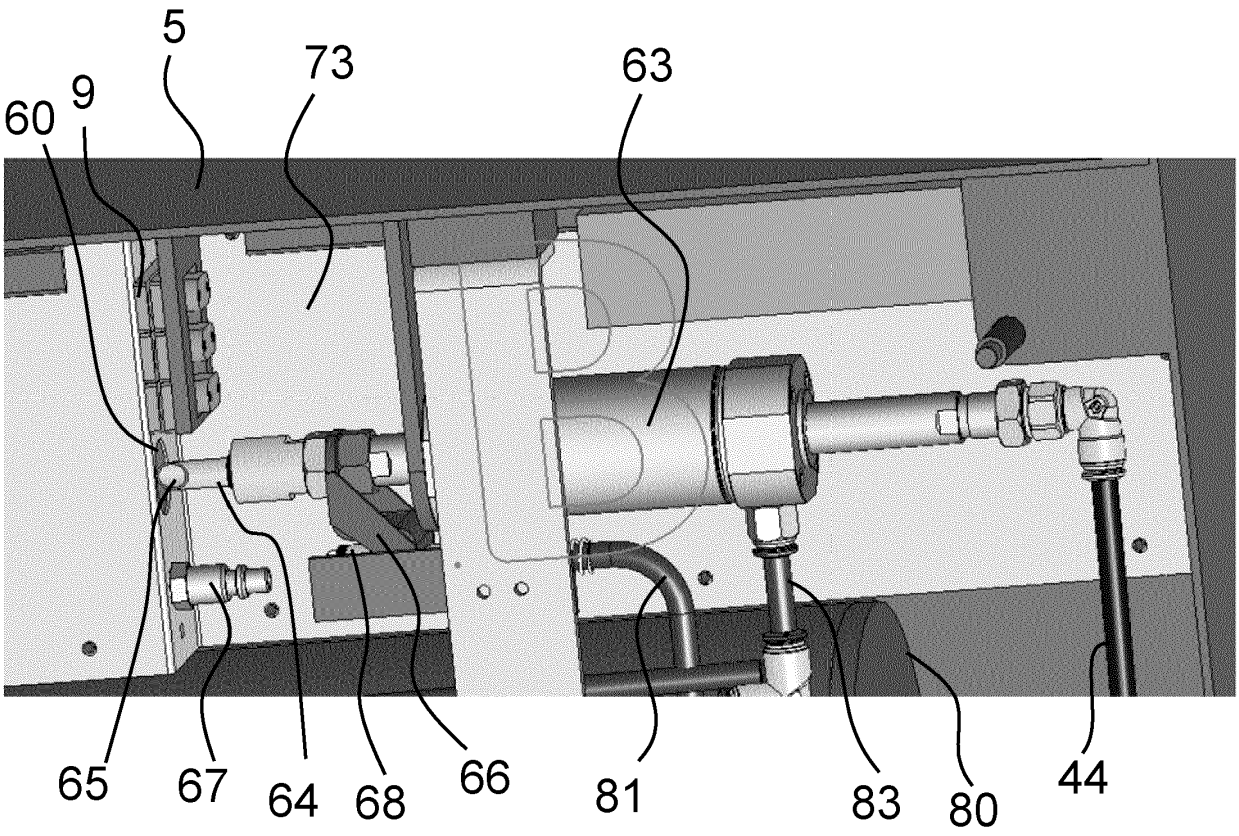


Fig. 8

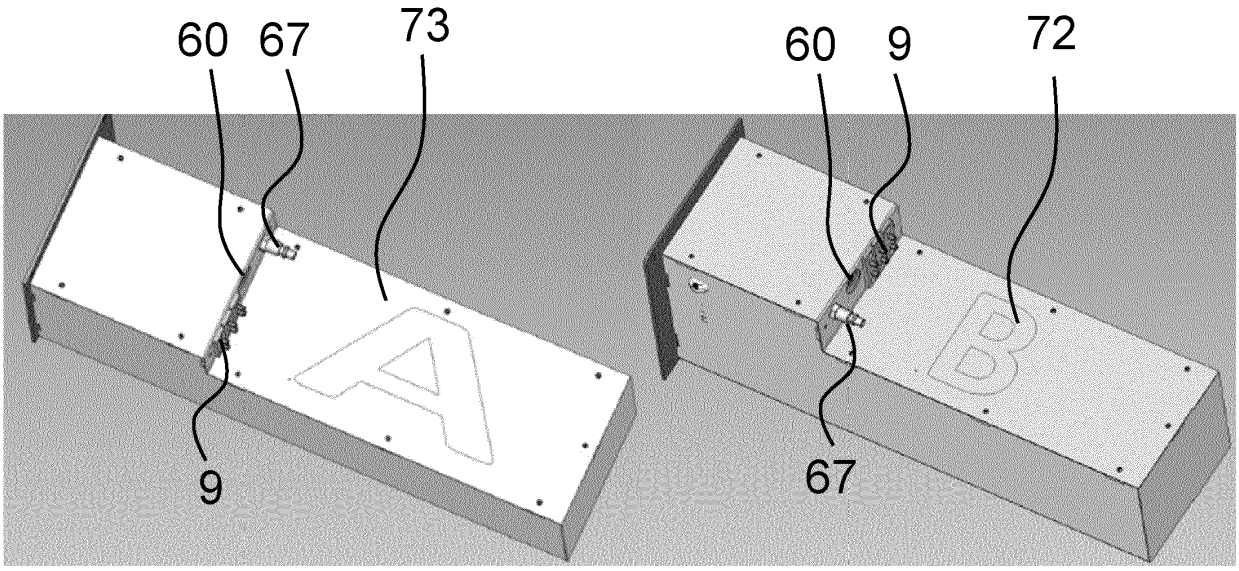


Fig. 9

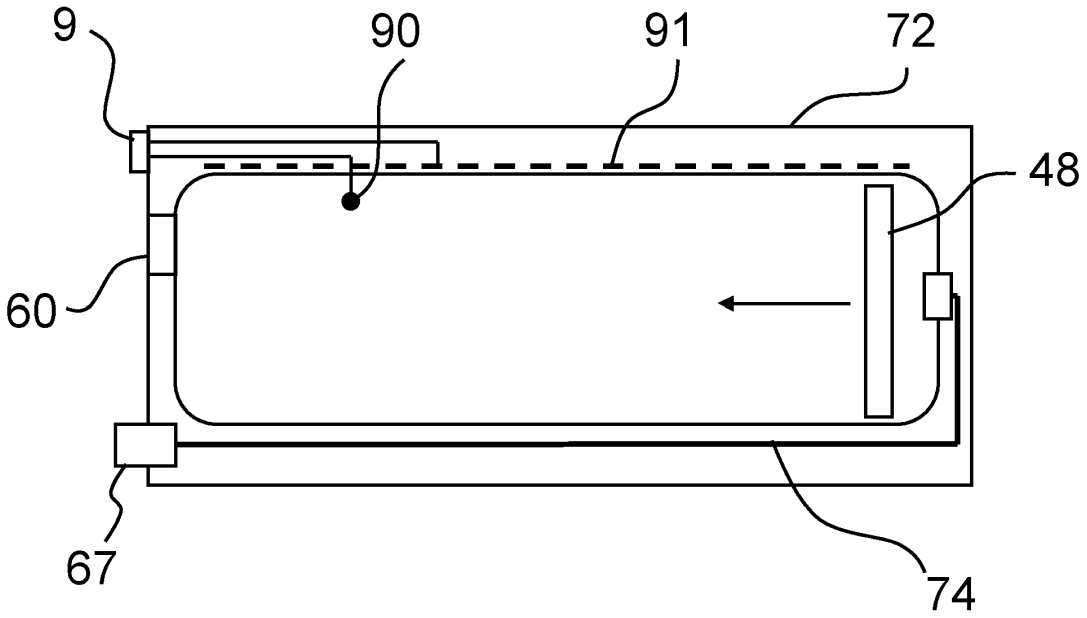


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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