(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 031 497 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.06.2016 Bulletin 2016/24

(21) Application number: **14306980.5**

(22) Date of filing: **09.12.2014**

(51) Int Cl.:
A62C 5/02 *(2006.01)* ***A62C 35/62*** *(2006.01)*
A62C 35/64 *(2006.01)* ***A62C 99/00*** *(2010.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) Method and arrangement for usage, flow control and discharge of compressed air foam in sprinkler systems

(57) The invention relates to a method for firefighting using compressed air foam (CAF), comprising the following steps
- detecting a fire,
- feeding a pressure actuated valve (6) with CAF,
- opening said pressure actuated valve to a known extent,
- projecting said CAF on the fire,
- measuring a pressure exerted by the CAF downstream of said valve (6),
- controlling a degree of opening of said valve (6) on the basis of the measured values of said CAF flow pressure.

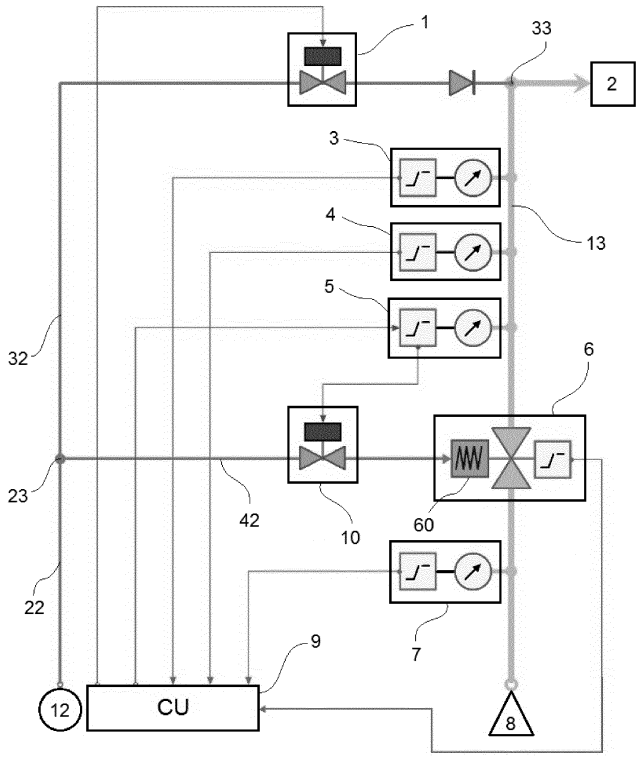

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a method and arrangement for firefighting using compressed air foam (CAF).

BACKGROUND OF THE INVENTION

[0002] Sprinkler systems are the oldest and most widely used type of stationary extinguishing systems. They are automatic water extinguishing systems especially suitable for fighting fires in stationary materials which form burning embers.

[0003] Sprinkler systems are as regards their function, design and dimensioning, technically developed and standardized systems.

[0004] The key advantage of these systems is the sprinkler itself, which within the unit is at the same time the fire alarm, the triggering element and the device for discharging the extinguishing media. This results in a relatively simple system as regards technical expenditure, and in particular limited technical expenditure for control.

[0005] The use of sprinklers having their specific manner of operation makes it possible, unlike the case of systems which spray water with open sprinklers, not only to regulate the flow of extinguishing medium, but also to spatially localize firefighting by means of one single sprinkler opened in its area of protection. This advantage is, from a point of view of extinguishing of fires, when compared to other extinguishing installations, associated with a higher rate of application per unit area, in other words with, overall, an increased extinguishing medium requirement.

[0006] The significant fire extinguishing effect achieved with sprinkler systems is the cooling of the combustible material through the water.

[0007] The use of water as an extinguishing agent means that sprinkler systems are not suitable, or are less suitable, for firefighting of flammable liquids, oils, greases, rubber, plastics, and insulation materials, among others.

[0008] Compressed air foam systems allow the fighting of fires presenting a specific fire risk or, respectively, involving materials which cannot be extinguished, or only extinguished with difficulty using water as mentioned above. Through the use of compressed air foam, one can achieve, during extinguishing, a variety of extinguishing effects operating in synergy such as a cooling effect, a smothering effect and an isolating effect. This results in the higher effectiveness and efficiency of extinguishing using compressed air foam when compared to water which is reflected, when compared to conventional sprinkler systems, in a reduced requirement for water in compressed air foam systems. Compressed air foam systems require on average only one-third of the required amount of firefighting water or volumetric flow of the stream of water in sprinkler systems.

[0009] However, production, transportation and application of compressed air foam by means of a conventional sprinkler system is technically impossible. Among other things, the following technical facts or respectively, differences are fundamental.

[0010] In conventional sprinkler systems, the water is under pressure at the sprinkler. The bursting of a sprinkler glass bulb usually under thermal stress leads to a pressure drop in the piping system, and thus sets the sprinkler system in operation, i.e. the sprinkler pump starts and the open sprinkler is supplied via the piping network at a predetermined flow rate with water which is thereby applied and distributed.

[0011] Compressed air foam is, when compared with water, compressible and unstable. The compressed air foam segregates over time and breaks down into its components - water and air. Briefly, this means that the discharge procedure used for the water is, in the case of compressed air foam, not possible.

SUMMARY OF THE INVENTION

[0012] The object of the present invention is to alleviate at least partly the above mentioned drawbacks and to overcome said technical prejudice.

[0013] More particularly, the invention aims to combine, in an extinguishing installation, said benefits of sprinkler system technology with those of compressed air foam (CAF) techniques by

- adaptation and implementation of the mechanical-hydraulic or mechanical-pneumatic triggering signal of the sprinklers in the form of electrical control and monitoring signals, and
- development of sprinkler zone valves for CAF volumetric flow and CAF flow direction control depending on the number and the local position of the opened sprinklers in the entire system.

[0014] This object is achieved with the invention which concerns a method for firefighting using CAF, comprising the following steps

- detecting a fire,
- feeding a pressure actuated valve with CAF,
- opening said pressure actuated valve to a known extent,
- projecting said CAF on the fire,
- measuring a pressure exerted by the CAF downstream of said valve,
- controlling a degree of opening of said valve on the basis of the measured values of said CAF flow pressure.

[0015] According to an embodiment of the method of the invention, for detecting a fire

- a CAF pipe, connecting the pressure actuated valve

to means for projecting CAF on the fire, is filled with compressed air issued from a first compressed air pipe, said pipe comprising a magnetic filling valve,

- air pressure in said CAF pipe is measured and compared to a predetermined low air filling pressure threshold, and
- when said air pressure in the CAF pipe falls below said predetermined low air filling pressure threshold, an electrical fire-detected signal is issued.

[0016] According to another embodiment of the method of the invention, the step of feeding the pressure actuated valve with CAF comprises:

- closing the magnetic filling valve,
- opening a magnetic control valve arranged on a second compressed air pipe leading to said pressure actuated valve,
- generating CAF.

[0017] According to a further embodiment of the method of the invention,

- a CAF inlet pressure is measured in the CAF pipe upstream the pressure actuated valve,
- CAF generation continues until said CAF inlet pressure reaches a predetermined high CAF inlet pressure threshold,
- CAF generation restarts when said CAF inlet pressure falls below a predetermined low CAF inlet pressure threshold.

[0018] According to another further embodiment of the method of the invention, the step of controlling the degree of opening of the pressure actuated valve comprises:

- comparing measured values of CAF flow pressure to a predetermined CAF flow pressure target,
- when said CAF flow pressure reaches said CAF flow pressure target, closing the magnetic control valve and the pressure actuated valve and venting, via a venting exit, the second compressed air pipe and a spring loaded pneumatic cylinder of said control valve, and
- when said CAF flow pressure falls below said predetermined CAF flow pressure target, reopening said magnetic control valve and said pressure actuated valve.

[0019] According to another embodiment of the method of the invention, filling the CAF pipe with compressed air, via the first compressed air pipe,

- continues until air filling pressure reaches a predetermined high air filling pressure threshold,
- restarts when said air filling pressure falls below a predetermined low air filling pressure threshold.

[0020] The invention also concerns an arrangement for firefighting using compressed air foam (CAF), comprising

- means for detecting a fire,
- a CAF generator,
- an air compressor,
- a pressure actuated valve connected to said CAF generator and said air compressor,
- means for opening said pressure actuated valve to a known extent to produce CAF,
- means for projecting said produced CAF on the fire,
- means for measuring a pressure exerted by said produced CAF downstream of said valve,
- a control unit for controlling a degree of opening of said valve on the basis of the measured values of said CAF flow pressure.

[0021] According to an embodiment of the arrangement of the invention, said arrangement comprises

- a CAF pipe connecting, via the pressure actuated valve, the CAF generator to the means for projecting the produced CAF on the fire,
- a magnetic control valve arranged on a first compressed air pipe connecting the air compressor to said pressure actuated valve,
- a first air filling pressure switch arranged on said CAF pipe, between said pressure actuated valve and said means for projecting the produced CAF on the fire,
- a second air filling pressure switch arranged on said CAF pipe, between said first air filling pressure switch and said means for projecting the produced CAF on the fire,
- a magnetic filling valve arranged on a second compressed air pipe connecting the air compressor to said CAF pipe, between said second air filling pressure switch and said means for projecting the produced CAF on the fire,
- a CAF inlet pressure switch arranged on said CAF pipe, between said pressure actuated valve and said CAF generator.

[0022] According to another embodiment of the arrangement of the invention,

- the means for measuring CAF flow pressure are a CAF flow pressure switch adapted to detect a crossing of a predetermined CAF flow pressure target and to issue an electrical CAF flow pressure target-crossing detected to the control unit,
- the means for projecting the produced CAF on the fire are at least one sprinkler comprising a glass bulb adapted to close said at least one sprinkler and to burst by the effect of heat,
- the air compressor is adapted to fill the first and second compressed air pipes with compressed air,
- the first air filling pressure switch is adapted to detect

a crossing of a predetermined low air filling pressure threshold in case of opening of said at least one sprinkler and to issue an electrical fire-detected signal to the control unit,

- the CAF inlet pressure switch is adapted to detect a crossing of some high and low predetermined CAF inlet pressure thresholds and to issue an electrical CAF inlet pressure threshold-crossing detected signal to said control unit,
- the second air filling pressure switch is adapted to detect a crossing of a predetermined high air filling pressure threshold and to issue an electrical air filling pressure threshold-crossing detected signal to said control unit,
- the control unit is adapted to receive said electrical signals from the first and second air filling pressure switches, from said CAF inlet pressure switch, and from said CAF flow pressure switch.

[0023] According to a further embodiment of the arrangement of the invention,

- the means for measuring CAF flow pressure are a CAF flow pressure switch,
- the magnetic filling valve and said CAF flow pressure switch are adapted to receive a control voltage from the control unit,
- the magnetic filling valve is adapted to receive said control voltage switched by said CAF flow pressure switch, and adapted to vent, via a venting exit, the first compressed air pipe and a spring loaded pneumatic cylinder of said pressure actuated valve.

[0024] Further features and advantages of the invention will appear from the following description of embodiments of the invention, given as non-limiting examples, with reference to the accompanying drawings listed hereunder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Fig. 1 shows schematically the arrangement for system release and CAF flow control for firefighting purposes, according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] At least one of the arrangements for firefighting using CAF according to the invention can be present in a practical CAF-sprinkler system, but more generally several such arrangements will be present depending on the size of the complete protection zone. This arrangement comprises means for detecting a fire and a CAF generator 8. The CAF generator 8 is connected, via a CAF pipe 13, to means for projecting CAF on a fire. Preferably, the means for projecting the produced CAF on the fire are at least one conventional sprinkler 2. The valve arrangement described below is particularly suitable for feeding several sprinklers 2 covering a defined floor surface. Such conventional sprinklers 2 are adapted to open under the effect of heat. Generally, conventional sprinklers 2 comprise a glass bulb adapted to close said sprinklers and to burst under the effect of heat.

[0027] The CAF pipe 13 has, from the sprinkler 2 to the CAF generator 8, a first and a second air filling pressure switch 3 and 4 respectively, means 5 for measuring a pressure exerted by CAF in said CAF pipe, a two-way pressure actuated flow regulator valve 6, and a CAF inlet pressure switch 7. Preferably, the means 5 for measuring CAF flow pressure are a CAF flow pressure switch 5 and all the pressure switches 3, 4, 5 and 7 are electrical pressure switches. All pressure switches 3, 4, 5 and 7 are pre-set to or adjustable to certain target/threshold pressures. A predetermined CAF flow pressure target of pressure switch 5 is set to the standard flow pressure of the sprinklers 2. At this flow pressure, the sprinklers will each spread out the designed nominal flow rate of CAF.

[0028] The arrangement for firefighting further comprises an air compressor 12 connected to the CAF pipe 13 in order to fill it with compressed air. More precisely, a first compressed air pipe 22 starting from the air compressor 12 divides, at a node 23, into a second 32 and a third 42 compressed air pipes leading respectively to a node 33 of the CAF pipe 13 and to the pressure actuated valve 6. At this pressure actuated valve 6, a spring loaded pneumatic cylinder 60 is mounted. When fire is not detected, the pressure actuated valve 6 is kept closed by the force of this spring. When a fire is detected, the pressure actuated valve 6 is opened to a known extent by compressed air acting against the force of the spring. The node 33 is between the sprinkler 2 and the first air filling pressure switch 3. The second compressed air pipe 32 comprises a magnetic two-way filling valve 1 and the third compressed air pipe 42 comprises a magnetic two-way control valve 10.

[0029] The magnetic control valve 10 comprises a vent port (not shown) which permits to evacuate compressed air out of the spring loaded pneumatic cylinder 60 when said valve 10 is closed. At the vent port, an adjustable throttle valve in combination with a silencer is mounted to avoid a sudden evacuation or respectively to allow the evacuation to proceed more gently.

[0030] The arrangement for firefighting further comprises a control unit 9 for controlling, by the pressure actuated valve 6, a degree of opening of the magnetic control valve 10 and so a degree of opening of the pressure actuated valve 6 in order to produce CAF, on the basis of the measured value of CAF flow pressure in CAF pipe 13. The magnetic filling valve 1 and the CAF flow pressure switch 5 are adapted to receive a control voltage from the control unit 9.

[0031] Magnetic valve 1 is opened when putting the sprinkler system into operation and closed in case of leakage when the air filling pressure sinks below a predetermined high air filling pressure threshold detected by the pressure switch 3. The magnetic valve 1 is controlled by

the control unit 9 and will be opened to fill/pressurize or to refill the CAF line 13 between valve 6 and the sprinklers 2 with compressed air supplied from the compressor 12. When the pressure switch 3 signals the right filling pressure the solenoid valve 1 will be shut off.

[0032] When the first air filling pressure switch 3 detects a crossing of a predetermined high air filling pressure threshold, said pressure switch issues an electrical air filling pressure threshold-crossing detected signal to the control unit 9.

[0033] The second air filling pressure switch 4 is adapted to detect an air pressure loss in the CAF pipe 13, i.e. a crossing of a predetermined low air filling pressure threshold, in case of opening of said at least one sprinkler 2 and to issue an electrical fire-detected signal to the control unit 9.

[0034] The magnetic control valve 10 is adapted to receive the control voltage switched by the CAF flow pressure switch 5 and adapted to open itself to another known extent in order to open, via the control cylinder 60, the pressure actuated valve 6 to its known extent using compressed air when the second air filling pressure switch 4 signals a pressure drop in the CAF pipe 13, i.e. when at least one sprinkler 2 opens due to the influence of a fire.

[0035] The pressure actuated valve 6, connecting the CAF pipe 13 and the second compressed air pipe 42, is adapted to control the discharge of CAF and to regulate the flow rate of CAF in said CAF pipe 13, depending on the number of connected and opened sprinklers 2.

[0036] The CAF inlet pressure switch 7 is adapted to detect a crossing of some predetermined high and low CAF inlet pressure thresholds and to issue an electrical CAF inlet pressure threshold-crossing detected signal to the control unit 9.

[0037] The CAF flow pressure switch 5 is adapted to detect a crossing of the predetermined CAF flow pressure target and to issue an electrical CAF flow pressure target-crossing detected to the control unit 9.

[0038] The control unit 9 is adapted to receive electrical signals from the second air filling pressure switch 4 and to, upon detection of a pressure collapsing, control a supplying of the at least one sprinkler 2 with CAF.

[0039] The control unit 9 is also adapted to receive electrical signals from the first air filling pressure switch 3, from the CAF inlet pressure switch 7 and from said CAF flow pressure switch 5.

[0040] To implement the method for firefighting using CAF according to the invention, it is appropriate, in a first step, to open the magnetic filling valve 1, close all the other ones in order to fill the first compressed air pipe 32 and the CAF pipe 13 to the pressure actuated valve 6 and to the sprinkler 2, and measure, via the first air filling pressure switch 3, air filling pressure in the CAF pipe 13.

[0041] Preferably, filling with compressed air, via the first compressed air pipe 32, of the CAF pipe 13 continues until air filling pressure reaches the predetermined high air filling pressure threshold, and restarts when said air filling pressure falls below said predetermined threshold.

[0042] A fire is detected by the arrangement according to the invention when, under the effect of heat, the glass bulb of the sprinkler 2 bursts and, thereby, air pressure falls in the CAF pipe 13. Such an air pressure loss, corresponding to a crossing of the predetermined low air filling pressure threshold, is detected by the second air filling pressure switch 4 which issues an electrical fire-detected signal to the control unit 9.

[0043] In other words, in such a case, the fire itself as well as the location of the fire will be signalized by the function of pressure switch 4. Controlled by the control unit 9 the complete system will then be released. The CAF generator 8 starts to generate CAF. Following the CAF flows to the inlet of valve 6. Pressure switch 5 is powered on by the control unit 9. Valve 6 is closed yet.

[0044] Upon reception of this electrical fire-detected signal, the control unit 9 closes the magnetic filling valve 1, opens the magnetic control valve 10 and starts the CAF generation. It should be noted that CAF inlet pressure in the CAF pipe 13, is measured upstream the valve 6 by the CAF inlet pressure switch 7.

[0045] Typically, the CAF generation continues until the CAF inlet pressure reaches the predetermined high CAF inlet pressure threshold, and restarts when said CAF inlet pressure falls below the predetermined low CAF inlet pressure threshold.

[0046] The CAF generator 8 is dimensioned to generate more CAF than all the sprinklers 2 connected to the valve 6 can simultaneously eject at the standard flow pressure. This is done on the one hand, to make sure the CAF pipe 13 between the CAF generator 8 and the valve 6 is always kept filled with a small overpressure in comparison with the flow pressure measured by pressure switch 5 in order to have sufficient CAF available in case of opening of further sprinklers 2. On the other hand it was found that pressurized CAF is more stable with reduced segregation of the CAF when stored in lines.

[0047] To keep the CAF overpressure in the CAF line 13 within limits to ensure the proper function of valve 6, pressure switch 7 is arranged at the inlet of valve 6. If the CAF pressure at the inlet of valve 6 increases the predetermined high air filling pressure threshold of pressure switch 7 the CAF generator 8 will be stopped by the control unit 9 until the CAF pressure sinks below the predetermined low air filling
pressure threshold of pressure switch 7 again. In this way, here also, a two points pressure regulated CAF flow is installed.

[0048] At the moment when the system is activated, the CAF flow pressure switch 5 can't measure any CAF flow pressure because the pressure actuated valve 6 is still closed.

[0049] Once the pressure actuated valve 6 is fed with CAF, the control unit 9 opens said pressure actuated valve 6 and CAF leaving the latter traverses the CAF pipe 13 to be projected, by the sprinkler 2, on the fire.

[0050] More precisely, for the opening of the pressure actuated valve 6, the control unit 9 issues a control volt-

age to the CAF flow pressure switch 5, the latter powers the solenoid of the magnetic control valve 10, i.e. switches said control voltage to the magnetic control valve 10 which opens to its known extent.

[0051] By the effect of opening of the magnetic control valve 10, compressed air can flow through the valve 10 into the control cylinder 60 which opens the pressure actuated valve 6 to its known extent. As a result, the CAF will flow through the valve 6 to the opened sprinkler 2.

[0052] The pressure exerted by the CAF in the CAF pipe 13 is measured by the CAF flow pressure switch 5. The control unit 9 controls the degree of opening of the pressure actuated valve 6 on the basis of the measured values of said CAF flow pressure.

[0053] More precisely, for controlling the degree of opening of the pressure actuated valve 6, the control unit compares measured values of CAF flow pressure to a predetermined CAF flow pressure target.

[0054] When the measured values of CAF flow pressure reaches the predetermined CAF flow pressure target, the control unit 9 orders on the one hand, via the CAF flow pressure switch 5, switching off of the solenoid of the magnetic control valve 10, i.e. closing of the valve 10, and, as a result, closing of the pressure actuated valve 6, and on the other hand venting, via the vent exit, of the second compressed air pipe 42 and the spring loaded pneumatic cylinder 60 of said pressure actuated valve 6. More precisely, through the vent port and the connected throttle valve in combination with a silencer, the compressed air will be evacuated out of the control cylinder 60 gently. As a result, the valve 6 closes slowly under the force of the spring in interaction with the dwindling compressed air pressure.

[0055] When the measured values of CAF flow pressure falls below the predetermined CAF flow pressure target, the control unit 9 orders reopening of the magnetic control valve 10, as described before.

[0056] Consequently, compressed air opens, via the control cylinder 60, valve 6 again respectively wider, more CAF can pass through valve 6 until the CAF flow pressure increases to above the predetermined CAF flow pressure target of the pressure switch 5. Following the above described procedure of two point pressure regulation, regulated CAF flow starts again.

[0057] Obviously, a degree of opening of the pressure actuated valve 6, the predetermined CAF inlet pressure thresholds and the CAF flow pressure target depend on the diameter of the CAF pipe 13 and on the number of sprinklers 2 terminating the CAF pipe 13.

[0058] In the case where more sprinklers open one by one the regulating procedure functions are similar. The next sprinkler which opens or will be opened causes a pressure drop, measured by the pressure switch 5, in the CAF line 13. Due to this pressure drop the CAF flow pressure in line 13 sinks below the predetermined CAF flow pressure target of the pressure switch 5. This causes the opening of magnetic valve 10 as well as the valve 6 by the pressurized control cylinder 60, which opens the valve 6 wider and lets a higher degree of opening of the valve 6. Following the above described procedure of two point pressure regulation, regulated CAF flow continues with a larger degree of opening of the valve 6 adapted to the new configuration wherein several sprinklers are opened, in order to maintain the CAF flow pressure at the predetermined CAF flow pressure target.

[0059] Preferably, the magnetic control valve 10, the spring loaded pneumatic cylinder 60 and a position signal switch of pressure actuated valve 6 enable to control precisely the degree of opening of said pressure actuated valve.

[0060] Advantageously, after the end of the fire, the CAF generator 8 is stopped before the air compressor 12 in order to clean the CAF pipe 13 by the effect of compressed air.

[0061] To make the arrangement operational again, it is necessary to

- stop the CAF generator 8 and the air compressor 12, then
- close all the valves 1, 6 and 10, then
- replace the burst bulb of the at least on sprinkler 2 or the at least one sprinkler 2 itself by a new bulb or by a new sprinkler respectively, then
- open the magnetic filling valve 1, and then
- restart the air compressor 12.

[0062] To comply with safety requirements, the complete sprinkler system can only be reset manually by authorized persons.

[0063] The invention has been described with reference to preferred embodiments. However, many variations are possible within the scope of the invention.

Claims

1. A method for firefighting using compressed air foam (CAF), comprising the following steps

   - detecting a fire,
   - feeding a pressure actuated valve (6) with CAF,
   - opening said pressure actuated valve to a known extent,
   - projecting said CAF on the fire,
   - measuring a pressure exerted by the CAF downstream of said valve (6),
   - controlling a degree of opening of said valve (6) on the basis of the measured values of said CAF flow pressure.

2. The method according to claim 1, wherein for detecting a fire

   - a CAF pipe (13), connecting the pressure actuated valve (6) to means for projecting CAF on the fire, is filled with compressed air issued from

a first compressed air pipe (32), said pipe comprising a magnetic filling valve (1),
- air pressure in said CAF pipe is measured and compared to a predetermined low air filling pressure threshold, and
- when said air pressure in the CAF pipe falls below said predetermined low air filling pressure threshold, an electrical fire-detected signal is issued.

3. The method according to claim 2, wherein the step of feeding the pressure actuated valve (6) with CAF comprises

- closing the magnetic filling valve (1),
- opening a magnetic control valve (10) arranged on a second compressed air pipe (42) leading to said pressure actuated valve (6),
- generating CAF.

4. The method according to claim 3, wherein

- a CAF inlet pressure is measured in the CAF pipe (13) upstream the pressure actuated valve (6),
- CAF generation continues until said CAF inlet pressure reaches a predetermined high CAF inlet pressure threshold,
- CAF generation restarts when said CAF inlet pressure falls below a predetermined low CAF inlet pressure threshold.

5. The method according to one of claims 3 to 4, wherein the step of controlling the degree of opening of the pressure actuated valve (6) comprises:

- comparing measured values of CAF flow pressure to a predetermined CAF flow pressure target,
- when said CAF flow pressure reaches said CAF flow pressure target, closing the magnetic control valve (10) and the pressure actuated valve (6) and venting, via a venting exit, the second compressed air pipe (42) and a spring loaded pneumatic cylinder (60) of said control valve (6), and
- when said CAF flow pressure falls below said predetermined CAF flow pressure target, reopening said magnetic control valve (10) and said pressure actuated valve (6).

6. The method according to one of claims 2 to 5, wherein filling the CAF pipe (13) with compressed air, via the first compressed air pipe (32),

- continues until air filling pressure reaches a predetermined high air filling pressure threshold,
- restarts when said air filling pressure falls below a predetermined low air filling pressure threshold.

7. An arrangement for firefighting using compressed air foam (CAF), comprising

- means for detecting (2 ; 4) a fire,
- a CAF generator (8),
- an air compressor (12),
- a pressure actuated valve (6) connected to said CAF generator and said air compressor,
- means for opening (10) said pressure actuated valve to a known extent to produce CAF,
- means for projecting (2) said produced CAF on the fire,
- means for measuring (5) a pressure exerted by said produced CAF downstream of said valve (6),
- a control unit (9) for controlling a degree of opening of said valve (6) on the basis of the measured values of said CAF flow pressure.

8. The arrangement according to claim 7, further comprising

- a CAF pipe (13) connecting, via the pressure actuated valve (6), the CAF generator (8) to the means for projecting (2) the produced CAF on the fire,
- a magnetic control valve (10) arranged on a first compressed air pipe (42) connecting the air compressor (12) to said pressure actuated valve,
- a first air filling pressure switch (4) arranged on said CAF pipe, between said pressure actuated valve (6) and said means for projecting the produced CAF on the fire,
- a second air filling pressure switch (3) arranged on said CAF pipe, between said first air filling pressure switch (4) and said means for projecting the produced CAF on the fire,
- a magnetic filling valve (1) arranged on a second compressed air pipe (32) connecting the air compressor (12) to said CAF pipe, between said second air filling pressure switch (3) and said means for projecting the produced CAF on the fire,
- a CAF inlet pressure switch (7) arranged on said CAF pipe, between said pressure actuated valve (6) and said CAF generator (8).

9. The arrangement according to claim 8, wherein

- the means for measuring CAF flow pressure are a CAF flow pressure switch (5) adapted to detect a crossing of a predetermined CAF flow pressure target and to issue an electrical CAF

flow pressure target-crossing detected to the control unit (9),
- the means for projecting (2) the produced CAF on the fire are at least one sprinkler comprising a glass bulb adapted to close said at least one sprinkler and to burst under the effect of heat,
- the air compressor (12) is adapted to fill the first and second compressed air pipes (32 ; 42) with compressed air,
- the first air filling pressure switch (4) is adapted to detect a crossing of a predetermined low air filling pressure threshold in case of opening of said at least one sprinkler (2) and to issue an electrical fire-detected signal to the control unit,
- the CAF inlet pressure switch (7) is adapted to detect a crossing of some predetermined high and low CAF inlet pressure thresholds and to issue an electrical CAF inlet pressure threshold-crossing detected signal to said control unit,
- the second air filling pressure switch (3) is adapted to detect a crossing of a predetermined high air filling pressure threshold and to issue an electrical air filling pressure threshold-crossing detected signal to said control unit,
- the control unit (9) is adapted to receive said electrical signals from the first and second air filling pressure switches (3 ; 4), from said CAF inlet pressure switch (7), and from said CAF flow pressure switch (5).

10. The arrangement according to one of claims 8 to 9, wherein

- the magnetic filling valve (1) and said CAF flow pressure switch (5) are adapted to receive a control voltage from the control unit (9),
- the magnetic filling valve (10) is adapted to receive said control voltage switched by said CAF flow pressure switch (5), and adapted to vent, via a venting exit, the first compressed air pipe (42) and a spring loaded pneumatic cylinder (60) of said pressure actuated valve.

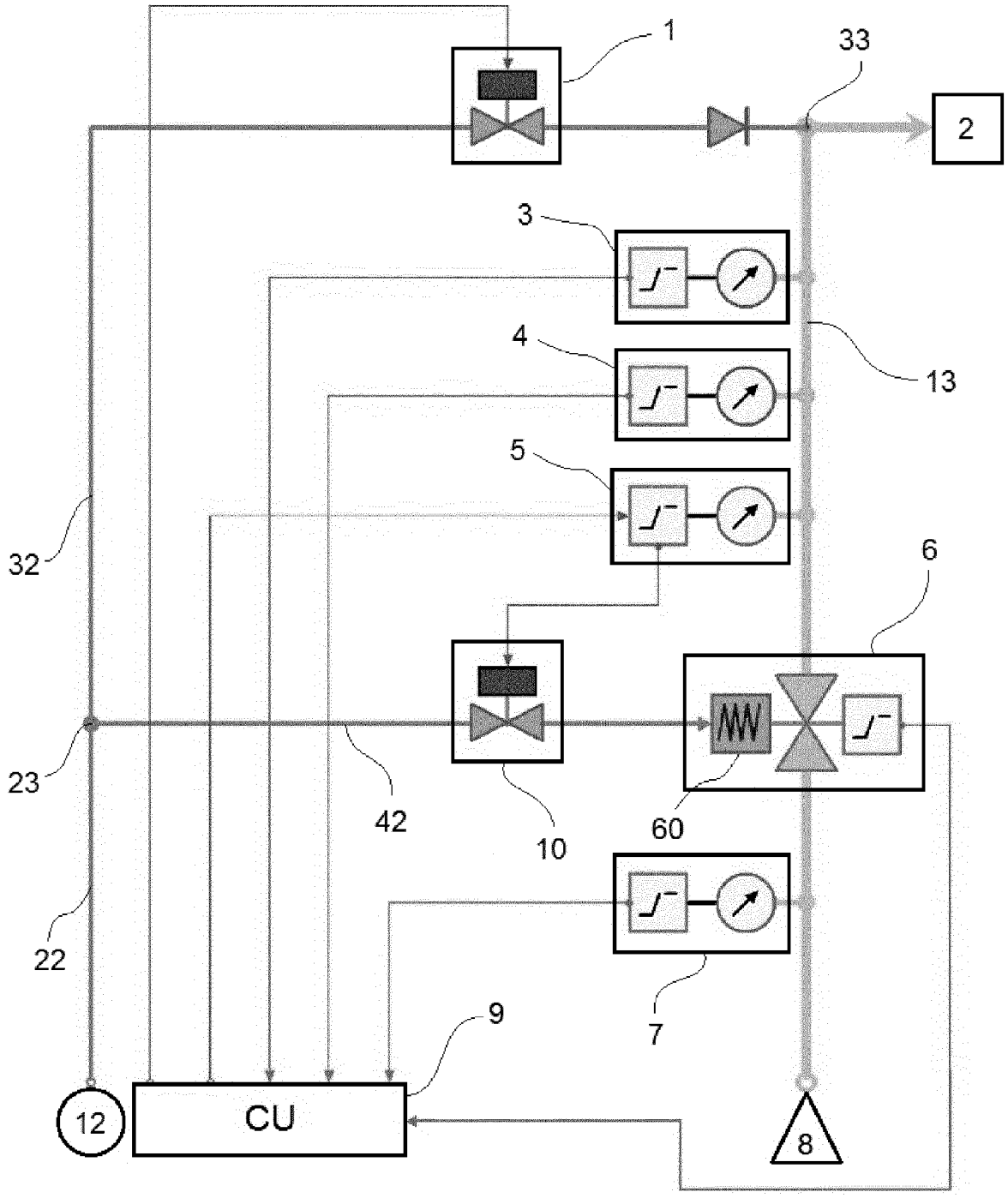

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 14 30 6980

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 2007/114046 A1 (MUNROE DAVID B [US]) 24 May 2007 (2007-05-24) * paragraphs [0032] - [0037]; claims; figures *	1-4,7	INV. A62C5/02 A62C35/62 A62C35/64 A62C99/00
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