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(54) Flow check means for fire-fighting systems

(57) Rain-like or atomising sprayers or sprinklers (1) adopted in fire-fighting systems are applied to the end parts (2) of the pipings ejecting the extinguishing fluid, with the interposition of check valves (4) Said valves are kept fully open by sprinklers associated to same, and remain open independently on whether sprinklers are sound, or in case of supply following interventions or breaking of the heat-sensitive elements. On the contrary, they automatically close, intercepting the flow of the extinguishing fluid only in case of lack or disassembly of the sprinklers. The repositioning of sprinklers (1) in their seats restores the opening of the check valves (4) and the advance-preparation for the intervention of fire-fighting systems.

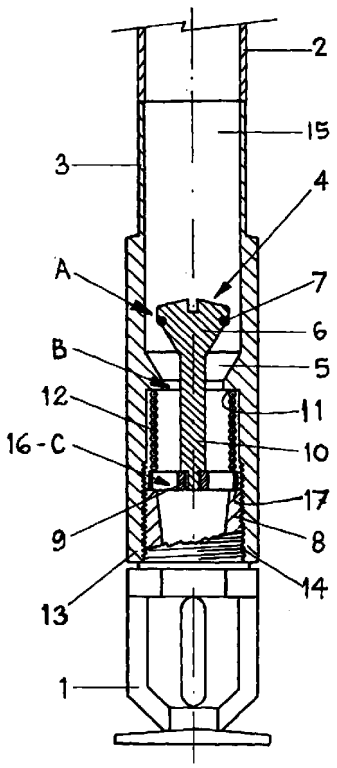

Fig. 1

EP 0 997 166 A1

Description

[0001] The present invention relates to flow check means for fire-fighting systems provided with automatic rain-like or atomising fluid distributors. More specifically, by automatic fluid distributors it is intended to indicate those heat-sensitive devices that are known by the British term "sprinklers", designed to automatically react at a given temperature by releasing a jet of extinguishing fluid and the supply of the same according to specific forms and amounts on a defined area, in order to extinguish fires or, more exactly, to extinguish fire beginnings and/or focuses. Automatic distributors or sprinklers, differently classified according to: type of incorporated heat-sensitive element, such as fuse or glass bulb, extinguishing jet, assembly position, system configuration, are associated to the flow check means subject matter of the present invention, without being subjected to any modification of form and/or effectiveness. Said flow check means are constituted by check valves which are interposed between the end parts of the extinguishing fluid feed pipings and the automatic distributors or sprinklers. Check valves may be inserted in the end parts of said pipings, just upstream of the sprinklers, or they may be located in special connecting units or elements, interposed and engaged between said end parts and the sprinklers. Check valves are kept open by said associated sprinklers, independently on whether sprinklers are sound, or in case of supply following interventions or breaking of the heat-sensitive elements. Check valves are, on the contrary, closed - intercepting the flow of extinguishing fluid, in case of lack or disassembly of the corresponding sprinklers.

[0002] As is known, rain-like or atomising fire-fighting systems are substantially constituted by networks of pipings wherefrom, in function of the requirements or the layout of the rooms to be protected, exhaust branches protrude at whose ends automatic distributors or sprinklers are applied which are provided with heat-sensitive elements. Heat-sensitive elements, in resting operating conditions, i.e. without intervention, are substantially located in such a way as to realise the sealing of the exhaust holes of the distributors. In case of fire or focus, the raise in temperature caused by fire causes the sensitive element to exceed the calibration values, which leads to the breaking of the check bulb or the melting, depending on the type of element, and the ensuing simultaneous and automatic opening of the exhausts of the distributors. In this way, the extinguishing flow is sprayed in the room, providing to the immediate extinguishing of the fire.

[0003] However, the aforesaid fire-fighting systems, while having proved to be highly effective and reliable both as concerns their construction rationality and their high sensitivity and intervention promptness - so that they are usually adopted in the majority of civil and naval applications - show several drawbacks at the time of their assembly and/or restoring. During the assembly, in fact, in order to be in condition of effecting the first filling and the pressurisation of the systems, it is necessary to provide to the interception of all the exhaust end parts by means of the application of the corresponding sprinklers; such operations are usually carried out simultaneously with other adjoining workings or activities. Based on the experience, it is known that in such conditions there often happen accidental breakings in the heat-sensitive elements of the sprinklers and, as a consequence, in the necessary replacement of even one only sprinkler, casually stricken and damaged or activated due to negligence or vandalism, or due to a correct intervention to extinguish a fire focus, the operation is long, complicated and delicate. In fact, it is first of all necessary to intercept the feed line of the system by acting on the relevant valves, to provide to their complete emptying, and afterwards to effect the replacement of the intervened or damaged sprinklers when the flow of the extinguishing fluid has been exhausted. For this reason, the operators must locate said check valves that are usually logistically placed in rooms or environments that cannot be always immediately and easily reached or accessible; they must promptly intervene on the same at the end of the necessary extinguishing distribution or at the time of the possible improper breaking of even one only sprinkler, in order to keep to a minimum the damages that may be caused on the structures, the arrangements and/or the furnishing by the jets of the sprinklers, preventing in any case their working throughout the operation; they must replace the intervened of damaged sprinkler(s) and refill the system. All this causes an obvious discomfort because of the long intervention and reactivating times, useless wastes of extinguishing fluid, possible additional damages that may be generated by the many operators who are involved in the intervention, to the detriment of their possible availability for other more necessary and urgent interventions.

[0004] Object of the present invention is to eliminate the above drawbacks. The invention, as is characterised by the claims, solves the problem through flow check means for fire-fighting systems having exhaust mouths provided with rain-like or atomising automatic distributors, by which the following results are obtained: each distributor or sprinkler is provided with a flow check valve; the coupling of each sprinkler to its own valve puts the same in opening conditions, i.e. each check valve is kept open by the same sprinkler to which it is associated, independently on whether it is sound or its heat-sensitive elements of the distribution control is broken or has melt; instead, the same check valve automatically closes by the simple de-coupling of the sprinkler associated to the same, intercepting the flow of the extinguishing fluid, independently on all the other sprinklers that make part in the same system, and keeping the system in regular running conditions, with all the pipings pressurised.

[0005] The advantages achieved by the use of the

object of the present invention lie essentially in that the replacement of the sprinklers that have worked to extinguish fires or that have been somehow damaged is carried out in a simple, quick and economical manner only on the intervened distribution points, with no need to intercept the general feed of the systems, or to exhaust the same, keeping therefore them in regular running conditions.

[0006] The invention is described in the following according to a preferred embodiment solely given by way of non limiting example, with reference to the attached drawing, wherein:

Figure 1 is a cross-section, according to the A-A line of Figure 3, of a check valve obtained in an intermediate extension, kept open by the positioning in its seat of the sprinkler associated to said valve.

Figure 2 shows the cross-section of said extension of Figure 1, with the check valve closed because of the absence of the sprinkler; and

Figure 3 shows a front view of said extension.

[0007] With reference to the figures showing a particular non limiting embodiment, the distributors or sprinklers (1), adopted in the rain-like or atomisation systems, are applied to the tubular exhaust mouths (2) of the end parts, with the interposition of tubular extensions (3). The connection between said extensions (3) and said exhausts (2) may be realised by means of welding, tight fitting on one another with peripheral mechanical compression, tight threaded coupling, or the like. The tubular extensions comprise check valves (4) constituted by circular seats (5) to which closing plugs (6) provided with gasket (7) are coupled. Said valves (4) are kept open by the same positioning of the associated sprinklers (1) by means of back tangs (8) which, in coupling conditions and with their end parts (17), enter in bearing and shifting relation with the intermediate units (9) on which the central stems (10) supporting plugs (6) engage.

[0008] Between said intermediate units (9) and the lower ledges (11) of the circular seats (5), return elastic means are interposed, such as for instance springs (12). Tangs (8) of sprinklers (1), coupled to the lower ends (13) of the tubular extensions (3) by means of conventional threading (4) act on the intermediate units (9) and therefore on the central stems (10), so as to move away plugs (6) from their circular seats (5) and to create in this way annular ports (B) whose passage areas are almost corresponding to the passage annular areas (A) associated to the positioning of plugs (6), open in the inside of the tubular ducts (15) of extensions (3). In the same way, the intermediate units (9) comprise a plurality of circumferential holes (16) whose added up areas (C) are also almost corresponding to the passage annular areas (A). Said sequential passage areas (A), (B) and (C) allow a downflow of the extinguishing fluid through extensions (3), substantially uniform and proportional to the exhaust capacity of the sprinklers associated to them.

[0009] The open position of the check valves (4) is kept both during the normal running and during the possible intervention of spraying of the extinguishing fluid, while they automatically close, intercepting said flow, only at the time when said sprinklers (1) are separated from the extensions. This is achieved through the action of the elastic means (12) which during the unscrewing of sprinklers (1) from seats (13) stretch out, pushing towards the exhaust of extensions (3) the intermediate units (9) which, being engaged with the central stems (10) that support plugs (6), cause said plugs to return in closing and sealing contact with the respective seats (5). Besides the stretching out of the elastic elements (12) the closing action of plugs (6) against seats (5) is exercised also by the pressure of the extinguishing fluid upstream of said plugs. The repositioning in the seat of sprinklers (1) replaced by the tubular extensions (3) automatically restores the re-opening of the check valves (4) and the readiness for the intervention of fire-fighting systems.

[0010] If distributors or sprinklers (1) provided with cage-filters protruding from the back part of tangs (8) should be used, the same bearing and shifting function with the intermediate units (9) on which the central stems (10) supporting plugs (6), instead of being exercised by the end parts (17) of said tangs, is exercised by the most protruding part of the filters. Tangs (8) of sprinklers (1), coupled to the lower ends (13) of the tubular extensions (3) by means of the traditional threading (14) bear the protruding parts of the filters in pushing relation against the intermediate units (9) and therefore on the central stems (10), so as to move away plugs (6) from their circular seat (5) and to create in this way the already described annular ports.

[0011] According to the same construction principle and the same working, the check valves (4) with the related opening and return means may also be realised otherwise. For instance, they may be realised in specific cartridges to be tight-inserted in the same tubular exhaust mouths (2) of the fire-fighting systems that are used at present, with bone positionings and suitable stop means, so that the distributors or sprinklers operate on them in the same manner as described above. Anyhow, the invention has been described and illustrated according to embodiments given by ways of non limiting examples, and it shall be evident to those skilled in the art that various changes in the structures, the details, the assemblies, the orientations, the combinations of parts, and the configuration in general may be introduced without exceeding its frame and scope.

Claims

1. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising

distributors, characterised in that they are constituted by extinguishing flow check units (4), interposed between exhausts (2) of the end parts of the fixed fire-fighting systems or the like, and the respective distributors or sprinklers (1); wherein the opening or closing conditions of said means for checking the extinguishing flow are function of the presence or absence of said distributors or sprinklers (1) associated to the same.

2. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claim 1, characterised in that the check units (4) are constituted by check valves.

3. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claim 1 or 2, characterised in that the check valves (4) are contained in cartridges that can be tight-inserted in the tubular exhaust mouths (2) of fire-fighting systems, and are stopped and boned in them in the wished positions, as function of the operating coupling with the associated sprayers or sprinklers (1).

4. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claim 1 or 2, characterised in that the check valves (4) are contained in tubular extensions (3) which connect with the tubular exhaust mouths (2) of said systems and on whose exhaust ends (13) the associated sprayers or sprinklers (1) engage.

5. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claim 1-4, characterised in that plugs (6) of the check valves (4) are associated to central stems (10) which engage with intermediate holed units (9), which enter in bearing relation, according to a relative translation motion, with the end parts (17) of the back tangs (8) of said distributors or sprinklers (1); the mutual engagement of said intermediate units (9) and said tangs (8) is a direct consequence of the opening or closing condition of the check valves (4), wherein the opening condition corresponds to the positioning in their seats of said sprinklers and lasts both during the usual running and during the extinguishing fluid spraying, and the closing condition, with automatic interception of said fluids, correspond and is simultaneous to the removal of sprinklers (1) from their seats; between said intermediate units (9) and the lower ledges (11) of the circular seats (5), return elastic means (12) are interposed that cause the closing return of said valves.

6. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claims 1-4, characterised in that plugs (9) of the check valves (4) are associated to central stems (10) that engage with intermediate holed units (9), which enter in bearing relation, according to a relative translation movement, with the end parts of the filters protruding from the back parts of terminals (17) of the back tangs (8) of said sprayers or sprinklers (1); the mutual engagement of said intermediate units (9) and said end parts of the filters protruding from tangs (8) is a direct consequence of the opening or closing conditions of the check valves (4), wherein the opening condition corresponds to the positioning in their seats of said sprinklers, and lasts both during the normal running and during the possible spraying of extinguishing fluids, and the closing condition, with automatic interception of the flow of said fluids, corresponds and is simultaneous to the removal of the sprinklers (1) from their seats; between said intermediate units (9) and the lower ledges (11) of said circular seats (5) elastic means are interposed (12) that cause the return in closing position of said valves.

7. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like or atomising distributors according to claims 1-6, characterised in that the annular passage areas (A) related to the positioning of plugs (6), open in the inside of the tubular ducts (15), the passage areas of the annular ports (B) related to the lifting of plugs (6) from their circular seats (5), and the adding up of areas (C) related to the through-holes obtained on the intermediate units (9) are almost corresponding to one another in relation with the constitution of a water downflow channel, substantially uniform and proportional to the exhaust capacity of sprinklers (1) associated to the same.

8. Flow check means for fire-fighting systems with exhaust mouths provided with rain-like sprinklers as described with the reservation expressed in the last period of the description specification, as illustrated by way of example, according to the preceding claims and for the purposes specified.

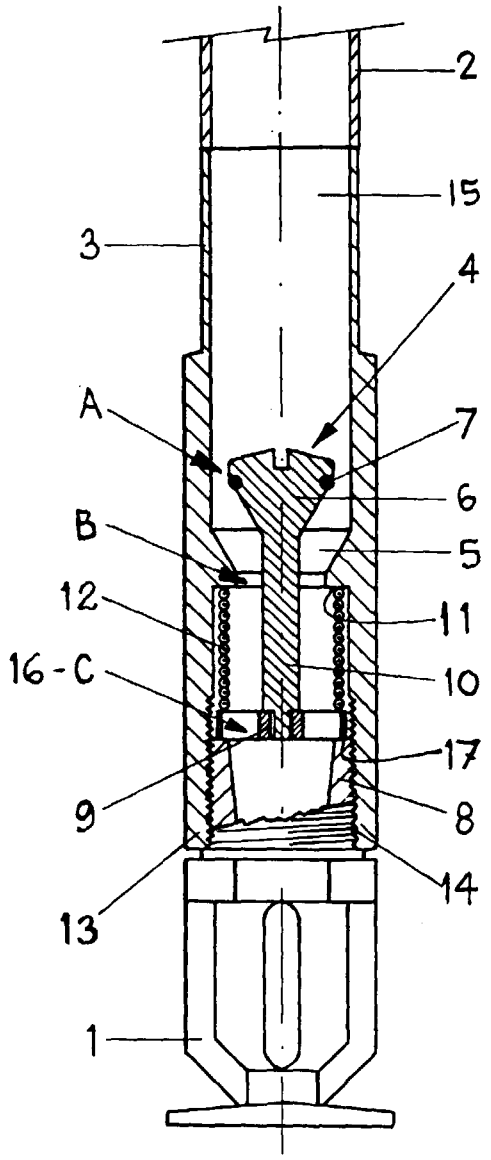

FIG. 1

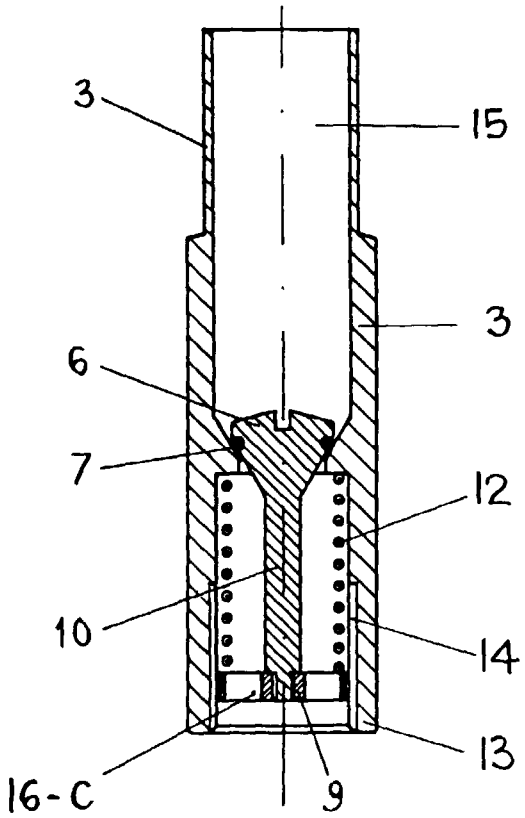

FIG. 2

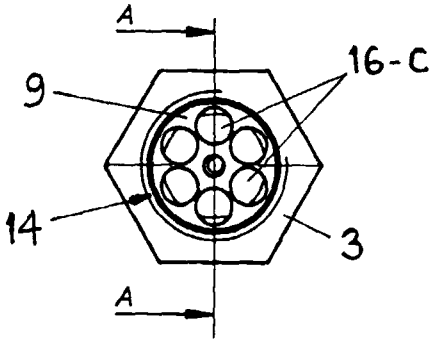

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0651

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y A	GB 198 945 A (CURNEY) * page 1, line 43 - page 2, line 43; figures 1-3 * ---	1 2-4 5-8	A62C37/20
Y A	US 5 174 327 A (TRUAX) 29 December 1992 * column 2, line 28 - column 4, line 62; figures * ---	2-4 5-8	
A	US 5 775 431 A (ONDRACEK) 7 July 1998 * column 3, line 21 - column 7, line 13; figures * -----	1-8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A62C
B05B
B01F
F16K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 May 1999	Triantaphillou, P

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82