

SPECIFICATION

Improvements relating to fire fighting sprinklers

- 5 This invention is concerned with fire fighting sprinklers and, in particular, fire fighting sprinkler units and fire fighting sprinkler installations.

One example of the use of fire fighting sprinklers is to protect storage areas in which goods are stored on racks. It has been proposed, recently, to protect such storage racks by including a number of "in-line" sprinklers arranged to give a symmetrical water distribution pattern over each level of the rack.

Whilst this proposal has attracted attention since the in-line sprinkler units are not as vulnerable to damage as the earlier, conventional, sprinkler units difficulties have been experienced in obtaining the required distribution patterns from the in-line sprinklers.

- 20 According to a first aspect of this invention a fire fighting sprinkler unit comprises a tubular body having a connection at both ends to enable it to be connected in series in a fire fighting liquid supply pipe and at least three laterally directed orifices spaced apart angularly around it through the peripheral wall for the outward flow of fire fighting liquid, and a deflector arranged laterally outwards of the orifices, in use, the deflector deflecting and spreading the flow of fire fighting liquid emerging from the orifices. The fire fighting sprinkler unit may comprise a two part body in which the two parts mate together with the one part fitting inside the other part, and in this case the one part of the body includes the orifices and the other part of the body includes the deflector. Preferably, however, the body is formed in one piece and the deflector is included in a sleeve surrounding the one piece body.

The deflector, or the other part of the body when it carries the deflector, may include a female screwthread and the body, or the one part of the body, carry a complementary male screwthread. In this way, the axial location of the deflector with respect to the orifices, is adjustable and can be readily varied by rotating the deflector with respect to the orifices to advance or retract the screwthreaded connection.

We have found that the distribution pattern of the fire fighting fluid emerging from the orifices can be varied by the axial movement of the deflector but, with a sprinkler unit in accordance with this invention we have found that it is not usually necessary to take advantage of this feature since it has a substantially uniform distribution pattern with a wide variety of differing heads of fire fighting liquid.

- 55 Preferably the sleeve carrying the deflector merely slides over the outer surface of the body and means are provided for locking the deflector at a predetermined axial position with respect to the orifices. The means may include co-operating flanges on the body and sleeve to locate the sleeve in position on the body. The means may also include a grub screw or pin to lock the sleeve into a predetermined position with respect to the orifices. Preferably the deflector includes a generally

frusto-conical surface which is arranged to face the orifices. Preferably the deflector surface, whilst being frusto-conical is castellated with a number of slots provided in its generally frusto-conical surface.

- 70 Preferably there are the same number of slots as orifices. The bases of the slots may be parallel to the generally frusto-conical surface but preferably they lie on a further frusto-conical surface having a greater included angle than the first mentioned frusto-conical surface.

Preferably the number of orifices are much greater than three and preferably there is a number in a range between eight and sixteen. We have found that a particularly good and uniform distribution pattern is achieved when twelve orifices are provided and when the orifices and slots are offset from one another in the circumferential direction. Preferably the free edge of the deflector lies in a plane containing the centres of the orifices.

- 85 According to a second aspect of this invention a fire fighting installation comprises a number of sprinkler units in accordance with the first aspect of this invention connected in one or more riser pipes which are in series communication with a valve the other side of which is connected to a source of fire fighting liquid under pressure.

Preferably the fire fighting installation also includes a detector in the region of influence of the sprinkler unit and means to open the valve in the event of fire being detected in the region of influence of the sprinkler units so that fire fighting liquid is emitted through the sprinkler units.

An example of and a modification of a sprinkler in accordance with this invention is shown in the accompanying drawings, in which:-

100 *Figure 1* is a longitudinal section through the sprinkler unit;

Figure 2 is an end elevation of the sprinkler unit;

Figure 3 is a cross section taken in the plane A-A shown in *Figure 1*;

Figure 4 is a detail of a portion of *Figure 3*; and,

Figure 5 is a longitudinal section through a modification of the sprinkler unit.

The sprinkler unit comprises a body 1 with a sleeve 2 surrounding the body. The ends of the body include connections to enable this body to be connected in series with a pipe, and in this example, the connections at the ends are identical and both formed by female 1" B.S.P. taper screwthreads 3.

- 115 The body portion 1 includes twelve equiangularly spaced identical orifices 4 each of which has a diameter of 3.8 mm and a shallow countersink on its external face as shown in *Figure 4*.

The end of the sleeve 2 adjacent the orifices 4 includes a frusto-conical surface 5 having an included apex angle of 60°. There are a number of slots 6 the bases of which all lie on a frusto-conical surface having an included apex angle of 90°. The slots 6 are offset with respect to the orifices 4 so that each slot 6 is intermediate each adjacent pair of orifices 4. The frusto-conical surface 5 and the slots 6 form the deflector which, in use, deflects fire fighting fluid flowing outwards through the orifices 4. The deflector is arranged with its free edge in a plane including the centres of the orifices 4. It has been

found that this position, together with the slots 6 gives a good, uniform distribution pattern for the fire fighting liquid.

In this example the body 1 includes a shoulder 7, 5 and the sleeve an inwardly directed flange 8 to locate the sleeve 2 in its preferred position on the body 1. The sleeve 2 includes a radial screwthreaded bore in which a grubscrew 9 is located to lock the sleeve 2 in position on the body 1. The body 1 also includes a pair of spanner flats 10.

A modification of the sprinkler unit is shown in Figure 5. In this modification six secondary orifices 11 are provided in the sleeve 2, opening away from the base of the slots 6 and inclined in the opposite sense to the frusto-conical surface 5. In use, some of the fire fighting liquid emerging through the orifices 4 is channelled through the secondary orifices 11 in a direction away from the main discharge of fire fighting liquid. These units are normally connected with the frusto-conical surface 5 facing downwards so that the main discharge of liquid is outwards and downwards. In this case the modification provides that some liquid is also directed upwards, which, in practice, is directed upwards against the underside 25 of the racks or underside of items housed on the racks.

In use, a number of the sprinkler units are connected "in-line" in a fire fighting liquid supply pipe or, in a full installation, in each of a number of such pipes. The unit connected to the end of the, or each, pipe has a plug screwed into one of its connections.

CLAIMS

1. A fire fighting sprinkler unit comprising a tubular body having a connection at both ends to enable it to be connected in series in a fire fighting liquid supply pipe and at least three laterally directed orifices spaced apart angularly around it through its peripheral wall for the outward flow of fire fighting liquid, and a deflector arranged laterally outwards of the orifices, in use, the deflector deflecting and spreading the flow of fire fighting liquid emerging from the orifices.

2. A unit according to claim 1, in which the body is formed in one piece and the deflector is included in a sleeve surrounding the body.

3. A unit according to claim 2, in which the sleeve is a sliding fit on the outer surface of the body and locking means are provided for locking the deflector at a predetermined axial position relative to the orifices.

4. A unit according to claim 3, in which the locking means include co-operating flanges on the body and on the sleeve, and a screw or pin to hold the sleeve with the flanges in contact with each other.

5. A unit according to any one of the preceding claims, in which the orifices all lie in a common plane, and in which the deflector has a free edge lying in the common plane containing the orifices.

6. A unit according to any one of the preceding claims, in which the deflector includes a generally frusto-conical surface which faces the orifices.

7. A unit according to claim 6, in which the frusto-conical surface is castellated with a number of slots in the surface.

8. A unit according to claim 7, in which the number of slots is equal to the number of orifices.

9. A unit according to claim 7 or claim 8, in which the bases of the slots lie on a further generally frusto-conical surface having a greater included angle of conicity than the first-mentioned frusto-conical surface.

10. A unit according to any one of the preceding claims, in which there are from eight to sixteen orifices.

11. A unit according to claim 10, in which there are twelve orifices.

12. A unit according to claim 6 or any one of the preceding claims dependent upon claim 6, in which the deflector includes a number of secondary orifices opening away from the frusto-conical surface and inclined in the opposite sense to the frusto-conical surface.

13. A unit according to claim 1, substantially as described with reference to the accompanying drawings.

14. A fire fighting installation comprising a number of units in accordance with any one of the preceding claims connected to one or more riser pipes, the riser pipe or pipes communicating with one side of a shut-off valve, the other side of which is connected to a source of fire fighting liquid under pressure.

15. An installation according to claim 14, which also includes a fire detector in the region of influence of the units; and means to open the valve when the detector detects a fire.

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5. A unit according to any one of the preceding claims, in which the orifices all lie in a common plane, and in which the deflector has a free edge lying in the common plane containing the orifices.

6. A unit according to any one of the preceding claims, in which the deflector includes a generally frusto-conical surface which faces the orifices.

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8. A unit according to claim 7, in which the number of slots is equal to the number of orifices.

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