

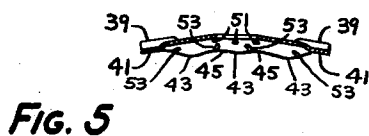
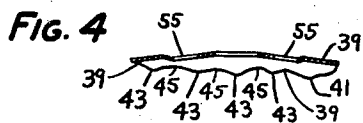
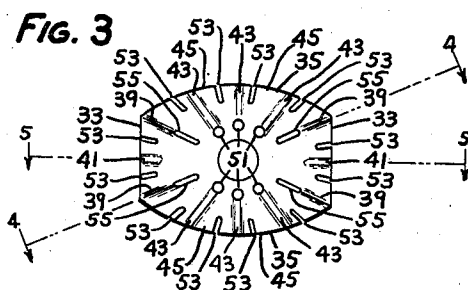
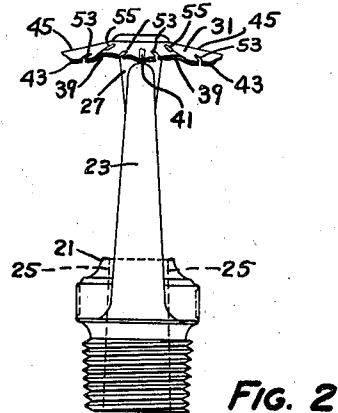
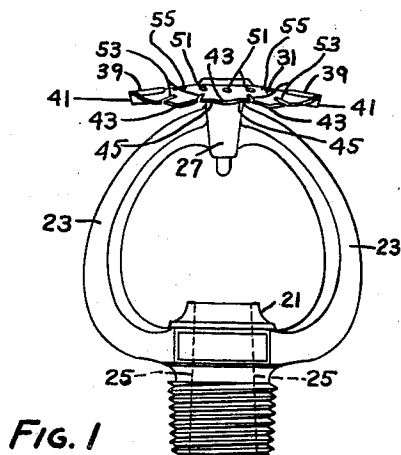
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AUTOMATIC SPRINKLER AND DEFLECTOR THEREFOR

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AUTOMATIC SPRINKLER AND DEFLECTOR
THEREFOR

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4 Claims. (Cl. 299—18)

This invention relates to fluid distributors such as automatic sprinklers and deflectors therefor, and more particularly to such sprinklers as are employed for fire extinguishing purposes.

Sprinklers for fire protection and certain other purposes have heretofore been devised with the intent of effecting fluid distribution in areas having rectangular rather than circular boundaries, to the end that a plurality of sprinklers may be employed for effecting distribution of a fluid over a comparatively large surface without any considerable degree of overlapping and—most important of all—without unreached areas.

For certain uses, notably that of fire extinguishment, it is important that there shall be attained a greater degree of uniformity of fluid distribution, over surfaces both above and below the sprinklers, than attainable through the use of prior sprinklers. In fact, the importance of uniformly adequate fluid distribution over the surfaces to be sprinkled is fully as great as that distribution shall be effected in an area of rectangular outline.

It is, therefore, an object of this invention to provide a sprinkler which will minimize variation in fluid distribution density over surfaces both above and below the sprinkler, which surfaces are substantially rectangular in form and of corresponding area.

It is a further object to provide an improved deflector for such sprinklers which will be inexpensive to manufacture and which may be advantageously applied to various types of sprinklers which are in common use.

The manner in which the foregoing objects are attained in accordance with this invention will be best understood from a consideration of the following description, taken in connection with the accompanying drawing, wherein

Figure 1 is a front elevation of a sprinkler embodying this invention;

Fig. 2 is an edge elevation of same;

Fig. 3 is an inverted plan showing the under side of the deflector of the sprinkler of Fig. 1;

Fig. 4 is a sectional view of said deflector taken on line 4—4 of Fig. 3; and

Fig. 5 is a sectional view of same taken on the line 5—5 of Fig. 3.

For convenience in illustration, a conventional form of automatic sprinkler is indicated in Figs. 1 and 2, comprising the base or nozzle 21 and the arms 23, 23, forming a yoke frame.

Said base has an opening therethrough, as indicated by the dotted lines 25, 25, and there-

fore serves as a spout or nozzle through which a stream of fluid may be discharged.

The junction 27 of said arms 23, 23, is situated in the path of fluid discharge from the nozzle 21.

It should be understood that the parts thus far described may be of any of various types of well known sprinklers of either the so-called "automatic" type (and therefore having a thermostatically controlled valve associated therewith in a well known manner), or may be of the so-called "open" type (which, being constantly open, is not provided with such valve structure).

In accordance with this invention, a deflector, such as the deflector 31, is secured to the junction 27, outside of the closed yoke frame formed by the arms 23, 23; so that the deflector will be above said junction when the sprinkler is installed in an upright position, as shown in Figs. 1 and 2, and would be below said junction if the sprinkler were to be installed in a pendant position.

Said deflector is therefore situated in the path of fluid discharge from the nozzle 21, and is disposed in a plane substantially perpendicular to such path.

In the preferred form of this invention which is represented in the accompanying drawing, the deflector 31 consists of an oblong sheet metal plate so formed as to present, to a stream of fluid discharged from the nozzle 21, a somewhat concave surface having a series of substantially radial corrugations involving ridges, grooves and openings arranged as best indicated in Fig. 3 and formed as best indicated in Figs. 1, 2, 4 and 5, for variously directing the distribution of such liquid or other fluid as may issue from the nozzle 21.

The longer axis of the plate 31 is disposed substantially coincident with the plane occupied by the arms 23, 23. The excess of the length of said axis over the shorter axis of said plate is such as to serve to counteract the fluid diversion effect resultant from the form and size of intervening portions of the arms 23, 23, so as to assure fluid distribution over the desired area.

In the instance of a sprinkler having arms such as those indicated in Figs. 1 and 2, the excess of the length of the longer axis over that of the shorter axis should be on the order of twenty per cent (20%).

For sprinklers having arms differing in size, shape and/or relative positioning, the relative dimensions of such deflector plates should be varied so as to obtain desired distributive effect.

The shorter edges 33, 33 of the deflector 31 are approximately straight and perpendicular to the major axis. The longer edges 35, 35 curve outwardly, rendering the deflector somewhat wider intermediate the ends thereof.

As indicated in Figs. 1, 2, 4 and 5, said plate is cupped, so as to prevent a somewhat concave surface to a jet of fluid issuing from the nozzle 21.

The major grooves 39, 39, 39, 39 extend diagonally from the junctions of the edges 33, 33 with the edges 35, 35, respectively, and are for augmenting both the volume and the velocity of the fluid directed toward the extreme corners of the area over which such fluid is to be delivered.

The ridges 41, 41 extend from the shorter edges 33, 33, intermediate the grooves 39, 39, 39, 39 for diverting liquid away from the nearer boundaries of the area to be covered into the general direction of the more distant corners.

The ridges 43, 43, 43, 43, 43, 43 are distributed along the longer edges 35, 35 for like purpose, with resultant intervening minor radial grooves 45, 45, 45, 45. Said ridges are substantially coextensive in length with the portions of the plate 21 in which they are formed, between the supporting junction 27 and the edges of said plate. The lengths of the ridges 41, 41 are somewhat less than such coextensiveness.

In order that there shall be an effective distribution of liquid above the sprinkler (e. g. on the under side of the ceiling or of the floor above, when used in an upright position), the deflector 31 has a plurality of openings therethrough, of which the openings 51 adjacent to the central support for said deflector may be circular in form. Other openings are provided such as the notches or open end slots 53 in the various edges, and the slots 55 between said edges and said central support.

Pairs of the open end slots 53 are formed in respective ones of the shorter edges 33, 33, being situated intermediate the ridges 41 and the grooves 39 adjacent thereto. Through these slots, jets of liquid are directed from the concave side of the deflector toward such portions of the surface above the sprinkler as otherwise would be somewhat shielded by the arms 23, 23 from the undeflected passage of such liquid.

Each of the grooves 39 has a slot 55 therethrough. These slots 55 are spaced from the corners of the deflector, respectively adjacent thereto, sufficiently to avoid depletion, to an objectionable extent, of the jets directed through said grooves 39 toward the corners of the area below the sprinkler to be reached by the liquid.

The slots 55 should be of such width and length that the volume and direction of liquid flow therethrough will assure formation of jets which will reach the extreme corners of the desired area above the sprinkler.

To these ends, the lengths both of the slots 53 and of the slots 55 should be at least double, and, preferably several times their width, and should approximate at least one-fourth of the length of their associated ridges.

Although a preferred form of this invention contemplates that the deflector shall, as already described, be very inexpensively and expeditiously formed from comparatively thin sheet metal, it may be constructed of any suitable material. It should be also understood that a broader aspect of this invention may be practiced through utilization of a comparatively thick deflector having a correspondingly concave face presented to the nozzle and having grooves and ridges formed in

such face and having openings therethrough similar in effectiveness to those shown by the drawing and hereinbefore more fully described.

In operation, liquid issuing from the nozzle 21 impinges against the concave face of the deflector 31 in two jets, which jets are divided from the stream issuing from said nozzle by the arms 23, 23.

The ridges 43 serve to counteract such separation of said stream by deflecting adjacent portions of the respective jets together and causing them to reunite, to the end that there will be an adequate volume and velocity of liquid distribution over the entire surface of the deflector to enable the grooves 39 and 45 and those grooves which are associated with the notches 53 to direct liquid flow of substantially uniform density throughout a rectangular area over surfaces below the sprinkler, and, further, to enable the openings 51 and the slots 53 and 55 to direct a like flow throughout a corresponding area over surfaces above the sprinkler.

In this connection it should be noted that were it not for the ridges 43 which are distributed along the longer edges 35, 35 of the deflector, as well as the outward curvature of said edges which makes the midwidth greater than that at either end, the volume and velocity of liquid delivery would be greatest in a path perpendicular to said edges and situated midway between the shorter edges 33, 33; notwithstanding that the greatest volume and velocity is needed in the portions of the liquid which are directed toward the corners of the area throughout which uniform distribution is to be accomplished.

Furthermore, the concave formation of the surface of the deflector which is presented to the liquid stream, and the absence of abrupt obstructions to radial flow of liquid over this surface (such as have characterized prior deflectors for like purpose) results in a minimum of reduction in the velocity of the liquid leaving the deflector and results in formation of comparatively solid jets which will more efficiently deliver liquid to distant corners than would occur if the liquid directed thereto were more or less completely disorganized into spray or the like because of having encountered rough deflector surfaces and obstructions in the paths of the intended flow thereover.

While the sprinkler and deflector herein shown and described, constitutes a preferred form of embodiment of this invention, it should be understood that other forms may be adopted all coming within the scope of the following claims, and it should also be understood that the language employed in these claims is intended to include all of the features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A sprinkler, comprising a discharge nozzle, a deflector positioned to intercept and divert liquid discharged from the nozzle presenting a generally concave diversion surface bounded on four sides in the form of a generally rectangular outline and having openings therethrough to deliver diverging streams at the opposite side of the deflector, and guiding ribs radiating generally from a central point upon the diversion surface to assist in the distribution of fluid thereover.
2. A sprinkler, comprising a discharge nozzle, a deflector positioned to intercept and divert liquid discharged from the nozzle, the deflector pre-

senting a generally concave diversion surface to discharge liquid and presenting a generally rectangular outline having radial distributing slots extending inwardly from the marginal edge, and
5 guiding ribs formed upon the diversion surface and associated with the slots to assist in the distribution of fluid.

3. A sprinkler, comprising a discharge nozzle, a deflector positioned to intercept and divert liquid discharged from the nozzle presenting a generally concave surface to liquid discharge with a generally rectangular outline bounded at opposite sides of the long axis by convex edges and at the ends of the length of the short axis by
10 straight edges, radially disposed slots extending through the deflector to deliver divergent streams
15

of liquid from the opposite side, and similarly disposed ribs projecting from the diversion surface to assist in the distribution of liquid toward the corner portions of the deflector.

4. A sprinkler, comprising a discharge nozzle, 5 a deflector positioned to intercept and divert liquid discharged from the nozzle, the deflector presenting a generally concave surface without abrupt curvature to the discharged liquid, the surface being mounted in the general form of 10 a rectangle with undulating edge portions, and guide projections extending from the diversion surface to distribute liquid discharge uniformly thereabout.

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