

Nov. 22, 1960

H. A. TOULMIN, JR
FIRE PREVENTION SYSTEM

2,961,049

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3 Sheets-Sheet 1

Fig-1

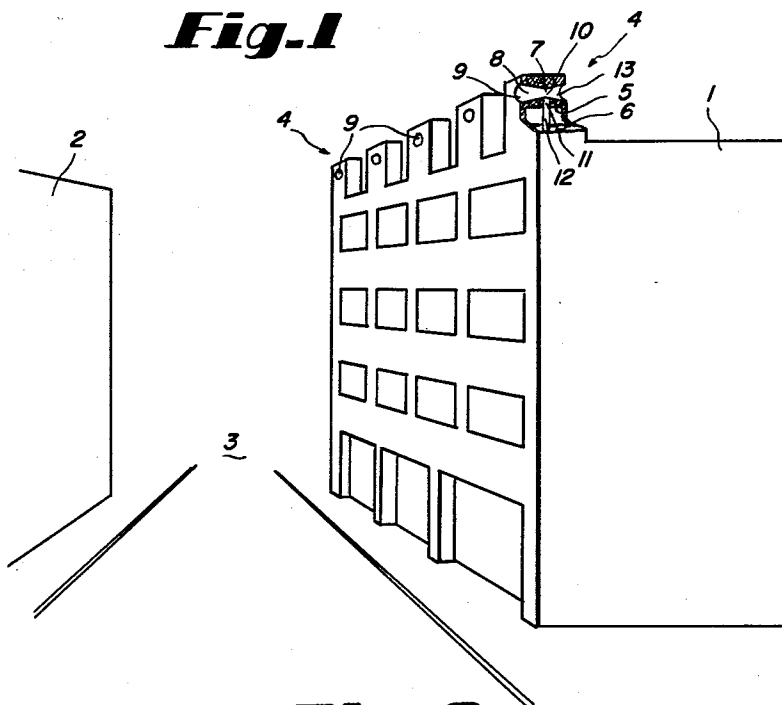
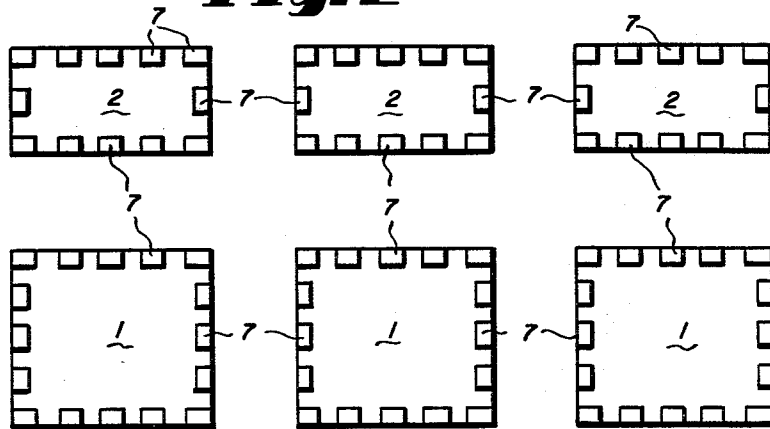


Fig. 2



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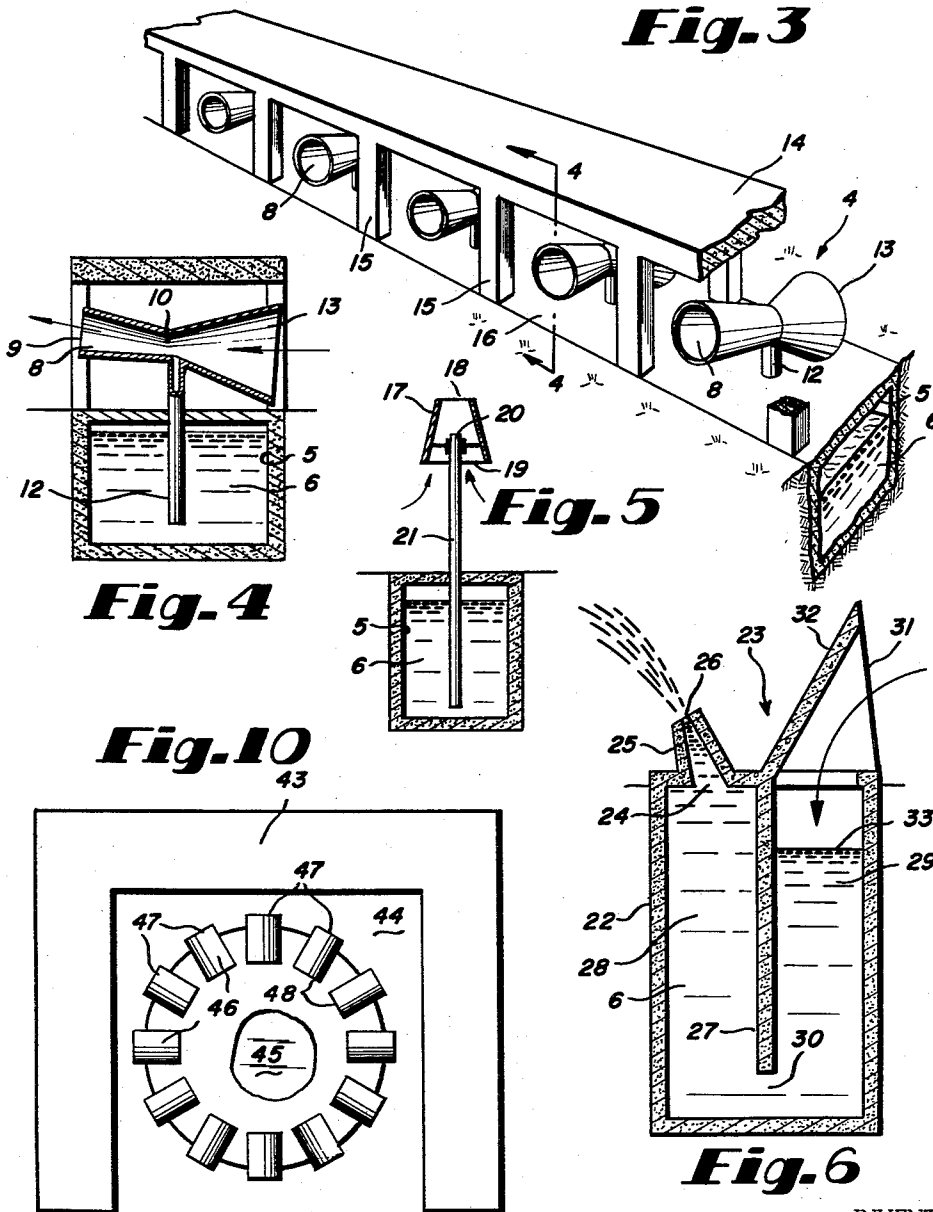
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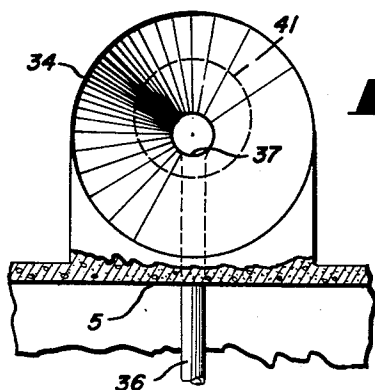
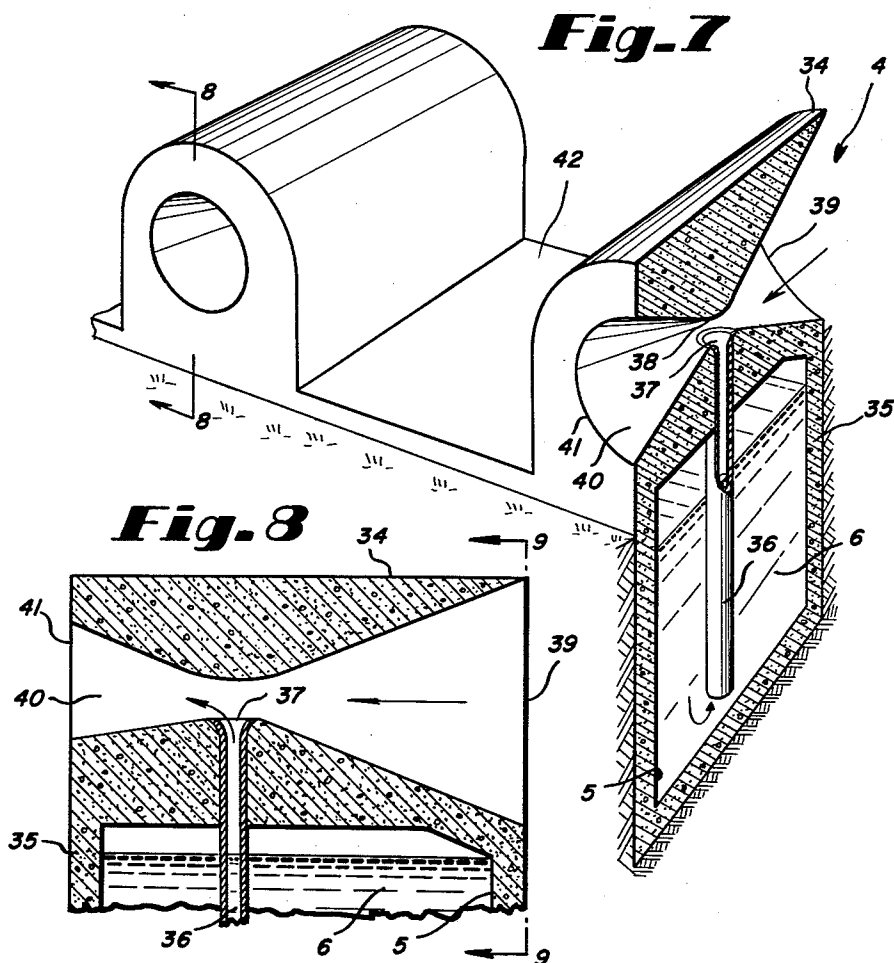
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3 Sheets-Sheet 3



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2,961,049

FIRE PREVENTION SYSTEM

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3 Claims. (Cl. 169—2)

This invention relates to protection against fire, and is particularly concerned with the provision of means and methods for preventing the spread of fire. Basically the invention utilizes a factor which occurs in conflagrations and which normally contributes to the spread of the conflagration to contain and quench the fire.

The invention is of very considerable importance in the control of conflagrations initiated by explosives and incendiaries. Whole cities have been substantially reduced to rubble and completely destroyed because of the rapid spread of fires started by bombings. The havoc occurs not primarily from the original bomb detonations, but because suitable means have hitherto been lacking to control the spread of the burning.

This invention provides a fire containing and quenching system which is automatically responsive to the initiation of the fire and which is substantially independent of a requirement for human control. Thus even evacuated areas are protected against building destruction by the utilization of the teachings of this invention.

Further, a very considerable plurality of sources for the fire quenching liquid are readily dispersed throughout an area to be protected; accordingly destruction of any considerable portion of the supply of quenching liquid in an area by bombing for example is quite unlikely.

Also the sources are conveniently positionable within the confines of the building structures of the area to which they afford protection. Only slight structural modifications or additions are required to provide the invention in existent structures and the invention is readily incorporable in both old and new buildings without detriment to the architecture.

Thus, when a fire occurs, whether occasioned by an explosive or otherwise, and particularly in large buildings, an updraft is caused by the fire. Such updraft induces air to be drawn to the fire from the immediate surroundings. The rush of air to the fire is at a considerable velocity. In the practice of this invention this rush of air is directed toward a reservoir or pool of a fire-quenching liquid to occasion a pressure change in the liquid. The reservoir is itself communicable through an outlet of the reservoir with nozzles of spray units spaced about the area to be protected. The pressure change in the liquid causes the liquid to flow to the nozzles and to be sprayed into the fire area.

In the preferred embodiment of the invention the nozzles are supported on a building structure in the upper reaches thereof overlooking the area to be protected, and they are in communication with the pool of fire-quenching liquid; air scoops intercept the rush of air toward the fire and direct the air to influence a pressure change in the liquid and flow of liquid to the nozzles.

It is accordingly a primary object of this invention to provide a novel method for containing and quenching a fire.

It is an important object of this invention to provide a novel system of preventing the spread of fire.

It is a particular object of this invention to provide

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novel devices useful in the fire prevention system of invention.

The invention will be more fully understood by reference to the following detailed description and accompanying drawings wherein:

Figure 1 is an elevational view illustrating an arrangement of the structure of invention on a building overlooking an area way and adjacent buildings;

Figure 2 is a plan view of building structures provided with the devices of invention;

Figure 3 is a fragmentary perspective view of parts broken away particularly illustrating the arrangement of nozzles, air scoops and a reservoir of the fire-quenching liquid;

Figure 4 is a sectional view taken on line 4—4 of Figure 3;

Figure 5 is a view like that of Figure 4 but illustrating a further modification;

Figure 6 is a sectional view like that of Figure 4 but illustrating yet another modification;

Figure 7 is a fragmentary perspective view partially in section but illustrating another arrangement of the structure of invention;

Figure 8 is a sectional view taken on line 8—8 of Figure 7;

Figure 9 is a view taken on line 9—9 of Figure 8; and

Figure 10 is a view in plan illustrating the system of invention with the spray units of the system circularly disposed.

In the drawings where practical similar numerals designate corresponding parts.

Referring now to the drawings more particularly the numeral 1 in Figure 1 indicates a conventional building structure separated from a similar building structure 2 by an area way 3, such as a street. The top of the building 1 is a parapet generally indicated by the numeral 4 and having formed therein a reservoir 5 for the retention of a fire-quenching liquid 6, such as water. It is to be understood that other materials or other materials in conjunction with water may be employed for effective action. Spray units 7 are formed through the parapet 4; each spray unit comprises a nozzle 8 having an opening 9 which extends from a throat indicated at 10. Nozzle 8 tilts slightly upwardly from the throat 10.

The reservoir has an outlet 11 communicable with the nozzle 8 through the throat 10. As shown in Figure 1 the outlet from the reservoir comprises a tube 12. Also communicable with the throat 10 and tapering toward the throat 10 in a downward direction is an air scoop 13. In effect the throat 10 and the area immediately adjacent on each side of the outlet form with the tube 12 venturi apparatus.

As will be appreciated should a fire occur in building 2 the rush of air toward the parapet 4 will be directed through the air scoops 13 to the throat 10 and will occasion a pressure change on the liquid 6 within the reservoir, causing the liquid to be forced up the tube 12 and to be carried with the air to the nozzle 8 and outwardly through the nozzle opening 9 to the fire at the building 2.

Referring now to Figure 2, which is a plan view of an area to be protected, it may be seen that by providing each of the buildings designated at 1, with the equipment described in connection with Figure 1, and by similarly providing the buildings designated at 2 with the same equipment as indicated, the area will be fully protected.

Further, it is to be noted (Figure 1) that should the building 1 itself take fire centrally the nozzle 8 would serve as an air scoop and the scoop 13 would serve as a nozzle. Thus the device is reversibly usable.

Figures 3 and 4 illustrate the device in more detail and in addition the spray units are formed independently of the parapet, providing a more convenient mounting ar-

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angement. Such is of advantage with respect to providing the device of invention on older building structures, wherein the reservoir may not be readily built into the structure itself. Thus in Figure 3 a covering 14 for the spray units designated at 7 is provided on leg supports indicated at 15. In contrast to the structure shown in Figure 1, air passing toward the scoop 13 will also pass, to some extent, on the outer side of the scoop and nozzle 8, that is, through the spacings designated at 16. However, as indicated in Figure 4, a large portion of the air will be directed through the scoop 13 and the throat 10 to the nozzle 8 and its opening 9; the flow of air through spacings 16 is at a lesser velocity and is impeded by the supports 15 and the spray units.

Referring now to Figure 5 a somewhat different arrangement is shown wherein the nozzle 17 opens upwardly at 18 for directing a spray of liquid from the pool 6 in an upward direction, as indicated by the arrows. The air scoop 19 in this instance is of somewhat shorter length than the nozzle 17; air flowing through the scoop over the outlet 20 to the reservoir 5 causes the fire-quenching liquid to be drawn upwardly through the tube 21 to the nozzle. The spray unit of Figure 5 may be used in conjunction with the units of Figure 3 or of Figure 1, for example, for it will be appreciated that the turbulent air flowing towards the fire will have components in various directions, including the upward direction.

In the structure of Figure 6 the reservoir 22 has a somewhat different configuration, as does the spray unit generally indicated at 23. Thus the reservoir has an outlet 24 communicable with the nozzle 25 having a nozzle opening 26. The reservoir is itself divided by baffle 27 into compartments 28, 29. The outlet 24 communicates with the compartment 28. The compartments 28, 29 communicate with each other beneath the baffle 27 through the aperture 30. The air scoop 31 is, in this instance, formed with a back wall 32, which directs the rushing air to the surface 33 of the liquid 6 within the compartment 29. The pressure exerted on the surface 33 forces the fire-quenching liquid 6 to the outlet 24, as indicated in Figure 6, and through the nozzle opening 26.

Referring now to Figures 7, 8 and 9, the air spray units of the parapet 4 are similar in structure to those described in connection with Figure 3, but are protected and formed in a somewhat different manner. Thus the covering 34, which is suitably of cement or concrete, is formed integral with the reservoir 35. The tube 36 cast with the reservoir, and suitably of metal, communicates the liquid 6 with the outlet 37 in the throat 38 formed by the inwardly tapering air scoop 39 and the outwardly tapering nozzle 40 having an opening 41.

Similarly to the structure of Figure 3, air, in addition to passing through the scoop 39, will pass in the spacings 42 between adjacent spray units. Such air however, as in the preceding instance, will be of a lesser velocity than the air channeled through the spray units.

Figure 10 illustrates an arrangement which is particularly adapted for individual building structures having areaways such as a courtyard. Thus in Figure 10 the numeral 43 indicates in plan view a building structure. In the areaway 44 there is provided a reservoir 45; spray units 46 have nozzles 47 facing towards the building structure 43. The air scoops 48 face towards the reservoir. The spray units are circularly disposed and face such that in the event of fire in any section of the building structure 43 air will be drawn to the scoops of the spray units

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facing that section, thus providing for directing a stream of fire-quenching liquid to the building section in which the fire has occurred.

In the devices described it is to be particularly noted that the spray units themselves are formed of fire-proof material, such as brick, concrete and similar structural compositions, which usually form building components; also in the event of fire adjacent the spray units the fire-quenching liquid such as water would tend to take heat and to cool the fire by evaporation of the quenching liquid. In the event of emergency the fire-quenching liquid is, of course, available for distribution by other methods.

The spray units of Figures 4, 5 and 6 may be employed in any desired combination to effect specific protective purposes. Also, it will be appreciated that in given instances the reservoir itself may be located well down within the building with which it is associated, in such position that it is protected against bomb destruction by high explosives.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In combination, a building structure, a reservoir for a supply of fire quenching liquid carried by said building structure near the top thereof, an outlet from said reservoir of fire quenching liquid, a substantially horizontal venturi tube on the roof of said building structure, and a connection between the low pressure portion of said venturi tube and said outlet whereby the movement of air through said venturi caused by a fire outside of said building will cause the liquid to be drawn into the venturi and discharged therefrom.

2. In an arrangement for preventing the spread of fire, the combination of a building structure, a reservoir for a supply of fire quenching liquid carried by said building structure near the top thereof, an outlet from said reservoir of fire quenching liquid, a substantially horizontal venturi tube on the roof of said building structure with one end of said venturi tube being directed toward the area which is to be protected from the spreading of the fire, and a connection between the low pressure of said venturi tube and said outlet from the reservoir of liquid whereby the movement of air through said venturi caused by a fire outside of said building will cause the liquid to be drawn into the venturi and discharged therefrom.

3. In an arrangement for preventing the spread of fire as claimed in claim 2 with said supply of fire quenching liquid being carried by said building structure below the roof thereof and said outlet extending upwardly from said reservoir toward said venturi tube on the roof of said building structure.

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