

Aug. 23, 1949.

W. F. KRAMER
FIRE EXTINGUISHER

2,480,033

Filed Jan. 21, 1946

2 Sheets-Sheet 1

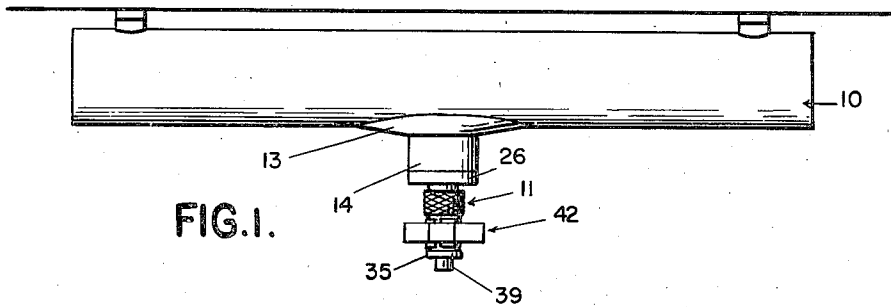


FIG. 1.

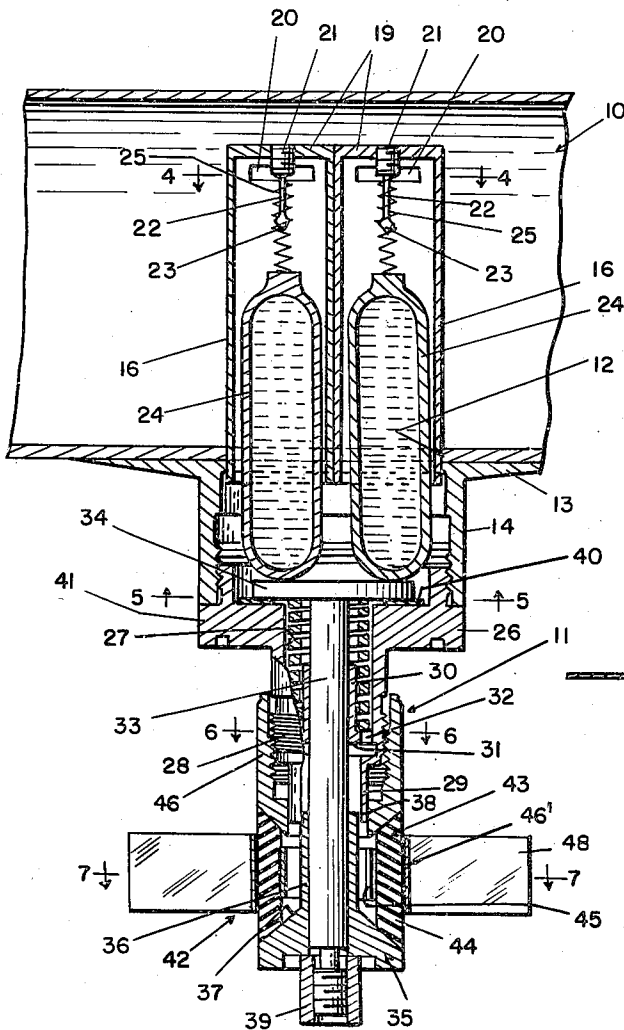


FIG. 3.

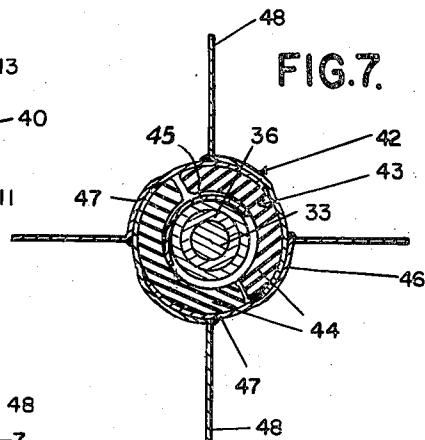


FIG. 7.

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2 Sheets-Sheet 2

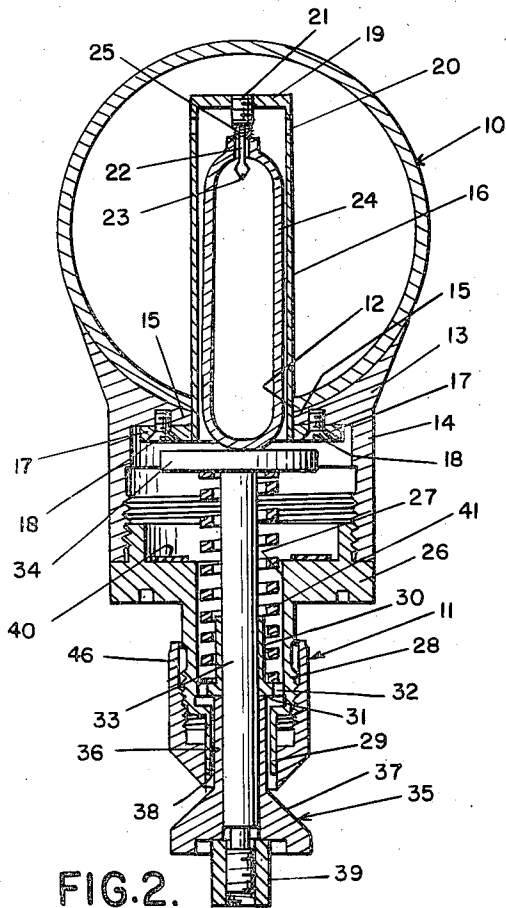


FIG. 2.

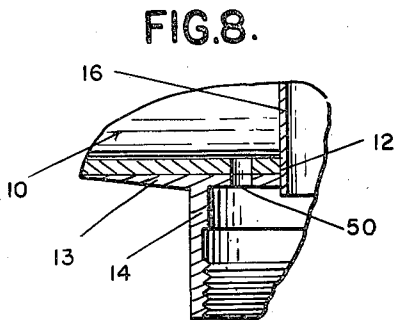


FIG. 8.

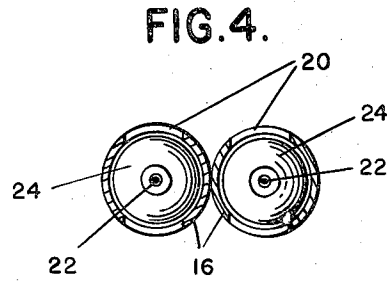


FIG. 4.

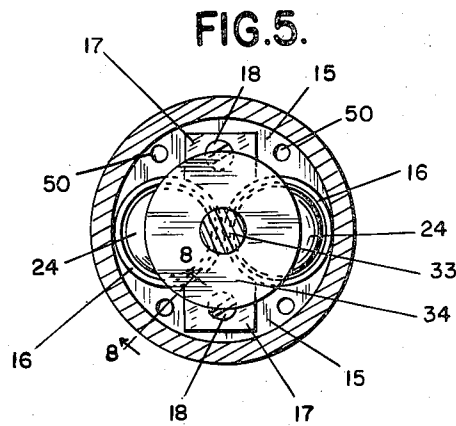


FIG. 5.

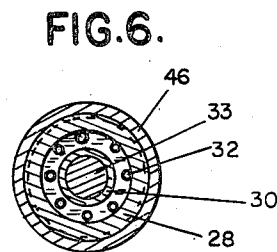


FIG. 6.

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FIRE EXTINGUISHER

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Application January 21, 1946, Serial No. 642,540

8 Claims. (Cl. 169-26)

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This invention relates generally to fire extinguishers and refers more particularly to improvements in fire extinguishers responsive to a predetermined temperature rise to discharge a pre-selected fluid into the ambient atmosphere.

One of the objects of this invention is to provide an improved automatic fire extinguisher composed of a relatively few simple parts capable of being inexpensively manufactured, assembled and installed.

Another object of this invention is to provide a fire extinguisher having a container adapted to house the selected fire extinguishing fluid under atmospheric pressure and having means responsive to a predetermined temperature rise in the atmosphere surrounding the extinguisher to apply a substantial pressure on the contents of the container.

Still another object of this invention is to provide a fire extinguisher of the above type having a nozzle for discharging the fluid from the container into the atmosphere in the form of a fine spray. As a result, a fog is created in the atmosphere and any fire in the range of the extinguisher is smothered for lack of oxygen.

A further object of this invention is to provide a fusing ring constructed and arranged to respond quickly to abnormal elevations in temperature in the atmosphere ambient to the fire extinguisher to release gas under sufficient pressure in the container to force the contents of the container through the nozzle into the atmosphere.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a side elevational view of a fire extinguisher constructed in accordance with this invention;

Figure 2 is a cross sectional view through a part of the fire extinguisher shown in Figure 1;

Figure 3 is a fragmentary sectional view also showing a part of the fire extinguisher illustrated in Figure 1;

Figures 4, 5, 6 and 7 are respectively cross sectional views taken on the lines 4-4, 5-5, 6-6 and 7-7 of Figure 3; and

Figure 8 is a detailed sectional view taken on the line 8-8 of Figure 5.

The fire extinguisher selected for the purpose of illustrating the present invention is adapted to be suspended from the ceiling of a room or other enclosure and is automatically operated in response to a rise in temperature above a predetermined value to discharge the contents of the fire

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extinguisher into the room or enclosure in the form of a fine spray. The arrangement is such as to produce a fog in the room or enclosure and thereby smother the fire due to a lack of oxygen in the atmosphere.

The fire extinguisher comprises a container 10 and a discharge nozzle 11. The container is in the form of an elongated tube sealed at opposite ends and adapted to contain a liquid having fire extinguishing characteristics such, for example, as carbon tetrachloride. The tube has an opening 12 intermediate the ends and a fitting 13 in the form of a casing or forging is brazed or otherwise secured to the tube in registration with the opening 12. The fitting 13 is formed with an annular flange 14 internally threaded at the outer end for threadably receiving the nozzle 11 about to be described and having laterally inwardly extending projections 15 adjacent the opening 12 in the tube. A pair of tubular guides 16 welded or otherwise secured together in juxtaposition project into the tube through the opening 12 and the outer ends of the guides are located between the projections 15. The outer ends of the guides 25 are fixed to the projections 15 by lugs 17 extending laterally outwardly from diametrically opposite sides of the tubes and removably clamped to the projections 15 by screws 18. The inner ends of the tubular guides are closed by walls 19 and suitable slots 20 are formed in the side walls of the guides adjacent the end walls 19. The end wall 19 of each tubular guide 16 is formed with a centrally arranged threaded bore for threadably receiving a plug 21 having a punch 22 extending toward the open end of the guide and terminating in an enlarged piercing head 23.

Supported for sliding movement in each guide 16 is a cartridge 24 preferably formed of a relatively soft metal and filled with a fluid under pressure such, for example, as carbon dioxide. The inner ends of the cartridges are normally supported in spaced relation to the piercing punches 22 by relatively weak springs 25, respectively surrounding the pins 22 with the inner ends abutting the plugs 21 and with the outer ends engaging the inner ends of the cartridges 24.

The nozzle 11 comprises a cap 26 threadably engageable with the annular flange 14 on the fitting 13 and having a central opening 27 registering with an outwardly extending tubular extension 28 of the cap. The extension 28 has a reduced portion 29 at the outer end thereof and is formed with a reduced tubular guide 30 intermediate the ends. The guide 30 is concentrically arranged with respect to the extension

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and the outer end of the guide is integrally connected to the extension at the inner side of the reduced portion 29 by an annular partition 31 having orifices 32 therethrough.

A plunger 33 is slidably supported in the guide 30 and is formed with a head 34 at the inner end positioned in the annular flange 14 adjacent the outer ends of the cartridges 24. The plunger 33 projects outwardly beyond the outer end of the reduced portion 29 and a spray head 35 is slidably supported on the outer end of the plunger. The spray head has a sleeve portion 36 slidably mounted on the plunger in concentric relation to the reduced portion 29 and is formed with a frustro-conical surface 37 beyond the outer end of the reduced portion 29. The inside diameter of the reduced portion 29 is somewhat greater than the outside diameter of the sleeve portion 36 on the spray head and cooperates with the sleeve portion to form an annular passage 38 therebetween. The spray head 35 is removably held in assembled relation with the plunger 33 by a nut 39 threaded on the extreme outer end of the plunger 33.

The plunger 33 is normally in its outermost position shown in Figure 3 of the drawings wherein the head 34 engages the inner surface of the cap 26. A sealing gasket 40 is seated on the inner surface of the cap 26 around the opening for abutting engagement with the head 34 on the plunger to seal the ports 32 from the container and thereby prevent leakage of the contents of the container. The gasket is formed of a material resistant to the particular fire extinguishing liquid employed and in cases where carbon tetrachloride is used, satisfactory results may be obtained by forming the gasket 40 from a plastic or rubber composition.

The plunger 33 is normally urged to its innermost position shown in Figure 2 of the drawings by a coil spring 41 surrounding the plunger with the inner end abutting the head 34 and with the outer end abutting the annular wall 31. The spring is held under compression or, in other words, the plunger 33 is held in its outermost position shown in Figure 3 of the drawings by a fusing element 42 comprising a ring 43 formed of two or more segments 44, yieldably urged apart by a spring 45 and normally held together by a band 46' encircling the peripheral portions of the segments. The outer end portions of the segments 44 engage the frustro-conical surface 37 on the spray head 35 and the inner ends of the segments abut the outer end of an adjustable nut 46 having a left-hand threaded engagement with the sleeve portion 28 on the cap 26. The nut 46 is adjustably positioned on the sleeve portion 28 to locate the plunger 33 through the fusing element 42 and spray head 35 in the position shown in Figure 3 of the drawings, wherein the head 34 is firmly engaged with the gasket 40 against the action of the coil spring 41.

The band 46' is formed of a material having high thermal conducting characteristics, such for example, as copper, and also comprises a plurality of segments 47. The segments 47 are arranged in overlapping relation and are secured together by a material characterized in that it fuses at relatively low temperatures. One end of each segment 47 terminates in an outwardly extending fin 48 in the manner clearly shown in Figure 7 of the drawings. The fins 48 render the fusing element highly sensitive to the temperature of the atmosphere in the range of the fire extinguisher and are largely responsible for the quick

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acting feature of the extinguisher. Another feature of the construction which contributes to the fast action of the extinguisher is the means provided for thermally insulating the band 46' from the metal parts of the extinguisher. This is accomplished herein by forming the sections 44 of the ring 43 from a heat insulating material such as fiber, plastic or other materials having characteristics similar to fiber. Thus the metal parts of the extinguisher are prevented from having a cooling or chilling effect on the band 46', and the temperature of the latter depends solely on the temperature of the surrounding atmosphere. In actual tests the segments 47 of the band 46' separated within three to seven seconds after the temperature of the atmosphere reached the fusing temperature of the material employed to secure the band segments together.

When the several parts of the fire extinguisher are in the relative positions thereof shown in Figure 3 of the drawings, the spring 41 is held under compression by the fusing element 42 and the relatively weak springs 25 act on the inner ends of the cartridges 24 to position the latter in their respective guides 16 with the outer ends abutting the head 34 on the inner end of the plunger 33. Assuming now that the temperature of the ambient atmosphere exceeds the fusing temperature of the metal previously described as securing the segments 47 of the band 46' together, one or more of the segments 47 are disconnected from the band. As a result, the spring 45 separates the segments 44 of the ring 43 and displaces the latter from its position between the spray head 35 and the adjusting nut 46. This releases the spring 41 and permits the latter to move the plunger 33 inwardly at a rapid rate. Inasmuch as the outer ends of the cartridges 24 abut the head 34 on the plunger, it follows that the cartridges are moved inwardly in their respective guides by the plunger 33.

As the cartridges are forced inwardly by the spring 41, the inner ends are punctured by the punches 22 and gas under pressure is discharged into the container 10 through the openings 23 in the tubular guides 16. As pressure builds up in the container 10, the fire extinguishing fluid is discharged through outlet ports 50 formed in the projections 15 and enters the tubular portion 28 of the cap 26. From the tubular portion 28, the fire extinguishing fluid under pressure flows through the ports 32 into the annular passage 38 and is discharged from the annular passage against the frustro-conical surface 37 on the spray head 35. As a result, the fire extinguishing liquid is discharged in the form of a spray and produces fog in the atmosphere. This fog displaces the oxygen and smothers any fire that may be present.

The fire extinguisher may be reconditioned subsequent to operation thereof by merely replacing the punctured cartridges 24 and installing a new fusing element 42. Of course, an additional supply of fire extinguishing liquid is inserted into the container 10 through the opening 12 before the nozzle assembly is again assembled with the container. Thus, it will be noted that the fire extinguisher not only operates to rapidly discharge the contents of the container 10 into the atmosphere when the temperature of the atmosphere exceeds a predetermined value, but in addition, may be readily reconditioned subsequent to operation thereof.

What I claim as my invention is:

1. A discharge nozzle assembly for fire extin-

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guishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a segmental ring positioned between said part and member, and a band surrounding the segments of the ring for holding the segments in assembled relationship, said band being formed of a plurality of sections held together by a fusible material.

2. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a ring composed of disconnected segments and positioned between said part and member in concentric relation to the latter, a band surrounding the ring segments for holding the latter in assembled relationship and composed of sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere, and spring means for displacing the ring segments in response to separation of the band sections.

3. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a ring composed of disconnected segments of heat insulating material positioned between said part and member in concentric relation to the latter, a band of heat conducting material surrounding the ring segments for holding the latter in assembled relationship and composed of a plurality of arcuate sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere.

4. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a ring composed of disconnected segments of heat insulating material positioned between said part and member in concentric relation to the latter, a band of heat conducting material surrounding the ring segments for holding the latter in assembled relationship and composed of a plurality of arcuate sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere, and a spring held under compression within the ring and acting on the segments tending to force the latter outwardly against the band.

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5. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a ring composed of disconnected segments and positioned between said part and member in concentric relation to the latter, a band surrounding the ring segments for holding the latter in assembled relationship and composed of sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere, and heat conducting fins extending outwardly from the band.

6. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, means for holding the member in a position wherein said portion engages the seat including a ring composed of disconnected segments of heat insulating material positioned between said part and member in concentric relation to the latter, a band of heat conducting material surrounding the ring segments for holding the latter in assembled relationship and composed of a plurality of arcuate sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere, fins of heat conducting material extending outwardly from the band sections into the atmosphere, and means for displacing the ring segments outwardly in response to separation of the band sections.

7. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, a second part threaded on the first part in concentric relation to the member, a third part movable with the member toward the second part upon movement of the member by the spring and having a portion cooperating with the second part to form an annular discharge orifice, means for holding the member in a position wherein the portion aforesaid thereof is in engagement with the valve seat including a ring composed of disconnected segments and positioned between the second and third parts in concentric relation to said member, and means for holding the segments in assembled relationship including a band surrounding the ring segments and composed of sections attached together by a fusible material.

8. A discharge nozzle assembly for fire extinguishers, comprising a part having a fluid passage and having a seat surrounding the passage, a member slidable relative to said part and having a portion engageable with the seat, spring means acting on the member normally urging the latter in a direction to disengage said portion from the seat, a second part threaded on the first part in concentric relation to the member, a third part movable with the member to-

ward the second part upon movement of the member by the spring and having a portion cooperating with the second part to form an annular discharge orifice, means for holding the member in a position wherein the portion aforesaid thereof is in engagement with the valve seat including a ring composed of disconnected segments and positioned between the second and third parts in concentric relation to said member, a band surrounding the ring segments for holding the latter in assembled relationship and composed of separable sections held together by a material adapted to fuse in response to a predetermined temperature rise of the surrounding atmosphere, and spring means for displacing the ring segments in response to separation of the band sections.

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