

No. 617,365.

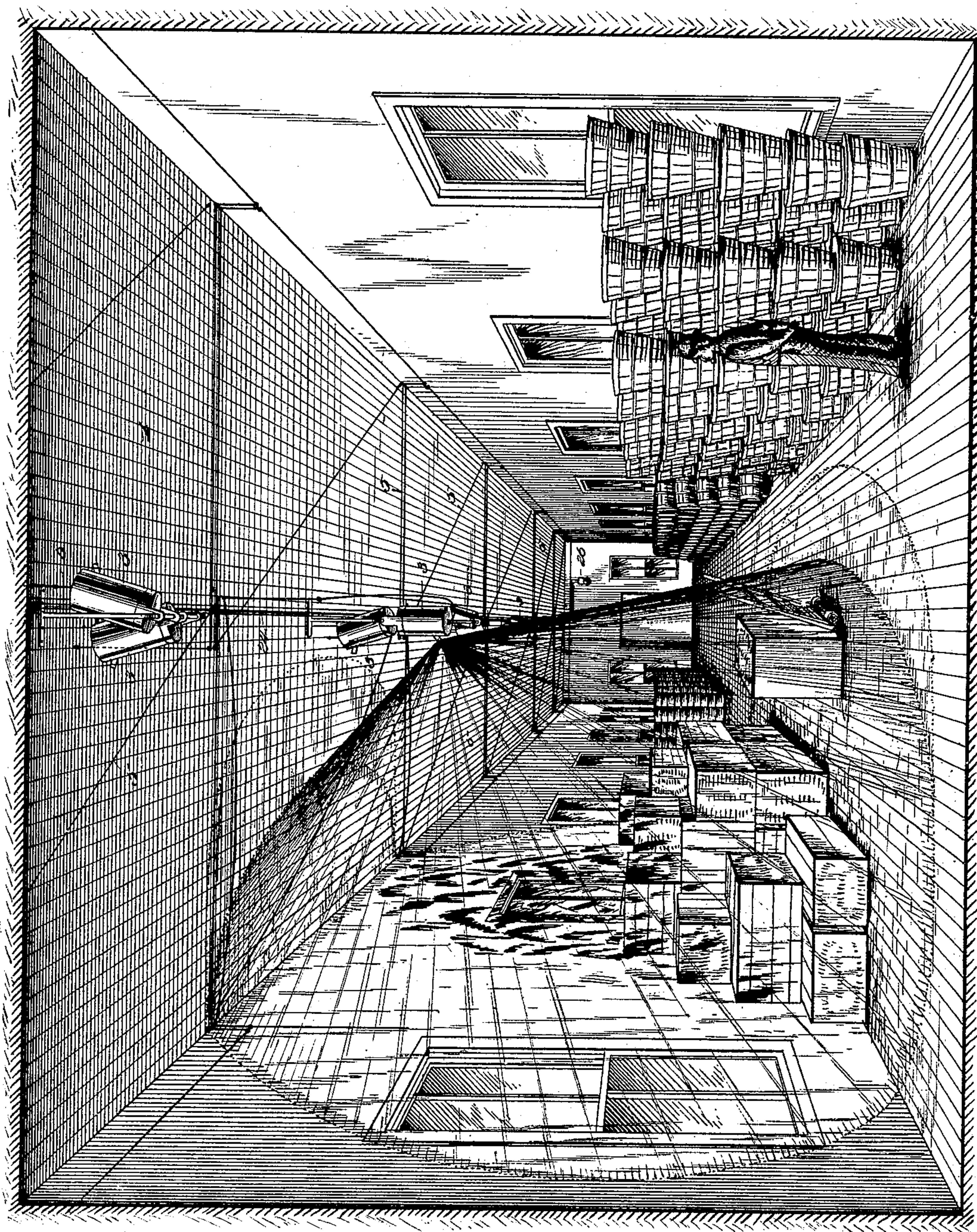
Patented Jan. 10, 1899.

C. G. SMITH.  
AUTOMATIC FIRE EXTINGUISHER SYSTEM.

(Application filed May 31, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

*W. J. Doyle*

*H. J. Pemberton*

*right.*

By *his* Attorneys,

*Charles A. Smith*

Inventor.

*C. A. Snow & Co.*



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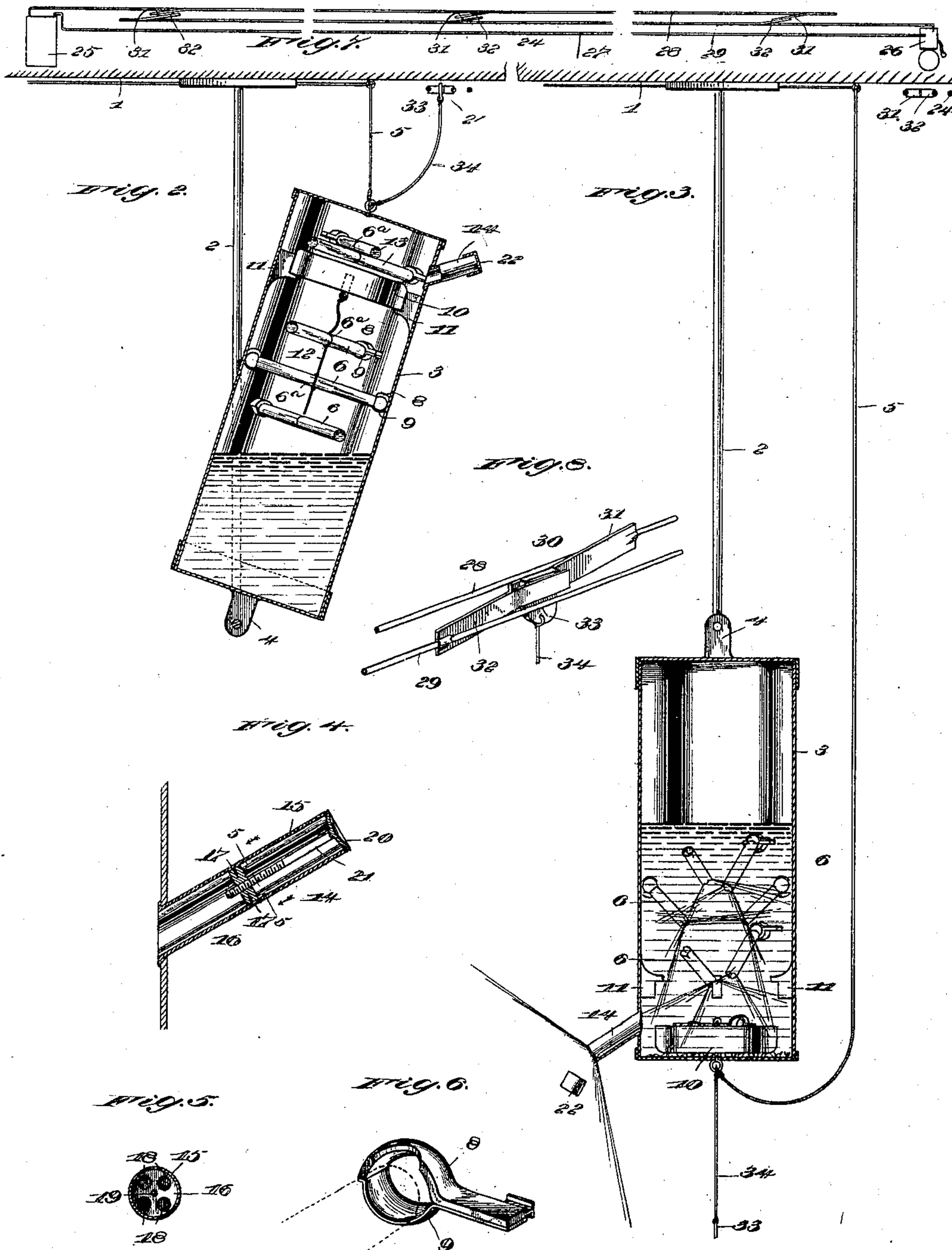
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*Charles G. Smith,*

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# UNITED STATES PATENT OFFICE.

CHARLES G. SMITH, OF DETROIT, MICHIGAN.

## AUTOMATIC FIRE-EXTINGUISHER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 617,365, dated January 10, 1899.

Application filed May 31, 1898. Serial No. 682,184. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES G. SMITH, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Automatic Fire-Extinguisher System, of which the following is a specification.

My invention relates to automatic fire-extinguishers of that class wherein a chemical is contained within a tiltable tank adapted to be brought into service by the burning of a detaining-cord or its equivalent, and to empty the chemical upon a fire in a room or apartment; and the primary object that I have in view is to provide an improved construction of extinguisher-tank in which one of the chemicals is contained, preferably, within a series of closed tubes or vials which are adapted to be fractured by positively-acting devices on inversion of the tank, whereby the liquid contents of the tubes are caused to thoroughly commingle with a solution in the tank and whereby the sealed tubes are broken, so as to avoid the danger of the cork remaining embedded in the bottle to interfere with or delay the action of the extinguisher, as in prior devices.

A further object of the invention is to provide an improved distributing-sprayer, which may be adjusted to regulate the quantity of liquid ejected from the tank when the latter is inverted, and to spread the liquid in the form of a sheet or spray over a large area of the room; and said nozzle or sprayer is also adapted to serve as a means for conveniently introducing the liquid into the tank after the system shall have been installed, or for renewing the liquid from time to time so as to compensate for the slight loss that may be occasioned by evaporation.

With these ends in view the invention consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional perspective view of a room or apartment with a series of my ex-

tinguishers applied thereto, all but one of the extinguishers being shown in their normal positions and the other extinguisher-tank represented as inverted to its active position. Fig. 2 is an enlarged sectional elevation through the tank in its normal position. Fig. 3 is a similar sectional elevation with the tank inverted to illustrate the series of tubes as having discharged their contents into the liquid contained in the tank for the purpose of insuring thorough commingling of the two liquids which are contained respectively in the chamber of the tank and the tubes or vials. Fig. 4 is an enlarged detail sectional elevation through the distributing-sprayer. Fig. 5 is a transverse sectional view through the sprayer, on the plane indicated by the dotted line 5 5 of Fig. 4. Fig. 6 is a detail view of one of the clamps by which one end of the acid-containing tube may be held in place securely within the tiltable tank. Fig. 7 is a diagrammatic view of the electric circuit to more clearly indicate the circuit-closers. Fig. 8 is a detail perspective view of the circuit-closer and the insulating-plug associated therewith.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

In order that others skilled in the art may understand my invention, I have represented the same in operative position on the ceiling of a room or apartment by Fig. 1 of the accompanying drawings. This figure illustrates a number of the extinguisher devices as suspended in different positions from the ceiling and as arranged to direct the fluid contained therein toward the corners and against the walls of the room as well as at points along the length of the room. The extinguishers may be and preferably are grouped or arranged in pairs so as to have each pair discharge the fluid contents thereof in different directions, and in said Fig. 1 a number of the extinguishers, preferably eleven, are shown in their normal inoperative positions, while the final or twelfth extinguisher is inverted and represented in its active position. I would have it understood, however, that I do not confine myself to the employment of any particular number of extinguishers nor to the arrangement thereof on the ceiling, as it is evi-



dent that the number of extinguishers will vary according to the dimensions of the room in which the system is installed, and that the extinguishers will be arranged in a manner  
5 best calculated to afford protection to the walls or contents of the apartment. It is to be understood, therefore, that I reserve the right to use one, two, or more extinguishers; but in passing I desire to remark that it is  
10 preferable to employ a pair of the extinguishers which are to be arranged to act independently of each other and to be controlled by separate cords or fusible-jointed wires, so that one tank will afford protection to one  
15 part of the room by severance of its wire or cords, and the other tank remains inoperative unless the fire spreads to such an extent as to sever the jointed wire or cord to said last-mentioned vessel.

20 I will now proceed to a detailed description of the preferred construction of one extinguisher, and it will be understood that each extinguisher is constructed according to the following description:

25 Secured rigidly to the ceiling is a frame or yoke 2, which depends a suitable distance below the horizontal plane of the ceiling and furnishes a support for a tiltable tank or vessel 3, which is arranged to lie compactly within the limits of the yoke. Normally this  
30 tank or vessel occupies an inverted position within the yoke, and in the following description it will be understood that the tank is described in its normal position, except wherein  
35 occasion is taken to refer to the tank as being "inverted." This tank is pivotally connected at or near its lower end to the frame or yoke, and such pivotal connections are indicated  
40 by the numeral 4 as being in the form of pins or bolts attached to a band or ring which is fixed to the tank, while the pins or bolts are loosely supported in the yoke; but the detailed construction of the pivotal joint is not  
45 essential. The tank is maintained normally in its upright position by means of a detaining-cord 5, which is rigidly attached at one end to the tank at or near its upper end. This cord may be led or carried through suitable  
50 guides, such as screw-eyes or sheaves, which are fastened to the wall of the room along that part thereof which is designed to be protected by the extinguisher, and the other end of said cord 5 is suitably secured in place on the wall or ceiling, so that the tiltable vessel or tank is designed to normally  
55 strain the cord, thus utilizing a part of the vessel's weight to hold the cord in a taut condition. In lieu of the cord shown and just described I may employ the equivalent thereof  
60 in the form of a wire provided at suitable intervals with fusible joints or connections, but as said sectional wire is a well-known feature in the art I have not deemed it necessary to illustrate the same or more particularly describe it.  
65

The tiltable tank or vessel is adapted to contain one of the chemicals which when mixed

with another chemical constitutes the extinguishing compound. The tank may contain a solution of carbonate of soda, while the  
70 other chemical may be in the form of sulfuric acid which is contained within a series or plurality of hermetically-closed tubes or vials 6, whereby loss of the acid by evaporation is  
75 wholly obviated. Each acid-carrying tube is blown of glass to provide an integral head at one end and is left open at its other end for the introduction of the sulfuric acid into the  
80 tube, after which said open end of the tube may be sealed in a hermetic manner to overcome evaporation and waste of the acid. I employ a series of these sealed acid-carrying  
85 tubes, and arrange them transversely within the tank or vessel 3, one below the other, and said tubes are attached to the tank or vessel to remain fixed therein when fractured or  
90 broken. This breakage of the series of tubes 6 is effected simultaneously with the tilting of the vessel or tank on its pivotal connection with the yoke through the medium of a drop-weight which is operatively connected with  
95 each tube of the series, so that on the tilting of the vessel from its normal position the drop-weight is displaced in the vessel or tank and operates to fracture the tubes as it travels through said vessel, thereby releasing the  
100 acid contained within the tubes and causing it to commingle with the solution contained within the tank to effect the admixture and chemical union of the two elements constituting the extinguishing compound during  
105 the period required for the tilting of the vessel from its inoperative normal position to its inverted active position.

The acid-containing tubes may be supported within the tank by suitable devices; but I prefer to employ a pair of clamps for each  
110 tube in order to attach the respective ends thereof to the vessel. In Fig. 6 of the drawings I have shown in detail one of the tube-clamps, and it consists of a substantially rigid member 8, which is solidly fastened to the tank,  
115 and a yieldable or spring member 9, also fastened to the tank and adapted to be deflected or depressed by hand away from the rigid member 8 for the purpose of readily introducing the end of the acid-tube between said  
120 member of the clamp. The two members of the clamp are preferably bent or curved in reverse directions to each other in order to form a seat for the reception of the closed end of the acid-tube. With the tank in its  
125 normal position the rigid clamp member 8 lies above the tube, while the yieldable and lighter clamp member 9 lies below the tube. This arrangement is adopted in order that the strong rigid member 8 may resist the  
130 shock or strain exerted on the tube by the action of the drop-weight when it is displaced from its seat on inversion of the vessel; but the yieldable member 9 of the clamp is of sufficient strength to sustain the weight of the light acid-tube and its contents. As shown by Fig. 6, the rigid stationary member 8 of



the clamp is provided with a slot or recess which permits the fractured portion of the acid-tube to turn when the extinguisher is in operation.

5 The drop-weight is indicated at 10, and it is of a diameter to move freely through the tank in the direction of the length thereof. This weight is normally sustained in an elevated position above the series of tubes 6 by  
10 the seats or flanges 11, which are provided within the vessel or tank on a horizontal plane above the series of tubes, and this drop-weight rests loosely on its seats, so that it may readily be displaced therefrom when the tiltable  
15 tank begins to turn on its pivotal connections to the inverted position shown by Fig. 3. The drop-weight is operatively connected with the series of acid-tubes by a wire, cord, or other equivalent device 12, one end of  
20 which is attached to the drop-weight. To insure quick fracture of the glass acid-tubes, I preferably, but not essentially, make each tube with a line of weakness, (indicated by the numeral 6<sup>a</sup>,) around which is looped or other-  
25 wise fitted the wire or cord 12. The connection between the wire or cord and the friable tubes is effected at points intermediate of the length of said tubes, and as the opposite ends of the tubes are attached to the tank or  
30 vessel by the clamps the tubes, when the drop-weight descends, are adapted to be broken at or near the middle thereof. The ends of the tubes remain attached to the tank while it is being inverted, and the acid is thus distrib-  
35 uted at different points, so as to commingle thoroughly with the solution contained in the tank, thus contributing to the efficiency of the structure and insuring rapidity in the chemical union of the ingredients forming  
40 the extinguishing liquid.

If preferred, the series of acid-tubes may be arranged within the tank in the same vertical plane; but, as shown by the drawings, I prefer to place the tubes crosswise to each  
45 other, thus insuring intersection of the tubes and a more uniform distribution of the liquid contents thereof into the solution contained within the tank.

To place the chemical in condition for im-  
50 mediate service on inversion of the tank, I employ one or more acid tubes or vials 13, which are arranged on the opposite side of the weight 10 from the series of tubes 6. In the drawings, two of these upper tubes 13 are  
55 shown as crossing one another above the horizontal position occupied by the drop-weight, and said tubes 13 lie quite close to the drop-weight and are supported in the tank or vessel by clamps similar to the one shown by  
60 Fig. 6, or by other suitable means. The upper tubes 13, which lie closely to the drop-weight, are designed to be crushed or broken at the initial movement of the tank during its inversion and before the acid from the  
65 tubes 6 shall have an opportunity to commingle with the solution which first falls to the bottom of the tank, and by emptying the

contents of the tubes 13 into the solution of the tank the extinguishing fluid is in a condition for service immediately the tank assumes  
70 a position where the distributing-sprayer permits the outflow of the fluid.

By the employment of the tubes 13 I am able to utilize all of the solution in the tank, because the elements of the extinguishing  
75 compound are united chemically before the first quantity of the solution having passed the tubes 6 shall have an opportunity to escape from the tank prior to commingling of the acid therewith, which is an objectionable  
80 feature in other devices.

The distributing-sprayer is indicated in its entirety by the numeral 14, and it is attached to the tank at or near the upper end thereof, assuming the tank to be in its vertical posi-  
85 tion. The sprayer consists of a tube 15, a plug 16, fastened within the tube by the screws 17, and a rose or deflector 20. The plug 16 is fitted in the tube at a point intermediate of its length, and it is secured firmly  
90 but detachably therein by the transverse screw 17. The plug is provided with a series of liquid-ports 18, and with a central female threaded socket 19, which is arranged within the liquid-ports 18. The rose or deflector 20  
95 is of concavo-convex form to present its convex working face to the liquid as it passes through the tube 15, and this rose or deflector is arranged at the open mouth of the tube so as to leave a narrow passage or channel be-  
100 tween the edge of the tube and the face of the deflector, through which channel the liquid is free to pass. The deflector is provided with a central threaded stem 21, which is screwed into the socket 19 of the plug 16, and this de-  
105 flector may be adjusted in relation to the mouth of the tube by screwing the stem into or out of the socket in the plug, thus making provision for variation in the area of the chan-  
110 nel through which the liquid may escape. The form of the rose or spreader makes it well adapted to distribute the liquid in the form of a sheet-like spray, and as the deflec-  
115 tor is adjustable the quantity of liquid which escapes from the distributor may be easily controlled or regulated. The open mouth of the tube 15, which is partially closed by the rose or distributor, is designed to be closed by an imperforate metallic cap 22, which is  
120 loosely fitted to said end of the tube to inclose the distributor within itself; but this cap 22 may be easily and quickly displaced on inversion of the tank by the gas which is produced in the tank by the chemical union of the ingredients forming the extinguishing  
125 compound.

In connection with my automatic extinguisher I employ an electrical alarm mechanism which is especially serviceable in con-  
130 nection with a series of the extinguisher devices, because the alarm mechanism is common to all of the extinguisher devices. The circuit of the electrical alarm is indicated generally by the numeral 24 in Fig. 1 of the



drawings, and this circuit includes a battery 25 or other suitable source of electric energy and an audible-alarm device 26, herein shown as embodied in an ordinary electric bell.

5 The circuit which I prefer to employ consists of a conductor 27, which is attached to one pole of the battery and the bell-magnet. A two-part return-conductor 28 and 29 is employed between the other pole of the battery  
10 and the bell-magnet, and the sections or wires 28 29 of this return-conductor are arranged in close parallel relation to each other to enable a series of circuit-closers 30 to be operatively combined therewith. Each circuit-closer consists of two members 31 and 32, connected, respectively, to the conductors 28 and 29, and between said circuit-closer members is interposed an insulating-plug 33, which serves normally to separate the members 31  
20 and 32, thus maintaining an open electric circuit. The insulating-plug 33 is preferably embodied in the form of an abrasive substance—as, for instance, emery—and this insulating-plug is operatively connected by a  
25 cord or wire 34 to one of the tiltable tanks. It will be understood that a circuit-closer and a connection are provided between each tank and the electric circuit. The severance of the detaining-cord 5 or the fusibly-jointed  
30 wire connected with one tank permits the latter to assume its inverted position, and the strain or pull exerted by the tank on the cord 34 withdraws the insulating-plug from engagement with the circuit-closer members 31  
35 32. As the plug is withdrawn it abrades the surfaces of the members 31 32, so as to remove any sediment or corrosion on the faces of said members, and the members are thus adapted to close together, so as to complete  
40 the electric circuit and permit the battery to energize the circuit and bell-magnet, thus automatically sounding the alarm.

It is proper to remark that the rose may be perforated with a series of transverse ports  
45 which permit the passage of liquid through the rose at points within the edge thereof, or the deflector may be imperforate and arranged to direct the liquid in a sheet-like spray from the narrow passage between the end of the  
50 tube 15 and the edge of the deflector.

Each acid-containing tube is or may be provided with enlargements at the ends thereof, and said enlargements are designed to be engaged by the clamps. This construction and  
55 arrangement insures retention of the tubes on the tank or vessel when the tube is broken. In lieu of the series of tubes I may employ a single tube to be broken by the weight; but it is desirable to use the tubes in series, because the acid is mixed thoroughly with the  
60 solution when the tubes are broken and the tank inverted.

Slight changes may be made in the form of some of the parts, while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be  
65 limited to the precise form of all the parts as

shown, as I reserve the right to vary therefrom.

Having thus described the invention, what I claim is—

1. In a fire-extinguisher, the combination with a tiltable vessel, and means for normally holding the same in an upright position, of a drop-weight confined within said vessel, a series of tubes arranged transversely within the  
75 vessel and fixed to the latter, and a cord connecting the drop-weight with all of the tubes, substantially as described.

2. A fire-extinguisher comprising a tiltable  
80 tank, a frangible tube therein, friction-clamps supported within the vessel and engaging with the ends of said tube to normally hold the latter in a stationary position and to permit the ends of the tube, when fractured, to turn  
85 in said clamps, and a drop-weight arranged to fracture the tube when displaced by inversion of the vessel or tank, substantially as described.

3. An automatic fire-extinguisher comprising a tiltable tank, a series of spaced tubes  
90 each fixed at its ends within the tank, a drop-weight normally seated in the tank above said tubes, and operative connections between the drop-weight and the tubes, whereby displacement of the drop-weight on inversion of the  
95 tank fractures the tubes at points intermediate of their length, substantially as described.

4. An automatic fire-extinguisher comprising a tiltable tank, a drop-weight seated removably therein, a series of tubes secured within the tank on one side of the drop-weight, means for connecting said tubes with the  
100 drop-weight, and another tube or tubes supported within the tank on the opposite side of the drop-weight and adapted to be fractured thereby on inversion of the vessel in advance of the first-named series of tubes, substantially as described.  
105

5. In a fire-extinguisher, the combination with a tiltable tank, and a drop-weight seated removably therein, of a tube held transversely within the tank at one side of said weight and in the path of the latter, another series of  
110 tubes fixed within the tank on the opposite side of the drop-weight, and an operative connection between the last-named series of tubes and said drop-weight, substantially as described.  
115

6. In a fire-extinguisher, the combination with a tiltable vessel and a drop-weight seated therein, of a series of frangible tubes arranged transversely within the tank in staggered relation one to the other and each tube having  
120 enlarged ends, a pair of clamps connected individually to the enlarged ends of each tube, and a pull-cord attached to the drop-weight and to the series of friable tubes, substantially as described.  
125

7. In an automatic fire-extinguisher system, the combination with a series of tiltable vessels, of an electric alarm-circuit including a battery, an alarm device, and with certain of  
130



its conductors arranged in close parallel relation to each other, a series of circuit-closers having their members operatively connected with the respective closely-adjacent conductors, and a series of insulated abrasive plugs fitted between the members of the circuit-closers and connected with the tiltable tanks, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES G. SMITH.

Witnesses:

J. M. WALKER,  
B. T. WEBSTER.